



Globalization and Economic Growth: A Case Study in A Few Developing Countries (1981-2022)

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Authors' contributions

This work was carried out in collaboration between all authors. Author Aashna Ased, designed the study and performed the statistical analysis. Authors HJ and PM managed the analysis of the study and wrote the first draft of the manuscript. Author Aastha Sinha managed the literature searches and wrote the protocol. All authors read and approved the final manuscript.

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ABSTRACT

This study makes significant contributions in the following key aspects: First, the study examines the dynamics of herding behavior within the cryptocurrency market, particularly during the Ukraine-Russia conflict and the COVID-19 pandemic. Second, in this article we employ static, and the Generalized Autoregressive Conditional Heteroskedasticity model (GARCH), specifically a GARCH (1,1), for the Temporal Segmentation estimation to uncovers distinct patterns of anti-herding and herding phenomena across specific time periods. Third, methodologically, this study contributes by employing Temporal Segmentation analysis, utilizing CSAD static and CSAD with the GARCH Model. This approach provides a comprehensive understanding of herding behavior in the cryptocurrency market, allowing for a more granular exploration of distinct temporal segments. These findings extend practical implications for portfolio management and risk mitigation, enriching

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the landscape of behavioral finance. The study's revelations also offer valuable guidance for investors and policymakers, shedding light on market behavior during critical geopolitical and global crisis situations. In essence, this research enhances our comprehension of cryptocurrency market dynamics in the face of unique challenges, contributing to the broader understanding of behavioral patterns in the financial realm.

Keywords: Globalization; developing countries; growth; foreign direct investment; gross domestic product; trade openness; economic impact; regression analysis; log-normal model.

1. INTRODUCTION

In today's world of international relations and dynamic economics, Globalization serves as a significant force that surpasses geographical boundaries and reshapes societies across the globe. As our interconnected world continues to progress, the impact of globalization on developing nations becomes an increasingly crucial area of study. This research paper aims to delve into the complexities associated with globalization in order to uncover a potential cause-and-effect relationship [1,2].

Globalization, characterized by the heightened interconnectedness of economies, cultures, and societies, has brought forth unprecedented opportunities and challenges. As these countries grapple with the intricate interplay of economic, social, and political factors, comprehending the consequences of globalization becomes essential for informed policy-making and the formulation of sustainable development strategies [2]. While globalization holds the promise of providing access to new markets, technologies, and ideas, it also introduces complexities that may disproportionately affect developing nations.

Studies have so far analyzed this premise in the European setting as well as in the context of individual countries [3,4]. Therefore, we have taken it upon ourselves to find out whether an approximate relationship can be established between growth and globalization in not just isolated instances, but as a whole for developing countries [5,6].

For this purpose, it is critical to define the metrics we will be using for the research. As such no one metric can completely capture the essence of either growth or globalization, which are colossal concepts emerging from individual human interactions. However, proxies considered the most appropriate have been used in their place.

This paper initially aimed to utilize the method of linear regression to formulate a relationship between metrics like purchasing power parity and the ratio of Foreign Direct Investment (FDI) to Gross Domestic Product (GDP), which serve as proxies for income inequality and globalization respectively. However, an unfortunate limitation that we cannot ignore is that this method automatically assumes a linear model. Therefore, in case the correlation coefficient is very low, the model assumes that there is no reasonable relationship between the two variables, when in practicality, a nonlinear relationship may exist.

Upon further research we came across a more reliable model which, according to Aderemi, Timothy Ayomitunde et al (2020), establishes the relationship between real GDP, trade openness (another proxy for globalization) and FDI as nonlinear. The paper proposed a transformed log-normal linear model that we have attempted to apply in our research, to find out whether the model which applies to European countries can be generalized to developing nations globally. The data collected was given the required treatment to make it suitable for application in the chosen model and regression analysis was conducted.

It is commonly known that globalization can boost a developing country's growth and incur development. This research attempts to unravel the intricate relationship between globalization and developing countries. Analyzing economic growth in form of RGDP and measure of globalization through FDI and Trade Openness, the scope of this investigation extends to a comprehensive examination of the economic impacts that globalization exerts on developing nations as they aim to become more integrated with the global economy.

In the 2nd section, the literature is reviewed in depth, in the 3th section the methodology and data are established and in the 4th section results are inferred. The paper concludes with the 5th section consisting of references.

2. LITERATURE REVIEW

Parisa & Hashem (2014) utilized the Generalized Method of Moments (GMM) technique to examine the relationship between globalization and economic growth within the Organization of Islamic Cooperation (OIC) nations from 1980 to 2016. The authors posited that globalization from an economic perspective impacted the economic growth statistically in the countries under investigation. In an explicit form, economies which have better educated workers and well-developed financial system experienced a substantially positive effect of globalization [7].

The concept of economic complexity has been a topic of discussion in the economic literature for quite some time, although its origins can be traced back to the past decade. Various factors that contribute to economic complexity, such as financial development, populations with high intellectual quotient, Internet usage, taxation, and foreign direct investment, have been thoroughly examined. However, instead of studying the effects of these factors individually, some of them can be categorized under the broader term of "globalization". In their work, Keohane and Nye (2000) defined globalization as a multidimensional concept, encompassing factors like trade liberalization, trade taxes, capital flows, and the financialization process as subfactors of economic globalization. Additionally, Internet usage is considered a subfactor of social globalization.

Theoretically, globalization can impact economic sophistication through various processes. Initially, based on conventional trade theory (Krugman & Obstfeld, 1995; Ricardo, 1817), openness enhances an economy's productive capacity by expanding the market potential for goods that each country excels in producing. Furthermore, trade openness tends to raise national incomes. Increased national income levels may result in higher investments in infrastructure and the accumulation of physical and human capital, ultimately leading to an enhancement in the productive structure of the economy (Pritchett & Summers, 1993). When a country embraces trade and integrates further into the global economy, capital taxes become less progressive as capital can easily move elsewhere, allowing the tax burden to shift towards the less mobile factor of production. This shift can potentially enhance competitiveness (Harberger, 1995; Pierson, 2001).

In order to gain a deeper understanding of the impact of globalization on economic growth, it is important to examine the relationship between globalization and economic sophistication [6]. According to Hausmann et al. (2007), there exists a strong connection between globalization, economic sophistication, and economic growth. Their research indicates that countries that specialize in producing goods similar to those of developed nations tend to experience faster growth compared to those specializing in other types of goods. Conversely, Aluko and Opoku (2022) have discovered that international financial integration, which is a facet of globalization, has significantly contributed to the development of the financial sector in OECD countries. Balcilar et al. (2019) have also concluded that globalization has had a positive impact on financial development in 36 countries during the period of 1996-2016. Furthermore, Asongu and De Moor (2017) and Stulz (2005) have found that a well-developed financial system plays a crucial role in reducing information asymmetry among economic agents, spreading risk, and allocating investments more efficiently.

Yuand Qayyum (2020) investigated the impact of financial integration on economic complexity in 120 countries over the 1996–2016 period. The findings from the generalized method of moments (GMM) suggest that international financial openness increases economic sophistication, and that this result depends on the income groups and industry.

Antonietti and Franco (2021) investigate the effect of inward FDI on the country's economic complexity. Findings from the panel vector autoregressive method show a unilateral effect from inward FDI to economic complexity. However, the positive impact of FDI on economic complexity prevails only in countries well above the average levels of GDP per capita, tertiary education, tertiarization, or financial development.

3. METHODOLOGY

The presented study makes analytical use of secondary data covering the period from 1981 to 2022. FDI inflows data were sourced from UNCTAD investment report of the World Bank. In the same vein, data on other macroeconomic variables such as real GDP and trade openness were extracted from the World Bank Development Indicator. The research has taken

the model based on the work of Parisa & Hashem (2014) [7] that linearizes the relationship between Real GDP and its determinants, namely Trade Openness and Foreign Direct Investment.

3.1 Research Design

While the relationship between Foreign Direct Investment (FDI) and economic growth has been explored by numerous studies, there are few studies where the relationship between the Real GDP and FDI can be found [8]. There are research papers which have successfully proved this relationship in the European continent [3,4] but none of them predominantly focused on the developing countries. The predominant focus of the existing research paper is the impact on the GDP because of the change in FDI in the developing countries that went under globalization in the 1980s. To achieve these different models have been employed: the Linearized model proposed by Parisa & Hashem (2014) [7] as it is and also, we have regressed the data using dummy variables. After analyzing the first model we used a dummy variable for the financial liberalization (after the year, a country underwent liberalization, the dummy variable has been considered to be one and zero otherwise) to improve the model.

3.2 Data Collection

Most of the data for this study is collected from the World Bank's website for various developing countries across different regions of the world. Some other trusted resources such as websites of ILO (International Labor Organization), IMF (International Monetary Fund) have also been used to extract some data. The primary variables of interest include the Real Gross Domestic Product (RGDP), Foreign Direct Investment (FDI), and Trade Openness (TRO). The data spans the period starting from the 1980s when globalization significantly impacted these economies to the recent years.

Real gross domestic product (RGDP) represents the total value of all goods and services produced within a country's borders, adjusted for inflation. Over time, it is an important indicator of the overall health and performance of the economy. The RGDP is often used as a proxy for economic growth because it reflects the expansion or contraction of economic growth, and provides insight into changes in living standards, employment rates, and overall economic well-being. Trade Openness (TRO) is

the degree to which a country engages in international commerce; it is commonly calculated as the ratio of its GDP (gross domestic product) to its total trade (exports plus imports). Higher levels of trade openness signify extended cross-border trade of products, services, capital, and generation, highlighting a country's interconnectedness with the worldwide financial system. FDI refers to the investment by a firm or individual in one country to pursue business interests in another country, usually through the acquisition of property, the establishment of manufacturing facilities, or the participation in joint ventures. It is used as the proxy for globalization as it facilitates cross-border investment, technology transfer, and market integration, embodying the interconnectedness and economic integration characteristic of globalization.

3.3 Model Specification and Statistical Analysis

We are trying to prove that RGDP is the function of TRO and FDI.

Linearizing model brings about model to be stated as follows:

$$\ln(\text{RGDP}) = b_1 + b_2 \cdot \ln(\text{FDI}) + b_3 \cdot \text{TRO} + U \quad (1)$$

$$\text{RGDP} = f(\text{TRO}, \text{FDI})$$

This model is based on the work of Parisa & Hashem [7] and linearizes the relationship between Real GDP and its determinants, namely Trade Openness and Foreign Direct Investment. We even added an intercept dummy variable D to the same model which has been valued 1 for years after liberalization and 0 otherwise:

$$\ln(\text{RGDP}) = b_1 + b_2 \cdot \ln(\text{FDI}) + b_3 \cdot \text{TRO} + b_4 \cdot D + U \quad (2)$$

RGDP data is with reference to the values in USD in the year 2015. FDI is Foreign Direct Investment net inflows on an annual basis which is measured in millions of dollars and TRO is trade openness which is the addition of imports and exports as a percentage of GDP on an annual basis. It is measured in percentage. The variable U represents other variables which were excluded from the model but nevertheless affect economic growth. It is assumed to be serially uncorrelated. Ln represents a natural logarithm.

We then converted the values of RGDP and FDI in the log form because nonsense regression is

with a unit root problem. Whereas, trade openness data was stationary at level, implying that the data is free from a unit root problem. always an aftermath effect of time series data Then we ran the data through simple regression in the form of the given equation.

Regression analysis is employed to estimate the coefficients of the specified models. The assumption of normal distribution of the data series is maintained throughout the analysis. simple multiple regression is a statistical technique that examines the relationship between variables by fitting a direct line on data points. It helps to quantify the degree to which changes in one variable are correlated with changes in another, providing insight into their linear dependence and predictive ability.

3.4 Interpretation of Results

The estimated coefficients from the regression analysis will be interpreted to understand the impact of globalization indicators on economic growth in the selected developing countries during the 1980s.

This methodology section outlines the research design, data collection process, model specifications, statistical analysis techniques, and the intended interpretation of results for your study on the impact of globalization on economic growth in developing countries during the 1980s.

4. RESULTS AND DISCUSSION

$$\text{(Model: } \ln(\text{RGDP}) = b_1 + b_2 \cdot \ln(\text{FDI}) + b_3 \cdot \text{TRO} + U)$$

The F values obtained for all countries is less than 0.05, hence at least one of the coefficients is significantly different from zero and we can go ahead with the individual tests of the coefficients.

All the countries that we have analyzed have a P-value of less than 0.05 for b_2 , suggesting that FDI has a significant effect on GDP. Also, for all countries the value of b_2 is positive, this implies that FDI has a positive impact on GDP.

For India [9], Chile [10,11] and the Philippines, the P-value of TRO is greater than 0.05 which implies that trade openness doesn't have a

statistically significant effect on Real GDP in these countries. (Coefficient is not significantly different from zero). In Turkey [12], Trade Openness has a statistically significant positive effect on Real GDP. However, for China [13], Mexico [14] and Kenya [15] Trade Openness has a statistically significant negative effect on Real GDP. Average value of exports - imports for Kenya is -5.24 and for Mexico is -0.787. This could be a reason for this peculiarity in the two countries as they rely heavily on imported goods for their industries or consumption, an increase in trade openness could lead to higher import levels, which might outweigh the benefits of increased exports, leading to a negative effect on GDP [4,6]. However, China has a positive average export - imports value (1.528). This means there could be other reasons for this relationship too [13].

This seems to show that there is a complex interplay between trade openness and economic growth, indicating that the impact of trade policies on GDP can vary depending on a country's specific circumstances and policy choices.

Relatively high R squared values can be observed for India, China, Mexico, Chile, Kenya and Turkey which indicates that the model explains a large portion of the variation in real GDP. Philippines has a moderate R squared value.

The above data shows how FDI and TRO impacts GDP, i.e. how globalization has impacted the economic growth of developing countries.

Analyzing the second model; by adding a dummy variable:

$$\text{(Model: } \ln(\text{RGDP}) = b_1 + b_2 \cdot \ln(\text{FDI}) + b_3 \cdot \text{TRO} + b_4 \cdot D + U)$$

This model did not estimate data for China and Chile as their liberalization took place before the year 1981 [10,13].

A significant improvement can be seen in the R-squared value of Kenya and Philippines and an overall improvement for all countries. This seems to suggest that this model is a better fit to analyze the impact of globalization on economic growth.

Table 1. Model statistics

Country	R Square	Significance F	b2	P-value(b2)	b3	P-value(b3)
India	0.837	4.296×10^{-16}	1.8315	0.0013185	-0.0184	0.323
China	0.907	7.206×10^{-21}	0.587	4.615×10^{-16}	-0.0139	0.0399
Mexico	0.9644	5.647×10^{-29}	0.1524	1.214×10^{-12}	-0.000605	3.444×10^{-8}
Chile	0.8750	2.443×10^{-18}	0.3425	1.756×10^{-14}	-0.00197	0.6964
Kenya	0.7512	1.656×10^{-12}	0.1337	6.4602×10^{-7}	-0.01804	2.754×10^{-5}
Turkey	0.9327	1.4016×10^{-23}	0.1587	2.9402×10^{-10}	0.02067	1.637×10^{-8}
Philippines	0.66629	5.0756×10^{-10}	0.2295	2.0576×10^{-8}	0.00061	0.85357

Table 2. Data interpretation

Country	R Square	Significance F	b2	P-value(b2)	b3	P-value(b3)	b4	P-value(b4)
India	0.848	1.3×10^{-15}	3.181	0.0019	-0.0552	0.059	-0.463	0.102
Mexico	0.964	1.4×10^{-27}	7.8×10^{-13}	0.678	0.145	1.07×10^{-7}	0.0059	4.67×10^{-7}
Kenya	0.890	2.7×10^{-18}	0.064	0.0010	-0.019	2.3×10^{-9}	0.4422	2.9×10^{-8}
Turkey	0.934	1.66×10^{-22}	0.172	9.49×10^{-9}	0.020	2.08×10^{-8}	-0.083	0.34
Philippines	0.745	2.27×10^{-11}	0.311	4.69×10^{-11}	0.0029	0.3372	-0.673	0.0014

In Mexico, Kenya and Philippines, Liberalization has had a statistically significant impact on the RGDP. While this impact is positive for Mexico and Kenya, it is negative for the Philippines which implies that there may be factors associated with financial liberalization that are negatively impacting economic growth in the Philippines.

In India and Turkey, since the P-value of the dummy variable is more than 0.05, Liberalization did not have a statistically significant impact on the RGDP [9,16,12].

However, further analysis and consideration of other factors are needed for a comprehensive understanding of the relationships between these variables.

5. CONCLUSION

The paper analyzed the impact of globalization on the economic growth of developing countries, using real GDP (RGDP) as a proxy for economic growth, and foreign direct investment (FDI) and trade openness (TRO) as proxies for globalization. The results indicate that an increase in foreign direct investment (FDI) leads to an increase in RGDP, suggesting that internal resources alone are insufficient for significant development; additional resources, like FDI, are necessary [8].

It also tries to analyze the impact of liberalization on the RGDP by adding an extra variable to the original model [15].

However, the study did not generalize the relationship between TRO and RGDP. It found a peculiar result that for many countries, an increase in TRO led to a decrease in RGDP. Possible reasons for this include heavy reliance on imported products, exchange rate volatility, or increased income inequality. Further research is needed to explore these findings.

Additionally, the study did not consider the impact of other variables that could affect economic growth. This suggests that there may be other factors at play that could influence the relationship between globalization and economic growth in developing countries.

This study can also incorporate VAR test and ARDL test to see whether these are short term or long-term effects [7]. Study can also be done with the employment data, as that is also a proxy for economic growth in a country.

We can conclude that policymakers should create an environment that attracts FDI, as it can significantly contribute to economic growth. This may include offering incentives to foreign investors, streamlining investment procedures, and ensuring political stability. FDIs are attracted by Ease of doing business which could be a main focus of the developing countries [8,17]. Also, Countries heavily reliant on a few export markets should diversify their export destinations. This can help mitigate the negative impact of trade openness on GDP.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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