

Article

The Economies' Ability to Produce Diversified and Complex Goods to Meet the Global Competition: Role of Gross Value Chain, Institutional Quality, and Human Capital

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Abstract: The theory of capabilities describes the need for a country to adopt different capabilities to enhance its productivity through the production of diversified and complex goods. These capabilities are not independent of the human, physical, institutional, legal systems, and gross value chain (GVC) of a country. Therefore, the current study analyzed the relationship between GVC, institutional quality, human capital development, and the economic fitness of different countries. This study used panel data from 131 countries for the period of 2007–2019. The generalized method of moments (GMM), fully modified ordinary least square (FMOLS), and quantile regression showed that GVC, institutional quality, and human capital development have a big positive effect on a country's economic health. The quantile regression results also showed that GVC, institutional quality, and skilled human capital have a positive and significant effect on the economic fitness of all three quantiles (25th, 50th, and 75th). Overall, the study concludes that greater GVC participation, political stability, effective government, good rules of law, high regulatory quality, and good human capital all enhance the country's capabilities to produce diversified and complex goods that increase its market share in the global competitive market. Thus, the government should formulate policies in such a way that they promote participation in GVC to overcome the limitations of resource availability and poor technology. In addition, it should be ensured that effective policy implementation is in place to facilitate business without unjust means, violence, etc.

Keywords: economic fitness; gross value chain; political stability; regulatory quality; effective governance; economic development



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1. Introduction

The division of labor and product specialization is a widely accepted idea in economic theory that leads to increased economic welfare and efficiency. This traditional concept in international trade exaggerates the benefits associated with specialization and trade at the country level. Moreover, it predicts a high rate of economic growth and shows a high level of development. However, some theoretical arguments challenge this concept [1,2]. Particularly, Hidalgo and Hausman [2] explained clearly that the specialization and division of labor at the individual level do not entail product specialization at the country level. Therefore, the concepts of product and economic complexity and the more recent concept of “economic fitness” have emerged [3].

“Economic fitness” is the ability of an economy to make a wide range of complex goods. This is a big part of economic growth [4] and macroeconomic competition. So,

Felipe et al. [5] stated that exporting a wide range of complex goods is a significant part of a country's economic growth and development. They talked about the country's long-term growth and development as a process of structural change and production. It means that countries must shift from low-productivity activities to higher-productivity ones. In the medium- to long-term, organizations' productivity growth is likely to slow down if they can't adapt to changes in customer demand or protect themselves from the inevitable obsolescence of their employees' skills. The average aggregate productivity of all organizations will go down if their resources are not given to the ones that have the most potential to quickly increase productivity by using cutting-edge technology and practices [6]. Therefore, human capital growth, technology development, and capital investment all contribute to long-term productivity growth. Additionally, it requires an environment that is good for growth, with institutions that encourage growth and a stable economy in general. The effects of several factors on productivity increases have altered over time. Demographics and other non-economic factors have become more important, as have innovation, cross-border technology transfer, and experience in making exports that are more complex and sophisticated [7].

Therefore, this structural transformation toward more complex and sophisticated products is the principal driver of economic development. The accumulation of capabilities that are necessary for producing diverse, complex, and sophisticated products determines the development path of a country. As a result, countries' abilities to accumulate those capabilities for producing complex and diverse products vary. According to the theory of capabilities, the development of a country does not mean that it improves its production process for the same set of goods but rather that it acquires the complex set of capabilities necessary to move toward a set of new activities that enhance its productivity. Therefore, the capabilities of producing diversified and complex goods depend on the physical and human capital, institutions, legal system, and the ability to add value [2,8,9].

Countries benefit a lot from economic diversification, which means switching to a more diverse production structure to make them more resistant to outside shocks and pave the way for fairer economic growth. Growth and less poverty can be achieved in LDCs through structural reform and trade expansion. Long-term economic growth can be hurt by a lack of economic diversification, which makes the economy more vulnerable to shocks from the outside. Many of the world's poorest countries have highly concentrated economies because they are small, far away, landlocked, or heavily reliant on basic agriculture or minerals [10]. Global value chains (GVCs), in which different parts of the manufacturing process happen in different countries, are the main way that globalized production, trade, and investment are put together. Globalization lets economies reorganize their operations on a global scale by letting them outsource and offshore tasks. In order to improve their manufacturing processes, economies spread out the phases of value chain activities over several places. In the past few decades, operations along the value chain, such as design, production, marketing, and distribution, have shown a strong tendency toward globalization [11].

Global value chain (GVC) is seen as an easy way to industrialize by changing the global structure of manufacturing [12]. Criscuolo and Timmis [13] stated that GVC helps countries become more competitive by giving them access to cutting-edge technologies and new markets. GVC enables countries at various stages of development to pool their resources and collaborate in the production of goods. According to Grossman and Helpman [14], technology increases economic growth in the long run. Imports and exports are both important components of any economy. Imports assist economies in accumulating capital, transferring technology, and innovating at the domestic level [15]. Because of this, GVC encourages cross-border movements of knowledge, expertise, investment, and human capital in addition to international trade in goods and services [16].

There are many different drivers that directly increase the firms' risk in the economy. The crises impact both economies as well as individual firm's stability. The quality of government in a country significantly matters in reducing the impacts of external shocks on the growth and stability of the economy. The quality of the national government has

a huge impact on how a crisis affects business operations. Better national governance, in particular, reduces the negative effects of the crises on corporate performance and amplifies the positive effects of the crises on firm risk [17]. Dang et al. [18] also explored the impact of institutional quality on the shadow economy. Similarly, Nguyen [19] also described the role of institutional quality in the stability of the Association of Southeast Asian Nations (ASEAN). Additionally, institutional quality also affects the relationship between financial development and the quality of the environment [20].

The different capabilities of the countries also differentiate them in their economic fitness, which describes the country's ability to produce a diversified and complex set of goods. Accordingly, a country's capabilities that allow the high production of diversified goods in large quantities lead to high economic development. Therefore, economic fitness depends highly on the domestic economic structure and changing GVCs around the world. Based on these arguments, the current study is planned to investigate the role of institutional quality, human capital, and the well-known form of trade, i.e., GVC.

The remaining parts of the article are organized into the following sections: the second section describes the review of literature related to economic fitness and study hypotheses; the third section explains the materials and methodology of the current research; the fourth section explains the results, the fifth section describes the discussion, and the last section of the study presents the conclusion.

2. The Literature Review and Hypotheses Development

The productivity of a country positively correlates with its exports and generates highly robust results in international trade [21]. At the industry level, the Ricardian model specifies a solid explanation to describe the supremacy of trade based on the correlation of productivity and export. Because of the considerable disparities in relative productivity, the trade patterns are regulated. Producers of a specific industry tend to enhance their export volume as their productivity level increases [22–24]. On the other hand, at the firm level, it is advocated that the exporters succeed since several firms have a satisfactory productivity level to overcome their exporting costs [25–27].

This standard model of exports describes that the country will export the goods in which it has a comparative advantage. In this situation, equilibrium can occur in two ways: if countries specialize entirely and get benefits from the trade, or if only one country produces both goods and there is no loss or gain in trade. However, a country with a relatively low cost of producing certain goods may exploit the comparative advantages because it can secure a paramount market share [3]. However, the empirical evidence depicts that the most prosperous economies, in terms of economic performance, tend to produce more diversified and complex goods for exports [1,2].

Furthermore, the diversification of countries' production structures is directly related to the level of development of their economies [28]. Klinger and Lederman [29] described the role of diversification and its link with economic development. Therefore, developing or less developed economies have no diversified production structure and are producing unsophisticated goods in the highly competitive global market.

Depending on its capabilities, an economy can produce a wide range of goods. A country's development is the process by which its institutions and businesses build and change their capabilities and infrastructure. Therefore, economic growth is possible when productive knowledge is enhanced through learning dynamics [30]. Such production capabilities may be physical, human, and institutional factors of the country or a form of knowledge that is difficult to exchange through the possession of patents, imports, foreign investments, and imitations.

The specialization of national building blocks, such as humans in tasks, knowledge, and skills, has enabled national capabilities to produce diverse and complex goods and services. Tacchella et al. [1] define economic fitness and explain the complex system that is used to define competitiveness. Morrison et al. [31] provide empirical and theoretical evidence for the fundamental instability of a non-linear definition of an algorithm,

which lies at the heart of the concept of economic fitness. They reported that more precise work is required to discern a reliable measure of the complexity and fitness of the economy. Zaccaria et al. [32] included the trade of services in the universal trade matrix that facilitates the analysis of global competitiveness. Vinci and Benzi [33] investigated the relationship between economic fitness and growth in countries based on per capita gross domestic product.

Roster et al. [34] proposed the concept of “country opportunity spotlights,” extracted from the conception of economic fitness. They used this concept to explore the capabilities of the countries and demonstrate which industries in each country have the ability to diversify within those capabilities. They further concluded that economic fitness played a role in economic growth and trade. Sbardella et al. [35] used the economic fitness concept to explore the factors behind the persistent economic disparities across the Italian regional units. They found that this system-wide method allowed them to discern the rich patterns of the economic sectors; these may play a vital role in diversifying the capabilities and can speed up the balance of economic development across the regions.

The diversified and complex production of goods that target global competition is what countries need to experience long-term growth. It enables the countries to secure a good level of competition in the world market. Countries producing highly diversified goods are more likely to export sophisticated goods to the rest of the world [1]. The fragmented production model, or outsourcing model, is a continuously growing trade form of the present century. Therefore, the admired role of GVC in global trade has drawn the growing attention of economies around the globe. It facilitates the production of complex consumer and capital goods. For example, the production of automobiles is very complex, and their parts are produced in different countries and assembled at one location [36]. It may contribute to the diversified production process of the final goods. Ultimately, each country participating in GVC trade gains the value-added amount by contributing its part to the production process [37]. Based on the growing complexity and sophistication of GVC, we have developed the following hypothesis regarding GVC and the economic fitness of the country:

H1: *GVC does not affect the country’s ability to produce complex and diversified goods.*

Stable leadership improves economic growth because many types of investments in the economy are politically sensitive, depending on the structural characteristics of the policy. Moreover, the return on investments is highly contingent on the government’s policies, which may change under new leadership. Moreover, political decision also affects the relationship between resources and outcomes [38]. The business environment and macroeconomic variables are moderated by political stability [39]. The following hypothesis has been developed regarding the impact of political stability on the country’s economic fitness:

H2: *Political stability does not affect the country’s ability to produce complex and diversified goods.*

Among the elements of institutional quality, the government’s effectiveness ensures a friendly and profit-oriented business environment free of political pressure and depicts the level of quality services provided to the residents of the countries. Government effectiveness is a desirable instrument to control corruption as well as the informal economy [40]. The government’s effectiveness enhances economic growth [41] and also promotes the firm’s innovation in products, technologies, and management [42]. The following relationship may be hypothesized between government effectiveness and economic fitness:

H3: *Government effectiveness does not affect the country’s ability to produce complex and diversified goods.*

An economy needs sustainability in the level of competition in the international market by producing diversified and complex goods. It is possible when domestic firms and investors are facilitated by a productive business environment. For this reason, domestic firms should pursue sustainable competitive advantages. These advantages are only possible when the firms develop a stream of innovations to maintain their leading positions among competitors [43]. This behavior of firms in the country is possible when the institutional conditions are favorable. The confidence of an economic agent rises when property rights are secure, everyone abides by the rules, and effective policies are implemented. Therefore, the rule of law and regulatory quality must be ensured to improve the economic fitness of a country. The following two hypotheses were developed regarding the rule of law and regulatory quality:

H4: *Sound policy implementation and regulation (regulatory quality) do not affect the country's ability to produce complex and diversified goods;*

H5: *Equality of all citizens and rights protection (the rule of law) does not affect the country's ability to produce complex and diversified goods.*

Based on the extensive literature reviews, it may be concluded that the role of the well-known and growing form of trade, i.e., GVC, and the direct impact of institutional quality and human capital on the economies' economic fitness are not covered. The current study may be the first contribution to the literature in this area, and it may aid in the formulation of effective policies to increase the country's capacity to produce diverse and complex products in order to compete globally.

3. Materials and Methods

3.1. Materials

This study used panel data from 131 countries for the period of 2007–2019, and the sample nations were chosen depending on the availability of data. The source and the definition of the variables are presented in Table 1. Production segmentation across countries is becoming more adept around the world. This change in trade patterns enables the firm to join the complex networks of the production system. For this purpose, national and international firms collectively work to provide multiple inputs for the goods and services being produced across the countries [44]. The growing form of trade (GVC) is very important for the earnings from trade. The current study considered GVC as an important variable that may have a significant relationship with diverse and complex production. We have used the EORA–MRIO (Multi-Regional Input–Output) data set for measuring the GVC of the countries.

The measures of institutions are one of the most important variables that contribute to economic growth [45] and ensure the success of the business and economic activities of the country [46]. Stable political systems, effective government, quality regulatory services, and the rule of law have all been contemplated as important determinants of the economic fitness of a country. The data on all these institutional measures were taken from the “World Development Indicators” (WDI) by the World Bank. The Human Capital Development Index data was obtained from Pen World Table 9.0, which entailed the importance of having the most literate and skilled labor force in any country.

3.2. Methods

The above-postulated hypotheses may be tested by developing the following equation:

$$EF_{it} = \text{fn}(GVC_{it}, PS_{it}, GE_{it}, RL_{it}, RQ_{it}, HCI_{it}) \quad (1)$$

where EF_{it} describes the economic fitness level of the i th section of the panel at time t that denotes the ability of a country to produce diversified and complex goods to meet the global competition. The GVC_{it} is measured by taking the sum of the forward GVC

(defined as the downstream links of countries in the production chain at the international level) and the backward GVC (which describes the upstream links in the production chain at the international level) [47]. The backward GVC is equal to the ratio of foreign value added to gross export, while the forward GVC is measured as the ratio of domestic value added to gross export. The PS_{it} , GE_{it} , RL_{it} , RQ_{it} , and HCI_{it} described the political stability, government effectiveness, rule of law, regulatory quality, and human capital index of the i th section of the panel at time t .

Table 1. Definitions of variables.

Variable Name	Variable Type	Definition	Source
Economic Fitness (EF)	Dependent	It describes the complexity level and ability of a country to produce diversified and complex goods to meet competition in a globalized market.	WDI
Global Value Chain (GVC)	Independent	An international production sharing system that describes the full range of production activities across the countries.	EORA–MRIO (Input–Output)
Political Stability (PS)	Independent	It describes the perception of the possibility of political instability as well as politically motivated violence.	WDI
Government Effectiveness (GE)	Independent	It describes the quality of public and civil services in the country and its degree of independence from the pressure of politicians. Moreover, it explains the quality of policy formulation as well as its implementation, and the credibility of the government’s commitment to such policies.	WDI
Rule of Law (RL)	Independent	It shows the degree of confidence of an agent in and willingness to abide by the rules of society, particularly in property rights, contract implementation, courtrooms, police, and the likelihood of violence and crime.	WDI
Regulatory Quality (RQ)	Independent	It shows the ability of the government to frame and implement effective policies and regulations that allow and promote the development of the private sector.	WDI
Human Capital index (HCI)	Independent	HCI describes a country’s ability to organize the economic and professional potential of its citizens.	Pen World Table

First of all, we confirmed the unit root in the data, followed by the cointegration tests, and later on, long-run parameters were estimated from a fully modified ordinary least-square (FMOLS) model. In Equation (2), the time series Z_{it} follows an AR [1]. The null hypothesis of a homogeneous panel unit root test is described in Equation (3), while the null hypothesis of a panel heterogeneous unit root test is presented in Equation (4).

$$\Delta Z_{it} = \varnothing_i Z_{it-1} + \gamma_{it} \quad (2)$$

$$H_0 : \varnothing_i = \varnothing_0 = 0 \text{ for all } i, \text{ whereas } H_A : \varnothing_i = \varnothing_A \neq \varnothing_0 \quad (3)$$

$$H_0 : \varnothing_i = \varnothing_0 = 0 \text{ for all } i, \text{ as } H_A : \varnothing_A \neq \varnothing_0 \quad (4)$$

The homogeneity hypothesis in Equation (3) describes the identical cross-sectionality (meaning across the members), as emphasized by Levine et al. [48] and Breitung [49]. On the other side, Equation (4) assumes that there is no identical cross-sectionality, which was also emphasized by Im et al. [50] and Maddala and Wu [51]. The current time series (Y_{it}) was found stationary through the homogeneous and heterogeneous unit root tests. Therefore, the following equation presents the panel regression:

$$Z_{it} = \partial_i \beta_i Y'_{it} + \forall_{it} \quad (5)$$

where Z denotes the $k \times 1$ column vector, ∂_i depicts the $k \times 1$ constant's vector, β_i is $n \times 1$ vector of slope coefficients, Y'_{it} describes the vector of independent variables, and $\forall_{it}$ shows the vector of the residual term. Therefore, stationary time series requires that the residual term follows the $I(0)$ process for the i th section at the t period. Similarly, if the residual term follows the $I(1)$ process, then it confirms the cointegration, as described by Pedroni [52] and Kao et al. [53]. Both homogeneous ($\beta_i = \beta_0$) and heterogeneous ($\beta_i \neq \beta_0$) variation structures were applied to perform the cointegration analysis. The following Equation (6) was adopted to test the cointegration according to Pedroni [54] and Kao et al. [53]:

$$\forall_{it} = \eta \forall_{it-1} + u_{it} \quad (6)$$

Equation (7) describes the homogeneous panel cointegration, and Equation (8) depicts the heterogeneous panel cointegration null hypothesis.

$$H_0 : \eta_i = \eta_0 = 1 \text{ for all } I, \text{ whereas } H_A : \eta_i = \eta_A < 1 \neq \eta_0 \quad (7)$$

$$H_0 : \eta_i = \eta_0 = 1 \text{ for all } I, \text{ whereas } H_A : \eta_i < 1 \neq \eta_0 \quad (8)$$

3.2.1. FMOLS

After the cointegration test, the FMOLS method was used to estimate the long-term panel coefficient. For this purpose, the covariance (long run) matrix F was disintegrated in Equation (9):

$$\Phi = \sum_{j=-\infty}^{\infty} E(\alpha_{ij} \alpha'_{io}) = \begin{bmatrix} \Phi_{\mu} & \Phi_{\mu\epsilon} \\ \Phi_{\epsilon\mu} & \Phi_{\epsilon} \end{bmatrix} \quad (9)$$

where $\alpha_{it} = (\mu_{it}, \epsilon'_{it})'$. Moreover, the symmetric covariance matrix is presented in Equation (10):

$$\Psi = \sum_{j=0}^{\infty} E(\alpha_{ij} \alpha'_{io}) = \begin{bmatrix} \Psi_{\mu} & \Psi_{\mu\epsilon} \\ \Psi_{\epsilon\mu} & \Psi_{\epsilon} \end{bmatrix} \quad (10)$$

Therefore, the OLS ($\hat{\beta}_{OLS}$) and FMOLS ($\hat{\beta}_{FMOLS}$) are described by Equations (11) and (12), respectively [55]. To counter the serial correlation and endogeneity problem, the $\hat{\beta}_{OLS}$ is conditional to the normal distribution with non-zero mean, and $\hat{\beta}_{FMOLS}$ is conditional to asymptotically normal distribution with non-zero mean [56].

$$\hat{\beta}_{OLS} = (\sum_{i=1}^N \sum_{t=1}^T (Y_{it} - \bar{Y}_i)^2)^{-1} (\sum_{i=1}^N \sum_{t=1}^T (Y_{it} - \bar{Y}_i) (Z_{it} - \bar{Z}_i)) \quad (11)$$

$$\hat{\beta}_{FMOLS} = (\sum_{i=1}^N \sum_{t=1}^T (Y_{it} - \bar{Y}_i)^2)^{-1} (\sum_{i=1}^N \sum_{t=1}^T (Y_{it} - \bar{Y}_i) (\hat{Z}_{it}^* - T\hat{\Psi}_{\epsilon\mu})) \quad (12)$$

where $\hat{Z}_{it}^* = Z_{it} - \hat{\Phi}_{\mu\epsilon}^* \hat{\Phi}_{\epsilon} \in_{it}$ and $\hat{\Psi}_{\mu\epsilon}^* = \hat{\Psi}_{\mu\epsilon} - \hat{\Psi}_{\epsilon} \hat{\Phi}_{\epsilon}^{-1} \hat{\Psi}_{\epsilon\mu}$.

3.2.2. Generalized Moments Method (GMM) Methodology

GMM is one of the most widely adopted econometric analyses around the globe. It was proposed by Hansen [57]. It allows envisaging the moments estimated from the population distribution compared to the moments computed from the specific sample. It tackles autocorrelation and different variances [58]. Equation (13) describes the general function of the GMM method to estimate the unknown parameters by locating the sample means of moment functions [59].

$$E[X'_i \mu_i] = 0 \quad (13)$$

The function of moments' optimal linear combination is estimated by a one-step GMM [60,61]. In a one-step GMM, the weight matrices of the estimated factors are determined independently through the weight matrices W [62,63],

$$W = \begin{bmatrix} W_d & 0 \\ 0 & W_1 \end{bmatrix} \quad (14)$$

An identity matrix was used in the one-step estimator by Arellano and Bond [64] as a weighting matrix, while the one-step GMM adopts the weighting matrix (Equation (15)) and the estimator, as defined in Equation (16). The best optimal GMM estimator is defined as $\mu_i | X_i$ is iid $[0, \sigma^2 I_t]$.

$$W_N = [\sum_i X_i' X_i]^{-1} = [X' X]^{-1} \quad (15)$$

$$\hat{\beta}_{OLS} = [Y' X (W)^{-1} X' Y]^{-1} Y' X (W)^{-1} X' z \quad (16)$$

3.2.3. Quantile Regression Methodology

The ordinary least square (OLS) regression is very sensitive to its assumptions; if any one of these assumptions is not met, the OLS may not provide efficient estimates [65]. Particularly, in the presence of a heterogeneity problem, the OLS may not be able to estimate efficient and consistent coefficients. In this situation, a regression model can consider the quantile and heterogeneity structures of the data. Therefore, quantile regression (QR) is the best option in these circumstances [66,67]. It is the best model in place of OLS regression because there is no need to assume the distribution of error terms that the model predicts [68]. The OLS regression predicts by taking the expected mean value of the outcome variable into account. The quantile regression makes a prediction based on the conditional median. Ong et al. [69] stated that QR estimates the coefficient by considering different quantiles; for example, the 10th, 25th, 75th, and 90th quantiles of the dependent variable.

Koenker and Bassett [70] made the QR in 1978. Koenker and Hallock [71] made improvements to it in 2001. The QR does not require the normal distribution of variables. Therefore, the model in the form of a linear regression equation is specified below.

$$x_i = \beta_0 + \beta_1 z_{i1} + \dots + \beta_p z_{ip} \quad i = 1, \dots, n \quad (17)$$

where, in Equation (17), x_i depicts the number of parameters to be estimated and i is the number of data points. Based on Equation (17), the quantile regression model can be specified for the T th quantile in Equation (18). Therefore, the parameter is dependent on the quantile [72]. At last, the final QR model is given in Equation (19).

$$Q_T(x_i) = \beta_0(T) + \beta_1(T) z_{i1} + \dots + \beta_p(T) z_{ip} \quad i = 1, \dots, n \quad (18)$$

$$Q_T x_{it}(T | x_{i,t-1}, x_{it}) = \partial_i + v(T) x_{i,t-1} + w_{it}^T \beta(T) \quad i = 1, \dots, n, \quad t = 1, \dots, T_i \quad (19)$$

The variable x_{it} shows the estimated output; $x_{i,t-1}$ describes the lag value of x_{it} ; w_{it} shows the exogenous variables, and $\partial_i = (\partial_1, \dots, \partial_N)$ shows the $N \times 1$ vector of intercepts. The effect of variables ($x_{i,t-1}$) and (w_{it}) are dependent on the T th quantile.

4. Results

Table 2 describes the descriptive results regarding all the variables in the panel. The normality of variables was assessed by applying the Jarque–Bera (JB) test and calculating the skewness and kurtosis values. Similarly to Dawar et al. [73], the JB test confirmed that the variables were not distributed normally. In these circumstances, the large sample confirms the validity of the t and F tests due to the asymptotic normality of OLS. When

the variables are not normally distributed, quantile regression in place of OLS regression provides more reliable estimates [74]. Moreover, the performance of quantile regression is still good even when high skewness and kurtosis exist in the data [75].

Table 2. Descriptive statistics.

	EF	GVC	PS	GE	RL	RQ	HCI
Mean	1.314	15.806	0.994	1.080	1.057	1.097	0.920
Median	1.134	15.891	1.089	1.082	1.028	1.098	0.983
Maximum	3.591	21.109	1.535	1.693	1.635	1.660	1.471
Minimum	1.099	10.946	−3.653	−0.082	−0.390	−0.451	0.128
Std. Dev.	0.402	2.508	0.447	0.330	0.341	0.322	0.286
Skewness	2.967	0.048	−2.689	−0.295	−0.287	−0.577	−0.623
Kurtosis	13.022	1.967	16.774	2.651	2.984	3.696	2.504
Jarque–Bera	9552.144	75.780	15,397.357	33.112	23.154	127.953	126.498
Probability	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

When there is heterogeneity and cross-sectional dependence in the data, the parameter prediction may be skewed and inconsistent. To avoid this, the data should be tested for heterogeneity and cross-sectional dependencies. Table 3 presents the results regarding cross-sectional dependency and heterogeneity. Two LM tests, i.e., Breusch–Pagan (BP-LM), Pesaran scaled (PS-LM), and Pesaran CD (P-CD), confirmed the presence of cross-sectional dependency [76] in the current panel data of the countries. This dependency might be due to some common factors in the world, such as the prices of natural resources, technological advancements, etc. In this situation, the fixed and panel effects may generate biased and unreliable estimators. There are some ways to tackle the cross-sectional dependency; for example, in panel regression, adding common factors or attaining its effect is one way to obtain reliable estimators [77]. Moreover, the bootstrap technique (1000 replications) may also be considered for the estimation to detect the biases in panel estimation [78]. In panel estimation, Juhl and Lugovskyy [79] described that the resulting coefficients are similar for each cross-sectional unit. However, this assumption is violated by population data, and it generates the problem of type-II error, which describes the situation of non-rejection of a false null hypothesis. It may result in biased parameters. To confirm the homogeneity of slope coefficients across the cross-sectional unit of the panel, we have applied the Pesaran–Yamagata test [80] of slop heterogeneity (Delta and Adj. Delta tests). The results of these tests have rejected the null hypothesis, implying that all slope coefficients are alike across the units of the panel.

Table 3. Cross-sectional dependence and slope heterogeneity Test.

	Value	<i>p</i> -Value
BP-LM	9147.43	0.0000
PS-LM	18.956	0.0000
P-CD	15.846	0.0000
Slope heterogeneity test		
Pasaran–Yamagata Delta	2.79	0.0100
Pasaran–Yamagata Adj. Delta	6.53	0.0000

The inconsistency problem of slop heterogeneity can be resolved by panel quantile regression through the parameter estimation at the lower, median, and upper tails of the conditional distribution. Table 4 presents the quantile slope equality test. The coefficients of

GVC, political stability, the rule of law, and human capital index were significantly different at the 25th (lower) quantile and the 50th (median) quantile. Similarly, the coefficients of GVC, government effectiveness, the rule of law, and regulatory quality were significantly different at the 50th (median) quantile tail and the 75th (upper) quantile tail. Therefore, the overall null hypothesis (all coefficients are identical to each other) was rejected.

Table 4. Quantile slope equality test.

		χ^2 Statistic	χ^2 d.f.	<i>p</i> -Value
WT		347.2701	12.0000	0.0000
RD: $b(\tau_{au_h}) - b(\tau_{au_k}) = 0$				
Q	Variable	RV	SE	<i>p</i> -value
0.25, 0.50	GVC	0.019	0.004	0.000
	PS	−0.014	0.006	0.014
	GE	−0.011	0.022	0.609
	RL	−0.066	0.017	0.000
	RQ	0.023	0.019	0.228
	HCI	0.037	0.014	0.011
0.50, 0.75	GVC	0.033	0.004	0.000
	PS	−0.006	0.015	0.676
	GE	−0.060	0.028	0.031
	RL	−0.241	0.046	0.000
	RQ	0.040	0.033	0.022
	HCI	0.023	0.025	0.368

WT = Wald test; Q = Quantiles; RD = Restriction Detail; RV = restricted value; SE = Standard Value.

Before estimating the parameters, the unit root is used to confirm the order of integration ($I(0)$ or $I(1)$) of the variables, and the cointegration test is used to find out if the variables are cointegrated. We followed the unit root test of Hadri [81] and Breitung and Das [82], which considers cross-sectional dependency. Hadri's [81] unit root test supposes that all panels (trends) are stationary; while Breitung and Das [82] consider that all panels have the unit root. In Stata 15, Hadri [81] and Breitung and Das [82] facilitated our selection of one of the suitable available options, including (i) panel-specific means (fixed effects), (ii) time trends, (iii) subtracting cross-sectional means, and (iv) allowing for cross-sectional dependence in the model of the data-generating process. A similar unit root test was applied by Bilgili et al. [78]. The results shown in Table 5 confirmed that the variables at the level $I(0)$ are non-stationary, while at the first difference, they are stationary; therefore, they followed the $I(1)$ order.

We used the Westerlund [83] cointegration test, which takes into account cross-sectional dependency using both group mean (Gt, Ga) statistics and panel (Pt, Pa) statistics. The test result (Table 6) demonstrated the existence of cointegration by examining the *z* score of Pt at a 1% level of significance. Again, the cointegration test of Wasterlund [83] was repeated with 500 and 1000 replications, and the results also rejected the null hypothesis of no cointegration. Finally, the variance ratio test [83] for cointegration was conducted by considering the unit root in the residual, in which the null hypothesis was that there was no cointegration, and the alternate hypothesis was that some panels were cointegrated. The test confirms the presence of cointegration at a 5% level of significance. Therefore, it was confirmed that the variables are $I(1)$ and have a long-run relationship with a non-zero rank in the estimated matrix. Based on these findings of unit root and cointegration tests, the estimation of parameters through quantile regression, GMM, and FMOLS is possible.

Table 5. Panel unit root tests' statistics by allowing the cross-sectional dependency.

Variables	z-Score	p-Value	z-Score	p-Value
EF	35.92	0.00	−2.68	0.278
GVC	26.82	0.00	−2.26	0.565
PS	32.43	0.00	−2.25	0.697
GE	30.37	0.00	−2.15	0.134
RL	31.96	0.00	−2.33	0.869
RQ	17.32	0.00	−1.75	0.996
HCI	22.89	0.00	−2.63	0.250

Table 6. Westerlund cointegration test.

Tests	Value	z-Score	p-Value
Gt	−2.315	−0.169	0.453
Ga	−2.258	7.321	1.000
Pt	−15.786	−4.789	0.0001
Pa	−4.467	2.765	0.889
Variance Ratio (VR)	−3.006	—	0.0172

The results estimated through the FMOLS, QR, and GMM are presented in Table 7. All three models confirmed that the GVC, political stability, government effectiveness, the rule of law, regulatory quality, and human development significantly contribute to a country's ability to produce diversified and complex goods that meet the demands of global competition. The estimations of GVC on economic fitness from the GMM, FMOLS, and QR (25), QR (50), and QR (75) are 0.0015, 0.075, 0.0224, 0.0425, and 0.0656, respectively. All these results are significant at the 1% level of significance, which rejects the H1 and confirms the significant impact of GVC on the country's ability to produce diversified and complex goods. Similarly, all hypotheses H2–H5 were rejected by the results of all econometric models. The impact of political stability on the ability of economies to produce diversified and complex goods from FMOLS is 0.0096, that from GMM is 0.0022, and those from QR (25), QR (50), and QR (75) are 0.0019, 0.0122, and 0.160, respectively. The impact of government effectiveness from FMOLS is 0.982, from GMM, 0.0214, and from QR (25), QR (50), and QR (75), 0.0240, 0.044, and 0.476, respectively. The impact of regulatory quality (RQ) on the economic fitness obtained from FMOLS is 0.0392; from GMM, it is 0.0151; and from QR (25), QR (50), and QR (75), it is 0.0666, 0.0066, and 0.0556, respectively. Similarly, the estimation of the rule of law on economic fitness from FMOLS is 0.1491, from GMM, 0.0102, and from QR (25), QR (50), and QR (75), 0.0102, 0.0189, and 0.0588, respectively. The impacts of human capital on economic fitness estimated from FMOLS, GMM, and QR (25), QR (50), and QR (75) are 0.0887, 0.0547, 0.0058, 0.0455, and 0.0550, respectively. Therefore, as hypothetically expected, the impact of all variables was found to be positive and significant except for the impact of regulatory quality (RQ) at the median quantile (QR = 50), which is insignificant and positive. It means the high participation of the countries in GVC enables them to produce diversified and complex goods to meet global competition. Similarly, all other variables that describe good governance in the country also improve the level of diversified production of complex goods that enable a country to secure its good position in the global market. The development of human resources also positively contributes to the economic fitness of a country.

Table 7. Outcomes of GMM, FMOLS, and Quantile Regression.

Dependent Variable: EPI	Coefficient	Std. Err.	t-Stat	p-Value
FMOLS				
GVC	0.0754	0.0012	62.8300	0.0000
PS	0.0096	0.0009	10.7959	0.0000
GE	0.0982	0.0030	32.7470	0.0000
RL	0.1491	0.0029	50.8069	0.0000
RQ	0.0392	0.0026	15.3055	0.0000
HCI	0.0887	0.0016	56.8125	0.0000
GMM				
GVC	0.0015	0.0003	5.3600	0.0000
PS	0.0022	0.0004	5.5100	0.0000
GE	0.0214	0.0067	3.2100	0.0020
RL	0.0102	0.0089	1.1500	0.2540
RQ	0.0151	0.0056	2.7000	0.0080
HCI	0.0547	0.0161	3.4000	0.0010
Panel Quantile Regression (0.25)				
GVC	0.0224	0.0023	9.7300	0.0000
PS	0.0019	0.0006	3.0500	0.0020
GE	0.0240	0.0026	9.3600	0.0000
RL	0.0189	0.0020	9.6900	0.0000
RQ	0.0666	0.0028	23.560	0.0000
HCI	0.0058	0.0034	1.7200	0.0850
Panel Quantile Regression (0.50)				
GVC	0.0425	0.0004	94.820	0.0000
PS	0.0122	0.0010	12.570	0.0000
GE	0.0044	0.0013	3.3800	0.0007
RL	0.0588	0.0085	6.9200	0.0000
RQ	0.0066	0.0201	0.3300	0.7440
HCI	0.0455	0.0030	15.230	0.0000
Panel Quantile Regression (0.75)				
GVC	0.0656	0.0040	16.240	0.0000
PS	0.0160	0.0059	2.7100	0.0070
GE	0.0476	0.0241	1.9750	0.0482
RL	0.2331	0.0609	3.8300	0.0000
RQ	0.0556	0.0176	3.1600	0.0020
HCI	0.0550	0.0102	5.4100	0.0000

5. Discussion

The current findings confirm GVC's important role in improving economies' economic fitness. Each country's primary goal in approaching globalized markets and competing in the global market is to produce diverse and complex goods. The strict trade rules in place around the world limit countries' abilities to compete in the global market. The different resource endowment levels are one of the key challenges faced by various developing coun-

tries to meet global standards of the trade. In this situation, many developing countries are trying to catch up with advanced countries in the manufacturing and service industries [84]. Countries are adopting many strategies to catch up with global competition, and the GVC is one of the best approaches that are becoming popular among the economies. The basic concept of GVC is industrial upgrading. It describes “moving to more complex value activities in the value chain to enjoy the everlasting and growing benefits such as high profit, availability of skilled labor, and advanced technology” [85]. This upgrading of the industry is classified into four different types: (i) improving production and technology, which is known as “process upgrading”; (ii) producing complex, sophisticated, and better-quality products, which is known as “product upgrading”; (iii) enhancing the range of activities or changing the mix of functions to perform higher-value tasks, which is known as “functional upgrading”; and (iv) chain upgrading, which describes the movement from one industry to another [86–88]. In this way, the GVC enables the countries to produce complex and diversified goods that meet the global standard. The involvement of the economies in the GVC increases their trust level in the world market, especially when a well-reputed and advanced economy is involved in the production of goods with the developing countries. South Africa, for example, produces complex and fast-responding products with higher fashion content. Furthermore, Taiwan exports large quantities of basic products while supplying a few complex products to the United States [89]. Hence, the production of the final goods has moved from the boundaries of one country to other countries worldwide. Therefore, the GVC describes that the world has moved to a distribution model of production, which has boosted the multifaceted production cycle and product complexity [90,91]. Thus, the growing complexity of production creates a sustainable worldwide trend of producing goods within the GVC [92].

A country with political stability has a peaceful environment for its citizens and economic agents who contribute to the economic growth of the economy. Political stability attracts investors who are not afraid of losing money in their businesses. Thus, firms can invest in the production of complex goods that are more profitable and highly demanded in the international market. Political stability increases economic growth by attracting more investment [93]. It contributes to economic freedom, allowing for the most efficient use of scarce resources, and it also increases policy certainty, influencing incentives for economic agents and, thus, assisting the country’s growth [94]. Furthermore, political instability endangers an economy’s business environment [95]. Similarly, other indicators of institutional quality, such as government effectiveness, the rule of law, and regulatory quality, also play a crucial role in providing a secure and attractive business environment for the economic agent to produce diversified and complex goods without any fear of loss or injustice. The government’s effectiveness provides a unique business environment that promotes innovation in the country. This innovation enabled the country’s firms to innovate their products, management, and production processes [42]. Trade facilitation leads to increased trade within the country. For trade facilitation, regulatory quality plays a vital role, leading to admirable trade performance [96]. In general, institutional quality is an important factor that significantly contributes to the quality of export products through competition and cost effects [97]. Similarly, the positive and significant impact of the human capital index revealed that it was also very important in upgrading the complexity of trade and growth. Zhu and Fu [98] and Chakroun et al. [99] also revealed that the growing complexity of export upgrading depends on human capital. That also revealed the important role of institutional quality and human capital in export upgrading.

6. Conclusions

Diverse and complex goods have a primary effect on the global market, which is known as a country’s economic fitness. This economic fitness describes the production of diversified and complex goods, which depends on the many non-tradable inputs (capabilities). Countries are different in their capabilities, which affect the economic fitness

of the country. Moreover, these capabilities are not independent of the physical, human, institutional, and legal systems of an economy.

The current study was designed to investigate the relationship between GVC, institutional quality, human capital development, and the economic fitness of economies. For this purpose, we used panel data from 131 countries for the period of 2007–2019. The preliminary tests were applied to the panel data to confirm the unit root and cross-sectional dependency. Their results ensured the application of three different models, i.e., quantile regression, GMM, and FMOLS. The application of three different models confirmed the robustness of the results.

The results of all three models were positive and significant for the GVC, the quality of institutions, and the growth of human capital. The countries' participation in GVC significantly contributes to their economic fitness and minimizes the problem of resource availability among the countries. Similarly, the important indicators of institutional quality, such as political stability, effective government, the rule of law, and regulatory quality, also significantly affect the economies' abilities to produce diversified and complex goods for the globalized market.

The present study has some important implications. The economies should make it easier for firms and industries that participate in the GVC to increase productivity and efficiency in the economy. The government should focus on effective policies to ensure good governance, low corruption, and no violations of rules to facilitate the business community's ability to do business without fear of injustice. The provision of educational funds must be ensured across countries, especially in developing countries, to improve their human capital.

Although this study is the first in the context of the impact of the GVC, institutional quality, and human capital on the economic fitness of the countries, it also has a few limitations. The current study could not focus on the income levels of the countries, which may also have an important effect on their economic fitness. Similarly, the current study was also unable to incorporate the various forms of GVC (backward and forward GVC) separately. The researchers can examine the true picture of different countries' economic fitness by taking into account both nations' income levels and separate GVC forms in their future endeavors.

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