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A Panel Data Analysis of Globalization, Peace and Stability: Implications for Governance and the Global Knowledge Economy

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Abstract

This study attempts to explore the relationship between globalization and the knowledge economy via governance. It intends to explain the channel of their relationship through peace and stability. Knowledge economy pillars (education, information and communication technology) are used as the dependent variables and globalization is used as the independent variable. A panel data set of 198 countries is used for the period of 1996-2016 to analyze fixed effect model (FEM), random effect model (REM), and Hausman test. The results reveal that the globalization has a significant and positive impact on the knowledge economy. This study recommends that the country should execute such reforms that help to enhance the globalization and increase the development of the knowledge economy.

Keywords: globalization, peace and stability, governance, global knowledge economy

JEL Classification Codes: F60

1. Introduction

Globalization is a complex phenomenon that is generally divided into economic, cultural and socio-political globalization. The concept of globalization can easily be understandable through different changes in the process of production, consumption, investment and above all, in

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[1] **Author's Acknowledgment:** I, hereby declare that this paper is a part of my thesis.

the pattern of international trade. In the literature, there are many studies that explain the relationship between globalization, political stability, and governance in the last few decades. Most of the studies either use one or two governance tools to check the impact of globalization on the knowledge economy. However, there is a gap to find the individual effect of globalization on the knowledge economy through the channel of governance.

The term globalization consists of different dimensions. Indicators of globalization include trade openness, foreign direct investment (FDI), portfolio investment, income payment to foreigners, outgoing telephone traffic, transfers, international tourism, foreign population, embassies in other countries, membership in an international organization, and participation in the United Nation (UN) security. These indicators provide grounds for international economic and interdependency of countries upon each other. The organization for economic cooperation and development (OECD) defines the term globalization as:

"The term globalization is generally used to describe an increasing internationalization of markets for goods and services, the means of production, financial systems, competition, corporations, technology, and industries. Amongst other things, this gives rise to increased mobility of capital, faster propagation of technological innovations and an increasing interdependency and uniformity of national markets."

Earlier studies have investigated the impacts of trade and foreign direct investment on the economic growth. These studies concluded that if efficient policies are adopted by the government; then, the globalization helps accelerate the economy through enhanced trade relative to foreign direct investment. They define globalization as cross-border flows and interactions among the countries. (De Gregorio, 1992; Dreher, 2006; Goldin & Reinert, 2007).

Globalization significantly affects business and market expansion that helps expand the trade in goods and services across the world, increasing the flow of foreign direct investment from developed countries, enhancing benefit by integrating with international brands, increasing the mobility of labor to earn living, and results in expansion of off-shoring and out-sourcing the production process. The world has now become a global village due to globalization that helps the countries to form economic interdependencies. So for the stability,

efficient performance of governance, and improvement in knowledge economy globalization have made the countries able to depend on each other.

Despite the plus points of globalization, different studies concluded that free trade has negative effects on domestic producers. So, there is a need for the trade barriers to protect the infant industries. Hence globalization is inter-linked with each and every part of the economy, and effecting it positively or negatively depending on the size of that country. But there are very few studies that highlighted the relationship between globalization, governance and knowledge economy pillars. Some studies examine the impact of globalization on the knowledge economy in one or two dimensions, and these studies observed only a few countries or a single region. We find no significant study that covers two or more regions to analyze the impact of globalization on the knowledge economy through the channel of peace and stability.

Good governance plays an important role in the development of a country. Political stability, government effectiveness and the rule and regulation of a country can boost or slow down the process of economic growth. Political instability[2] is one of the main reasons that affects the economic growth negatively. Hibbs (1973), and Özler, Roubini and Swagel (1996) concluded that countries are suffering from lower economic growth due to government collapse (political instability) as compared to a country where the government is stable. Political stability plays a significant role in the growth of a country. Moreover, most of the studies find the direct effect of political stability on a country's economic growth.

Stability (positive/negative) provides diverse conditions for governance. Political stability creates more possibilities for the effective conveyance of economic governance in a country. Moreover, the respect of the native and foundations (institutional governance) is encouraged by such type of stability. It is reasonable to hypothesize that this type of environments for governance ease the initiative towards the knowledge-based-economies.

In another stream of the literature, Freeman (1997) states that the governance models make the world where boundaries are flux and

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[2] The terms 'Stability', 'peace and stability', and 'political stability', are similar.

are organized by the public and private players. These players are the states, organizations, associations, the expert group, civil societies, and different business organizations. Governance uses news instruments and tools that lead to development, improving performance and different law instruments (Jordana & Levi-Faur, 2004). Globalization may change the scale between corruption costs and benefits, shows that globalization may indirectly effect corruption (Bonaglia et al., 2001). These studies link governance and globalization ignoring the effect of governance on the knowledge economy that leads to the development of a country.

If the knowledge economies are developed into the particular position of economic institutions that are interlinked with each other, it will help us to develop new standards, beliefs, and knowledge that is compatible with the objective of global sustainability. If any nation does not make significant changes in the development of knowledge, the knowledge-based market will make it difficult for the country to compete and bind the power of knowledge.

Similarly, Asongu and Le Roux (2017) investigate how ICT enhances inclusive human development and decompose their analysis into the essential features of inclusive human development that is based on; political stability, landlockedness, religious domination, legal origin, income levels and resource wealth. Literature has made the scope of growth-oriented explanation of knowledge economy limited. The exposition of the knowledge economy in the context of increasing production and growth is not perfect to achieve a sustainable society.

This study is an endeavor to fill the gap in the literature and is different from the previous studies. This study incorporates the indicators of governance and the knowledge economy. Our detailed analysis of the knowledge economy has incorporated governance, political stability, and globalization.

Most of the studies in the literature are about the relationship between globalization, economic growth, and governance. However, according to our knowledge, few studies highlight the relationship between globalization and knowledge economy. Moreover, there is a gap in the literature to find the individual effect of globalization on the knowledge economy through the channel of governance.

This study examines the relationship between macroeconomic variables and other factors that drive the KE. Two components of the

KE are taken described by the World Bank that are: education, and information and communication technology (ICT). This opens up another path for the policymakers and researchers by navigating the increasing scope of KE literature (Rooney, 2005; Anyanwu, 2012; Lin, 2006; Amavilah, 2009; Ford, 2007; Wantchekon, Klašnja, & Novta, 2015).

This study discovers the instantaneous effect of globalization, stability, and governance on the knowledge economy. For the analysis, relevant techniques are applied such as a fixed effect model, the random effect model, and Hausman technique.

The purpose of the study is to find the dynamic effects of globalization, stability, and governance on the knowledge economy. Due to data availability constraint, 198 countries were selected for the period of 1996-2016. The research question of the study is: What is the relationship between globalization and stability, how it directly affects governance and how does this relationship indirectly affects the knowledge economy?

The rest of the study is organized as follows. Section 2 takes a vivid review of the existing literature and Section 3 discusses the economic specification and methodological issues. Section 4 defines the variables of interest and data sources. Empirical results are given and discussed in Section 5. Finally, Section 6 concludes and provides some policy implications.

2. Literature Review

The global world economy relies on the infinite development of international trade. In the global economy, citizens in developing countries have minimal control over their resources, globalization makes the countries to depend on the other countries to fulfill their demands. International challenge has raised the pace of globalization. Globalization altogether influences business and market development that grows the exchange merchandise and enterprises over the world. It upgrades the advantage by incorporating with global brands, expanding the versatility of work.

Holt and Turner (1966) consider stability as an instrumental economic term. They argue that stability is necessary for development because people will only invest and trade if they have the surety of their future. Political instability and economic changes undermine the

business and weaken the consumer's confidence, so the government has to maintain law and order for stability. Huntington (1970) states that political instability arises when demand is more than the political system capacity.

Goldsmith (1987) finds the positive and negative effect of political stability on economic development. Political researchers are facing problems regarding the political stability for a long time. Aristotle had devoted his two books of politics to this subject. For the past two decades, the interest of developing countries is changing due to the increasing challenges to the power of developed countries. Earlier studies have treated political stability as the dependent variable. These studies explain the causes of political instability by introducing reforms and policies to sustain the existing authority.

Olson (2008) asserts that "societies with unchanged boundaries are more likely to tend towards collusion and organizations for combined action over time". It is also difficult for that society to reallocate the resources according to new economic conditions that result in reducing the economic growth rate.

Waltz (1999) found that what should be the implications of international politics. The more interdependence system of economies, the countries need more securities for its balancing power. Due to interdependence, it is difficult for the country's political and physical capabilities to sustain the present world. Another reason for this misbalancing is that other countries also try to lead the world. So, international political situations can be unnatural.

Alesina *et al.* (1996) find the relationship between political instability and per capita GDP growth. They have taken a sample of 113 countries for the time period of 1950-1982. They define the term political instability as government collapse. Sudden changes in government and economies also affect the economic growth. They concluded that countries are suffering lower economic growth due to government collapse as compared to other countries where the government is stable.

In another strand of literature, Rodrik (1998) states that Neo-liberal economist inclined to decrease the negative relationship of governance and conflicts. They are of the view that these hidden frictions weaken the degree of governance institutions. These weak institutions are not able to tackle the hidden frictions because these

conflicts are linear and are reasonable to ignore the impacts of globalization on the peace and stability of a country.

Earlier, Bonaglia, Braga de Macedo and Bussolo (2001) find the indirect relationship of globalization and its impact on corruption. Scholte (2000), and Lee and Sirgy (2004) also highlight the different negative impacts of globalization as it is a double-edged phenomenon. Through globalization, people gain an unequal share of profit who had already taken advantages of it at earlier stages.

Most of the studies were in favor of governance, globalization and economic growth relationship, but Quibria (2006) finds that with low governance indicators, the economic growth is faster in Asian countries. This might be due to the difference in the measure of governance used. Governance indicators positively affect the economic performance, and its effect mainly depends on the measurement of governance. By using the governance indicators of the World Bank and "Mo Ibrahim Foundation's" indicators; Amavilah (2009) and Strulik et al. (2013) find that each indicator of governance has a different effect on the economic growth. The World Bank's indicator "rule of law" limits the economic performance, but "Mo Ibrahim Foundation" states that it improves the economic performance.

Moreover, most of the studies also find the relationship between globalization and corruption that is another main indicator of governance. Majeed (2014) contributed in finding the relationship between trade and corruption and the role of policy reforms in determining the linkages between corruption and trade. He finds that it is not only the trade that can decrease or reduce corruption, but significant policy reforms also play a role in reducing the level of corruption. Asongu (2014) also finds whether the globalization is fighting against corruption through human development? In high-income countries, political and social dimensions are more emphasized as they have a significant control over corruption. While in low-income countries, more emphasis is placed on the economic dimension as compared to the political and social dimensions of globalization to increase the international integration which results in low control of corruption.

Through the indirect channel of IPRs (intellectual property rights), Andrés, Asongu, and Amavilah (2015) find the direct relationship between the formal institutions and the K.E (Knowledge

Economy) for the Middle East and North African (MENA) and Sub-Sahara African (SSA) countries. Their study finds that these IPRs are essential, but these are not significant and accurate determinants of the knowledge economy.

The literature on globalization, governance, and the knowledge economy shows the possibility of both positive and negative effects of globalization on governance and the knowledge economy. Most of the existing studies demonstrate a negative impact of globalization on governance and the knowledge economy. However, some of the recent studies have also begun to point out the possibility of the positive relationship between globalization and governance. The present study explores this relationship and empirically tests whether this relationship depends on domestic policy reforms and/or other factors also incorporate.

3. Methodology

In this section, we have considered a variety of estimation issues related to variable and data.

3.1. Theoretical Framework

This study considers that globalization encourages peace and stability that in turn affects the governance. This argument is strong and proven as augmented Solow (1957), Aggregate Production Function where governance (Y_{it}) across countries (i) at any time (t) depending on the predictable factors and production forces (X_{it}) and state the of technology is (A_{it}) $i.e.$,

$$Y_{it} = (X_{it}A_{it})^{\alpha} e^{xp(u_{it})} \qquad (1)$$

We can take the state of technology as

$$A_{it} = A_{i0}e^{xp}(g_t + \beta_i Z_{it})$$

Here we divide the equation by X_j (factor intensive form), by taking natural logarithm it will lead to X_j an intensive form of equation as:

$$\frac{Y_{it}}{X_j} = \frac{X_{it}^{\alpha}}{X_j} A_{i0}^{\alpha} e^{(\alpha gt + \alpha\beta_1 stab + \alpha\beta_2 W_{it})} + V_{it} \qquad (2)$$

where

$$\ln(\frac{Y_{it}}{X_{jt}}) = ln(\frac{X_{it}^{\alpha}}{X_{jt}} A_{i0}^{\alpha} e^{(\alpha gt + \alpha\beta_1 stab + \alpha\beta_2 W_{it})} + V_{it})$$

Since we claim that

$$Stab_{it} = f(glob_{it})$$
$$gov_{it} = f(stab_{it})$$

Hence
$$gov_{it} = f(stab_{it}(f(glob_{it})))$$
We can also write our estimation strategy as:
$$IPI = F(GLOB, x, t) \tag{3}$$
Here 'IPI' represents institutional performance indicators consisting of the knowledge economy, governance, and political stability, 'glob' represents globalization, 'x' shows other explanatory variables and, 't' for the time fixed effect.

3.2. Estimation Technique

For the panel regression model, different models are being introduced which provide the best result under different assumptions. We start with simple best and well-established estimations techniques for panel data that are Fixed Effect Model (FEM) and Random Effect Model (REM).

This study utilizes a panel fixed effects estimation strategy. In this study, endogeneity is tackling through a three-stage process. The impact of hidden variables due to geographical, cultural, and other factors is captured through a fixed effect technique (Oxley & McAleer, 1993; Pesaran, 2006).

Different stages for estimation are as follow.

3.3. First-Stage Regression

$$stab_{it} = \beta_0 + \beta_1(trade)_{it} + \beta_2(FDI)_{it} + \beta_3(glob_{it}) + V_{it} \tag{4}$$

Stability is representing 'Political Stability'. Trade represents trade openness, FDI for "foreign direct investment". From Eq (4), we save fitted values from the estimation process to use in the second regression.[3]

3.4. Second-Stage Regression

In the second stage, our regression is

$$gov_{it} = \beta_0 + \beta_1(to\_stability)_{it} + \beta_2(FDI\_stability)_{it} + \beta_3(glob\_stability_{it}) + \varepsilon_{it} \tag{5}$$

Here 'gov' is representing 'governance'. To-stability and FDI-stability represent trade openness foreign direct investment associated with

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[3] To-stability: trade-influence stability. FDI_ stability: FDI influence stability. Glob_ stability: globalization influence stability.

stability. From Eq (5), nine more variables[4] are generated by regressing the governance indicators on fitted values generated from the first stage.

3.5. Third-Stage Regression

$$KE_{it} = \beta_0 + \beta_1(to\_stab\_EG)_{it} + \beta_2(FDI\_stab\_EG)_{it} + \beta_3(glob\_stab\_EG)_{it} + \beta_4(to_{stab_{IG}})_{it} + \beta_5(FDI\_stab\_IG)_{it} + \beta_6(glob\_stab\_IG)_{it} + \beta_7(to\_stab\_IG)_{it} + \beta_8(FDI\_stab\_GG)_{it} + \beta_9(glob\_stab\_GG)_{it} + \beta_{10}x_{it} + \varepsilon_{it} \qquad (6)$$

Here 'KE' is representing 'knowledge economy' representing "Education" and "Information and Communication Technology". On the right-hand side, there are variables of Trade, FDI and globalization related to stability influenced by governance indicators, and X represents the vector of other variables.

Here:

$i = 1, 2, 3 \ldots N$

N is different for all regions as different regions have different numbers of countries. The total number of countries included in our study is 198.

$t = 1996 \ldots 2016$.

We have taken the data for 20 years for all countries from 1996 to 2016.

3.6. Construction of Model

This section provides a clear understanding related to the construction of all the models that how all independent variables are regressed on the dependent variable individually.

$$\text{stab}_{it} = \beta_0 + \beta_1(trade)_{it} + \beta_2(FDI)_{it} + \beta_3(glob_{it}) + V_{it} \quad (4)$$

We construct two models in the first model, stability is taken as the dependent variable and the impact of trade is taken as the dependent variable.

To_stab_EG: trade induced stability associated with economic governance. FDI_stab_EG: FDI induced stability associated with economic governance. Glob_stab_Eg: Globalization influenced stability associated with economic governance. To_stab_IG: trade induced stability associated with institutional governance. FDI_stab_IG: FDI induced stability associated with Institutional governance. Glob_stab_IG: Globalization influenced stability associated with institutional governance. To_stab_GG: trade induced stability associated with general governance. FDI_stab_GG: FDI induced stability associated with general governance. Glob_stab_GG: Globalization induced stability associated with general governance.

$$\text{stab}_{it} = \beta_0 + \beta_1 tra_{it} + V_{it} \qquad (4.1)$$
$$\text{stab}_{it} = \beta_0 + \beta_1 FDI_{it} + V_{it} \qquad (4.2)$$
$$\text{stab}_{it} = \beta_0 + \beta_1 glob_{it} + V_{it} \qquad (4.3)$$

In the second model, governance is taken as the dependent variable. Impact of fitted values from the first regression is regressed on governance indicators.

$$gov_{it} = \beta_0 + \beta_1(tra\_stab)_{it} + \beta_2(FDI\_stab)_{it} + \beta_3(glob\_stab)_{it} + \varepsilon_{it} \qquad (5)$$

Governance variable is further divided into subcategories that are economic governance, institutional governance, and general governance. After constructing the sub-categories, the fitted values from the first regression are regressed individually on each of the governance indicators.

For Economic Governance

Here, each of the focused and control variables is regressed on the dependent variable that is economic governance. Trade influenced stability, FDI influenced stability, and globalization influenced stability variables are regressed on the economic governance in the following equations:

$$Eco\ gov_{it} = \alpha_0 + \alpha_1(tra\_stab)_{it} + \varepsilon_{it} \qquad (5.1)$$
$$Eco\ gov_{it} = \beta_0 + \beta_1(FDI\_stab)_{it} + \varepsilon_{it} \qquad (5.2)$$
$$Eco\ gov_{it} = \gamma_0 + \gamma_1(glob\_stab)_{it} + \varepsilon_{it} \qquad (5.3)$$

For Institutional Governance

Trade influenced stability, FDI influenced stability, and globalization influenced stability variables are regressed on the institutional governance in the following equations:

$$Ins\ gov_{it} = \alpha_0 + \alpha_1(tra\_stab)_{it} + \varepsilon_{it} \qquad (5.4)$$
$$Ins\ gov_{it} = \beta_0 + \beta_1(FDI\_stab)_{it} + \varepsilon_{it} \qquad (5.5)$$
$$Ins\ gov_{it} = \gamma_0 + \gamma_1(glob\_stab)_{it} + \varepsilon_{it} \qquad (5.6)$$

For General Governance

Trade influenced stability, FDI influenced stability, and globalization influenced stability variables are regressed on the general governance in the following equations:

$$Gen\ gov_{it} = \alpha_0 + \alpha_1(tra\_stab)_{it} + \varepsilon_{it} \qquad (5.7)$$

$$Gen\ gov_{it} = \beta_0 + \beta_1(FDI\_stab)_{it} + \varepsilon_{it} \qquad (5.8)$$
$$Gen\ gov_{it} = \gamma_0 + \gamma_1(glob\_stab)_{it} + \varepsilon_{it} \qquad (5.9)$$

In the third stage, nine more variables were generated from the second stage estimations. These variables are regressed on the knowledge economy indicators. Knowledge economy indicators are "Education" and "information and communication technology".

$$KE_{it} = \beta_0 + \beta_1(to\_stab\_EG)_{it} + \beta_2(FDI\_stab\_EG)_{it} +$$
$$\beta_3(glob\_stab\_EG)_{it} + \beta_4(to\_stab\_IG)_{it} +$$
$$\beta_5(FDI\_stab\_IG)_{it} + \beta_6(glob\_stab\_IG)_{it} +$$
$$\beta_7(to\_stab\_GG)_{it} + \beta_8(FDI\_stab\_GG)_{it} +$$
$$\beta_9(glob\_stab\_GG)_{it} + \beta_{10}x_{it} + \varepsilon_{it} \qquad (6)$$

The knowledge economy is further divided in its two pillars that are "*Education*" and "*information and communication technology*" that is associated with economic governance, institutional governance and general governance.

$$Education_{it} = \beta_0 + \beta_1(to\_stab\_EG)_{it} + \beta_2(FDI\_stab\_EG)_{it} +,$$
$$\beta_3(glob\_stab\_EG)_{it} + \beta_4(to\_stab\_IG)_{it} + \beta_5(FDI\_stab\_IG)_{it} +$$
$$\beta_6(glob\_stab\_IG)_{it} + \beta_7(to\_stab\_GG)_{it} +$$
$$\beta_8(FDI\_stab\_GG)_{it} + \beta_9(glob\_stab\_GG)_{it} + \beta_{10}x_{it} + \varepsilon_{it} \quad (6A)$$

We can write the above eq 3.19 in subcategories:

In Term of Economic Governance

Trade influenced stability, FDI influenced stability, and globalization influenced stability variables are regressed on the economic governance in the following equations:

$$Education_{it} = \alpha_0 + \alpha_1(to\_stab\_EG)_{it} + \alpha_2x_{it} + \varepsilon_{it} \qquad (6.1)$$
$$Education_{it} = \beta_0 + \beta_1(FDI\_stab\_EG)_{it} + \beta_2x_{it} + \varepsilon_{it} \qquad (6.2)$$
$$Education_{it} = \gamma_0 + \gamma_1(glob\_stab\_EG)_{it} + \gamma_2x_{it} + \varepsilon_{it} \qquad (6.3)$$

In Term of Institutional Governance

Trade influenced stability, FDI influenced stability, and globalization influenced stability variables are regressed on the institutional governance in the following equations:

$$Education_{it} = \alpha_0 + \alpha_1(to\_stab\_IG)_{it} + \alpha_2x_{it} + \varepsilon_{it} \qquad (6.4)$$
$$Education_{it} = \beta_0 + \beta_1(FDI\_stab\_IG)_{it} + \beta_2x_{it} + \varepsilon_{it} \qquad (6.5)$$
$$Education_{it} = \gamma_0 + \gamma_1(glob\_stab\_IG)_{it} + \gamma_2x_{it} + \varepsilon_{it} \qquad (6.6)$$

In Term of General Governance

Trade influenced stability, FDI influenced stability, and globalization influenced stability variables are regressed on the general governance in the following equations:

$$Education_{it} = \alpha_0 + \alpha_1(to\_stab\_GG)_{it} + \alpha_2 x_{it} + \varepsilon_{it} \qquad (6.7)$$
$$Education_{it} = \beta_0 + \beta_1(FDI\_stab\_GG)_{it} + \beta_2 x_{it} + \varepsilon_{it} \qquad (6.8)$$
$$Education_{it} = \gamma_0 + \gamma_1(glob\_stab\_GG)_{it} + \gamma_2 x_{it} + \varepsilon_{it} \qquad (6.9)$$

Another category of the knowledge economy is information and communication technology that can be written as follow:

$$ICTX_{it} = \beta_0 + \beta_1(to\_stab\_EG)_{it} + \beta_2(FDI\_stab\_EG)_{it} + \beta_3(glob\_stab\_EG)_{it} + \beta_4(to\_stab\_IG)_{it} + \beta_5(FDI\_stab\_IG)_{it} + \beta_6(glob\_stab\_IG)_{it} + \beta_7(to\_stab\_GG)_{it} + \beta_8(FDI\_stab\_GG)_{it} + \beta_9(glob\_stab\_GG)_{it} + \beta_{10} x_{it} + \varepsilon_{it} \qquad (6B)$$

We can rearrange above eq. 3.20 into the following subcategories:

In Term of Economic Governance

Trade influenced stability, FDI influenced stability, and globalization influenced stability variables are regressed on the economic governance in the following equations:

$$ICTX_{it} = \alpha_0 + \alpha_1(to\_stab\_EG)_{it} + \alpha_2 x_{it} + \varepsilon_{it} \qquad (6.1)$$
$$ICTX_{it} = \beta_0 + \beta_1(FDI\_stab\_EG)_{it} + \beta_2 x_{it} + \varepsilon_{it} \qquad (6.2)$$
$$ICTX_{it} = \gamma_0 + \gamma_1(glob\_stab\_EG)_{it} + \gamma_2 x_{it} + \varepsilon_{it} \qquad (6.3)$$

In Term of Institutional Governance

Trade influenced stability, FDI influenced stability, and globalization influenced stability variables are regressed on the institutional governance in the following equations:

$$ICTX_{it} = \alpha_0 + \alpha_1(to\_stab\_IG)_{it} + \alpha_2 x_{it} + \varepsilon_{it} \qquad (6.4)$$
$$ICTX_{it} = \beta_0 + \beta_1(FDI\_stab\_IG)_{it} + \beta_2 x_{it} + \varepsilon_{it} \qquad (6.5)$$
$$ICTX_{it} = \gamma_0 + \gamma_1(glob\_stab\_IG)_{it} + \gamma_2 x_{it} + \varepsilon_{it} \qquad (6.6)$$

In Term of General Governance

Trade influenced stability, FDI influenced stability, and globalization influenced stability variables are regressed on the economic governance in the following equations:

$$ICTX_{it} = \alpha_0 + \alpha_1(to\_stab\_GG)_{it} + \alpha_2 x_{it} + \varepsilon_{it} \qquad (6.7)$$

$$ICTX_{it} = \beta_0 + \beta_1(FDI\_stab\_GG)_{it} + \beta_2 x_{it} + \varepsilon_{it} \qquad (6.8)$$

$$ICTX_{it} = \gamma_0 + \gamma_1(glob\_stab\_GG)_{it} + \gamma_2 x_{it} + \varepsilon_{it} \qquad (6.9)$$

3.7. Principal Component Analysis

The Principal Component Analysis is used to minimize a large number of highly correlated variables into smaller uncorrelated principal components (PCs) that hold essential and adequate information same as the primary dataset of the Knowledge Economy and governance indicators (Asongu, 2013; Andrés et al., 2015). This study follows the Kaiser (1974) and Jolliffe (2002) principle for holding the PCs that have eigenvalues more than one.

3.8. Testable Hypothesis

This study takes three steps to validate the intention that globalization influences stability, that affects governance, and hence KE. The first-stage reports globalization induced stability. Through instrumentation process, three outcomes were produced that are trade-induced stability (Trade-Stab), FDI induced stability (FDI-Stab), and globalization induced stability (Glob-Stab).

In the second-stage regression, governance is instrumented with the above three outcomes obtained from the first-stage estimation process. From second stage estimation process, nine more outcomes were obtained: trade, FDI and globalization induced stability in term of economic governance (Eg), institutional governance (Ig) and general governance (Gg).

The third stage estimation process deals with the relationship of the KE and the governance indicators. At last, the whole estimation process diminishes to the subsequent hypotheses:

Hypothesis 1. Globalization induced from stability is associated with governance that effects the Knowledge Economy (KE) in terms of Education. Hypothesis 2. Globalization induced from stability is associated with governance that affects the Knowledge Economy in terms of Information and Communication Technology (ICT).

3.9. Variables and Data

We have taken global data from 198 countries. Some countries were excluded due to the absence of data. Data is taken from the World Development Indicators (WDI) for the period of 1996 to 2016. We

have limited data to that period because data for stability is only available from 1996.

Most of the data of our study are taken from the World Development Indicators (WDI) and World Governance Indicators (WGI). Main variables of our study like governance and stability are taken from WGI and other macro-economic variables are taken from WDI. Main variables of our study are the indicators of governance, globalization, stability, and the Knowledge Economy (see Table 1). The knowledge economy variables are taken from the World Development Indicators (WDI) and the stability variable is taken from the World Governance Indicator (WGI).

Table 1 describes the main variables, data, and sources. Definition of additional variables is in the table footnotes. Main variables of the study are: Panel A shows the indicators of Knowledge Economy (KE), Panel B for governance, Panel C represents political stability, Panel D denotes the globalization, and Panel E represents the control variables. Table 2 represents the summary statistics of all the variables used in this study while table 3 and table 4 represent the principal component analysis of the Knowledge Economy and governance indicators.

Knowledge Economy

In table 2, principal components of the knowledge economy are given for which eigenvalues are greater than one.

Governance Indicators

As governance is defined in three different aspects which are economic, institutional and political governance. Here we are taking economic, institutional and general aspects of governance as Political Governance (PS) that is taken as stability which will be used at the first stage. Economic governance (Eg) is the sum of government effectiveness (GE) and regulation quality (RQ) while institutional governance (Ig) is a composite of control of corruption (COC) and rule of law (ROL). While general governance (Gg) is the sum of government effectiveness (GE), regulation quality (RQ), control of corruption (COC), rule of law (ROL) and voice and accountability (VAC).

Table 1: Description of Variables

	No.	Variable	Denoted by	Measured in	Sources	Transformation
PANEL A	1	Primary, secondary and tertiary school enrollment	Edutex	% of gross	WDI (2017)	Ln
	2	Internet users, mobile cellular subscriptions, telephone subscriptions	ICTX	Per 100 people, % of the population	WDI (2017)	Ln
PANEL B	3	Government effectiveness, regulation quality	Economic governance	Estimate	WGI (2017)	Estimates
	4	Rule of law, control of corruption	Institutional Governance	Estimate	WGI (2017)	Estimates
	5	Government effectiveness, regulation quality, Rule of law, control of corruption, voice and accountability	General governance	Estimate	WGI (2017)	Estimates
PANEL C	6	Political stability	Ps	Estimate	WGI (2017)	Estimates
PANEL D	7	Trade openness	Trade	% of GDP	WDI (2017)	Ln
	8	Foreign direct investment, net inflows	FDI	% of GDP	WDI (2017)	Ln
	9	Globalization	Glob	Index	KOF Swiss Economic Institute	Index
PANEL E	10	Inflation, GDP deflator: linked series	Inf	annual %	WDI (2017)	Ln
	11	GDP growth	Ggdp	annual %	WDI (2017)	Ln
	12	Net acquisition of financial assets	F Assets	% of GDP	WDI (2017)	Ln
	13	Urban population growth	Upopg	annual %	WDI (2017)	Ln
	14	Unemployment, total	Unem	% of the total labor force	WDI (2017)	Ln

Note: WDI: World Development Indicators. WGI: World Governance Indicators. PCA: Principal Component Analysis. Edutex Is The Principal Component of Primary, Secondary And Tertiary School Enrolments. ICTX: Principal Component Of Mobile subscriptions, Telephone subscriptions, and Internet users. Governance variables with higher values show better governance conditions.

Table 2: Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min.	Max.
Corruption	3478	-0.045	0.987	-1.869	2.470
Governance	3471	-0.037	0.987	-2.446	2.437
P.stability	3493	-0.044	0.994	-3.315	1.962
Reg. quality	3471	-0.034	0.990	-2.645	2.261
Rule of law	3527	-0.049	0.987	-2.606	2.100
Voice & Acc.	3521	-0.044	0.996	-2.313	1.801
Pri. School	3225	4.604	0.188	3.078	5.110
Sec. school	2736	4.230	0.554	1.651	5.099
Ter. School	2401	3.038	1.181	-1.640	4.803
Internet user	3955	1.840	2.374	-9.132	4.588
Mob. Cellular	3948	13.820	3.011	2.996	21.034
Tel. subscript	4067	12.883	2.425	6.488	19.723
Globalization	3825	3.999	0.350	1.903	4.589
Trade	3789	4.356	0.613	-3.616	6.758
FDI	3576	0.979	1.451	-12.252	6.145
Inflation	3936	9.185	91.020	-31.566	5399.5
GDP growth	3452	1.320	0.888	-4.706	5.011
Unemployment	2440	1.920	0.789	-1.966	4.086
Financial asset	1049	0.387	1.450	-9.000	5.464
Population	3663	0.560	1.005	-7.813	2.869

Table 3: PCA for the Knowledge Economy (KE) Indicators

KE components	Variables	Component matrix			Eigen Value	Indexes
Education	School Enrollment	PSE 0.431	SSE 0.650	TSE 0.626	2.1311	Edutex
Information and communication technology	ICTX	Int 0.502	Mbl 0.645	Tel 0.576	2.0837	ICTX

Note: PSE: Primary School Enrolment, SSE: Secondary School Enrolment.
TSE: Tertiary School Enrolment.

Stability and the Control Variables

Stability is used at the first stage. We have included inflation, population growth, GDP growth, net acquisition of financial assets and unemployment as control variables.

At the first stage regression, trade and FDI are used as a measure of globalization that is associated with stability. At the second stage regression, stability is associated with governance individually (economic governance, institutional governance, and general governance). In the last regression fitted values of the second stage,

regression is associated with the knowledge economy. Our analysis finds a negative and positive correlation among globalization, stability, governance, and the knowledge economy.

Table 4: PCA for the Governance (Gov) Indicators

Governance Dimensions		Component matrix					Eigen Value
Eg	Eg	Government effectiveness		Regulation quality			1.93275
		0.7071				0.7071	
Ig	Ig	ROL				COC	1.94145
		0.714				0.714	
Gg	Gg	COC	GE	RQ	ROL	VAC	5.07989
		0.4231	0.4246	0.4166	0.4339	0.3853	

Note: PC: Principal Component.

Other control variables that are used in the study are inflation, GDP growth, net acquisition of financial assets, population growth and unemployment rate. Data for these variables are taken from the World Development Indicator (WDI, 2017).

5. Results

5.1. First- and Second-Stage

Results of the first and the second stage estimation are reported in table 5. Panel A shows the negative effects of trade and the positive effect of FDI on political stability. In the second stage, trade-induced stability has a more negative impact on governance indicator as compared to FDI-induced stability as it has a positive effect.

At the first stage, fitted values of the estimation process were saved to use in the second regression. In Panel B, three fitted values are used for regression that is taken from the first regression that is trade influenced stability, FDI influenced stability and globalization influenced stability.

Panel B shows the results of the second regression in which the dependent variable is governance. Governance variable is decomposed into further three categories that are economic governance (Eg), institutional governance (Ig), and general governance (Gg). In panel B, trade openness influenced stability is regressed on economic governance, institutional governance, and general governance. Trade influenced stability variable has a negative but significant impact on the economic, institutional and general governance.

Table 5: Estimate from Fixed Effect Model: Dependent Variable for Panel A (Political Stability), Panel B (Economic Governance), Panel C (Institutional Governance) and Panel D (General Governance)

	First Stage Regression						Second Stage Regression					
	Panel A			Panel B			Panel C			Panel D		
Regressors	Political Stability			Economic Governance			Institutional Governance			General Governance		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Trade openness	-0.0363* (0.0205)											
FDI		0.0137*** (0.00619)										
Globalization			-0.0553* (0.0282)									
To-stability				-9.019*** (1.233)			-7.357*** (1.103)			-7.409*** (1.094)		
Fdi-stability					1.196*** (0.251)			0.674*** (0.223)			0.689*** (0.229)	
Glob-stability						-2.859*** (0.862)			-0.467* (0.762)			-0.602* (0.757)
Constant	0.110* (0.0896)	-0.0953*** (0.0088)	0.144* (0.113)	-0.395*** (0.0577)	0.0835*** (0.0172)	-0.176*** (0.0510)	-0.336*** (0.0516)	0.0163** (0.0153)	-0.0525 (0.0451)	-0.338*** (0.0511)	0.0210** (0.0156)	-0.0584* (0.0448)
N	3224	3060	3238	3224	3063	3244	3230	3068	3251	3206	3051	3223
						Diagnostic Check						
R²	0.19	0.21	0.16	0.17	0.18	0.14	0.15	0.13	0.18	0.15	0.13	0.17
F	3.147	4.894	3.842	53.53	22.69	11.00	44.45	9.165	0.375	45.90	9.078	0.633

Note: Parenthesis include the standard error. *, ** and *** show level of significance at 10%, 5% and 1% respectively.

FDI influenced stability variable has a positive and significant impact on the economic, institutional and general governance. In panel B, FDI influenced stability is regressed on economic governance. Panel D of the above table shows that FDI influenced stability still has a positive and significant effect on general governance.

In the last, globalization influenced stability is regressed on the economic, institutional and general governance. In the above table, panel B shows that globalization influenced stability variable that has a negative but significant impact on the economic, institutional and general governance. Panel D of the above table shows that globalization influenced stability that still negatively affects general governance. Our results are consistent with the study of Choong (2012); Amavilah Asongu, and Andrrs (2014); and Anyanwu (2012). Results show that if proper policies are adopted that help reduce the trade restrictions then it will help in improving the stability conditions of the economy.

5.2. Third-Stage Regressions

In the second stage, the fitted values were saved from the estimation process to use in the third regression by regressing the fitted values on the governance indicators and generating nine variables to use.

In the table (6), education is the first pillar of the knowledge economy that is used as the dependent variable. Results of our first hypothesis for the study is that education indirectly influences the knowledge economy through the channel of globalization that affects political stability that further affects governance are reported in the following table. The hypothesis of the study is recognized across the conditions. Positive signs are reliable with perception and forecasts of economic theory. In line with weight and significance, an effect of trade-influenced stability, FDI-influenced stability, and globalization-influenced stability on economic governance are weakest as compared to the effects of institutional and general governance. Table (6) shows that coefficients of trade-influenced stability, FDI-influenced stability, and globalization-influenced stability are greater in the case of institutional governance as compared to economic and general governance. This study finds the mixed impact of trade, FDI, and globalization-induced stability on governance and the KE, depending upon how these indicators are explained.

Table 6: Stage 3/ Fixed Effect Estimations / Dependent Variable Knowledge Economy (Education)

Regressors	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
To-stability-EG	6.006*** (0.818)								
FDI-stability-EG		3.124*** (1.120)							
Glob-stability-EG			2.913*** (0.712)						
To-stability-IG				7.419*** (1.010)					
FDI-stability-IG					5.523*** (1.980)				
Glob-stability-IG						11.46*** (2.802)			
To-stability-GG							7.373*** (1.004)		
FDI-stability-GG								5.399*** (1.935)	
Glob-stability-GG									9.510*** (2.325)
Diagnostic check									
Inflation	-0.0054*** (0.0018)	-0.0025* (0.002)	-0.0018* (0.002)	-0.0054*** (0.0018)	-0.0025* (0.002)	-0.0018* (0.002)	-0.0054*** (0.0018)	-0.0025* (0.002)	-0.0018* (0.002)
GDP growth	-0.074*** (0.0156)	-0.094*** (0.0181)	-0.081*** (0.0176)	-0.074*** (0.0156)	-0.094*** (0.0181)	-0.081*** (0.0176)	-0.074*** (0.0156)	-0.094*** (0.0181)	-0.081*** (0.0176)
Unemployment	-0.138*** (0.0375)	-0.0945** (0.0418)	-0.09** (0.0413)	-0.138*** (0.0375)	-0.0945** (0.0418)	-0.09** (0.0413)	-0.138*** (0.0375)	-0.0945** (0.0418)	-0.09** (0.0413)
F.Assets	-0.0045 (0.0118)	0.004 (0.0136)	0.0096 (0.0131)	-0.0045 (0.0118)	0.004 (0.0136)	0.0096 (0.0131)	-0.0045 (0.0118)	0.004 (0.0136)	0.0096 (0.0131)
Ur-pop-growth	-0.0478 (0.0305)	-0.0477 (0.0345)	-0.0353 (0.0342)	-0.0478 (0.0305)	-0.0477 (0.0345)	-0.0353 (0.0342)	-0.0478 (0.0305)	-0.0477 (0.0345)	-0.0353 (0.0342)
Constant	0.764*** (0.0767)	0.644*** (0.0868)	0.665*** (0.0862)	0.776*** (0.0769)	0.742*** (0.0986)	0.868*** (0.107)	0.760*** (0.0767)	0.718*** (0.0946)	0.881*** (0.109)
N	317	313	313	317	313	319	317	313	319
R²	0.301	0.245	0.269	0.301	0.245	0.269	0.301	0.245	0.269
F	16.99	6.640	8.094	16.99	6.640	8.094	16.99	6.640	8.094

Note: Parenthesis include the standard error. *, ** and *** show level of significance at 10%, 5% and 1% respectively.

The association between them has different strength. Moreover, interpretation of such findings can be as meaning the determinations for KE in these regions are genuine and attainable if these regions endure involving in types of globalization that affects stability, and leads to encouraging governance. The results are inspiring as positive effect offsets the negative one, and these results also explain why globalization has a two-way effect as it positively affects political stability while it also increases poverty and inequality. This type of interpretation is consistent with the study of Kremer's (2006) uncertainty related to the net benefit of globalization for the developing countries.

Our results find that trade influenced stability, FDI influenced stability and globalization influenced stability positively and significantly affect economic, institutional and general governance in terms of education.

Fixed Effect Estimations for Knowledge Economy (ICTX)

In the second hypothesis, political stability from globalization is associated with governance that affects KE in terms of ICT. Table (7), estimates are significant and are with expected signs that are consistent with understanding and theoretical perceptions. Effects of FDI-influence stability on institutional governance are positive and significant but are lowest with reference to Economic Governance. The impact of FDI-influence stability on general governance falls in-between economic governance and institutional governance.

In the table (7), ICT is the second pillar of the knowledge economy that is used as the dependent variable. Results of our second hypothesis for the study is that ICT indirectly influences the knowledge economy through the channel of globalization that affects stability that resultantly affects governance are reported in the following table. In line with weight and significance, the effect of trade-influenced stability, FDI-influenced stability, and globalization-influenced stability on economic governance are not stronger as compared to the effects of institutional and general governance.

Whereas, table (7) shows that coefficients of trade-influenced stability, FDI-influenced stability, and globalization-influenced stability are greater in the case of institutional governance as compared to economic and general governance.

Table 7: Stage 3/ Fixed Effect Estimations / Dependent Variable Knowledge Economy (ICTX)

Regressors	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
To-stability-EG	8.202*** (1.247)								
FDI-stability-EG		6.737*** (1.496)							
Glob-stability-EG			5.134*** (1.090)						
To-stability-IG				10.13*** (1.540)					
FDI-stability-IG					11.91*** (2.646)				
Glob-stability-IG						20.20*** (4.289)			
To-stability-GG							10.07*** (1.531)		
FDI-stability-GG								11.64*** (2.586)	
Glob-stability-GG									16.76*** (3.559)
Inflation	-0.0158*** (0.0029)	-0.0120*** (0.003)	-0.0115*** (0.003)	-0.0158*** (0.0029)	-0.0120*** (0.003)	-0.0115*** (0.003)	-0.0158*** (0.0029)	-0.0120*** (0.003)	-0.0115*** (0.003)
GDP growth	-0.114*** (0.0265)	-0.125*** (0.028)	-0.118*** (0.026)	-0.114*** (0.0265)	-0.125*** (0.028)	-0.118*** (0.026)	-0.114*** (0.0265)	-0.125*** (0.028)	-0.118*** (0.026)
Unemployment	-0.421*** (0.0554)	-0.400*** (0.0574)	-0.369*** (0.0567)	-0.421*** (0.0554)	-0.400*** (0.0574)	-0.369*** (0.0567)	-0.421*** (0.0554)	-0.400*** (0.0574)	-0.369*** (0.0567)
F.Assets	0.0151 (0.0177)	0.0359* (0.0183)	0.0345* (0.018)	0.0151 (0.0177)	0.0359* (0.0183)	0.0345* (0.018)	0.0151 (0.0177)	0.0359* (0.0183)	0.0345* (0.018)
Ur-pop-growth	-0.0629 (0.0490)	-0.0722 (0.0507)	-0.0472 (0.0510)	-0.0629 (0.0490)	-0.0722 (0.0507)	-0.0472 (0.0510)	-0.0629 (0.0490)	-0.0722 (0.0507)	-0.0472 (0.0510)
Constant	1.676*** (0.116)	1.627*** (0.121)	1.645*** (0.124)	1.692*** (0.116)	1.838*** (0.135)	2.004*** (0.163)	1.671*** (0.116)	1.787*** (0.130)	2.027*** (0.166)
N	548	540	546	548	540	546	548	540	546
Diagnostic check									
R^2	0.229	0.189	0.180	0.229	0.189	0.180	0.229	0.189	0.180
F	22.17	17.07	16.27	22.17	17.07	16.27	22.17	17.07	16.27

Note: Parenthesis include the standard error. *, ** and *** show level of significance at 10%, 5% and 1% respectively.

Table (7) shows the results of third stage regression. In the following table, we have regress 9 models which produce different results. Results show that in panel A, trade-influenced stability (associated with economic governance) has a positive significant effect on knowledge economy (KE).

6. Discussion

This study evaluates the linkages between the determinants of Knowledge Economy (KE). First, this study relates globalization with stability, then analyzed that how it is linked to governance and lastly, estimates the impacts of governance on KE. Findings of the study are that as it is justifiable why developing countries are curious regarding globalization. It is understandable that globalization offers assistance to the knowledge economy by enhancing social change through stability. These changes provide effective governance, and it is known that effective governance is also 'good' for the KE.

7. Conclusions

Recent studies and conceptual frameworks have laid the stress to check the relationship between globalization and governance indicators. But there are very few studies in the context of globalization, governance, and knowledge economy. Few studies have contributed in investigating the relationship between globalization and the knowledge economy. In this study, the relationship between globalization on governance is examined through the channel of peace and stability, and also examine its indirect impact on the knowledge economy. The objective of the present study is to investigate the effect of globalization on governance through the channel of peace and stability and its indirect impact on the knowledge economy.

In order to fulfill our purpose, we used the panel global data of seven regions over the period of 1996 to 2016. To investigate the impact of the globalization we estimated the model through the well-established techniques, that are, the fixed effect model and random effect model. It is important to mention that we preferred the result obtained from the fixed effect model on the basis of the Hausman Test.

To check the impact of globalization on governance indicators and the knowledge economy, the key factors for globalization that are

used in the study are trade openness, foreign direct investment, and globalization index. Whereas an index of governance is generated by combining different governance indicators and then dividing it into three dimensions that are; economic governance, institutional governance, and general governance. Another index of education is generated by combining the three variables that are; primary school enrollment, secondary school enrollment, and tertiary school enrollment. An index for information and communication technology is predicted by merging three variables that are; internet users, mobile cellular subscriptions, and fixed telephone subscriptions.

Recent studies found the negative or positive impact of globalization and governance on the knowledge economy. This study shows that globalization-influenced stability can affect both positively and negatively the governance and Knowledge economy in the selected regions in the meantime, contingent upon how these (globalization and governance) are defined.

In this study, results show that there exists a negative relationship between trade and political stability, while a positive relationship exists between foreign direct investment and political stability. This is because, in our sample, more countries are developing and are facing strict restrictions from developed countries. That's why trade is affecting the negatively the political stability of these countries and FDI is affecting it positively. Globalization is also affecting political stability negatively, as there is a major portion of the trade than FDI which makes the globalization affect also negative (Saxegaard, 2006).

The impacts of trade influenced stability, FDI-influenced stability, and globalization-influenced stability associated with institutional governance are greater than the impacts of trade, FDI and globalization-influenced stability associated with economic governance. Impact of trade-influenced stability, FDI-influenced stability, and globalization-influenced stability associated with general governance lie between these two dimensions (economic and institutional governance).

Our empirical findings have the following policy implications:

- Developing countries should engage in such trade negotiations which could contribute to their growth and development.

- Well-developed institutions and sound political system can improve the condition of an economy by expanding the knowledge economy.
- If appropriate policies and measures are taken to lessen the political instability, then globalization can significantly affect the knowledge economy thus paving the way for development.

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