

TRADE, GOVERNANCE AND THE MEDIATING ROLE OF INNOVATION

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Abstract

The purpose of the study is to review the direct and indirect effect of governance and innovation on International Trade and the mediating effect of innovation on the indirect relation between governance and international trade. Simple and multiple regression analysis was used on data from 119 countries to test the simple mediation model in this study. A significant direct relationship is evident between country's governance and innovation as well as between its innovation and trade. But governance indirectly influences international trade as the relation between them is partially mediated by innovation. In this complementary partial mediation, the 65% of positive effect of governance on international trade is through innovation. Consequently, governments should focus on its governance to facilitate innovation in their countries in order to better perform in trade globally. The role of innovation will be high-lightened in paper in shaping the relationship between governance and international trade. Moreover, the nature of influence of governance on international trade was identified in the paper.

Keywords: international Trade, Governance, Innovation, Export, Mediation

JEL Classifications: F18, O31, C30

1. Introduction

The importance of good governance cannot be denied in upholding the investment and business in a country (Klapper, Amit and M. 2010, Busse and Hefeker 2007, Kaufmann, Kraay and Zoido-Lobaton 1999). Governance is the process through which authority is conferred on government, through which they make the rules to govern, and through which those rules are imposed and amended (Mayntz 2003). In this era of globalization, a country's economic progress significantly depends on its involvement in international trade. International trade may take many forms, but the most common form of international trade that governments usually favor is its exports as it is an indication of the nation's competitiveness in global trade and a way to accumulate foreign currency reserves (Shan and Sun 1998). Export occurs when a firm, individual or government of a country sales goods or service produced in that particular country to a firm, individual or government of another country. Another aspect of development is innovation. The contribution of innovation in national economy is significant as study shows, it

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contributes to 65% growth of developing countries and 75% growth of developed countries (Santacreu 2015). Innovation is considered as the creation, adaptation and application of new thoughts, processes, products or services (Baregheh, Rowley and Sambrook 2009).

The major theories on international trade considered the governance and innovation as an influencing factor for international trade and except some theories. But, none of the theories does not considered both governance and innovation as a combined determinant of trade. Even recent studies found that governance of a country is crucial for the development of international trade (Groot, Linders and Rietveld, Institutions, Governance And International Trade: Opening The Black Box Of OECD And GDP Per Capita Effects In Gravity Equations 2005, Berden, Bergstrand and Van Etten 2014). Even it has significant effects on innovation of nation (Pippidi 2015, Moon and Bretschneider 1997). Similar effect of innovation was found on firm level foreign trade, specifically on export (Lages, Silva and Styles 2009, Roper and Love 2002, Golovko and Valentini 2011). Even though, studies found significant influence of governance on innovation, governance on international trade and innovation on international trade, no study was conducted on the collective impact of governance and innovation on international trade. This study will attempt to reveal the answer of three questions. First, what is the combined impact of governance and innovation on trade? Second, what is the distinct nature of impact of each factor on international trade, whether they are direct or indirect relation? Third, whether innovation mediate the effect of governance on international trade?

The purpose of this study is to examine the impact of governance and innovation on international trade. More precisely, this study will to evaluate the direct and indirect effect of governance and innovation on international trade and the mediating effect of innovation on the indirect relation between governance and international trade.

The study will guide governments and other non-government agencies in formulating policies regarding trade, governance and innovation by providing insights on how these variables are related to each other. It will show the importance of innovation in developing international trade of a nations as well as the evidence of governance acting as an instrument in facilitating innovation in a country.

2. Review of Literature

2.1. Innovation and International Trade

The classical free trade theories on international trade identified absolute and comparative advantages of nations as the determinant of their international trade (Ricardo 1891, Smith 1986 [1776]). According to Smith, the advantages a country can have over other countries may be of two categories- natural and acquired. Acquired advantages includes a countries innovation in product and process technology. Afterwards, the factor-proportions theory introduced that the variation in land and capital factor endowments among nations is determinants of their trade (Heckscher 1991). But further study found that innovations in a nation concentrates on industries those use factor endowments which are expensive and this innovation in industry based on rare factor endowment indirectly influence the export (Davidson 1979). The International product life cycle theory suggested that country that invent a product, dominates the international trade of the

product throughout the product's three stages of life cycle except the last stage (Vernon 1992). Likewise, study on SMEs found innovation directly leads to increased export and thus to high growth rate for firms (Golovko and Valentini 2011). Even, the trade performance significantly depends on R&D capabilities of firm (Lefebvre, Lefebvre and Bourgault 1998). Although it indicates the importance of innovation in trade, but earlier empirical evidences in some studies suggested that the theory does not always comply in some cases (Ayal 1991, Mullor-Sebastian 1983). Another study found some evidence of negative relationship of export and scale of innovation activities in firms (Roper and Love 2002). Thus, earlier studies except a few, conforms that the innovation has a significant influence on international trade.

2.2. Governance and International Trade

Studies considering the individual dimensions of governance found mixed effects on trade. In this section the outcomes of some of these are discussed. The importance of governance on trade cannot be denied as institutional quality, as an outcome of good governance, has significant influence on trade (Anderson and Marcouiller 2002, H. L. Groot, G. J. Linders, et al. 2003, Groot, Linders and Rietveld 2005, Linders, et al. 2005, C., et al. 2018). Similarly, corruption, in absence of good governance, has reverse effect on trade (Torrez 2002, Thede and Gustafson 2012, Ali and Mdhilat 2015, Wang, LI and Wang 2018). On contrary, the finding of studies focused on the relationship between trade and corruption may vary based on the category of the country (Wang, LI and Wang 2018, Roy 2014) or may depends on the methodology of the study (Knack 2003) or even in some cases have found insignificant relation (Abdella, Naghavi and Yin Fah 2018). Another dimension of governance is political stability. Political stability found to be beneficial for country's economic, trade and investment growth (Muhammad, D'Souza and Amponsah 2011). Another study on political stability found it as a factor decreasing international trade of nations (Berden, Bergstrand and Van Etten 2014). Therefore, the effect of governance on trade vary, depending on the dimensions and the type of country on which the study was conducted.

The classical mercantilism theory of international trade supported the role of government in creating barriers to countries import and supporting export to maximize the reserve (Vaggi and Groenewegen 2016). Albeit, it support the role of trade policies in influencing the trade, but ignored the role of aggregate governance, which includes not only policies but also factors like- corruption, rule of law, political stability and so on. Some studies even disbelief that high level of governance has a positive effect on trade (Decker and Lim 2007, Li and Reuveny 2003, Tavares 2007). Consequently, the effect of overall governance on trade may not be significant.

An indirect relationship between governance and international trade of nations may be exist, which explain the presence of insignificant direct relationship between these two factors. People's tendency to engage in invention depends on the availability of government support. Consequently, a country with good governance will upsurge the innovation. Furthermore, product and production innovation of a country will increase the demand of its products in global market, which in turn, will increase the volume of trade. Finally, if governance can create an environment where innovation can flourish, the

nation's capability to trade will improve. The foregoing argument proposes that the relationship between governance and trade is probably indirect and this indirect relation is probably mediated by innovation. Based on which, the three hypotheses are proposed below:

Hypothesis 1: There is significant positive relationship between Governance and International Trade.

Hypothesis 2: The relationship between governance and international trade is significantly indirect.

Hypothesis 3: The relationship between Governance and International Trade is mediated by Innovation.

3. Methodology

The study is conducted based on a cross sectional data of the year 2017, collected from different secondary sources like-the World Bank, Cornell University, INSEAD, the WIPO, The United Nations, The World Intellectual Property Organization and Transparency International. Primarily 188 countries, covered by world governance indicator project of World Bank, are selected for the study. Later, Judgmental sampling method is used to select 119 country cases based on two criteria: availability of data and data normality. Country cases with complete data on governance, innovation and trade indicators are considered for the study.

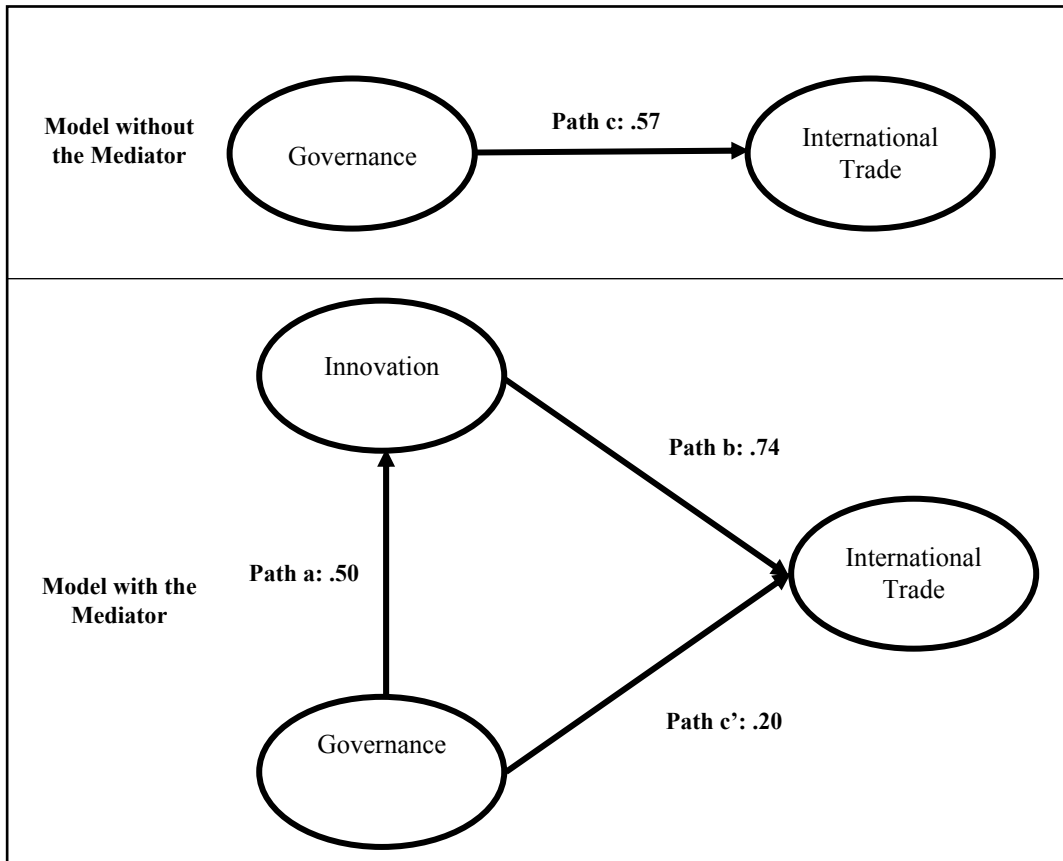
Table no. 1 Country distribution by continents

Subcontinent	Number of countries
Asia	33
Europe	40
Africa	24
North and South America	19
Oceania	3
Total	119

Some country cases are deducted from the list as they were outliers in the dataset. Some basic information about the selected countries are given in the table 1 and the name of countries are given in the appendix A.

3.1. Measurement Variables

The model of the study is shown in **Figure 1**. The model consists of one exogenous paradigm (Governance) and two endogenous paradigms (Innovation and International Trade). Governance was measured by the mean value of five factors: Political Stability (X1), Regulatory Quality (X2), Control of Corruption (X3), Government Effectiveness (X4), and Rule of Law (X5). Innovation by the mean value of three factors: Global Innovation index (Y1), Research and Development Expenditure as Percentage of GDP (Y2), Patent application by Residents (Y3); Trade by one factor: Export (Y4).

Figure no. 1 Proposed and tested model of mediation

Political Stability, Regulatory Quality, Control of Corruption, Government Effectiveness and Rule of Law factors are indexes developed by World Bank measured on a scale between -2.5 (weak) to 2.5 (Strong). Global Innovation Index is annually published by Cornell University, INSEAD, and the World Intellectual Property Organization. It is measured on scale of 0 to 100. Research and Development Expenditure as Percentage of GDP was collected from the World Bank. It includes capital and current expenses in the four key areas: Business enterprise, Government, Higher education and Private non-profit. R&D covers basic research, applied research, and experimental development. The Patent Application by Residents was sourced from the World Intellectual Property Organization. Globally patent applications are submitted through the Patent Cooperation Treaty procedure or with a national patent office for exclusive rights for an invention. A patent offers security for the invention to the proprietor of the patent for a limited period, generally 20 years. The World Bank provides Export data annually, which includes export value of goods and services of countries and measured in billion USD.

3.2. Data Analysis

The IBM SPSS Statistics 23 software package was used to analyze the model. In the beginning, the assumptions of the model were tested. Data were log transformed to achieve normality. Then, The normality and variability of data were checked. In this regard, the Shapiro-Wilk and Kolmogorov-Smirnov test and Q-Q plots and Histograms were used to check the normality of variables. Skewness and Kurtosis were also be verified to check the normality of the samples. Afterwards, independence of samples were checked to verify the randomness of data set. Linearity and Homoscedasticity were tested to found out the correlation between variables and the homogeneity of variance. As a final point, multicollinearity was tested to find out whether independent variables in the model are correlated.

In order to assess hypotheses, simple linear regression and multiple linear regression between the variables were used. The mediation model was tested by using regression analysis (Baron and Kenny 1986, Hopwood 2007).

4. Results

To test the assumptions of the model, a series of tests were conducted. First, the samples of study were approximately normally distributed. All the samples showed $p > .05$ both in Shapiro-Wilk's (Shapiro 1965, Razali 2011) and Kolmogorov-Smirnov's (Goodman 1954, Lilliefors 1968, Rosenthal 1968) tests as well as normal Q-Q plots and histograms as shown in appendix B (Ghasemi 2012). The export, governance and innovation of countries had skewness of .011 (SE=.223), -.290 (SE=.223) & .271 (SE=.223) and kurtosis of -5.67 (SE=.442), -3.68 (SE=.442) & -.301 (SE=.442) respectively (D. Cramer 1998, D. & Cramer 2004, Doane 2011). Subsequently, The Durbin-Watson test for independence of sampling scores 2.153, where it should be in between 1.5 to 2.5 to be considered non-autocorrelated (Durbin 1950). In case of Linearity, the correlation between Export & Governance and Export & Innovation is not zero as suggested by the scatterplots in appendix C, indicating a linear relation between the pairs of variables. Later, the scatterplot, given in Appendix D between Regression Standardized Residual and Regression Standardized Predicted Values of the three regression model shows non violation of Homoscedasticity (Pryce 2002). Finally, to test the multicollinearity, we found tolerance value $> .1$ and $VIF < 10$ (Belsley, Kuh and Welsch 1980, Goldberger 1991, Hill and Adkins 2001). The R^2 value of the overall regression model is 0.73, indicating a substantial model fit. (Hair, et al. 2014, Chin 1998, Cohen 1992).

Three hypotheses to be tested were recommended to evaluate the direct and indirect effect of governance and innovation on International Trade and the mediating effect of innovation on the indirect relation between governance and international trade. The first hypothesis projected, significant direct positive relationship between Governance and International Trade. It was tested by using a simple linear regression with governance as an independent variable and international trade as the dependent variable. As shown in table 2, the result supported the hypothesis, where, $b=0.57$, $t(116) = 7.47$, $p < .001$. A moderate regression model was found, $F(1,116) = 55.84$, $P < .001$, with $R^2 = .32$ (Cohen 1992). It verifies that one unit increase in governance will have a significant positive improvement in international trade by 0.57 unit.

Baron and Kenny (1986), Judd and Kenny (1981) and James and Brett (1984) advocated a four steps approach to conform a mediation (shown in figure 1): a. the independent (governance) variable significantly influence dependent (international trade) variable (Path c), already established with the acceptance of first hypothesis; b. the independent (governance) variable significantly influence mediating (innovation) variable (Path a); c. mediating (innovation) variable significantly influence the dependent (international trade) variable (Path b); d. In order to be a full mediation, the initially significant relationship between the independent (governance) and dependent (international trade) variable must become insignificant when the mediator role accounted in the process. The mediation will be partial mediation, if the relation still remains significant, but effect size reduces. If none of these two happens, it will means no mediation in the relationship. The table 2 and figure 1 summarizes the results of set of regression tests in order to verify the second and third hypothesis.

Table no. 2 Coefficients of mediating effects

Testing Paths	B	SE(B)	95% CI	β	SP ²
Path c: DV= International Trade					
R ² =.32, F(1,116)= 55.84, P<.001					
IV= Governance	1.89	.25	1.39,2.39	.57	.33%
Path a: DV= Innovation					
R ² =.25, F(1,116)= 39.03, P<.001					
IV= Governance	1.19	.19	.82,1.57	.50	.70%
Path b and c': DV=International Trade					
R ² =.73, F(2,115)= 157.23, P<.001					
IV= Governance(c')	.66	.19	.30,1.03	.20	.03%
IV= Innovation(b)	1.03	.08	.88,1.18	.74	.41%
Total indirect effect (a)*(b)				.37	
P _M = [$\frac{\text{Total indirect effect (a*b)}}{\text{total effect (a*b+c')}}$]				65%	

First, a simple linear regression was conducted considering governance as independent variable and innovation as dependent variable, where $b=0.50$, $t(116)=6.25$, $p<.001$. A substantial regression model was found, $F(1,116)=39.02$, $P<.001$, with $R^2=.25$ (Cohen 1992). The result shows a significant effect of governance on innovation as one unit rise in governance will improve.50 unit in innovation. It approves the second condition for mediation.

Finally, a multiple linear regression was conducted considering international trade as dependent variable and governance and innovation as independent variable. A significant regression model was found, $F(1,117)=157.23$, $P<.001$, with $R^2=.73$ (Hair, et al. 2014, Cohen 1992). The outcomes demonstrates a crucial effect of innovation on international trade with $b=0.74$, $t(115)=13.23$, $p<.001$. Which means a unit change in innovation will increase.74 unit in international trade. However, in case of governance where $b=0.20$, $t(115)=3.58$, $p<.001$. Even though the effect is highly significant, but it shows that one unit change in governance will only improve.20 unit in international trade,

a dramatic reduction of effect size from 0.57 unit in earlier model. These outcomes indicate the relation between governance and international trade has a significant indirect relationship as assumed by the second hypothesis. Subsequently, accepting the second hypothesis. This indirect relationship between governance and international business is partially mediated by innovation as the effect of governance on international trade in presence of mediator (innovation) in the model is still significant, but the effect size reduced significantly from .57 to .20 (Baron and Kenny 1986). As both of direct (.20) and indirect effect (.37) has a positive effect on international trade, representing a Complementary Partial Mediation (Baron and Kenny 1986). It specifies that a portion of the effect of governance on international trade is mediated through innovation, whereas governance still defines a portion of international trade that is independent of innovation. In that case, the P_M (proportion of total effect) can be used to measure the size of the mediation (Alwin and Hauser 1975, MacKinnon, Warsi and Dwyer 1995). In table 2, $P_M = 65\%$ indicates that 65% of the effect of governance on international trade is occurred by innovation. The rest of 35% effect of governance on international trade is not mediated by innovation. Consequently, we accept the third hypothesis that the relationship between governance and international trade is mediated by innovation.

5. Discussion

The results of the study reveal that both governance and innovation has a significant impact on the country's international trade. Which means that when a country do better innovation, its performance in international trade accelerates. Governance is one of the significant contributing factor of innovation and governance indirectly influences country's international trade through developing innovation.

Studies have found that the positive impact of innovation on economic growth and development (Pece 2015, Malecki 1997, Fagerberg 2008). Since the findings lead us to conclude that innovation has significant impact on country's international trade, promoting innovation in a country is crucial for government to ensure the growth and development of country's international trade.

Berden et. al. (2014) earlier found that dimensions determining governance has a diverse impact on international trade. In their study, improved political stability and voice and accountability were found to decrease trade and better corruption control, rule of law and government effectiveness has a positive impact on trade. But, the results in this study found an overall significant positive effect of governance on international trade. It also recommend that governance has significant indirect relation with country's international trade as relation between them is partially mediated by innovation. A country with good governance ensures premises for innovation to flourish. The finding is also supported by earlier study which stated that some state of governance encourages a better innovation system in a country (Ebner 2007). Consequently, countries performing better in innovation will develop competitiveness (Carayannis 2014). Subsequently, innovation helps countries to perform better in trading globally (Kaplinsky 2005). This study suggests that in order to enhance a country's performance in international trade, a good governance must prevail in the nation-state. Since, without a good governance, the innovation will not develop and will not create trade competitiveness in global market.

Hence, governments have to focus on the state of governance they practice and its effects on innovation to improve their performance in trade with foreign countries.

This study is also entitled with limitations. The study evaluated the relationship between governance and innovation and their impact on international trade. These variables are comprised of many factors as mentioned earlier, like- political stability, regulatory quality, innovation index, research and development expenditure of GDP, export, etc. But the paper didn't studied the relationships among these factors. The partial mediation only expresses partial impact of governance on international trade through innovation. So, other factors are there which are mediating in the relationship between governance and trade, it is not yet explored. Moreover, there may be other factors which should have to be considered to measure more accurate relationship among the variables. For example, the study considered only export to measure international trade, but international trade includes varieties of variables like- import, licensing, franchising, etc. In addition, only 119 countries and the data of 2017 were covered for the study. But data from more courtiers and multiple year panel data will be able to determine the relation with better accuracy.

6. Conclusion

The study assessed the three direct and one indirect relationship between country's innovation and international trade. In addition, the paper examined the mediating role of innovation on indirect relationship between governance and international trade. The results suggested that the relation between innovation and international trade and, between innovation and governance is direct. Furthermore, the relation between governance and international trade is partially mediated by innovation. In this complementary partial mediation, innovation explains 65% of effect, governance has on international trade. As a result, to make progress in foreign trade in the competitive world countries depends on innovation. Likewise, governance of the country facilitates the innovation of the nation. Therefore, governments should emphasis on developing better governance to aid innovation so that their global trade improves.

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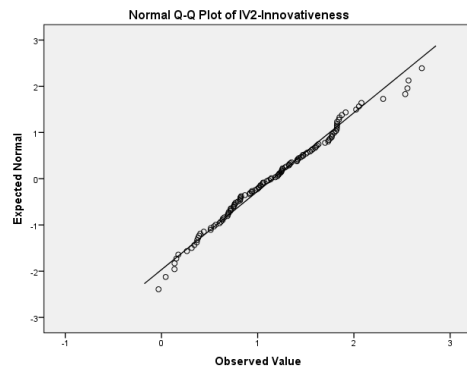
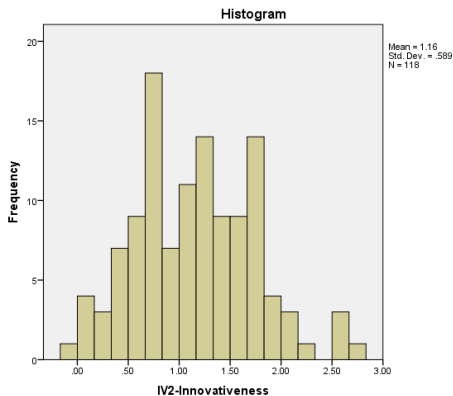
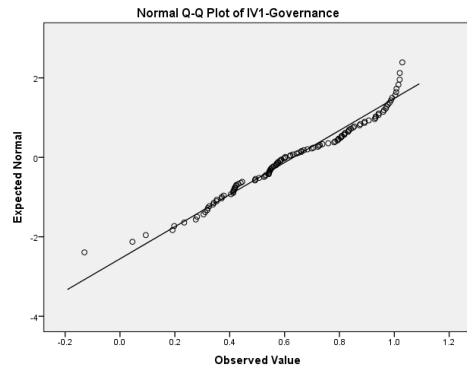
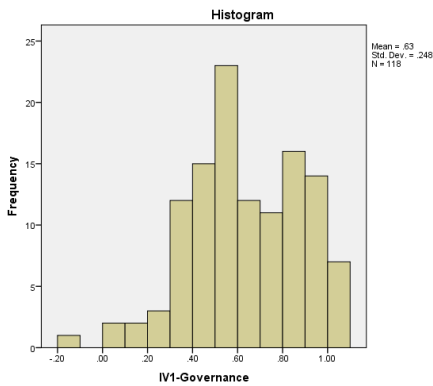
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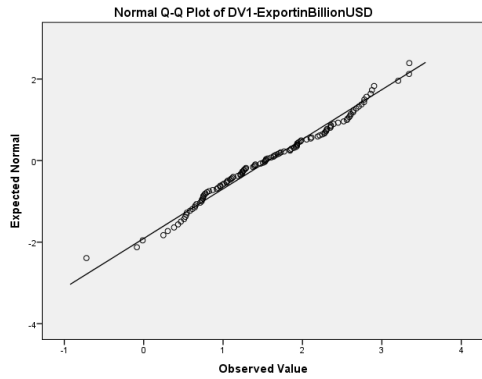
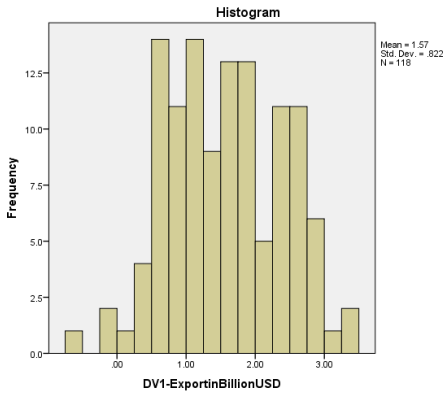
Appendices

Appendix A: Name of the Nations

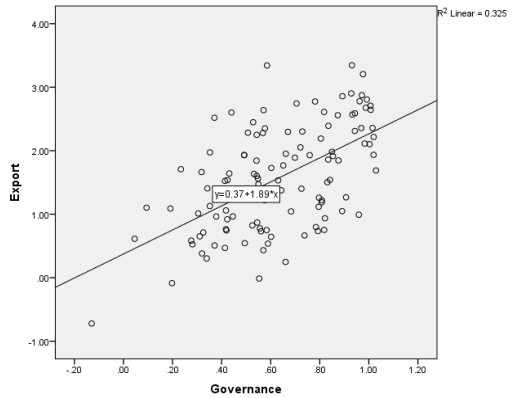
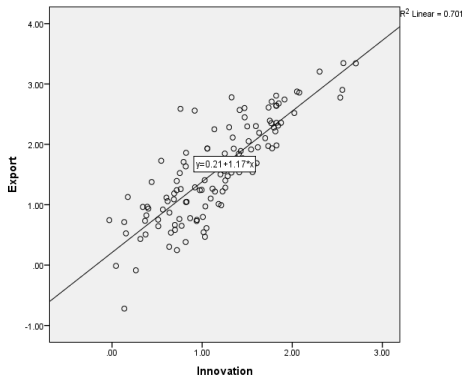
Albania, Algeria, Argentina, Armenia, Australia, Austria, Azerbaijan, Bahrain, Bosnia, Belarus, Belgium, Bolivia, Botswana, Brazil, Brunei Darussalam, Bulgaria, Burkina Faso, Burundi, Cambodia, Canada, Chile, China, Colombia, Costa Rica, Croatia, Cyprus, Czech Republic, Denmark, Ecuador, Egypt, El Salvador, Ethiopia, Estonia, Finland, France, Georgia, Germany, Ghana, Greece, Guatemala, Honduras, Hong Kong, Hungary, Iran, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Jordan, Kazakhstan, Kenya, Republic of Korea, Kuwait, Kyrgyz Republic, Lao People's Democratic Republic, Latvia, Lebanon, Lesotho, Lithuania, Luxembourg, Macedonia, Madagascar, Malaysia, Mali, Malta, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nepal, Netherlands, New Zealand, Nicaragua, Nigeria, Norway, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Romania, Russian Federation, Saudi Arabia, Serbia, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sri Lanka, Sudan, Sweden, Switzerland, Tajikistan, Tanzania, Thailand, Tunisia, Turkey, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uzbekistan, Uruguay, Viet Nam, Zambia, Zimbabwe.

Appendix B: Histogram and Q-Q plots of Variables





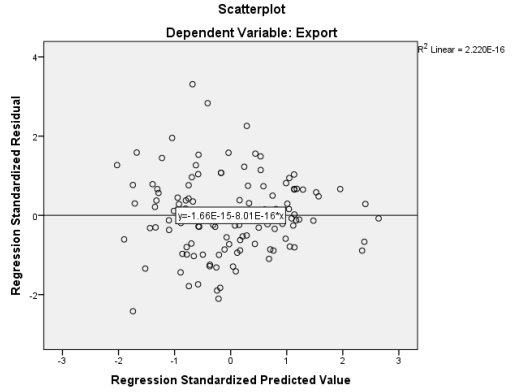
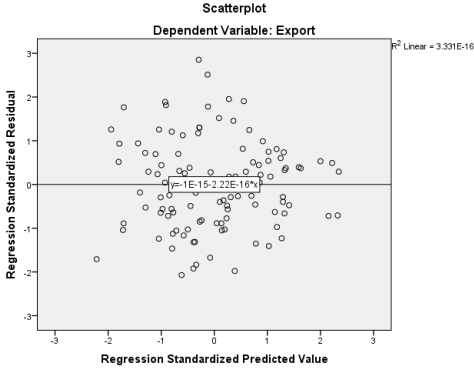
Appendix C: Scatter plot between variables



Appendix D: Scatter plots: Regression Standardized Residual and Regression Standardized Predicted Values

Dependent Variable: Export
Independent Variables: Governance and Innovation

Dependent Variable: Export
Independent Variables: Innovation



Dependent Variable: Export
Independent Variables: Governance

