The Effect of Institutions on Economic Growth in Muslim Countries

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Abstract

For the last century, Muslim countries have been generally recalled by political and economic instabilities. They have been facing important problems such as poverty, internal turmoil, social disorders, lack of democracy, inadequate health services and low education level that obstruct their economic developments. These problems in general are addressed to the low level of governance and spoiled institutional structures of markets and political area. According to the good governance approach, efficient markets attract private investors which will drive economic development and growth. For a market to be efficient, various institutions must be established and markets must operate within that framework. This work examines the relationship between the institutions and economic growth in Muslim countries to address this problem. The problem statement is: Is there a significant relationship between the institutions and economic growth in Muslim countries? The D-8 Organization for Economic Cooperation Countries are used as a proxy of Muslim countries. World Bank World Governance Indicators are used as a proxy for the levels of institutions and UNDP Human Development Index is used to proxy human capital. Results show that there exists a significant relationship between the institutions and economic growth in Muslim countries.

Keywords: Economic growth, Governance, Institutions, Economic development, D-8 countries, Islamic economics

Jel Codes: O43, C33

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Introduction

Globally, there are nearly 50 countries whose populations are at least 50 percent Muslim which enables us to name them as Muslim countries ("Interactive Data Table: World Muslim Population by Country," 2017). If oil rich countries and some highly industrialized ones are excluded from the list, almost all of the rest have internal economic problems and show poor economic performance during the years. Although Islam does not prohibit the wealth but also encourage the proper trade and fair wealthness, which is necessary to help needies by means of zakat and sadaqah, in the big picture Muslim countries have economically poor life and could not show a stable and sustainable growth for the last century. Here the big question arises: what is the reason of Muslim World not showing a good economic performance?

It has long been accepted that economic output of a country is a function of the physical capital, human capital and level of technology it has access to. Therefore, the more a country has ability to increase the levels of these factors, the more the economic output would increase and the economic growth would be achieved. However, it is a fact that there are differences in the levels and effective use of human capital, physical capital and technology for different countries which eventually effects their economic performances. This issue is addressed to the institutional structures and their effectiveness of those countries. Institutions are defined as the rules and norms in a society which are humanly designed and they are the constraints that forms the interaction of humans. The type of institutions and their effectiveness in the society are among the most important factors to determine the size and growth of economies (Acemoğlu & Robinson, 2010).

Institutional economics tries to discover the role of institutions in an economy. It argues that markets are the result of complicated interactions of institutions such as individuals, firms, social norms, cultures etc. Although its origin dates back to Thorstein Veblen, it was introduced by Hamilton (1919) into economics, who argues that different parts of economic system are related to the whole. According to him, science of economics can be unified with the help of institutional thought (Hodgson, 2000). John R. Commons, Wesley C. Mitchell and Clarence Ayres are among the important representatives of this area (Klein, 1998). From the later 20th century, institutional economics is evolved into New Institutional Economics (NIE) by including the neoclassical economics thought with the earlier institutional economics approach. Its origins date back to a work of Coase (1937) where he analyses the firm, however it became formal with Williamson (1975). NIE tries to combine different social sciences like economics, law, business, politics, sociology etc. to understand the institutions of economic life by keeping the individualism of the neoclassical economics (Rutherford, 2001).

In this work, the economic performances of Muslim World are examined from the perspective of institutionalism. In the public and media, especially for the last decades, Muslim countries and their societies are known for poverty, poorness, violence, low living conditions, lack of education, weak export performance, depreciating value of national currencies, increasing indebtedness etc. which are not valid for an economically developed country. This situation is

generally related to lack of democracy for the political areas and lack of institutions in economic and financial areas. Good governance approach argues that if efficient markets exist in a country, private investors will drive economic development (Khan, 2007). If this holds, as long as Muslim countries can ensure proper institutional frameworks, economic development will come eventually. To be able to examine this, this study investigates the relationship between economic growth and six different institutions by improving Solow's classical growth model. In the classical model, or in other words neoclassical growth model, capital stock and labor force are the two main inputs for the economic output. To test the effect of institutions, neoclassical model is revised by adding six institutional variables; Control of Corruption (CC), Political Stability and Absence of Violence/Terrorism (PV), Regulatory Quality (RQ), Rule of Law (RL), Voice and Accountability (VA) and Government Effectiveness (GE). Human Capital (HC) is also used as another input factor to be able to capture labor force effectiveness.

Within the study, the D-8 Organization for Economic Cooperation Countries (called D-8 from now) is selected to reflect the Muslim World. D-8 was established through the Istanbul Declaration of Summit of Heads of State/Government on June 15, 1997 and consists of Bangladesh (BGD), Egypt (EGY), Indonesia (IDN), Iran (IRN), Malaysia (MYS), Nigeria (NGA), Pakistan (PAK) and Turkey (TUR). The combined population of these countries is approximately 1 billion or in other words 60% of all Muslims. Thus, it is thought to be a good proxy for Muslim World. The main objectives of D-8 are to improve the economic positions of member states globally, to diversify and produce new trading opportunities between members, to enhance decision-making participation at international level and to improve the living standards of member countries ("D-8 Health and Social Protection Programme," 2018). Although not directly stated in aims that governance and institutions will be improved, if good governance has an effect on economic growth, it will serve as a catalyst for the last item to be accomplished. Data is acquired from different sources; institutional data are obtained from World Bank Databank: Worldwide Governance Indicator database, human capital data is obtained from United Nations Development Programme (UNDP): Human Development Reports, economic output, capital stock and labor force data are obtained from Penn World Table 10.0 from 1996 to 2019.

In the next section, a short literature review is done to have a background about the previous works that search the relationship of different factors on economic growth. In section 2, data and methodology used for the analyses are explained in detail. In section 3, empirical results and findings are presented and finally in the last section the work is summarized with a conclusion and proposal of further research.

1. Literature Review

In his pioneering work, Solow (1956) introduced a mathematical model to explain the dynamics of economic growth of a nation. In this basic model, economic output is formulated as a production function of capital stock and labor force. Then he integrated the technological progress to his model and showed that a sustainable continuous growth can be obtained only

by technological advancements. In this model technology is an exogenous input, meaning that it is not produced inside the country but imported directly from outside into the economic processes. The basic model is shown in (1) where Y(t) is the economic output, K(t), A(t), L(t) and α are capital stock, labor force, an exogenous technology level and weighting parameter between 0 and 1 respectively.

$$Y(t) = F(K(t), A(t)L(t)) = K(t)^{\alpha}(A(t)L(t))^{1-\alpha} \ (0<\alpha<1) \qquad (1)$$

Starting from the 1980's, economists argued that economic growth is not the result of some exogenous variables that come from outside, but is an endogenous outcome of itself (Romer, 1994). The endogenous theory argues that as the level of human capital of a country increases, this will lead to new technologies and effective ways of producing outputs (Çamlıbel, 2014). Such factors are called total factor productivity, which includes not only human capital but also factors like health, education, governance levels and others that can affect the economic output directly or indirectly. Thus, following the pioneering work of Solow and its extension to endogenous model, several works have been done to find out the effects of these factors. One of the focus areas is the effect of governance on economic growth, since governance plays an important role for improving the institutions of a country and increasing the level of life quality of its people (Grindle, 2004).

Huang & Ho (2017) study twelve Asian countries to find out whether there exists a Granger causality from governance to economic growth. They classify the countries into three subgroups according to freedom levels over the period of 1996–2014. They find that for "not free" countries they classify, different dimensions of governance lead to more significant economic growth, compared to "Free" and "Partly Free" countries.

Haini (2020) investigates Association of Southeast Asian Nations (ASEAN) economies from 1995 to 2017 using a dynamic panel estimator to examine the role of financial and institutional development on economic growth. The results show that the effect of financial institutions is positively significant on economic growth, while financial markets are not. They also find that institutional quality has a significant effect on economic growth and shows a complementary factor to financial markets.

Siddiqui & Ahmed (2013) try to find out how institutional indicators influence economic growth using 31 indicators each covering 84 countries over a span of five years. They classify factors as institutional and policy rents, political rents and risk-reducing technologies and use these factors in a growth model. Results show that favorable institutions positively affect the economic growth. They also find that for a developing country, institutional and policy rent is more important than political rents and risk-reducing technologies.

Fayissa & Nsiah (2013) investigates the role of governance to explain the economic growth performance of The New Partnership for Africa's Development (NEPAD) economies using fixed, random effects and Arellano-Bond models. Their results suggest that good governance has the ability to explain the differences in growth of these countries and that the effect of

governance on economic growth depends on the level of countries' income. Furthermore, they conclude that without good governance, it would be hard to achieve the goals of NEPAD in Africa.

Islam & McGillivray (2020) use a panel data set from Credit Suisse for 45 sample countries over the period 2000–2012 to study the effects of wealth inequality on economic growth. They find that the wealth inequality is negatively related to cross-country economic growth and reveal that the impact of wealth inequality on growth can be mitigated with better governance.

Çamlıbel (2014) explores whether Islam hinders economic growth in Muslim countries by using a cross-country regression. The findings show that the adaptation of technology and scientific innovations, human capital and economic freedom have significant effects for economic growth. He concludes that Islam by itself has no effect on economic prosperity in Muslim Countries.

Noland (2003) tries to find out whether any strong statistical relationship exists between the major world religions, which are Islam, Christianity and Buddhism, and national economic performances. He uses both cross-national and sub-national data from three countries: India, Malaysia and Ghana. For India and Malaysia, he concludes that there is no consistent and systematic relationship between economic growth and the share of Muslim population. However, he finds a significant and positive correlation for the same relationship for Ghana.

Guiso et al. (2003) tries to identify the relationship between the intensity of religious beliefs and economic behaviors toward cooperation, the government, working women, legal rules, thriftiness and the market economy, in order to find out how far religions affect economic performance. They find that on the average religious beliefs cause "good" economic attitudes, where "good" is defined as conducive to higher per capita income and growth.

Rigobon & Rodrik (2005) estimate the interrelationships among economic institutions, political institutions, openness and income levels. They find that democracy and the rule of law have positive effects on economic performance, but the latter has stronger effect on incomes. Openness has a negative effect on democracy and income levels, but has a positive effect on rule of law. Although not very significant, higher income produces greater openness and better institutions.

Zulkhibri & Ghazal (2017) try to find out the relationship between the institutions, governance and financial inclusion using more than 100,000 individuals' data by performing panel data analysis for developing Muslim countries. The results suggest that governance affects financial inclusion of individuals positively by increasing the number of bank and savings accounts, but impacts on borrowing negatively. Also removing corruption, increasing transparency in legal institutions and ensuring fair judicial proceedings help to the development and increase in financial inclusiveness.

Muhammad et al. (2020) examine the mediating role of institution quality between financial development and economic growth for selected Muslim countries from 2000 to 2017.

According to the mediation analysis results, institution quality mediates the relationship significantly between financial development and economic growth in a positive way. It is also shown that economies with a well-developed financial system perform faster growth, and financial development results in poverty reduction and long-term economic growth.

AlBassam (2013) examines whether there is a significant relationship between governance and economic growth during economic crises or only during non-crisis periods. He finds that different levels of national development cause different relationship patterns between governance and economic growth during crisis times. Thus, he emphasizes that during these periods, there exists unstable relationship between governance and economic growth.

Acemoğlu & Roberson (2010) argue that the main reason of the differences in welfare and thus income per capita across countries are the differences in their economic institutions. However, economic institutions are closely related to the political institutions (i.e. the form of government and the constraints on the politicians) and how the political power is distributed in the society. Countries can achieve rapid economic growth if they are able to reform their economic institutions but this is highly depended on the structure of political institutions and the distribution of political power in the society.

Alternatively, studies in the opposite direction are also conducted. Przeworski et al. (2000) propose that economic development affects political stability. Kaufmann et al. (2002) and Adams & Mengistu (2008) suggest that more developed nations tend to have greater political stability than less developed countries. Furthermore, during economic crises many governments put governance aside and give more attention to economic growth. In general, during times of crisis, governments generally respond with short-term remedial plans which have the potential to result in destructive long-term economic recovery. Therefore, the relationship between governance and economic growth may be different in the short-term and long-term periods (Huang & Ho, 2017).

2. Data and Methodology

To examine the problem, Solow's neoclassical model is revised into a model which includes six institutions; Control of Corruption (CC), Political Stability and Absence of Violence/Terrorism (PV), Regulatory Quality (RQ), Rule of Law (RL), Voice and Accountability (VA), Government Effectiveness (GE) in addition to neoclassical model's Capital Stock and Labor Force. Human Capital (HC) is also used as another input factor to take human development into account to align with Mankiw et al. (1992). D-8 countries are selected as a proxy of Muslim World since they represent %60 of all Muslim population, and they are prone to establish a collaboration for economic development and growth.

2.1. Proposed Model

The model proposed is given in (2) where $Y_i(t)$, $K_i(t)$ and $L_i(t)$ represent respectively the economic output, capital stock and labor force for country i at year t. $g_{ji}(t)$ represents institution j for country i at year t. α_i and β_i are the parameters and determine the weights of input factors.

$$Y_i(t) = F(K_i(t), L_i(t), \overrightarrow{g_i}(t)) = K_i(t)^{\alpha_i} L_i(t)^{1-\alpha_i} \prod_i e^{\beta_j g_{ji}(t)} \quad (2)$$

By taking the natural log of both sides and performing some mathematical operations, we obtain the linear model given in (3) where y_i(t) represents economic output per capita and k_i(t) capital stock per capita for country i at year t.

$$ln(y_i(t)) = \alpha_i(ln\, k_i(t)) + \sum_i \beta_j g_{ji}(t) \quad (3)$$

In panel data regression analyses, either fixed or random effects model can be used. In their works, where they investigate the role of governance on economic growth for NEPAD countries, (Fayissa & Nsiah, 2013) apply both fixed and random effects model to their panel data and find that fixed effects model is preferred statistically. (Siddiqui & Ahmed, 2013) and (Islam & McGillivray, 2020) also use fixed effects in their models. Thus, we use country specific fixed effects model and apply panel data regression to the final model in Equation (3).

2.2. Data

The model is examined using the data between 1996 - 2019 for D-8 countries. The data for economic output, capital stock and labor force are obtained from Penn World Table 10.0. Institutions data is taken and proxied from World Bank Databank: Worldwide Governance Indicators database, each of which ranges from -2.5 to 2.5; -2.5 meaning poorest institutionalized and 2.5 supremely institutionalized. Human capital is obtained and proxied from human development index on UNDP Human Development Report Database and ranges from 0 to 1; 0 meaning worst human development and 1 meaning supreme development. To be able to compare the results accurately, human capital data is transformed into the same range as institutions data.

Model parameters in Equation (3) are defined as:

y : Per Capita Real GDP at constant 2017 national prices (in mil. 2017US$)

k : Per Capita Capital Stock at constant 2017 national prices (in mil. 2017US$)

g_1 : Control of Corruption (CC)

g_2 : Political Stability and Absence of Violence/Terrorism (PV)

g_3 : Regulatory Quality (RQ)

g_4 : Rule of Law (RL)

g_5 : Voice and Accountability (VA)

g_6 : Government Effectiveness (GE)

g_7 : Human Capital (HC)

World Governance Indicators are based on 441 variables produced by 35 different sources such as surveys of firms and individuals, the assessments of commercial risk rating agencies, non-governmental organizations and a number of multilateral aid agencies and other public sector organizations. The indicators are constructed and defined by Kaufmann et al. (2009) as follows:

- Control of Corruption (CC) – capturing perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.
- Political Stability and Absence of Violence (PV) – capturing perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.
- Regulatory Quality (RQ) – capturing perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
- Rule of Law (RL) – capturing perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.
- Voice and Accountability (VA) – capturing perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
- Government Effectiveness (GE) – capturing perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.

The human development index, which is the proxy for human capital, is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living. It is measured by taking the geometric mean of normalized indices for each of the three dimensions ("Human Development Index (HDI)," 2022)

2.3. Descriptive Statistics

In Table-1, summary statistics are shown for the mean institution levels of each country. As can be seen, almost all the average institution levels within countries are below zero which shows that good governance does not exist. However, MYS has an exception compared to the others. It shows a positive performance except g5 (VA), but on the average it is the only D-8 country which has positive institution levels.

Table 1: Average Institution Levels

Country	g1 (CC)	g2 (PV)	g3 (RQ)	g4 (RL)	g5 (VA)	g6 (GE)	Mean
BGD	-1.060	-1.060	-0.911	-0.830	-0.449	-0.732	-0.840
EGY	-0.607	-0.607	-0.502	-0.269	-1.110	-0.495	-0.598
IDN	-0.706	-0.706	-0.326	-0.593	-0.110	-0.254	-0.449
IRN	-0.636	-0.636	-1.440	-0.835	-1.360	-0.481	-0.898
MYS	0.225	0.225	0.604	0.474	-0.375	1.010	0.361
NGA	-1.150	-1.150	-0.881	-1.140	-0.686	-1.030	-1.006
PAK	-0.936	-0.936	-0.641	-0.807	-0.861	-0.616	-0.799
TUR	-0.106	-0.106	0.239	-0.021	-0.280	0.149	-0.021
Mean	-0.622	-0.622	-0.482	-0.503	-0.654	-0.306	-0.531

The worst country is NGA regarding institutions where almost all of its mean institution levels are below -1. If it is considered that -2.5 is the worst score ever, NGA seems to be very far away from good governance. TUR, IND, EGY, PAK, BGD and IRN are close to good governance respectively after MYS. On the overall, the average score for all institutions is -0.53147, where each individual mean scores are again negative. The worst institution level in D-8 countries on the average is g5 (VA) which is -0.654.

Average human development indexes are shown in Table-2. Here MYS has the highest score, where NGA has the lowest one. On the average, human development levels seem not as bad as institutions with a mean of 0.634. TUR, IRN, EGY, IDN, BGD and PAK have scores in descending order after MYS. The best and worst countries are the same as in the case of institutions. Here IRN has an exception with a score of 0.728. Although its institution levels are very low, human development level is relatively high.

Table 2: Average Human Development Levels

Country	g7 (HC)
BGD	0.546
EGY	0.658
IDN	0.657
IRN	0.728
MYS	0.761
NGA	0.486
PAK	0.502
TUR	0.735
Mean	0.634

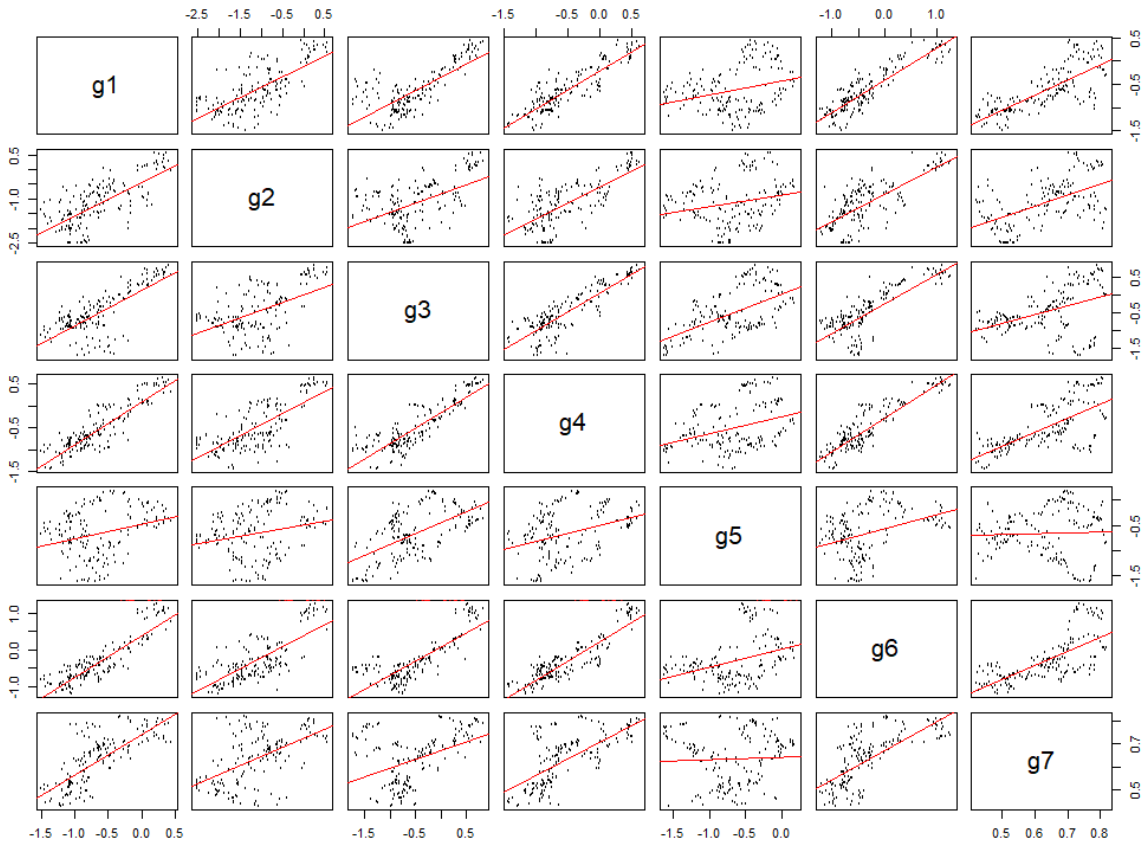
Table-3 and Figure-1 show the correlations between the institutions and human development levels of the pooled data. Although all of the correlations are positive and relatively greater than zero, it is seen that high correlations exist between g1 (CC) - g4 (RL), g1 (CC) - g6 (GE),

g3 (RQ) - g4 (RL) and g4 (RL) - g6 (GE). Human development level also seems to be relatively highly correlated to g1 (CC).

Table 3: Correlations Between Pooled Institution Levels

	g1 (CC)	g2 (PV)	g3 (RQ)	g4 (RL)	g5 (VA)	g6 (GE)	g7 (HC)
g1 (CC)	1.000	0.712	0.756	0.894	0.294	0.892	0.760
g2 (PV)	0.712	1.000	0.528	0.736	0.240	0.757	0.551
g3 (RQ)	0.756	0.528	1.000	0.861	0.587	0.808	0.434
g4 (RL)	0.894	0.736	0.861	1.000	0.358	0.901	0.677
g5 (VA)	0.294	0.240	0.587	0.358	1.000	0.370	0.037
g6 (GE)	0.892	0.757	0.808	0.901	0.370	1.000	0.708
g7 (HC)	0.760	0.551	0.434	0.677	0.037	0.708	1.000

Figure 1: Pair Plots of Pooled Institution Levels



Correlations between the output and dependent variables are given in Table-4 for each country. As it can easily be seen, except for NGA and PAK, capital stock per capita is highly correlated to output, which is in line with what the neoclassical model proposes. For the institutions, however both the direction and intensity vary interestingly across countries. For example, in case of IDN, each of the institutions has a very positive high correlation with the output, whereas for EGY, almost all of them are highly negatively correlated to output except g7 (HC). Others have a mixed structure; positive-negative and intense-weak correlations exist

together. By the way, g7 (HC) in every case has a very strong correlation for each country. That can be interpreted as human development index has a very important influence on economic output.

Table 4: Correlation of Economic Outputs to Dependent Variables

	ln(k)	g1 (CC)	g2 (PV)	g3 (RQ)	g4 (RL)	g5 (VA)	g6 (GE)	g7 (HC)
BGD	0.999	0.450	-0.248	0.297	0.818	-0.662	-0.306	0.992
EGY	0.973	-0.374	-0.765	-0.687	-0.785	-0.734	-0.548	0.985
IDN	0.978	0.931	0.918	0.600	0.876	0.782	0.860	0.975
IRN	0.832	-0.753	-0.539	-0.151	-0.438	-0.701	0.401	0.807
MYS	0.932	-0.448	-0.319	0.178	0.544	0.208	0.209	0.946
NGA	-0.803	0.365	-0.869	0.427	0.515	0.549	-0.339	0.858
PAK	-0.130	0.424	-0.539	0.164	0.438	0.426	-0.334	0.837
TUR	0.987	0.192	-0.472	-0.122	-0.378	-0.450	0.470	0.952

2.4. Hypotheses

Hypotheses are constructed according to the research problem which tries to determine whether there is a significant relationship between the institutions and economic growth in Muslim countries. Thus, nine hypotheses are tested to find out relationships as:

H1: Capital Stock per capita has a significant effect on economic growth in Muslim Countries

H2: Control of Corruption (CC) has a significant effect on economic growth in Muslim Countries

H3: Political Stability and Absence of Violence/Terrorism (PV) has a significant effect on economic growth in Muslim Countries

H4: Regulatory Quality (RQ) has a significant effect on economic growth in Muslim Countries

H5: Rule of Law (RL) has a significant effect on economic growth in Muslim Countries

H6: Voice and Accountability (VA) has a significant effect on economic growth in Muslim Countries

H7: Government Effectiveness (GE) has a significant effect on economic growth in Muslim Countries

H8: Human Capital (HC) has a significant effect on economic growth in Muslim Countries

If it is found that at least one of the six hypotheses about the institutions (H2-H7) holds, it will be concluded that there is a significant relationship between the economic growth and institutions in Muslim countries. To test the hypotheses, fixed effects linear regression model in Equation (3) is applied to the data and results are examined statistically.

3. Results

The result of the fitted model is shown in Table-5. The model has a considerably high R-squared value with 0.859, which shows that approximately %86 of the variation can be explained by the model. F-statistics is very small than %5 that implies at least one of the independent variables is related to the dependent variable. If we consider the dependent

variables, capital stock per capita has a very significant effect at %5 level which is expected from the neoclassical growth model. g1(CC), g4 (RL) and g7 (HC) have significant effects at %5 level. In descriptive statistics, g4 (RL) is seen to be highly correlated to g1 (CC), g3 (RQ) and g6 (GE). Thus, along with the regression results, it can be interpreted as g4 (RL) is alone capable of explaining the effect of g3 (RQ) and g6 (GE). However, g7 (HC) has the highest effect on the output per capita with a coefficient of 0.536, where g4 (RL) has 0.131 and g1 (CC) has 0.073. It can be said that g7 (HC) affects output per capita nearly three times more than capital stock per capita, four times than g4 (RL) and seven times than g1 (CC).

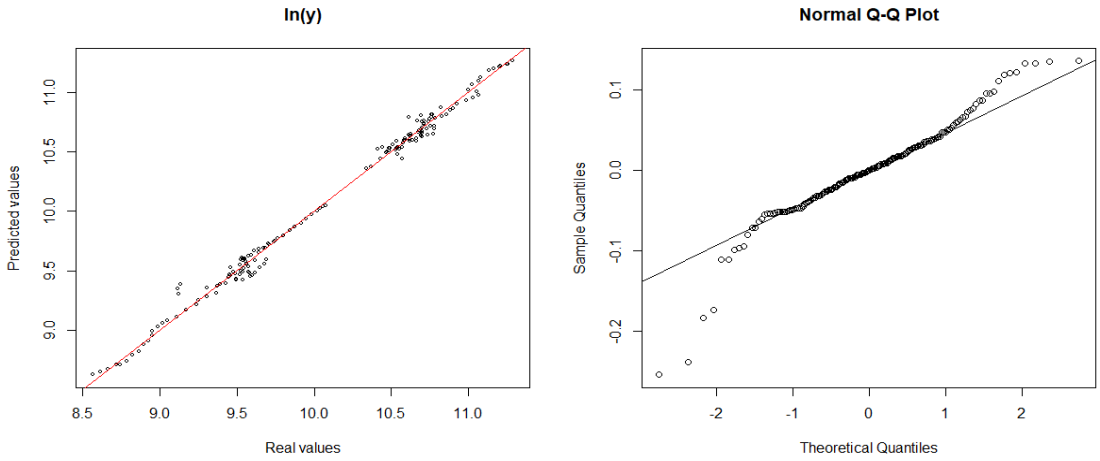
Table 5: Results of The Fixed Effects Model

	Coefficients			
Dependent variables	Estimate	Std.Error	t-value	Pr(>|t|)
ln(k)	0.188	0.041	4.543	**<0.001**
g1 (CC)	0.073	0.034	2.154	**0.033**
g2 (PV)	0.007	0.019	0.381	0.704
g3 (RQ)	-0.031	0.037	-0.848	0.398
g4 (RL)	0.131	0.048	2.751	**0.007**
g5 (VA)	0.037	0.027	1.385	0.168
g6 (GE)	-0.048	0.039	-1.224	0.223
g7 (HC)	0.536	0.041	13.094	**<0.001**
R-Squared	0.859			
Adj.R-Squared	0.845			
F-statistic: 115.934 on 8 and 152 DF, p-value: < 2.22e-16				

According to the results, it can be concluded that hypotheses H1, H2, H5 and H8 cannot be rejected at %95 confidence level and thus it can be said that capital stock per capita, control of corruption, rule of law and human capital have significant effects on economic growth in Muslim Countries. Since two of the six hypotheses on institutions holds, it is concluded that there is a significant relation between the economic growth and institutions in Muslim countries.

From the results, it can be inferred that governance is an important factor for Muslim countries to achieve a sustainable economic growth. This proves what Khan (2007) says about good governance approach in case of D-8 countries. However, it is notable that not all of the institutions have significant effects. Out of the six institutions, only two of them are significant. Although g1 (CC) is one of the two institutions to affect economic growth, its effect is in the border of %5 significance and its impact is almost half of g4 (RL). Moreover g7 (HC) is four times more determinative than g4 (RL) alone that is the its significance is much more than any of the two institutions.

Figure 2: Real vs Fitted Values and Normal Quantiles of Residuals



Another interesting result shows itself in the fitted values and residuals. As it is shown in Figure-2, there are outliers in both tails of the residuals which implies that there are some over and under fittings. To investigate this in deeper, the first lowest and highest ten residuals of the model are shown in Table-6. Eight out of the first lowest ten residuals belong to IRN and NGA. The situation is the same for the highest ten residuals. This implies that the model used in the study has difficulties fitting NGA and IRN data. This is understandable because of changes in political situations and international relationships directly affect the economy of the countries in the short-term and long-term with different dynamics. It is a well-known fact that IRN deals with international embargos and NGA deals with national security problems for the last decades. These are the important things that cause high impacts on the economies. Even though country fixed effects are allowed in the model, these factors are expected not to be captured in the results. To check the veracity of this argument, IRN and NGA are excluded from the dataset and the same model is applied again to the remaining countries.

Table 6: Lower and Upper Tail of Residuals

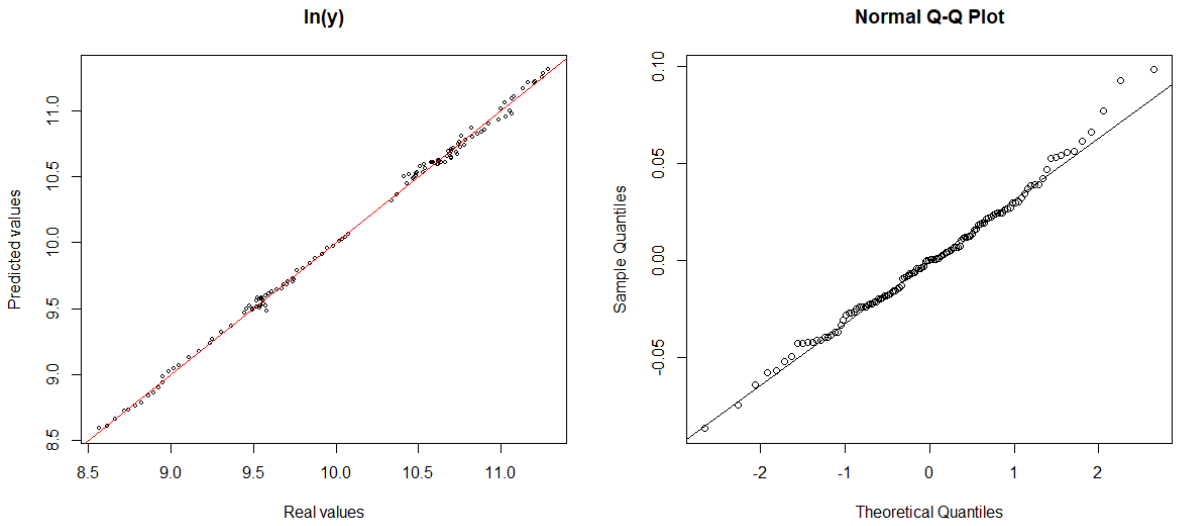
Lower tail		Upper tail	
Country	Residuals	Country	Residuals
NGA	-0.2537	IRN	0.1362
NGA	-0.2379	NGA	0.1359
NGA	-0.1827	NGA	0.1334
IRN	-0.1727	NGA	0.1329
IRN	-0.1104	NGA	0.1225
MYS	-0.1100	NGA	0.1217
MYS	-0.0978	IRN	0.1192
IRN	-0.0965	PAK	0.1118
IRN	-0.0939	NGA	0.0979
NGA	-0.0802	MYS	0.0959

In Table-7, results are shown for the remaining six countries. The institutions that have a significant impact on the output do not change with an exception; in the previous model with IRN and NGA, g1 (CC) is significant at %5 level, whereas in the latter model excluding these countries, not g1 (CC) but g2 (PV) is significant at %5 level. The significance levels are also increased as p-values become much smaller. R-squared value in this case is greater than the previous one with 0.961 which implies a better explanation of variation. Similarly, in Figure-3 predicted values are closer to the real outputs and residual quantiles are much closer to the normal. This result supports the argument in case of D-8 countries that, institutions are more effective on the output and fixed effects model is fitted well, if some filtering is done that might impact the short-term and long-term economic conditions.

Table 7: Results of The Fixed Effects Model (IRN and NGA Excluded)

	Coefficients			
Dependent variables	Estimate	Std.Error	t-value	Pr(>|t|)
ln(k)	0.301	0.033	8.979	**<0.001**
g1 (CC)	-0.010	0.023	-0.443	0.658
g2 (PV)	0.041	0.012	3.365	**0.001**
g3 (RQ)	-0.028	0.024	-1.176	0.241
g4 (RL)	0.115	0.032	3.556	**<0.001**
g5 (VA)	0.007	0.017	0.459	0.646
g6 (GE)	-0.026	0.024	-1.092	0.277
g7 (HC)	0.484	0.034	13.960	**<0.001**
R-Squared	0.961			
Adj.R-Squared	0.957			
F-statistic: 351.548 on 8 and 112 DF, p-value: < 2.22e-16				

Figure 3: Real vs Fitted Values and Normal Quantiles of Residuals (IRN and NGA Excluded)



Conclusion

In this work, the relationship between the economic growth and institutions was examined in terms of six institutions for Muslim countries. D-8 countries were used as a proxy of Muslim countries, World Bank Databank: Worldwide Governance Indicators were used to proxy institutions, UNDP Human Development Index was used to proxy human capital and the neoclassical growth model was revised by including these factors. Based on the descriptive statistics and previous works done, fixed effects panel data regression was used for modeling to capture the country level effects. According to the results, capital stock per capita and two of the institutions which are control of corruption and rule of law were found to have significant effects on economic growth at %5 level. Human capital effect was also found to be significant at %5 level. Since at least one of the hypotheses about the institutions held, it was concluded that there is a significant relationship between the institutions and economic growth in Muslim countries.

From the results, Iran and Nigeria were seen to have outliers. Since these two countries have dealt with either international embargos or security problems for the last decades, it was argued that their economies were also affected from this situation year to year and it might not be captured via fixed effects variables. To check the validity of this assumption, these countries were excluded from the dataset and analysis are performed again with the remaining countries. It was found that the significant factors remain the same with an exception; control of corruption became insignificant but political stability and absence of violence/terrorism became significant in this case. However, the validity of the model and significance of parameters increased, whereas the number of outliers decreased dramatically. Thus, it was concluded that country level fixed effects model performs very well for Muslim countries, especially if some filtering done about national and international dynamics that might affect the short-term and long-term economic conditions. Nevertheless, out of the six institutions, only two of them showed significant effects on economic growth which might indicate a relatively poor institutionalized economic structure of the countries.

Further research is proposed to improve the model by adding variables to reflect the country dynamics such as regional conditions, international restrictions, internal political developments etc. which have potential to affect the economic output in the short-term as well as have long term effects.

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