

How Does Institutional Quality Moderates the Impact of Public Debt on Economic Growth? Startling Evidence from OIC Countries

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ARTICLE INFO	ABSTRACT
<p><i>Article History:</i> Received: 12 April 2022 Revised: 09 May 2022 Accepted: 20 June 2022 Available Online: 10 Oct 2022</p> <p>DOI: 10.56536/ijmres.v12i3.287</p> <p><i>Keywords:</i> Public debt; Hierarchy of Institutions Hypothesis; Economic growth; OIC member countries; Nonlinearity.</p> <p><i>JEL Classification:</i> C23, E02, F43, H63, O43, O47</p>	<p>Utilizing the data from 1996 to 2018 for forty-three member countries of the Organization of Islamic Cooperation (OIC), this study delves into the impact of public debt on economic growth and evaluates how institutional quality moderates this effect. The outcomes of the study disclose a nonlinear relationship between public debt and economic growth in OIC countries. The results disclose threshold value of public debt is 63.43 as a percent of GDP in OIC economies after this it thwarts the economic growth. The quantitative outcomes unveil that quality of political and economic institutions boost economic growth. The findings from the various models demonstrate that political institutions influence the growth impact of the economic institutions, these findings are acknowledging the "Hierarchy of Institutions Hypothesis." The results of the interaction term reveal that, even as public debt hurts the economic growth, but better political and economic institutional quality measures alleviate this negative impact. Institutional infrastructure reforms are critical for public debt accumulation policy to mitigate the undesirable consequence of debt on economic growth in OIC member countries. Countries should considerably lessen their dependence on public debt and keep it below the threshold level that harms economic growth. OIC countries should mobilize their internally produced revenue collection mechanisms in order to increase revenue generation and close the gap between available resources and spending while incurring the least amount of public debt. Our findings can be pragmatic to design a germane fiscal policy to maximize the economic growth.</p>

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1. INTRODUCTION

After the global fiscal imbalances caused by the Great Recession of 2007-2008 and recently COVID-19 pandemic the issue of rising public debt has become a matter of increasing interest in developed as well as developing nations. Theoretically, one may find reasons for the positive, negative, or neutral impact of public debt on economic growth (Ahlborn & Schweickert, 2018). In Keynesian school of thought higher debt levels accelerate GDP growth due to expansionary fiscal policy via the mechanism of expenditure multiplier (Auerbach & Gorodnichenko, 2012). But this positive impact is projected generally in the short run. Contrary to this the neo-classical theory postulates a deleterious role of government borrowing on the economic growth owing to crowding-out effect (Modigliani, 1961; Diamond, 1965). Ricardian equivalence proposes that

public debt and deficit don't make an influence on economic growth because an increase in the demand is offset by rising savings due to the debt-financed government expenditure. People prefer to save more to pay a future tax rise that will be imposed by the government to repay the country's massive public debt (Sardoni, 2021).

In their renowned research work, Reinhart and Rogoff (2010a) concluded that above 90% of public debt to GDP ratio is growth detrimental. Their work reignited researchers' interest on debt threshold value because debt threshold value is a key parameter in formulation the fiscal policy to turn aside an unwarranted level of public debt. However, the study of Égert (2015) raises a question about the result and claim that there is no clear public debt tipping point exists. The outcomes of Reinhart and Rogoff were significantly mistaken and that the negative debt turnabout of 90 percent did not influence economic development (Herndon et al., 2014). Panizza and Presbitero (2013) reignited this work by expressing a cautious note on the notion that nonlinearities and threshold play a significant role in debt-growth relationship, arguing that more study is needed to verify the prevalence of debt threshold.

Hypothetically, good institutional quality acts as a catalyst to growth. Institutional quality may matter the debt-growth relationship via the efficient and sensible use of public debt, threshold value of debt is higher for nations with better institutional quality (Law et al., 2021). However, there is no unanimity on how distinct kinds of institutions are interconnected and how they impact the debt-growth relationship. Different sets of institutions have been highlighted from the literature review as the "hierarchy of institutions hypothesis" hereafter HIH.¹ The HIH states that political institutions determine the rules of governance, which in turn determine what kind of economic institutions a country would be embrace which in turn have a direct effect on economic growth (Flachaire et al., 2014). In the empirical literature of debt-growth relationship HIH has got little consideration.

Total public debt stock of OIC group countries is recorded a 210 percent increase, from around \$570 billion to \$ 1.77 trillion over the 2000 to 2019 period with a growth equal to 217 percent (SESRIC, 2020). The outstanding debt to GDP of OIC members nations is very heterogeneous ranging between 3 percent to 434.907 percent of GDP. The aim of present study is to unveil how the HIH moderates the debt-growth link and also the threshold value of debt in OIC economies. The novelty of this study is that OIC region is the least explored area of study in terms of debt-growth and institutional quality. The study also adds to the existing literature of debt growth relationship in the following ways. First, this study uses uncorrelated institutional measures, as suggested by Slesman et al. (2015) to provides empirical indication for the presence of the HIH in debt growth relationship for OIC economies. Second, this study uses non-linear empirical

¹ (See Acemoglu & Robinson, 2000, 2008; Acemoglu et al., 2005).

models which allows unveiling a turnaround value of public debt with special reference to political and economic institutions.

The noteworthy characteristic of our findings is that economic institutions have an augmenting impact on the debt-growth relationship only in the existence of political institutions. In the presence of both the political and economic institutions, OIC countries have a high debt threshold point after this there is a disadvantageous consequence on the economic growth. Third, the novelty of this research work is to use the two different interaction term, one between the public debt and political institutions and the other between the public debt and the economic institutions to explore the potential growth effect of public debt. Fourth, the results of this study are intended to provide valuable recommendations and applicable policies for debt sustainability. Fifth, estimation-wise too, apart from traditional panel data econometrics technique, this study used a dynamic panel system generalized method of moments (S-GMM) to solve the problem of endogeneity that may occur when to consider the public debt and institutional measures together in the equation.

The remaining portions of the research work are planned in a following manner: second section assess the literature on institutional quality and economic growth also on public debt and economic growth. Section three explains econometrics analysis. The fourth section portrait the empirical findings and construes the results. Concluding remarks with policy recommendation of the findings are concluded in the last section.

2. LITERATURE REVIEW

The review of literature is separated into two sections: first, the influence of public debt on economic growth while considering the threshold effect and the second segment evaluates the impact of institutions on economic growth. Caner et al. (2010) considered 99 nations from 1980 to 2008 to see whether there is a debt ceiling. They concluded that average debt to GDP ratio across all sample countries is seventy seven percent. One unit increase in debt above this limit diminishes real economic growth by 0.017 points annually. Reinhart and Rogoff (2010a) are likely the most important research on debt and growth since the global financial crisis. They used the data of 20 advanced countries ranging from 1946 to 2009 and 24 emerging countries spanning from 1900 to 2009.

The study pointed out that a high level of public hurts economic growth. The outcomes of the study exposed that in both the advanced and emerging economies a public debt higher than 90 percent lowers the economic growth rate. However, a low level of public debt has an insignificant impression on economic growth. Also, the findings highlighted that in emerging countries, debt levels below 60 percent adversely impact the GDP growth rates. Krugman (2013) assembled data through the IMF, WB, and OECD for forty-four economies spanning from 1946-2009 to assess the influence of public debt on economic expansion. The study concluded that a high level of public debt is linked with lower growth in both advanced and emerging economies.

Herndon et al. (2014) imitated the work of Reinhart and Rogoff (2010a, 2010b) investigates by utilizing the data of advanced nations during the period between 1946-2009. Conversely to Reinhart and Rogoff's work, Herndon et al. (2014) recognized that there is compelling confirmation that such nonlinearity does not occur at the level determined by Reinhart and Rogoff. According to the study, nonlinearity occurs only when the public debt to GDP ratio is somewhere between 0% and 30%. More precisely, Herndon et al. (2013) concluded that countries having more than 90 percent have a linear relationship and this contradicts Reinhart and Rogoff (2010a) findings. Also, Herndon et al. (2014) and Dafermos (2015) stated that the unusual weighting of summary statistics and excessive data exclusions from certain nations harmed the conclusion of Reinhart and Rogoff (2010b). Woo and Kumar (2015) documented that a high level of debt, above 90 percent exerts a negative considerable effect on growth. The study highlighted that a 10 percent rise in the initial level of debt slow down the growth rate of real income per capita at 0.2 percent per annum.

Whether a debt threshold present or not Alshammary et al. (2020) utilized the data for 20 the MENA nations during a period of 1990 to 2016. The research work established that government debt has a substantial and favorable consequence on economic progress only under a specific level of government debt. Debt has a positive consequence on the economic performance when it is less than fifty-eight percent of GDP, but it has a detrimental impact when it exceeds this benchmark. This is in line with earlier research that shows emerging countries have lower debt thresholds. Swamy (2020) analyzed the panel dataset by using by using a Solow growth model. The study finds an inverse correlation between debt and growth by employing a two-step GMM estimator for a very large global sample of two hundred fifty-two nations spanning from 1960 to 2009. A 10% rise in debt is lessen a 23-percentage point in economic growth. Bhimjee and Leão (2020) used polynomial regression to quantify the impacts of public debt on output. Employing the dataset of AMECO. The analysis demonstrates that the average of Eurozone member countries' public debt and GDP trends follow the sovereign debt Laffer curves. The results, however, confirm the presence of thresholds. Apart from Estonia and the study had debt threshold levels ranging from 50 to 105 percent of GDP. Ndoricimpa (2020) also documented a threshold point of public debt, ranging between 62 to 66 percent in the case of African economies. Law et al. (2021) employed a threshold technique on the data of seventy-one developing nations and concluded 51.65 threshold value of debt to GDP ratio.

Another substantial strand of the literature validated the institutional aspects, a key variable determining the consequence of debt on economic growth is Kourtellos et al. (2013) who employed a threshold regression technique in a sample of 82 nations across the three set of ten-years periods i.e., 1980 to 1989, 1990 to 1999, and 2000 to 2009. The outcomes of the analyses didn't prove any threshold value of public debt in debt-growth relationship, as it has been extensively assumed in the economic literature. Rather, they concluded that the strength of a nation's institutions moderates the connection between debt and growth. They explicitly noted

that debt slows the pace of development where institutional performance is under a certain threshold, whereas public debt is growth-neutral in countries having an adequate institutional quality. Contrary to this, Presbitero (2008, 2012) concluded that debt is not linked to growth if country's policies and institutions don't certify a conducive environment and a nation implement good macroeconomic framework policies only if it has strong institutions. Cordella et al. (2005) did a panel analysis in the case of 79 emerging economies spanning 1970 to 2002 to see how well the debt-growth link changes with varying levels of indebtedness and other country variables. The findings of the OLS and system GMM showed that nations with solid institutional face a threshold value of debt above 15% -30% of GDP, whereas the influence of marginal debt on growth is no longer effective at debt levels over 70% -80% of GDP. The impact of debt overhang and irrelevant criteria, on the other hand, was found to be smaller in economies with bad institutional arrangements. In a similar spirit, Imbs and Ranciere (2005) used different econometrics approaches to investigate the debt overhang theory in 87 developing nations from 1969 to 2002. They found that different institutional performance measures contribute to limiting a debt accumulation also promote economic performance. According to the study there seems to be a breakdown of investment activities and a worsening in the implementation of economic policy in circumstances where debt overhang reigns are supreme.

Also, the new wave of research emphasized that in developing nations, poor institutions are not just to blame for the country's dismal economic growth, as well as for its high debt levels. Many researchers explained this phenomenon, for instance, Jalles (2011) examined the data of 72 developing nations from 1970 to 2005 to assess the effect of institutional performance on the debt growth association. The findings of the study unveil the fact that nations with a high level of institutional performance can utilize their debt more realistically. Analogously, Kim et al. (2017) investigated the influence of corruption on a debt-growth relationship and reported that corruption has a substantial statistically meaningful effect on the debt-growth association. Similarly, the connection between institutional measure, the shadow economy, and debt was also explored by Cooray et al. (2017). The study corroborated that the shadow economy augments the consequence of corruption on debt. The findings also validated that shadow economy diminishes the tax collection, which ultimately increases the debt burden. In the case of Malaysia Daud and Podivinsky (2014) contributed a great deal as well. They demonstrated the relevance of the conditional impact of institutional performance on a debt-growth relationship by using time series data spanning from 1970-2011 and employing threshold approach. They argued that government debt is helpful to the economy of Malaysia if they meet a minimal standard of institutional integrity. Hence, the findings of the study validated the presence of contingency impacts of institutional performance on the debt-growth link. Tarek and Ahmed (2017) hypothesized that the low quality of institutions concerns for the buildup of the debt in the MENA zone. The findings corroborated that dearth of violence, political stability, rule of law and regulatory quality has a substantial statistical effect on debt accumulation. Also, the findings indicated that poor institutions have a considerable indirect consequence on reducing the GDP

growth rate. Kemoe and Lartey (2022) concluded that the deleterious consequence of debt on growth is dampened by the better institutional performance in a sample of African economies.

3. DATA AND METHODOLOGY

The data on real per capita GDP as determined variable is provided by the World Bank database. Public debt is taken from Historical Public Debt Database of the IMF. To construct the political and economic institutional indexes, data is collected from the Political Risk Services Group. Political institution measures reflect the political structures which control the state's everyday activities and maintain the absence of cross-border disputes which are closely reflected in government stability, investment profile, and external conflict. These institutional measures promote stable and accountable government, as well as freedom from expropriation and outside pressures. While socioeconomic conditions, corruption, nonmilitarized politics, rule of law and order, and bureaucracy quality are all strongly weighted in economic institutions. Economic institutions reflect the economic institutions that ensure socioeconomic fairness, property rights protection, and contract enforcement. All these ICRG institutional measures were rescaled from 0 to 10, then used the Principal Component Analysis (PCA) command to construct the political and economic institutional indexes where a low score designates weak institutional quality, and the high score signifies the robust institutional quality. By keeping in mind, the existing literature, the expected signs of the institutional measures with relation to economic growth are positive (Slesman et al., 2015). The data for the control variables like physical capital, human capital and trade openness are all taken from WB database. Description, measurement unit, of all variables are presented in Table 1. Due to the non-availability of the data, fourteen countries were excluded from a total of fifty-seven OIC countries, only forty-three countries were selected. The missing data problem has been solved by employing multiple imputation techniques (Rubin, 1976, 1996).

Model Description

The modelling style to unveil linear and nonlinear effect of public debt on economic growth also, the direct and indirect effect of political and economic institutions on the debt-growth relationship is constructed on the following studies like Acemoglu and Robinson (2012); Dombi and Dedák (2019); and Swamy (2020) with little modification for the investigation purpose and the dynamic model is specified below.

$$\text{LNGDP}_{it} = \beta_{0it} + \beta_1 \text{LNGDP}_{it-1} + \beta_2 \text{LNPD}_{it} + \beta_3 \text{LNPD}_{it}^2 + \beta_4 \text{LNPINS}_{it} + \beta_5 \text{LNEINS}_{it} + \beta_6 \text{LNX}_{it} + \varepsilon_{it} \quad (1)$$

Where i signifies the cross-sectional and t for the time period, GDP_{it} represents the real per capita GDP representation for economic growth and GDP_{it-1} is the lagged term of the dependent variable, PD indicating the public debt as a ratio to GDP, square term of the public debt is mentioned by PD^2 . Political and economic institutional measures are included by following the Acemoglu and Robinson (2012) to recognize the differences in per capita income levels across

the countries. The significance of the inclusion of other economic growth-related variables in the growth studies, are backed by Lucas (1986) and Romer (1986) and also, growth studies like Mankiw et al. (1992), key factors like life expectancy, and trade openness also be incorporated in the equation (1) and ε_{it} for the error term.

By accepting the notion that exorbitant public debt expansion beyond a certain threshold point stigmatizes economic growth, Krugman (1988) and Sachs (1989) suggest the architectural framework of the sovereign debt Laffer curve. It is a quadratic curve with two segments: a "beneficial" segment where a low level of public debt augments the economic growth, and a "detrimental" segment in where a high level of public debt hurt the economic performance. So, a quadratic specification can be used to validate this configuration. As a result, an ideal threshold point separates the two portions. This 'optimality' should be seen only from the standpoint of leverage and not from the standpoint of maximization of economic wellbeing. Hence a quadratic econometric fit appears to be a good instrument for testing this theoretical framework.

In Eq (1) magnitude of β_2 and β_3 would be the main points. To develop a nonlinear association between public debt and real per capita income, both coefficient β_2 and β_3 must be statistically significant and have contradictory signs; in other cases, the relation is to be considered a linear one. If both coefficient β_2 and β_3 are statistically significant, with β_2 being negative and β_3 being positive, correspondingly, the connection is U-turn. On the contrary, if, β_2 and β_3 are both statistically significant, with β_2 being positive and the β_3 being a negative, the connection is endorsed by the debt Laffer curve as an inverted U. The reversal point of public debt can be calculated from the equation 1 (in the case where β_2 and β_3 are significant and have contradictory signs) by taking the first partial derivative of of Eq. 1 with respect to to public debt and setting it equal to zero and get the Eq. (2) as to find the turnaround point of public debt:

$$\frac{\partial \text{LnGDP}_{it}}{\partial \text{PD}_{it}} = - \frac{\beta_{2it}}{2\beta_{3it}} \quad (2)$$

$$\text{LNGDP}_{it} = \beta_{0it} + \beta_1 \text{LNGDP}_{it-1} + \beta_2 \text{LNPD}_{it} + \beta_3 \text{LNPD}_{it}^2 + \beta_4 \text{LNPINS}_{it} + \beta_5 \text{LNX}_{it} + \varepsilon_{it} \quad (3)$$

$$\text{LNGDP}_{it} = \beta_{0it} + \beta_1 \text{LNGDP}_{it-1} + \beta_2 \text{LNPD}_{it} + \beta_3 \text{LNPD}_{it}^2 + \beta_5 \text{LNX}_{it} + \beta_6 \text{LNEINS}_{it} + \varepsilon_{it} \quad (4)$$

To validate the hierarchy of institutions hypothesis Eq (3) excludes the economic institutions and incorporates the political institution with other control variables to assess how much political institutions matter for the economic growth in the absence of economic institutions. Eq. (4) excludes the political institutions and incorporates the economic institutions with other control variables to evaluate the impact of economic institutions in the absence of political institutions on real income per capita GDP.

To proceed the further analysis this study considers the two interaction terms. Equation (5) include the interactive term of political institutions and public debt and exclude the economic institution to evaluate whether political institution moderate the effect of public debt on real per capita GDP in the absence of economic institutions or not. Equation (6) incorporates the interaction term of public debt and economic institution in the regression to explore the sign and significance level of the public debt, economic institutions, and the interaction term in the absence of political institution. Equation (7), incorporating the political, economic institutions and the interaction term between the economic institution and public debt with other explanatory variables to evaluate whether the interaction term between economic institution and public debt moderate the consequence of public debt on real per capita GDP only in the presence of political institution or not. Hence, the motivation from empirical literature (e.g., Flachaire et al. 2014; Slesman et al. 2015), and in accordance with the theoretical framework of equations 1 to 7, the empirical models are developed in the following manners:

$$\text{LNGDP}_{it} = \beta_{0it} + \beta_1 \text{LNGDP}_{it-1} + \beta_2 \text{LNPD}_{it} + \beta_3 \text{LNPD}_{it}^2 + \beta_4 \text{LNPINS}_{it} + \beta_5 \text{LNX}_{it} + \beta_7 \text{LN}(\text{PD}_{it} * \text{PINS}_{it}) + \varepsilon_{it} \quad (5)$$

$$\text{LNGDP}_{it} = \beta_{0it} + \beta_1 \text{LNGDP}_{it-1} + \beta_2 \text{LNPD}_{it} + \beta_3 \text{LNPD}_{it}^2 + \beta_5 \text{LNX}_{it} + \beta_6 \text{LNEINS}_{it} + \beta_8 \text{LN}(\text{PD}_{it} * \text{EINS}_{it}) + \varepsilon_{it} \quad (6)$$

$$\text{LNGDP}_{it} = \beta_{0it} + \beta_1 \text{LNGDP}_{it-1} + \beta_2 \text{LNPD}_{it} + \beta_3 \text{LNPD}_{it}^2 + \beta_4 \text{LNPINS}_{it} + \beta_5 \text{LNX}_{it} + \beta_8 \text{LN}(\text{PD}_{it} * \text{EINS}_{it}) + \varepsilon_{it} \quad (7)$$

From Eq (5) β_2 is the direct (or unconditional) marginal effect of PD on real per capita GDP, and it is constant across countries. β_7 gives the result of PD on real income per capita conditional on PINS. Since PINS is a variable, this means that this effect is not constant across the countries. From Equation (7), β_2 is the direct (or unconditional) marginal effect of PD on real per capita GDP and it is constant across countries whereas β_8 gives the effect of PD on real per capita GDP conditional on EINS. Since EINS is a variable, this means that this effect is not constant across countries.

Estimation Methodology

Panel data models usually have an endogeneity problem, so, the traditional estimators give biased and inconsistent estimates. The literature provides evidence that the public debt and institutional quality variables normally employed in growth studies have a strong possibility to be endogenous (Kourtellos et al., 2013; Panizza & Presbitero, 2014). To tackle these issues, Holtz-Eakin et al. (1988) presented the Generalized Method of Moments (GMM) estimator. Arellano and Bond (1991) proposed first differencing of the regression equation to eliminate any linear connections between lagged dependent variables and individual-specific effects. Furthermore, to solve the problem of endogeneity, they proposed the lagged values of regressors in levels as instruments. On the other hand, due to criticism that Arellano and Bond (1991) difference GMM (D-GMM) may result in incorrect inferences as a lagged level of dependent and explanatory variables are weak instruments if these factors persist across time (Blundell & Bond, 1998). Arellano and Bover (1995) and Blundell and Bond (1998) created the dynamic panel model known as the system GMM (S-GMM). In the panel dataset, S-GMM is the best at evaluating endogeneity biases, omitted variables, overidentifying limitations, measurement errors, and autocorrelation (Ozkan & Ozkan, 2009). This study recommends the S-GMM technique over the D-GMM methods because of four major reasons that have been established for doing so. First, when the cross-sections (N) exceeded the time periods (T). $N (43) > T$ (1996–2018 or 23 years) in our situation. Second, in a case where the dependent variable is persistent, the estimator has been claimed to have a good match. Third, the strategy takes into consideration cross-country variances.

4. RESULTS AND DISCUSSIONS

Descriptive Statistics

Table 1. summarizes the descriptive summary of the designated dependent and independent variables without logarithm. GDP is real per capita income constant US\$ 2010; PD is public debt percentage of GDP; PINS is political institutions index constructed through PCA; EINS is economic institutions index constructed through PCA; GFCF is gross fixed capital formation (constant 2010 US\$); LEXP is Life expectancy at birth, total (years) and TO is trade openness calculated as $(\text{export} + \text{imports}) / \text{GDP}$.

The mean of the real GDP per capita is 8274.39 US\$ at constant 2010 with a minimum 232.528\$ and a maximum 69679.4\$. It is also noted that the real GDP per capita of OIC countries is highly disparate, with a very large standard deviation. The mean value of the public debt to GDP ratio is 65.163% with a maximum of 485.286% and a minimum of 0.318% respectively. The mean values of political and economic institutional quality indexes are 7.144 and 4.468 respectively and its maximum values are 9.722 and 7.799 correspondingly. The average life expectancy is 65.548 years with 80.100 maximum years of age and with a minimum age has 37.194 years with 9.459 variations. The trade openness index has a 73.702 mean with 37.518 variations. Its maximum value is 220.407 and minimum value is 0.027 respectively.

Table: 1. Summary statistics of forty-three OIC member countries

Variable	Unit of Measurement	Mean	Std.Dev	Minimum	Maximum
Economic growth	Real GDP per capita (constant US\$ 2010)	8274.39	13567.7	232.528	69679.4
Public Debt	Percentage of GDP	65.163	61.323	0.318	485.286
Political Institutions	Index through PCA ²	7.144	1.084	0.000	9.722
Economic Institutions	Index through PCA	4.468	1.490	0.000	7.799
Physical capital stock	(Constant 2010 US\$)	3.22E+10	3.59E+10	1.35E+08	3.50E+11
Human capital	Life expectancy (years)	65.548	9.459	37.194	80.100
Trade openness	Percentage of GDP	73.702	37.518	0.027	220.407

Source: Calculations are based on the data of forty-three OIC countries

Results and Discussions of Panel Regression

Empirically, to answer the research hypothesis; whether the public debt has a positive, negative, nonlinear, or neutral influence on real per capita GDP, and how the political institutions play their role in the development of economic institutions, and to what extent do these institutions moderate the negative effect of public debt or do these institutions have no significant role in the debt-growth link? Empirically, to test the nonlinear growth impact of public debt, table 2 contains the six models and have seven columns in the first column, there are explanatory variables and columns 2 to 4 contain the public debt and its square term, along with political and/or economic institutions also with other control variables. Whereas columns to 5 to 7 contain no square term of the public debt. Also, in column two, the results of the estimated equation (1) are presented; in column three estimates of the equation (3) are documented. In column four, the findings of the equation (4) are reported. Whereas in columns five, six, and seven the estimates of the equation (5), (6), and (7) are exhibited respectively. Each row of the column contains the name of the regressors, their coefficient values and the standard errors, and all other appropriate information about the S-GMM estimator. The inclusion of lagged terms in all models is statistically significant and corroborated the dynamic model, as the past value of regressand has a positive and statistically significant impression on per capita GDP at $p < 0.01$ significance level with the coefficient values ranging between 0.9651 to 0.9903 percent, *ceteris paribus*.

² STATA command is employed to construct the political and economic institutions indexes.

Turning to the coefficient sign of public debt and its square term with real per capita GDP. According to the exhibited values, the public debt and its square term exposed that the former has a positive connection with the economic growth, but the latter has a negative relationship with the dependent variable. These findings are validated by Pattillo et al. (2011), they documented a positive link between public debt and the economic growth. Based on the assumption of perfect capital mobility, they claimed that debt has a positive link with growth at low levels. The justification for perfect capital mobility is based on the idea that shifting funds from one geographical place to another incurs no additional cost, and so acquiring loan capital does not raise the borrowing economy's cost. This explanation also stated that debt expansion can have a positive influence on economic growth if the borrowed money is invested at a rate equal to or greater than the cost of borrowing. As a result, the effect of public debt on the economic growth is embedded in the investment of borrowed funds. The square term has a negative association with economic growth which validated the nonlinear growth impact of public debt. These results established that the debt-growth relationship in our study of OIC economies follows a debt Laffer curve pattern. These outcomes concluded that public debt has dual influence on economic growth in OIC economies. A modest level of public debt augmented the economic growth but after reaching a certain point it depresses the economic growth.

Moving to the coefficient value and its significance level, this study evaluates how much public debt impacts economic growth in OIC economies, variable of public debt is significant, at $p < 0.01$ levels, and the PD^2 is significant, at $p < 0.05$ level. Regarding public debt's coefficient value, in OIC countries the coefficient value of public debt is ranging between 0.0165 to 0.0338, concluded that a 1 percent increase in public debt would increase the real income per capita GDP by 0.165 to 0.0252 percent, *ceteris paribus*. As concern to the coefficient value of square term of public debt it ranged between 0.0031 to 0.0032. These findings delved that a moderate level of public debt augments the economic growth, before depressing it after touching a certain turning point.

Table: 2 Dependent variable: Economic Growth (Results of Two-step system GMM)

Regressors	Natural Log of Real GDP per capita (constant 2010 US\$) proxy for economic growth					
	(1)	(2)	(3)	(4)	(5)	(6)
	Without interaction term			With interaction term		
L.LNGDP	0.9860*** (0.0211)	0.9903*** (0.0311)	0.9064*** (0.0132)	0.9735*** (0.0151)	0.9783*** (0.0232)	0.9651*** (0.0251)
L.NPD	0.0174*** (0.0064)	0.0252*** (0.0093)	0.0165*** (0.0060)	-0.0159*** (0.0029)	-0.0218*** (0.0042)	-0.0079*** (0.0019)
L.NPD ²	-0.0021** (0.0009)	-0.0031** (0.0015)	-0.0021** (0.0009)	-	-	-
L.NPINS	0.0224*** (0.0081)	0.0213*** (0.0077)	-	0.0150*** (0.0028)	-	0.0163*** (0.0028)
L.NEINS	0.0162** (0.0068)	-	0.0116 (0.0082)	-	0.0014 (0.0015)	0.0030** (0.0015)
L.NGFCF	0.0138** (0.0061)	0.0194** (0.0088)	0.0143* (0.0077)	0.0132*** (0.0029)	0.0120*** (0.0015)	0.0139*** (0.0032)
L.NLEXP	0.0225** (0.0107)	0.0262** (0.0113)	0.0291* (0.0153)	0.0137** (0.0059)	0.0102** (0.0051)	0.0169*** (0.0062)
L.NTO	0.0432*** (0.0144)	0.0621** (0.0271)	0.0445* (0.0247)	0.0426*** (0.0143)	0.0439** (0.0179)	0.0413** (0.0198)
LN(PD*PINS)	-	-	-	0.0021*** (0.0008)	-	-
LN(PD*EINS)	-	-	-	-	0.0013 (0.0012)	0.0016** (0.0008)
Threshold Point (Public debt to GDP)	62.9825	58.2367	50.8343	-	-	-
Constant	0.1715*** (0.0101)	0.3176*** (0.1083)	0.7923*** (0.1144)	0.2891* (0.1531)	0.2573*** (0.0981)	0.5419*** (0.1701)
Observations	946	946	946	946	946	946
Countries	43	43	43	43	43	43
J Stat (Instruments)	40	42	40	36	38	36
AR (1)	-1.4031	-1.3921	-1.3952	-1.4701	-1.4133	-1.3941
AR (1) <i>p</i> Value	0.1601	0.1641	0.1633	0.1412	0.1580	0.1630
AR (2)	1.0521	1.0290	1.0171	1.2481	1.1092	0.1101
AR (2) <i>p</i> Value	0.2931	0.3030	0.3091	0.2121	0.2673	0.9131
Sargan	68.01	72.15	60.72	51.75	55.58	46.05
Sargan <i>p</i>	0.000319	0.000221	0.00230	0.00410	0.00305	0.0126
Hansen	34.08	37.38	33.65	34.85	36.26	33.30
Hansen <i>p</i> Value	0.4162	0.3601	0.4363	0.1741	0.2003	0.1871
Wald <i>Chi</i> ²	2.470e+08	3.750e+08	1.730e+09	4.160e+07	1.320e+08	3.060e+07
<i>Chi</i> ² <i>p</i> Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Source: Author's own calculation xtabond2 command of Roodman, (2009) in Stata 14 is adopted (Standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$)

Explicitly, *ceteris paribus*, at a reasonable level of public debt, a 1 percent rise in public debt enhanced the economic growth by about 0.0165 to 0.0338 percent in OIC countries, while on the other hand, at high levels of public debt above the turnaround point, a unit increment in public debt worsens the economic growth by about 0.0021 to 0.0031 percent in OIC countries. Nonlinear relationship between the public debt and the economic growth is validated by the existing literature (e.g., Caner et al. 2010 and Herndon et al. 2014). These studies claim the nonlinear growth impact of public debt which followed a debt Laffer curve shape.

The dual effect of debt on economic growth resulting a debt Laffer curve connection between these two variables. There is a peak level of debt above this level it is damaging to economic growth. By utilizing Equation (2) ceiling point of public debt has been determined, from model 1 it was obtained 62.9825 percent of GDP [$\exp(0.0174/0.0042) = 62.9825$], from model 2 the threshold point has been established at 58.2367 percent of GDP, got by [$\exp(0.00252/0.0061) = 72.9281$]. While from model 3 tipping point of public debt has been documented at 50.8343 percent of GDP, calculated by [$\exp(0.0165/0.0042) = 50.8343$]. These tipping points indicated that public debt has a positive influence on economic growth in OIC countries when it remains below these tipping points, but it has become deleterious to economic growth when it crosses these tipping points. Based on these outcomes OIC countries will find a beneficial growth impact of public debt to their nations if these nations keep the public debt as to GDP ratio below these threshold points. However, from the descriptive statistics, it has been disclosed that the average public debt to GDP ratio stood at 65.163, which is above the threshold points OIC countries. This implied that most OIC countries had public debt stock in excess of their threshold point. Also, from the existing literature, these estimated tipping points are below. In developed economies Reinhart and Rogoff, (2010b) documented 90 percent; Caner et al. (2010) calculated 77 percent for developed and developing economies and 64 percent for the emerging economies. Threshold value of this study also falls between 20 to 60 percent range as it was found by Égert (2015). The findings are in line with the study of Ndoricimpa (2020) who documented a threshold point of public debt, ranging between 62 to 66 percent in the case of African economies. Also, the outcomes are endorsed by the study of Alshammery et al. (2020), who disclosed a turnaround point of debt at 58 percent in a panel of 20 MENA economies. It is also noteworthy that threshold point varies, and it depends on the inclusion of institutional measures. It is high when both institutional measures are part of the model, and it is 62.9825 percent of GDP. When only the economic institutions variable was incorporated in the model 3 then the threshold point fell to 50.8343 percent of GDP.

Turning to the institutional measures, in model 1, both the political and economic institutional variables labeled by PINS and EINS has been incorporated with other explanatory variables of the growth model. In model 2 PINS measures were used with other explanatory variables and the EINS variable has been excluded, model 3 had the EINS with other control variables but excluded the political institutions. Model four had an interactive term of political institutions and public debt, while in model 6, interactive term between the economic institutions and public debt has been incorporated. The main objective to frame these models was to test the hierarchy of

institutions hypothesis which stated that PINS shape the EINS. EINS works only in the existence of political institutions. In all model both institutional measures have a truthful sign and PINS is statistically significant at 1 percent and EINS is at 5 percent levels. It is indicating that political and economic institutions have had a major influence in uplifting the living standards of OIC countries' people. This conclusion backs up the widely held belief that good institutional qualities are necessary for economic growth. It appears to confirm the findings of previous research like (Acemoglu et al., 2001 and Slesman et al., 2015). Moreover, it is noted that interaction term between political institutions and public debt has a positive sign and is significant even in the absence of individual economic institutions variable but, on the other way interaction term between EINS and public debt also has a positive sign, but it is only significant in the presence of PINS which may validate the hierarchy of institutional hypothesis. Furthermore, the magnitude of the interaction term of political institutions and public debt is higher than the interaction term of economic institutions and public debt.

The findings of the study reveal that Gross Fixed Capital Formation (GFCF), human capital proxy by life expectancy and trade openness have been evidenced as an economic growth promotor. All have a positive association with real per capita income in OIC economies. The outcomes unveiled that the impact of trade openness is higher than other two growth related variables. The outcome regarding GFCF is consistent with the findings of Meyer and Sanusi (2019) and contradicting with the findings of Hartwig (2010) in OECD economies. The results regarding trade openness are validated by previous work like Chaudhry et al. (2010) utilizing the data of Pakistan's economy. Moreover, this study considers two specification tests, proposed by Arellano and Bover (1995) and Blunedell and Bond (1998). All models passed the AR (1) and AR (2) tests, as evidenced by their p-values. As a result, AR (2) is more authentic. The results of AR (2) show that there is no serial correlation in this investigation as its p-value is greater than 5 percent which suggests that all models are free from the problem of second-order serial correlation. The p-values of the Hansen tests show the overall instruments' validity, as the additional instruments employed are a requirement for S-GMM. The results conclude that both the Sargan and Hansen stats yield insignificant p-value in all six models which infers that the instruments in all models are not over-identified and are adequate. The Wald Chi-square test reveals that all variables in this model contribute to the model. From these results, one may infer that estimated models are properly defined.

5. CONCLUSION AND POLICY IMPLEMENTATION

This study empirically adds to the knowledge on debt-growth relationship by exploring different debt thresholds in OIC countries. The outcomes show that the threshold of public debt to GDP ratio is low when the indebted country has only the economic institutions without the supportive political institutions, and it is high when the countries have both political and economic institutions. This shows that hierarchy of institutional quality has a considerable influence on the debt-growth connection.

There has an obvious policy implication: Governments of OIC nations should dramatically reduce their reliance on public debt and also keep public debt level below the ideal level of public debt beyond which it stifles economic growth. As an alternative, OIC countries should galvanize their internally generated revenue collecting mechanism to boost revenue generation and fill the gap between existing resources and spending with the least amount of public debt. Another policy conclusion of the findings is that OIC economies should develop export-led growth initiatives to enhance their balance of payments.

Further key policy relevance to the findings of the institutions is that the lending institutions and governments should make compliance with the measures that improve the institutional infrastructure, a prerequisite for nations exhibiting interest in receiving loans. This policy would undoubtedly redirect their attention to enhancing the quality of institutions in OIC countries, while also limiting the region's public debt accumulation, as countries that do not satisfy the criteria will be denied such facilities.

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