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Political stability and growth: An application of dynamic GMM and quantile regression *

Md Akther Uddin, Md Hakim Ali, Mansur Masih*

INCEIF, Lorong Universiti A, 59100 Kuala Lumpur, Malaysia

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ABSTRACT

This paper studies the effect of political stability on economic growth by taking 120 developing countries over the period of 1996–2014. We apply relatively advanced dynamic two step system-GMM and quantile regression. Political stability is found to be a key determinant of economic growth. More importantly, political instability (or risk) is found to be higher in the OIC countries and is a deterrent to economic growth. Also, for the lower and middle income OIC countries, political instability appears to affect economic growth more severely perhaps due to the absence of strong economic and political institutions. Moreover, political instability is also found to be significantly higher in the oil-dependent OIC countries. Notably, political instability is likely to affect growth through the channels of investment and human capital accumulation in the developing countries. Finally, the impact of political stability and political instability on growth is found to be equally distributed across the OIC countries with higher or lower growth level. Therefore, the development of political and economic institutions along with human capital development is recommended for all the developing countries in general and the OIC countries in particular.

1. Introduction

Muslim world has been found persistently entangled in war, foreign invasion, coup, ethnic rivalry, and sectarian violence. In spite of having tremendous economic prospect, developing Muslim countries have lost their growth trajectory in the last decade or so. Persistent political instability,¹ internally and externally, has threatened not only the socio-political structure but also the economic development process. Not surprisingly enough, Muslim countries have been devastated by sixteen major wars, many coups, political, religious and ethnic insurgencies, and revolutions since the World War II.² Furthermore, ongoing political instability with economic and political repression resulted in many Arab springs like revolutions in many Muslim countries. Therefore, the importance of political stability on economic development in the Muslim world deserves much attention. The Organization of Islamic Conference (OIC) countries represent one of the world's largest market having around 1300 million consumers which roughly constitute 25 percent of the world population. With the objective of promoting close cooperation among Islamic countries in the economic, political and cultural fields following the demolition of Masjid AL Aksa, almost all Muslim majority countries set out a new journey in the name of OIC. The commencement of this journey is still quite young established in 1969. Apparently the 57 countries throughout the world are members; those Islamic countries are known to be diverse in terms of their economic structure, political system, level of development, ethnic and socio-cultural background.

Is *political stability* or instability a new phenomenon in the Muslim world? The answer is obviously negative. The importance of *political stability* for economic prosperity and greater human welfare was repeatedly mentioned in the Holy Quran and traditions of the Prophet (PBUH). Therefore, we argue that theoretical underpinnings of *political stability* and economic growth from Islamic perspective are based on the Holy Quran and the Sunnah. With the recent development of Islamic Economics, contemporary Islamic scholars have already proposed the so called Islamic growth model (Anwar, 1987; Khaldūn et al., 1969; Mannan, 1989) in which they identify political stability as an important determinant of growth. At the same time, a good number of researchers have found strong empirical evidence in support of the

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^{*} Corresponding author.

E-mail addresses: aktherpu@gmail.com (M.A. Uddin), bmhakimru@gmail.com (M.H. Ali), mansurmasih@gmail.com (M. Masih).

¹ Political instability and political risk are used interchangeably.

² Author's calculation from the Encyclopedia of Britannica and web resources.

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proposition that political stability promotes growth (Aisen and Veiga, 2013; Alesina et al., 1996; Barro, 1991; Devereux and Wen, 1998; Fosu, 1992; Goldsmith, 1987; Londregan and Poole, 1989). However, some others have not found significant relationship between political stability and growth (Goldsmith, 1987; Londregan and Poole, 1989). In the meantime, several attempts have been made to study this relationship in only a very few Muslim countries even idiosyncratic (Ahmed and Pulok, 2013; Armah, 2009; Gurr et al., 2005; Mohamed, 2015; Slesman et al., 2015; Tang and Abosedra, 2014). To the best of our knowledge, no comprehensive study has been conducted so far to study this phenomenon, and even if such research exists, there is no study talking about this phenomenon considering the dichotomy of political stability and political risk together in such a wide number of countries. Hence the importance of political stability for sustainable economic development is still not settled yet in the literature. Therefore, we make an humble attempt to examine the impact of political stability on economic growth in OIC countries and how it is different from other developing countries from the point of view of the so called Islamic growth model (Anwar, 1987; Khaldūn et al., 1969; Mannan, 1989; Mirakhor and Askari, 2010) by using important determinants which truly reflect economic growth in Islam, namely human, institutional, financial, and environmental development.

Most of the previous studies focus on political instability rather than stability, which is obviously a dichotomous concept (Olson cited in Goldsmith, 1989). In our study, we use two indicators both political stability and political risk. The political stability index³ by Worldwide Governance Indicator (WGI) and political risk index is calculated by Oxford Economics based on WGI. In developing econometric model, most of the previous studies did not incorporate the lag of economic growth, rather used only initial GDP per capita, which is really important in growth studies, as economic growth is considered dynamic rather than static i.e., current economic growth depends on the past growth. To test our hypothesis whether political stability and risk affect the economic growth in Muslim countries, we apply advanced dynamic two step system-GMM and quantile regression. This estimator handles important modeling concerns, namely the fixed effects and endogeneity of regressors, whilst avoiding dynamic panel bias.⁴ Also, time dummies have been included to control for the timespecific effects and to eliminate cross-sectional dependence in the data. We have also studied various channels through which political stability affects economic growth. In addition to that, when there is evidence of outliers and heavy tailed distributions, quantile regression results are characteristically robust for such cases but standard OLS regression estimators are not robust even to a modest departure from normality.

Our results tend to show that the three most important aspects of development in Islam, namely institutional, financial and human development, are found to be significant contributors to growth. *Political stability* is one of the key determinants of economic growth for OIC and non-OIC developing countries. Political stability has a positive but political risk has a negative effect on economic growth. Political risk is significantly higher in OIC countries which obviously hinder economic growth. For the lower and middle income OIC countries, political risk affects economic growth severely perhaps due to the absence of strong economic and political institutions. In oildependent OIC countries, political risk is also found to be significantly higher. The importance of strong economic institution for sustainable growth is also reconfirmed. We have identified two channels, investment and human capital accumulation, through which political stability affects economic growth. The significance of economic institutions is greatly reduced in the absence of strong political institutions and for the OIC countries the development of political institutions is more important compared to other developing countries.

Our humble contributions in this paper lie in the following: (i) this is the first attempt to theoretically propose the importance of political stability on economic growth from the perspective of Islamic economics. (ii) Also, we test empirically the Ibn Khaldun's proposition of the importance of political stability in the Muslim countries compared to that in the non-Muslim countries. (iii) Moreover, we contribute to the existing growth literature by extending the works of Alesina et al. (1996) and Aisen and Veiga (2013) by applying dynamic two-step system GMM and quantile regression techniques simultaneously. (iv) We also study various channels through which political stability can affect economic growth. (v) Finally, we test Olson's theory which implies that political stability and instability are dichotomous by using two unique variables hitherto unexplored.

The rest of the paper is organized as follows. Section 2 discusses the theoretical foundation of *political stability* from the Islamic perspective. Section 3 presents the relevant theoretical and empirical literature. The theoretical model specification, data and the econometric methodology are explained in Section 4. The empirical results and discussions are presented in Section 5. The last section ends with the concluding remarks and policy implications.

2. Theoretical foundation of *political stability* and economic growth in Islam

The history of economic development in Islam started in Medina since the first Islamic state was established by the Holy Prophet (PBUH). The Prophet Mohammad (PBUH) founded a progressive state based on divine principles which became one of the most powerful political movements within a very short period of time.

Allah the Almighty mentions in the Glorious Quran:

O you who have believed, obey Allah and obey the Messenger and those in authority among you. And if you disagree over anything, refer it to Allah and the Messenger, if you should believe in Allah and the Last Day. That is the best [way] and best in result.⁵ [The Quran, 4:59].

This verse portrays the fundamental principles of religious, social, cultural and political life in Islam. One of the significant lessons from this verse is obeying the leader in power right after Allah and His Messenger Prophet Mohammad (PBUH). There are also numerous Hadiths⁶ on this regard. Even though Muslim accept the Quranic injunction without any doubt in their mind, our inquisitive mind wants to investigate the rationality behind this revelation. While discussing different Quranic interpretations, Rafique (2015) argues that following the leader would ensure stable law and order, political stability, protect countries from foreign aggression, and ensure peace and prosperity. The consequence of recent Arab uprisings in many Middle Eastern and North African countries is evident to us and post revolutionary situation clearly restates that this has led to an intense political instability and slower economic growth. However, silence against brutal dictator who does not uphold Islamic values and public interest is also not acceptable. Even in this situation uprising is not recommended in Islam rather concerted counselling is recommended as insurgency may create not only disorder but also unnecessary bloodshed. In another verse Allah (SWT) says:

...*fitnah* is worse than killing....⁷[The Quran, 2:191].

Here, the word *fitnah* means confusing state or corruption. In this way, Islam clearly prohibits social disorder, arm revolution, political

 $^{^3}$ GMM estimations with this variable are presented in a separate appendix available upon request.

⁴ 'Fixed effects' (FE) and 'Random effects' (RE) models are 'static' panel models and do not take into account the DYNAMICS of the model through the lagged dependent variables. The Pooled Mean Group (PMG) and Mean Group (MG) are dynamic heterogeneous panel models but require long time series variables (which we do not normally have in Islamic finance). Hence we are applying the dynamic GMM models (system and difference) containing smaller 'T' and larger 'N'.

⁵ Sahih International translation of the Holy Quran.

⁶ Authentic sayings and traditions of the Prophet Mohammad(PBUH).

⁷ Sahih International translation of the Holy Quran.

insurgency and corruption. In other words, Islam encourages *political stability* for greater human welfare.

One of the brightest minds in early Islamic period, Ibn Khaldun (Khaldūn et al., 1969) states that political instability adversely affects economic growth. He argues that political stability creates a favorable environment for business to flourish, create employment opportunities and migration into the cities which increase demand and stimulate economic growth. This could certainly be considered as one of the first foundational theories of political stability and economic growth from Islamic economics perspective. M. Umer Chapra argues that ongoing revival of Islam may make it possible to have material advance accompanied by moral uplift, justice and social harmony, which are important for providing the needed social and ethical capital for sustained development (Chapra, 2008).

Anwar (1987) while proposing an interest-free economic model argues that the failure of the traditional approaches to economic development is evident from the mass poverty, co-existence of hunger and affluence, exploitation of poor by rich and the powerful, increasing disparities at the regional and international levels, the unsuitability of production and consumption processes to environmental needs, and the irrational use of non-renewable resources. Economic development in Islam must be explained in terms of raising the absolute income levels of the poor to eradicate poverty, meeting material or nonmaterial human needs, the conservation of natural resources, protection of property rights, wildlife, and ecological environment (Mannan, 1989; Mirakhor and Askari, 2010). In other words, major foundational elements of development in Islam are: individual self-development, the physical development of the earth and its natural resources, and the holistic development of human (Askari and Rehman, 2013; Mirakhor and Askari, 2010). In addition, the goals of the Islamic concept of development must be designed for the preservation of moral and spiritual values, as reflected in the concept of 'Tazkiyah' (moral purification plus growth).

Askari and Rehman (2013) argue that in most Muslim societies, efficient institutions, rules and rule-compliance to promote development are not embraced and practiced, therefore, in many countries that profess Islam and are labeled as Islamic today, we see injustice and underdevelopment. He further argues that despite the fact that the Islamic basis of development is multidimensional, having its moral, social, political and economic dimensions, moral and spiritual development need to be integrated into the very concept of economic development right from the beginning.

Based on the above revelations and arguments we can state that Islam is a religion of peace and prosperity, moreover, which encourage political stability and reduce political risk for the greater welfare of human being. Understanding the relationship between political stability and growth would help us identify the key reason of underdevelopment in Muslim countries. Furthermore, it would help us better explain and develop a sustainable Islamic economic growth model, which would help eradicate mass poverty, growing inequality, unemployment, higher inflation, poor healthcare, illiteracy, and rampant corruption in the Muslim world, which constitutes 23.4% of the world population.⁸

3. A brief literature review

3.1. Political stability and growth

According to the political theories of Max Weber, *political stability* depends on the government's legitimate use of physical force. If the government cannot ensure the basic services it provides for people, such as security and the possibility of procuring food and shelter, it loses the power to enforce laws and political instability ensues. Political

instability is associated with the concept of a failed state (Mommsen, 1992). Mancur Olson's influential *The Rise and Decline of Nations* stressed the importance of institutional and political factors in explaining differences in rates of economic growth. Goldsmith summarizes Olson's theory as follows:

Olson's theory implies that *political stability* and instability are dichotomous: instability must reach a threshold to disrupt distributional coalitions. Lesser degrees of instability may not trigger this effect at all. The discontinuous character of stability suggests a fourfold typology of political systems. Each type is expected to have a characteristic growth pattern: (1) The Chronically Unstable states should exhibit persistently slow growth. (2) The Consistently Stable ones should grow relatively quickly but show a declining trend over time. (3) The Stabilizing political systems that are settling into a new pattern of political order should undergo a spurt in growth rate. (4) Finally, there are regimes that are becoming less stable. Olson does not make an explicit prediction about these Destabilizing systems, but the inference is that their growth rates would drop sharply.

The Economist (2009) defines political instability as those events or developments that pose a serious extra-parliamentary or extra-institutional threat to governments or the existing political order. Political instability is defined as the propensity of a government collapse (Alesina et al., 1996). This could be either because of conflicts or rampant competition between various political parties. Also, the occurrence of a government change increases the likelihood of subsequent changes. Political instability tends to be persistent or intermittent.

Alesina et al., (1996) in their seminal work studied political instability and growth in a sample of 113 countries for the period of 1950–1982 and found that countries with higher political instability, the propensity to change government is high, suffer lower growth. In other words, political instability and economic growth are deeply interconnected. Unstable political environment may reduce investment activities and the growth, conversely, poor economic performance may lead to government collapse and political unrest. However, they also found that low economic growth does not affect political instability and economic growth (Aisen and Veiga, 2013; Alesina et al., 1996; Barro, 1991; Bashir and Xu, 2014; Caporale and Leirer, 2010; Cebula, 2011; Devereux and Wen, 1998; Feng, 1997; Fosu, 1992; Goldsmith, 1987; Londregan and Poole, 1989; Radu, 2015).

In their more recent work, Aisen and Veiga found negative association between political instability and economic growth by using advanced panel data econometric technique, system GMM, on 169 countries for the period of 1960- 2004; it was also found that political instability reduces GDP growth rates significantly (Aisen and Veiga, 2013).

On the other hand, there are few empirical studies which did not find any significant relationship between political stability and growth (Goldsmith,1987), one of the earlier empirical works to test Mancur Olson's theory, where political instability is treated as exogenous variables in 77 Least Developed Countries (LDCs) (Goldsmith, 1987). In another study, Londregan and Poole (1989) did not find evidence of lower growth as a consequence of increased political instability; instead, they argue that low economic growth increases the probability of political instability.

There are a number of channels through which political stability can affect economic growth. Aisen and Veiga (2013) identified total factor productivity as the main transmission channel through which political instability negatively affects growth. Physical and human capital accumulation is also found as an important channel. If a country's future becomes uncertain, it may affect the rate of time preference of society as a whole by shrinking its time horizon. Consequently, less efficient resource allocation and reduced research and development efforts by firms and governments lead to slower technological progress. Moreover, consumption and government ex-

⁸ Christianity 2015: Religious Diversity and Personal Contact.

penditure as well as trade tend to decline drastically during chronic political instability in developing countries. The recent study by Cooray et al. (2017) has studied the role of political institutions, democracy, political rights, and civil liberties on trade openness and labor force participation rate in Africa. Their results tend to indicate that improved political institutions enhance labor force participation rate (LFPR) which in turn boost a country's economic development. In other words, political stability may affect growth through various channels e.g., political stability creates a favorable environment for business to flourish, attract domestic and foreign investment, create employment opportunities and migration into the cities which increase aggregate demand and stimulate economic growth.

3.2. Political stability and growth in Muslim countries

The importance of persistent political stability for sustainable economic development is questionable but Islamic paradigm of economic thought always urge to maintain political stability in order to avoid detrimental socio-economic consequences. Very few researches have been conducted on this issue by taking and focusing on the majority of Muslim countries. Many Muslim countries have become independent from colonial power since the World War II. Muslim countries were in crisis for roughly one of every four years between 1955 and 2003 (Gurr et al., 2005). Since then most of the Muslim countries have been facing political instability in the form of regional war,⁹ foreign invasion, frequent coup d'état, uprising, ethic violence, political insurgency, and revolution. Moreover, the so called Arab springs have erupted in Tunisia, Libya, Egypt, and Syria since 2011. In this background, isn't it logical to hypothesize that these political uncertainties significantly hinder the economic development of Muslim countries?

Ahmed and Pulok (2013) study the direct impact of political stability on economic performance of Bangladesh for the period of 1984–2009 by using time series econometric approach and surprisingly they found that political stability has negative effect in the long run while the short run effect is positive. They argue that destabilizing events interrupt economic activities in the short term, but these can set the stage for more rapid growth in the medium term. Moreover, self-seeking interest group or "distributional coalition" is responsible for this kind counter intuitive relationship between political stability and growth. However, they conclude that even though political stability is an important precondition of growth for developing countries like Bangladesh but it cannot be considered as the key determinant of economic performance. Yilmaz and Levent (2015) found bidirectional causality between political stability and economic growth.

If we study the empirical literature of *political stability* and growth in Muslim countries, the results are also not convincing. There could be many reasons for not finding conclusive evidence. First of all, OIC countries are not at the same level of economic development; there are countries with higher per capita GDP, also, countries with very low per capita GDP; there are countries which rely heavily on natural resources, oil and gas, like countries in the Gulf; there are emerging economies like Malaysia, Indonesia, and Turkey where manufacturing and service sectors have been growing faster than other countries; there are also countries like Bangladesh, Pakistan, Egypt, Sudan, Nigeria where political instability is comparatively higher than other OIC countries; types of institutions, government structure: democratic, autocratic, and monarchy also varied across regions. Importantly, financial sector is also at different stage of development, most of the OIC countries do not have well-developed capital market and the economy is based on banking system, financial regulation and rule of institutions are also weak, most importantly property rights are not ensured due to lack of rule of law. In a number of recent researches, the importance of two political institutions, quality of governance (Al Mamun et al., 2017) and democracy (Saha and Zhang, 2017) on growth are highly emphasized. Not surprisingly, corruption is rampant across the OIC countries except few countries which make these countries very different from other developing or emerging countries. Not surprisingly enough, there are only seven high income countries¹⁰ in the OIC, all of them are GCC countries except Brunei Darussalam (Armah, 2009; Gurr et al., 2005; Khan and Saqib, 2011; Mohamed, 2015; Tang and Abosedra, 2014; Yilmaz and Levent, 2015).

Analysis of empirical literature indicates that the results are not conclusive and different studies applied different indicators to measure political stability or instability. Political stability has been treated as both an endogenous or exogenous variable. Economic growth and political stability are profoundly interconnected. It can be argued, on the one hand, that uncertainty associated with an unstable political environment may reduce investment and the pace of economic development. On the other hand, poor economic performance may lead to government collapse and political unrest. Although, theoretical foundation has been strengthened, the lack of appropriate variable to measure political stability and political risk may have given conflicting empirical findings. The use of econometric methods also varied across the studies including OLS, correlation, multivariate regression, threestage least-squares, fixed and random effect, panel least squares estimations, panel two-stage least squares estimations and GMM.

4. Methodology and empirical model

4.1. Generalized Method of Moments (GMM)

In this paper, we investigate the dynamic linkages between political stability and economic growth, also, political risk and economic growth by following Beck et al. (2000), Aisen and Viega (2013) and Slesman et al. (2015) which are commonly used in the current growth literature. We estimated the following growth equation.

$$Y_{it} = \alpha_i Y_{it-1} + \beta_i Initial GDP percapita_{it} + \gamma_i X_{it} + \delta_{it} PL_{it} + v_i + \mu_t + \varepsilon_{it}$$
(1)

Where *i* indicates the country (i = 1,...N) and *t* indicates the time period $(t = 1...T_i)$.

Where Y_{it} stands for the Economic Growth of country *i* at the end of period t, X_{it} is a vector of other control variables hypothesized to affect output growth, PL_{it} for a proxy of *political stability* and *political risk*, α , β , λ and δ are the parameters and vectors of parameters to be estimated, v_i are country-specific effects, μ_i are period specific effects and, e_{it} is the error term.

The main control variables comprise the log of initial GDP per capita, capital investment to GDP, average year of schooling, and CO_2 emission per capita (metric tons) Eq. (1) forms the basis for our estimation. As in (Aisen and Veiga, 2013; Alesina et al., 1996), the coefficient δ for *political stability* in Eq. (1) is expected to be positive if it indicates conditional convergent and negative if divergent and vice for *political risk*.

Aisen and Veiga (2013) discussed the limitations of estimating the dynamic model (Eq. (1)) by using OLS. As our sample has only 6 nonoverlapping 3-year periods the dynamic panel bias may still exist. Arellano and Bond (1991) suggest the use of first differences of the variables to eliminate the fixed effects, which is also known as the

⁹ Significant wars in Muslim countries since the World War II: the First Kashmir War between India and Pakistan (1947–1948), first Arab-Israeli War (1948-49), Malayan War(1948–1960), Algerian War of Independence (1954–1962), Suez War of 1956, Yemen Civil war(1962–1970), Second Kashmir War (1965), Six-Day War (1967), Bengali War of Independence(1971), Lebanese Civil War (1975), Afghan Civil war (1978-Present), Iran-Iraq War (1980–1988), Israeli Invasion and Occupation of Southern Lebanon (1982–2000), Gulf war (1991), American Invasion of Afghanistan and Iraq at the beginning of this century.

¹⁰ Country and Lending Groups. The World Bank (2016). Retrieved from http://data. worldbank.org/about/country-and-lending-groups

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Standard or Difference GMM. First difference of Eq. (1) can be rewritten as follows:

$$\Delta Y_{it} = = \alpha_i \Delta Y_{it-1} + \beta_i \Delta Initial GDP per capita_{it} + \gamma_i \Delta X_{it} + \delta_{it} \Delta P L_{it} + \Delta v_i + \Delta \mu_i + \Delta \varepsilon_{it}$$
(2)

However, the problem of correlation between the lagged dependent variable and the error term remains, which requires the use of instruments. To solve this problem, Arellano and Bond (1991) use appropriate lags of dependent and independent variables as instruments. The lagged levels of regressors, independent variables, may be weak instruments for the differenced variables which cannot be addressed in difference estimator. More specifically, first difference GMM estimator behave poorly and lead to large sample biases when the independent variables are persistent over time (Blundell and Bond, 1998). Finally, the absence of information about the focus variables in the level form can result in loss of a substantial part of total variance in the data (Arellano and Bover, 1995).

To solve these above discussed problems with Difference GMM, Arellano and Bover (1995) and Blundell and Bond (1998) proposed System GMM estimator. This estimator combines in a system with the regression in first differences and with the regression in levels. To compute the system estimator, variables in differences are instrumented with the lags of their own levels, while variables in levels are instrumented with the lags of their own differences (Bond et al., 2009). In other words, the first differenced moment conditions in Difference GMM are augmented by level moment conditions in System GMM for more efficiency in estimation (Blundell and Bond, 1998). In the System GMM, even though the levels of the explanatory variables are essentially correlated with the country specific fixed effect, the differences are not correlated. In addition to that time dummies may be included to control for the time-specific effects and to eliminate cross-sectional dependence in the data and country or unit dummies may be used to control for the country specific or unit effects. One more argument in favor of using System GMM is that for unbalanced panel data, as in our case, it is better to use System GMM and avoid Difference GMM estimation, which has weakness of magnifying gaps (Roodman, 2009b).

While System GMM solves the above discussed problems, there exist two weaknesses. Though asymptotically more efficient, the twostep GMM carries out estimations of the standard errors that tend to be critically downward biased. However, it is possible to overcome this problem using the finite-sample correction to the two-step covariance matrix developed by Windmeijer (2005) which make two-step robust GMM estimates more efficient than one-step robust¹¹ one especially for the System GMM (Roodman, 2009b). Too many instruments problem is the second weakness of GMM estimations. Roodman develops a detailed analysis on this issue, emphasizing the symptoms of an excessive use of instruments. The idea is that as time dimension increases, the number of instruments can be too large compared to the sample size, invalidating some asymptotic results and specification tests. Too many instruments can over fit endogenous variables and fail to wipe out their endogenous components, resulting in biased coefficients (Roodman, 2009a, 2009b). Another argument is that the Hansen and difference-in-Hansen tests can be weak in the presence of overidentification. The system GMM estimation can follow two empirical strategies to deal with too many instruments (Roodman, 2009b). The first one is to use the 'collapse' sub option for the xtabond2 command in STATA.¹² The second empirical strategy (lag limits) forces the use of only certain lags instead of all available lags as instruments. Both empirical choices have something in common, which is the reduction of the number of instruments and their linearity in T (Vieira et al., 2013). We followed the second strategy in our study.

We use the xtabond2 command (Roodman, 2009a) to run System GMM estimation in Stata 13.¹³ We follow up with post estimation specification tests, namely the Hansen J-test test for over-identifying restrictions after applying Weinjmier correction to correct the distortion of standard deviation, by using syntax robust in STATA and the Arellano and Bond (1991) test, AR(2), for no autocorrelation in the second-differenced errors.

4.2. Quantile regression

As our sample consist of countries with different level of economic, financial, social and political development, for example, three major categories in terms of income: high income, mid income and low income; also different type of political structure, and degree of oil dependence, consequently, standard least-squares assumption of normally distributed errors does not hold for our dataset because the values for per capita GDP and other independent variables follow a skewed distribution. This is because when there are evidences of outliers and heavy tailed distributions, quantile regression results are characteristically robust for such cases but standard OLS regression estimators are not robust even to the modest departure from normality.

Furthermore, advantage is that while conventional regression focuses on the mean, quantile regressions are able to describe the entire conditional distribution of the dependent variable (Coad and Rao, 2006). In the context of this study, high political stability or low political risk, high oil dependency and per capita GDP countries are of interest in their own merit, we don't want to remove from analysis just because they are outliers, but on the other side we strongly believe that it would be meaningful to study them in detail. But this can be done by calculating coefficient estimates at various quantiles of the conditional distribution by using quantile regression equation. Finally, as variable (Coad and Rao, 2006) documented a quantile regression approach avoids the restrictive assumption that the error terms are identically distributed at all points of the conditional distribution. If we relax this assumption we will be able to acknowledge, to some extent, country heterogeneity and consider the opportunity that estimated slope parameters diverge at different quantiles of the conditional distribution of lower and higher per capita GDP. By following the quantile regression framework of Tiwari (2013) we try to investigate whether different stages of economic growth are affected by our focused and control variables.

The quantile regression model in the framework of Koenker and Bassett (1978) can be written as follows:

$$y_{it} = \dot{x}_{it}\beta_0 + \varepsilon\theta_{it} with Quant_{\theta}(y_{it} | x_{it}) = \dot{x}_{it}\beta_0,$$
(3)

Where *i* denotes country, *t* denotes time, y_{it} denotes economic growth, \dot{x}_{it} is a vector of regressors, β is the vector of parameters to be estimated, ε is vector of residuals. $Quant_{\theta}(y_{it} x_{it})$ denotes θ^{th} conditional quantile of y_{it} given x_{it} . θth regression quantile, $0 < \theta < 1$, solves the following problem:

¹¹ After specifying the Windmeijer correct (WC-robust) standard errors (without which simulation studies indicate the standard errors in the two-step estimation to be severely downward biased), Sargan test is not reported but Hansen J-test is applied for validating the instruments particularly in the presence of heteroscedasticity.

¹² The idea is to combine instruments by adding smaller sets, without dropping any lags, meaning that there is the creation of one instrument for each variable and lag

⁽footnote continued)

distance, rather than one for each time period, variable, and lag distance. The final outcome is to divide the GMM style moment conditions into groups and sum the conditions in each group to form a smaller set of conditions. At the end, we have a set of collapsed instruments where one is made for each lag distance, with zero substituted for any missing values.

¹³ xtabond2with optionstwostep robust small

Table 1

Summary statistics.

Variable	Observations	Mean	Std. Dev.	Min	Max
Economic Growth	2196	4.67	6.14	-62.08	106.28
GDP Per Capita	2197	6157.71	10,051.63	122.49	74,632.24
Capital Investment (% of GDP)	2059	23.24	8.46	-2.42	74.82
Average Year of Schooling	1252	6.68	2.72	0.7	11.7
CO2 emission per capita (m.ton)	1872	3.69	6.88	0.01	68.7
Political Stability	1909	-0.39	0.91	-3.32	1.54
Political Risk	2116	3.58	0.79	1.21	5.915
Economic Freedom Index	2005	56.43	9.32	16	79
Corruption Perception Index	1331	32.98	12.88	4	78
Rule of Law	1916	-0.45	0.72	-2.67	1.62

$$\min/\beta \frac{1}{n} \left\{ \sum_{i,t:y_{it} > \hat{x}_{it}\beta} \theta \left| y_{it} - \hat{x}_{it}\beta \right| + \sum_{i,t:y_{it} < \hat{x}_{it}\beta} (1-\theta) \left| y_{it} - \hat{x}_{it}\beta \right| \right\}$$

$$= \min/\beta \frac{1}{n} \sum_{i=1}^{n} \rho_{\theta} \varepsilon_{\theta it}$$

$$(4)$$

Where $\rho_{\theta}(\bullet)$, which is known as the 'check function', is defined as":

$$\rho_{\theta}(\varepsilon_{\theta it}) = \begin{cases} \theta \varepsilon_{\theta it} & if \theta \varepsilon_{\theta it} \ge 0\\ (\theta - 1)\varepsilon_{\theta it} & if \theta \varepsilon_{\theta it} \le 0 \end{cases} \tag{5}$$

Finally Eq. (2) is solved by linear programming methods. According to Buchinsky (1998), as one increases θ continuously from 0 to 1, one traces the entire conditional distribution of y_{it} , conditional on x_{it} .

Due to the advantages (as stated above) of quantile regression estimation technique over OLS, fixed and random effect models, in the study we examined at the 5th, 25th, 50th, 75th and 95th quantiles as shown here:

$$Q_{0.05}(LPC) = \alpha_{0.05} + \beta_{0.05,1}LPR + \beta_{0.05,2}LOR + \beta_{0.05,3}LMI + \beta_{0.05,4}LFI + \varepsilon_{0.05it}$$
(6)

$$Q_{0.25}(LPC) = \alpha_{0.25} + \beta_{0.25,1}LPR + \beta_{0.25,2}LOR + \beta_{0.25,3}LMI + \beta_{0.25,4}LFI + \varepsilon_{0.25it}$$
(7)

$$Q_{0.50}(LPC) = \alpha_{0.50} + \beta_{0.50,1}LPR + \beta_{0.50,2}LOR + \beta_{0.50,3}LMI + \beta_{0.50,4}LFI + \varepsilon_{0.50,i}$$
(8)

$$Q_{0.75}(LPC) = \alpha_{0.75} + \beta_{0.75,1}LPR + \beta_{0.75,2}LOR + \beta_{0.75,3}LMI + \beta_{0.75,4}LFI + \varepsilon_{0.75it}$$
(9)

$$Q_{0.95}(LPC) = \alpha_{0.95} + \beta_{0.95,1}LPR + \beta_{0.95,2}LOR + \beta_{0.95,3}LMI + \beta_{0.95,4}LFI + \varepsilon_{0.95it}$$
(10)

We have used sqreg module of Stat 13 for running simultaneous quantile regression estimation by using yearly data span from 1996 to 2014for a panel of 120 countries.

Table 2 Correlation matrix.

(1)(2) (3)(4) (5) (6) (7) (8)(9) (10)Economic Growth (1) 1.00 GDP Per Capita (2) -0.04 1.00 Capital Investment (% of GDP) (3) -0.011.00 0.21 Average Year of Schooling (4) -0.090.34 0.12 1.00 CO2 emission per capita (m.ton) (5) 0.03 0.85 0.11 0.33 1.00Political Stability (6) 0.08 -0.45-0.16-0.34-0.311.00 Political Risk (7) -0.120.51 0.41 0.33 -0.591.00 0.07 Economic Freedom Index (8) 0.13 -0.42-0.01-0.36-0.270.40 -0.701.00 Corruption Perception Index (9) -0.09 0.53 0.11 0.37 0.38 -0.65 0.80 -0.64 1.00 Rule of Law (10) -0.130.53 0.14 0.37 0.34 -0.750.86 -0.67 0.82 1.00

5. Data, empirical results and discussions

We estimate the (Eq. (1)) dynamic linkages between political stability and economic growth, also, political risk and economic growth using two-step system GMM estimator and quantile regression of an unbalanced panel of 120 countries of which 55 belong to the Organization of Islamic Countries (OIC) over the period 1996–2014. and averaged over 3-year interval, to smooth business cycle fluctuations, which is common in current growth literature (Imam and Kpodar, 2016; Slesman et al., 2015). The sample size is constrained by data availability, in particular with regard to the variables capturing political stability. The data used in the analysis were collected from the World Development Indicators (WDI), Barro and Lee (2013), UNESCO Institute for Statistics and HDRO estimates based on data on educational attainment from UNESCO Institute for Statistics (2013b), Global Financial Development Database (GFDD), the Heritage Foundation, Transparency International, the Worldwide Governance Indicators (WGI), and Datastream (see Appendix A for variable definitions and source).

Since the classical work by Alesina et al. (1996), researchers have tried to estimate the impact of institutional development on economic growth with various variables and most recently such variables as polity, cabinet changes, economic freedom (Aisen and Veiga, 2013) corruption, military in politics, rule of law and order, ethnic tension, democratic accountability (Slesman et al., 2015) have been used. Lack of appropriate proxy to measure political instability has been widely criticized in the literature. We also find it difficult to choose an appropriate proxy, which are available for a long period of time and large number of countries. Worldwide Governance Indicators is perception-based indicators. The validity of perception-based governance indicators are less warranted when the indicators are applied exclusively to developing countries (Knoll and Zloczysti, 2012). Despite this, we proceed with one of the subscales of WGI, political stability and absence of violence due to lack of representative proxy and test the claim of Knoll and Zloczysti. In addition to that, we have used political risk index from Oxford Economics which is calculated based on WGI. Our research add new dimension in literature by bringing political

Table	3
1 upic	

Political stability and economic growth. Dependent variable: Economic growth.

	(1)	(2)	(3)	(4)	(5)
Lag Economic	0.121***	0.108**	0.145***	0.140***	0.110**
Glowin (-1)	[0.04]	[0.05]	[0.04]	[0.04]	[0.04]
Log of Initial GDP	-1.957***	-1.982***	-1.356***	-2.127***	-2.122***
Per Capita	[0.47]	[0.51]	[0.45]	[0.47]	[0.52]
Capital Investment (% of GDP)	0.221***	0.211***	0.207***	0.206***	0.197***
01001)	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]
Average Year of	0.554***	0.535***	0.429***	0.559***	0.613***
Schooling	[0.14]	[0.17]	[0.12]	[0.15]	[0.16]
CO_2 emission per	0.273***	0.255***		0.271***	0.280***
capita (m.ton)	[0.06]	[0.06]		[0.06]	[0.06]
Lag Political	8.594**				
Stability (-1)	[3.58]				
Lag Political Risk (-8.478** [3.25]				
Lag CO_2 emission per capita			0.173***		
(m.t) (-1)			[0.04]		
Economic Freedom			4.029* [2.16]		
Corruption Percept	ion Index			-2.970* [1.58]	
Lag Rule of Law (-	-1)				-11.241*
Time Dummies	Yes	Yes	Yes	Yes	[6.53]Yes
Observations	469	456	463	469	469
Instruments	81	81	81	79	81
Number of	104	100	103	104	104
Arellano-Bond:	0.002	0.003	0.002	0.002	0.002
Arellano-Bond:	0.504	0.365	0.605	0.589	0.318
AK(2) Sargan test (p-	0	0	0	0	0
val) Hansen test (p- val)	0.091	0.098	0.126	0.143	0.211

Notes:

 System-GMM estimations for dynamic panel-data models. Sample period: 1996– 2014. Syntax xtabond2 twostep small robust

 All explanatory variables were treated as endogenous. Their two period lagged values were used as instruments in the first-difference equations and their once lagged firstdifferences were used in the levels equation;

 Two-step results by using robust standard errors corrected for finite samples (by using Windmeijer, 2005, correction) and Hansen J tests never reject the validity of the overidentifying restrictions.

- Second order autocorrelation of residuals is always rejected.

 Standard errors are in parentheses. Significance levels at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%.

stability and *political risk* together in estimating economic growth for a large number of countries but special attention is given to the OIC countries. Tables 1 and 2.

By following Aisen and Veiga (2013) we apply the System GMM estimations to estimate the impact of political stability on economic growth. To avoid "too many instruments"(Roodman, 2009b) problem,

we use the smallest possible lag length: twice lagged values of the dependent and of all explanatory variables are used in the first-differenced equations and their once-lagged first-differences are used in the levels equation.

The first sets of results from dynamic System-GMM estimations on economic growth, real GDP per capita growth, are presented in columns 1 to 5 of Table 3. The diagnostic tests on dynamic System-GMM reveal the followings. All the variables are statistically significant at the conventional level in all estimated models. All the models passed the AR (2) tests, as indicated by p-value showing that the serial correlation in the error terms is not second order. The numbers of instruments are less than the number of groups (i.e., countries). On the whole, the validity of the instruments used as a necessity for System-GMM is confirmed, as indicated by the p-values of the Hansen J test. Accordingly, considering all test statistics of these models we can conclude that the estimated models are adequately specified.

As mentioned earlier we have selected the control variables which closely resemble the economic development from Islamic perspective. Regarding the control variables, as expected, lag of economic growth is persistently significant for all the models which justify the dynamic estimations. Capital investment, a proxy for factor productivity, affects economic growth positively as investment plays a significant role in not only developed countries but also developing countries. Human capital accumulation sparks economic growth with the coefficient for average year of schooling significant in all regressions. Human capital accumulation affects labour productivity which increases output in the long run. CO2 emission per capita, a proxy for industrial development and environmental externality, affects economic growth positively. Most of the developing countries extensively use fossil fuels, one of the main sources of CO2, is mainly used in agricultural sectors, cars, generating electricity, and other light industries. Cement industry also contributes significantly in CO2 emissions. The rise in consumption of fossil fuels and cement production indicates the increasing economic activity through industrialization and development of private sector which ultimately would increase economic growth. China, India and Russia, the fastest growing developing countries, alone emit 41.6% of global emissions in 2014. Narayan and Narayan (2010) find that country has reduced carbon dioxide emissions as its income has increased, also, emissions have fallen over the long run. Macroeconomic instability measured through MISERY index, sum of inflation rate and unemployment rate, affects economic growth significantly negatively.¹⁴

Olson's theory argues that *political stability* and instability are dichotomous: instability must reach a threshold to disrupt distributional coalitions (as cited in Goldsmith, 1987). Our proxies for political stability and instability, *political stability and political risk*, are significant at conventional level and have expected sign. We have used one lag (3 year average) of both focused variables which confirm that political stability and political.

risk Granger-causes economic growth positively and negatively respectively and they are statistically significant at conventional level. Our model (1) indicates that a one-standard-deviation increase in political stability is associated with an increase in annual growth rate of about 6% (obtained by multiplying the slope coefficient, 0.08594 (8.594/100), by the standard deviation, 2.096 divided by 3, the time gap in our panel estimate). This is a large magnitude to be ignored for developing countries. At the same time, model (2) almost gives almost equal but negative effect of political risk on economic growth. This has also confirmed the consistency in our findings. Our results are consistent with the previous literature (Aisen and Veiga, 2013; Alesina et al., 1996; Gurr et al., 2005; Slesman et al., 2015).

The hypothesis of economic convergence is supported by the negative and significant coefficient of the variable, initial GDP per

¹⁴ We exclude MISERY in our final estimation equation as it reduces the number of countries due to missing values.

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Table 4

Political stability and economic growth in OIC countries, Dependent Variable: Economic Growth.

	(6)	(7)	(8)	(9)	(10)	(11)
Lag Economic Growth (-1)	0.134*** [0.05]	0.133** [0.06]	0.141*** [0.04]	0.116*** [0.04]	0.137** [0.05]	0.156*** [0.04]
Log Initial GDP Per Capita	-2.382*** [0.47]	-1.922*** [0.48]	-2.014*** [0.46]	-2.013*** [0.40]	-1.797*** [0.52]	-1.674*** [0.50]
Capital Investment (% of GDP)	0.236*** [0.04]	0.201*** [0.03]	0.216*** [0.03]	0.211*** [0.03]	0.199*** [0.04]	0.194*** [0.03]
Average Year of Schooling		0.402** [0.18]	0.533*** [0.16]	0.528*** [0.13]	0.462*** [0.15]	0.438*** [0.15]
Lag Average Year of Schooling (-1)	0.599*** [0.16]					
CO ₂ emission per capita (m.ton)	0.228*** [0.05]	0.194*** [0.05]	0.241*** [0.06]	0.290*** [0.05]	0.148** [0.06]	0.194*** [0.05]
Lag of Political Risk (-1)		-14.264** [5.69]			-14.992*** [5.68]	
Lag of Corruption Perception (-1)			-1.984 [1.70]			-3.852** [1.56]
Lag of Political Stability (-1)				10.505*** [3.94]		
OIC		-23.459* [11.99]				
Lower Income OIC			25.079* [14.38]			
Lower Middle Income OIC				18.195 [11.67]		
Oil Dependent OIC					-22.741** [10.14]	
OIC with Islamic Bank presence						-16.449* [9.04]
OIC x Political Risk		13.558** [6.81]				
Lower Income OIC x Corruption Perception			-7.205* [4.18]			
Lower Middle Income OIC x Political Stabilit	ty			-9.922* [5.93]		
Oil Dependent OIC x Political Risk					13.923** [6.03]	
OIC with Islamic Bank presence x Corruption	n Perception					4.284*
Time Dummies	Yes	Yes	Yes	Yes	Yes	[2.45]
Observations	451	456	469	469	456	1es 469
Instruments	68	98	94	98	98	94
Number of Groups	103	100	104	104	100	104
Arellano-Bond: AR(1)	0.004	0.003	0.002	0.002	0.003	0.002
Arellano-Bond: AR(2)	0.124	0.486	0.507	0.487	0.505	0.658
Sargan test (p-val) Hansen test (p-val)	0.000	0.000	0.000	0.000	0.000	0.000
	0.002	0.107	0.01	0.100	0.227	0.202

Notes:

- System-GMM estimations for dynamic panel-data models. Sample period: 1996-2014. Syntax xtabond2 twostep small robust

All explanatory variables were treated as endogenous. Their two period lagged values were used as instruments in the first-difference equations and their once lagged first-differences were used in the levels equation;

- Two-step results by using robust standard errors corrected for finite samples (by using Windmeijer, 2005, correction) and Hansen J tests never reject the validity of the overidentifying restrictions.

- Second order autocorrelation of residuals is always rejected.

- Standard errors are in parentheses. Significance levels at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%.



Fig. 1. Variation in the Political Stability and Political risk coefficient over the conditional quantiles. Confidence intervals extend to 95% confidence intervals in both directions. 100 replications is used to bootstrap standard errors. Horizontal bold dotted lines represent OLS estimates with 95% confidence intervals. We have plotted the graphs using the Stata command 'grqreg' developed by Azevedo (2011).

capita (Barro, 1991). Economic freedom, a proxy for economic institutional quality, affects economic growth positively for OIC and non-OIC countries also, previously reported by (Aisen and Veiga, 2013). The institutional factors, rule of law and corruption perception, are found negatively correlated with the economic growth. Slesman et al. (2015) in their recent study also reported significant negative relationship between conflict preventing institutions and economic growth for OIC countries. At the same time, as mentioned earlier perception based WGI indicators may not reflect true scenario for developing countries (Knoll and Zloczysti, 2012). However, we argue in line with Slesman et al. (2015) that improvement in political institutions is fundamental to the economic development process and that without improvement in economic institutions conflict preventing institutional development may be inadequate in developing countries.

To extend the empirical analysis and investigate the political stability and economic growth in OIC countries, we add the interaction terms (models 6 to 11 in Table 4), combination of discrete and continuous variable, as an additional explanatory variable in our model apart from the standard variables used in the growth equation. To study the impact of political stability on economic growth in OIC countries, we classify OIC countries into several groups: country groups, ¹⁵regional groups, dependency on oil revenue, ¹⁶ and presence of Islamic finance. Table 4 summarizes the significant results when

various OIC country group dummies are interacted with the key political stability variables and other institutional development indicators.

Considering all the test statistics mentioned earlier we can confirm that all the estimated models are well specified. Column 1 of Table 4 is considered as a baseline model. From column 1 to 6 all the variables are statistically significant at the conventional level except corruption perception and lower middle income OIC dummy. When we add interaction terms, we also make sure that both the variables are present independently to see the impact of interactions which is common in literature (Aisen and Veiga, 2013; Slesman et al., 2015). Column 2 of Table 4, significant positive interaction term between OIC and political risk confirm that an increase in political risk affects OIC countries significantly higher than non-OIC countries. For oil dependent OIC countries we have identified the same results (column 6). Most of the oil dependent OIC countries are in MENA region and political instability has been a major issue for this region for quite a long period of time. From column 4 it is found that increase in political stability has significant lesser effect on growth in lower middle income OIC countries. Most of the lower and middle income OIC countries have been enjoying rather moderate growth rate for last twenty years in spite of political instability in the Middle East and North Africa, South and Southeast Asia. For lower income OIC countries, improvement in corruption perception affects economic growth with lesser degree than other developing countries. OIC countries with the presence of Islamic finance seem to be more positively affected by an increase in corruption perception. Islamic finance has been growing tremendously over the

¹⁵ Country groups are classified following the new World Bank Country classification. ¹⁶ The dummy variable for the Oil Dependent Countries takes the value of 1when country's oil revenue to GDP is 2% or more for 19 years average i.e., from 1996 and 2014.

last two decades and so Imam and Kpodar (2016) in their recent study conclude that Islamic banking promotes economic growth. Generally, countries where Islamic finance is well developed have better quality of political and economic institutions which is of course contributing to economic growth.

5.1. Political stability and political risk transmission channels

When we interacted political stability and political risk with three control variables namely, proxy for macroeconomic stability, human capital accumulation, industrialization (see models 12 to 17 in Annex Table C1), it is found that political risk as a proxy for political instability adversely affects economic growth through all these channels in developing countries. The coefficient of political risk also remains more or less the same, sign changes and remains significant at the conventional level in all three models. On the other hand, after interactions, political stability also changes sign and statistically significant however, no significant affect has been identified in interaction terms. Therefore, it can be argued that political instability slows down economic growth of developing countries through reduction in capital investment, slowdown in human capital accumulation and deindustrialization.

Political stability and political risk can have also indirect influence on growth through economic institutions. To analyze that, we interacted political risk and political stability with economic and political Political Risk*Economic institutions, Freedom, Political Stability*Economic Freedom, and Political Stability*Corruption Perception interaction terms are significant at the conventional level (see regressions 18 to 23 in Annex Table C2), we identified that political stability affects economic growth significantly through economic and political institutions. Economic institutions alone may not affect growth without strong political institutions (Slesman et al., 2015). However, we didn't find any significant transmission effect through the rule of law variable (see regressions 21 to 23 in Annex Table C2). The development of political and economic institutions is equally important for developing countries to achieve sustainable economic growth.

5.2. Robustness analysis

Additional regressions are run to test the robustness of the relationship between political stability and economic growth.¹⁷ Consequently, we have estimated simultaneous quantile regressions (Annex Table C3) which show the effect of our focus variable at different quantiles. As discussed in methodology, it gives better estimate when there are outliers in dataset which is not uncommon for dataset as there are developing countries with really higher per capita GDP (Gulf and other emerging economies). To see the impact of political stability¹⁸ we run simultaneous quantile regressions by using annual data of 120 countries which are divided into OIC (54) and non-OIC (66) over the period of 1996 and 2014.

Fig. 1 shows the marginal effects of Political Stability and Political Risk for all quantiles within the (0, 1) range of the real economic growth. The bold dotted line refers to the OLS coefficient and the difference between the OLS and the marginal effects of Political Stability and other control variables for all percentage points of the quantiles in the economic growth distribution tell us that one cannot just consider the relationship between growth and political stability

political risk variables in the conditional mean model.

Fig. 1a (for tabulated value see Annex Table C2 upper left panel) shows that political stability is not statistically significant in any of the quantiles for OIC countries but statistically significant at the higher quantiles (95) and insignificant negative coefficient at lower quantiles for non-OIC countries (Fig. 1b). The results further strengthen our results in System-GMM estimation and confirm that political stability is equally important for all OIC countries irrespective of their growth tendency which is not true for non-OIC countries. Fig. 1c (for tabulated value see Annex Table C2 lower left panel) gives us the consistent result for political risk for OIC countries where no significant coefficients in any of the quantile regressions are reported. However, at lower quantiles (5 and 25) coefficients are positive but not significant. On the other hand, Fig. 1d (for tabulated value see Annex Table C2 lower right panel) for non-OIC countries, political risk is statistically significant positive coefficient at the lower quantile (5) and negative coefficient at the higher quantiles (75 and 95). Hence, we conclude that Political Stability affects economic growth equally in all quantiles for OIC countries and somewhat higher quantiles for non-OIC countries. At the same time, political risks affect growth uniformly across different quantiles for OIC countries but positive at lower quantiles and negative at higher quantiles for non-OIC countries.

6. Conclusions

Political stability is one of the fundamental principles mentioned in the Holy Quran and traditions of the Prophet (PBUH) for socioeconomic development. To the best of our knowledge, there has been no attempt so far to systematically estimate the effect of political stability and political instability(or risk) on economic growth by considering economic and institutional factors within the Islamic development framework. We add value to the existing literature by theoretically arguing the importance of Islamic growth model (Anwar, 1987; Mannan, 1989; Mirakhor and Askari, 2010) and quantitatively determine the growth models by incorporating the key determinants from the Islamic economics perspective for the OIC countries in particular and developing countries in general. Moreover, we also directly address the econometric issue of the weakness of too many instruments' problem that overwhelmed the system-GMM estimator by using the advanced two-step system GMM estimator and simultaneous quantile regression of an unbalanced panel of 120 countries, of which 55 are OIC member countries over the period of 1996-2014.

In line with the existing literature, we find that political stability is pivotal for economic growth of developing countries. Political risk is found to have detrimental effect on economic growth. Development of economic institution in developing countries affects economic growth positively. Most importantly, an increase in political risk affects economic growth negatively at the higher level in OIC countries compared to non-OIC countries. In other words, the impact of political instability on economic growth is more severe for the OIC countries. On the contrary, an increase in political stability has less effect on economic growth in lower middle income OIC countries than other developing countries, where political instability has been a major issue for decades (Ahmed and Pulok, 2013; Gurr et al., 2005; Mohamed, 2015; Slesman et al., 2015). Improvement in political institutions affects economic growth of OIC countries at a significantly lower level than other developing economies. Also, economic growth of oildependent OIC countries is badly affected by political risk than their developing counterparts. Political instability reduces economic growth of developing countries through a decrease in capital investment, human capital accumulation and industrialization process. The development of political and economic institutions is found equally important for developing countries to achieve sustainable economic growth. Political risk affects growth negatively at higher quantiles (75 and 95) but positively at lower quantiles (5 and 25) which are statistically significant for non-OIC countries. However, our results

¹⁷ We also run separate regressions for all models by removing financial crisis data i.e., 2008 and 2009. Also, we run regressions for OIC and non-OIC country groups only data set but due to lower number of countries, which is less than 50 for OIC, while T=6, we suffered from too many instruments problem ((Roodman, 2009b). These results are not reported but available upon request from authors. ¹⁸ We have also run simultaneous quantile regressions for economic and political

¹⁸ We have also run simultaneous quantile regressions for economic and political institutions variables separately and the results are available upon request from authors.

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development of sustainable non-oil tradable sector, human capital,

and small and medium enterprises (SMEs) are the order of the day and the recent action plan of economic diversification in Saudi Arabia and

other MENA countries confirms this urgency (Micklethwait et al.,

2016). Finally, greater unity, economic and political cooperation

among the OIC member countries is urgently needed to fight the

growing political instability in many Muslim countries across the

world. Inclusive studies at the regional and micro level can be further

conducted to see how political stability affects growth. A separate study

to investigate the political stability transmission channel in the OIC

countries can be an interesting endeavor. Moreover, the development

of a comprehensive political stability index by taking all dimensions of

political stability into account can be a very challenging but a

prospective future research topic.

tend to show an evidence against the conclusion made by Gurr et al. that the key drivers of political instability in the Muslim world are, in most respects, the same as those in the rest of the world (Gurr et al., 2005).

The main implication of our findings is that the OIC-based developing countries need to systematically develop their political and economic institutions because sustainable economic development is unlikely to be achieved in the long run without strong political institutions. There is a need for immediate actions to reform political institutions as political repression and rampant corruption prevail across many lower and middle income OIC countries. Long lasting political instability might cause many Muslim countries suffer the same kind of political unrest as in the Middle East and North African (MENA). For the unstable Middle East and Gulf countries, the

Appendix A

See Appendix Table A1.

	Definition and Source	Expected Sign
Dependent Variable		
Economic Growth	Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2010 U.S. dollars. Source: The World Bank	(+)
Independent Variable		
Log_GDP Per Capita	GDP per capita is gross domestic product divided by midyear population. Data are in constant 2010 U.S. dollars. Source: The World Bank	(+/-)
Capital Investment to GDP	Gross capital formation (formerly gross domestic investment) consists of outlays on additions to the fixed assets of the economy plus net changes in the level of inventories. Source: The World Bank	(+)
Average Year of Schooling	Average number of years of education received by people ages 25 and older, converted from education attainment levels using official durations of each level. Source: Barro and Lee (2013).	(+)
CO ₂ Emission Per Capita	Carbon dioxide emissions are those stemming from the burning of fossil fuels and the manufacture of cement. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring. Source: The World Bank	(+/-)
Political stability	Political stability and Absence of Violence/Terrorism measures perceptions of the likelihood of political instability and/or politically-motivated violence, including terrorism. Source: The Worldwide Governance Indicators. The World Bank	(+)
Political risk	This indicator, sourced from Worldwide Governance Indicators: Government Effectiveness, ^a shows the government's commitment to policies which is vital for economic growth. It is calculated according to the formula: Government Effectiveness/2.5*3+4. Source: Datastream, Oxford Economics	(-)
Economic Freedom Index	The Overall index of economic freedom has ten components grouped into four broad categories: Rule of Law; Limited Government; Regulatory Efficiency and Open Markets. The overall economic freedom is scored on a scale of 0 to 100, where 100 represents the maximum freedom. Source: The Heritage Foundation	(+)
Corruption perceptions index	The Corruption Perceptions Index is an indicator of perceptions of public sector corruption, i.e. administrative and political corruption. The indicator values are determined by using information from surveys and assessments of corruption, collected by a variety of reputable institutions. Source : <i>Transparency International</i>	(+)
Rule of Law	The index for Rule of Law captures 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. Source: The Worldwide Governance Indicators, The World Bank	(+/-)

^a Government Effectiveness reflects 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.

Appendix B

See Appendix Table B1.

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Table B1 Sample countries.

Economic Modelling xxx (xxxx) xxx-xxx

Non-OIC		OIC	
Andorra	Lesotho	Afghanistan	Libya
Angola	Liberia	Albania	Malaysia
Argentina	Macedonia	Algeria	Maldives
Armenia	Malawi	Azerbaijan	Mali
Bahamas	Malta	Bahrain	Mauritania
Barbados	Mexico	Bangladesh	Morocco
Belarus	Moldova	Benin	Mozambique
Belize	Mongolia	Brunei	Niger
Bhutan	Montenegro	Burkina Faso	Nigeria
Bolivia	Namibia	Cameroon	Oman
Bosnia and	Nepal	Chad	Pakistan
Herzegovina	1		
Botswana	Nicaragua	Comoros	Oatar
Brazil	Panama	Diibouti	Saudi Arabia
Burma (Myanmar)	Papua New Guinea	Egypt	Senegal
Cambodia	Paraguay	Gabon	Sierra Leone
Chile	Peru	Gambia	Somalia
China	Philippines	Guinea	Sudan
Colombia	Puerto Rico	Guyana	Suriname
Croatia	Romania	Indonesia	Svria
Dominican	Russia	Iran	Tajikistan
Republic	Rubblu	IIIII	rujikistan
Feuador	Rwanda	Iraa	Togo
El Salvador	Samoa	Ivory Coast	Tunicia
Eritroo	Sarbia	Iordan	Turkov
Eiliea	South Africa	Kazakhatan	Turkmonistan
Chana	Sri Lanka	Kuwait	Ilganda
Honduras	Tanzanja	Kuwan	United Arab
Honduras	Talizallia	RyigyZstall	Emirates
Hungary	Thailand	Lebanon	Uzbekistan
India	Ukraine	Lebulon	Yemen
Jamaica	Uruguay		Temen
Kenva	Venezuela		
Kiribati	Vietnam		
Laos	Zambia		
1405	Zimbabwe		
	Zimbabwe		
Oil Dependent OIC		OIC Islamic Bank Presence	
Albania	Libva	Bahrain	Maldives
Algeria	Malavsia	Bangladesh	Mauritania
Azerbaijan	Mauritania	Brunei	Nigeria
Bahrain	Nigeria	Egynt	Oman
Brunei	Oman	Gambia	Pakistan
Cameroon	Oatar	Indonesia	Oatar
Chad	Saudi Arabia	Iran	Saudi Arabia
Egypt	Sudan	Iraq	Senegal
Gabon	Suriname	Ivory Coast	Sudan
Indonesia	Suria	Jordan	Svria
Iran	Tunisia	Kuwait	Tunicia
Iran	i unisia Turkmonistan	Labanon	Turkov
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Appendix C

See Appendix Table C1-C3.

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Table C1

Political Stability, Political Risk and Economic Growth in Developing Countries Dependent Variable: Economic Growth.

	(12)	(13)	(14)	(15)	(16)	(17)
Lag Economic Growth (-1)	0.118**	0.107**	0.120**	0.125***	0.122***	0.130***
	[0.05]	[0.05]	[0.05]	[0.04]	[0.04]	[0.04]
Log of Initial GDP Per Capita	-1.335***	-1.633***	-1.951***	-1.805***	-1.899***	-1.939***
	[0.50]	[0.49]	[0.51]	[0.45]	[0.50]	[0.42]
Capital Invest (% of GDP)	0.568***	0.206***	0.215***	0.077	0.226***	0.219***
	[0.13]	[0.03]	[0.03]	[0.10]	[0.03]	[0.03]
Average Year of Schooling	0.401***	0.500***	1.362**	0.489***	0.593***	0.296
	[0.12]	[0.14]	[0.53]	[0.12]	[0.13]	[0.28]
CO ₂ emission per capita (m.ton)	0.131**	0.578***	0.234***	0.233***	0.182	0.233***
	[0.06]	[0.16]	[0.06]	[0.05]	[0.30]	[0.04]
Lag Political Risk (-1)	2.119***	2.356***	2.496***			
	[0.71]	[0.58]	[0.78]			
Political Risk x Capital Investment	-0.073***					
	[0.03]					
Political Risk x CO ₂		-0.092*				
		[0.05]				
Political Risk x Average Year of Schooling			-0.192*[0.11]			
Lag Political Stability				-1.695*** [0.59]	-1.526*** [0.55]	-1.319** [0.57]
Political Stability x Capital Investment				0.03 [0.02]		
					0.015	
Political Stability x CO2					[0.05]	
Deliving On hilling a Annual Manual Cale align						
Time Dummies	Voc	Voc	Voc	Voc	Voc	0.056[0.06] Voc
Observations	455	455	455	468	468	468
Instruments	94	94	94	94	94	94
Number of Groups	100	100	100	104	104	104
Arellano-Bond: AR(1)	0.003	0.003	0.003	0.002	0.002	0.002
Arellano-Bond: AR(2)	0.38	0.38	0.502	0.594	0.491	0.565
Sargan test (p-val)	0.000	0.000	0.000	0.000	0.000	0.000
Hansen test (p-val)	0.149	0.253	0.153	0.129	0.283	0.196

Notes:

- System-GMM estimations for dynamic panel-data models. Sample period: 1996-2014. Syntax xtabond2 twostep small robust

All explanatory variables were treated as endogenous. Their two period lagged values were used as instruments in the first-difference equations and their once lagged first-differences were used in the levels equation;

- Two-step results by using robust standard errors corrected for finite samples (by using Windmeijer, 2005, correction) and Hansen J tests never reject the validity of the overidentifying restrictions.

- Second order autocorrelation of residuals is always rejected.

- Standard errors are in parentheses. Significance levels at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%.

Table C2

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Political Stability, Political Risk, Economic and Political Institutions in Developing Countries Dependent Variable: Economic Growth.

	(18)	(19)	(20)	(21)	(22)	(23)
Lag Economic Growth (-1)	0.314*** [0.06]	0.277*** [0.08]	0.267*** [0.07]	0.300*** [0.07]	0.288*** [0.07]	0.304*** [0.05]
Log of Initial GDP Per Capita	-1.868*** [0.65]	-1.197** [0.57]	-1.913*** [0.64]	-1.854*** [0.60]	-1.953*** [0.47]	-1.862*** [0.53]
Lag Capital Investment (% of GDP)	0.139** [0.07]					
Capital Investment (% of GDP)		0.212*** [0.04]	0.301*** [0.06]	0.250*** [0.05]	0.278*** [0.05]	0.196*** [0.05]
Average Year of Schooling	0.443*** [0.16]	0.487*** [0.15]	0.710*** [0.23]	0.663*** [0.17]	0.641*** [0.14]	0.817*** [0.17]

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Table C2 (continued)

	(18)	(19)	(20)	(21)	(22)	(23)
CO ₂ emission per capita (m.ton)	0.250*** [0.06]	0.181** [0.07]	0.119 [0.11]	0.170** [0.08]	0.187*** [0.06]	0.276*** [0.07]
Economic Freedom	-0.764*** [0.24]	0.294 [0.19]				
Political Risk	-8.364*** [2.49]		1.916 [1.66]		-1.441 [1.16]	
Political Risk x Economic Freedom	0.135*** [0.04]					
Political Stability		5.454** [2.65]		-1.766 [1.12]		-0.849 [0.74]
Political Stability x Economic Freedom		-0.096** [0.04]				
Corruption Perception			0.211 [0.19]	-0.258 [0.19]		
Political Risk x Corruption Perception			-0.074* [0.04]			
Political Stability x Corruption Perception Rule of Law				0.041[0.03]	-2.19 [2.76]	2.192 [5.14]
Political Risk x Rule of Law					-0.222 [0.53]	
Political Stability x Rule of Law						-0.979 [1.06]
Time Dummies Observations Instruments Number of Groups Arellano-Bond: AR(1) Arellano-Bond: AR(2) Sargan test (p-val) Hansen test (p-val)	Yes 438 76 98 0.002 0.974 0 0.092	Yes 445 76 101 0.003 0.736 0 0.112	Yes 383 74 100 0.012 0.87 0.004 0.066	Yes 390 74 104 0.008 0.971 0.001 0.138	Yes 456 76 100 0.003 0.975 0 0.174	Yes 469 76 104 0.001 0.598 0 0.182

Notes:

- System-GMM estimations for dynamic panel-data models. Sample period: 1996-2014. Syntax xtabond2 twostep small robust.

- All explanatory variables were treated as endogenous. Their two period lagged values were used as instruments in the first-difference equations and their once lagged first-differences were used in the levels equation.

- Two-step results by using robust standard errors corrected for finite samples (by using Windmeijer, 2005, correction) and Hansen J tests never reject the validity of the overidentifying restrictions.

- Second order autocorrelation of residuals is always rejected.

- Standard errors are in parentheses. Significance levels at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%.

Table C3

Political stability and economic growth of OIC and Non-OIC countries in different quantiles, Dependent Variable: Economic Growth.

	OIC	OIC					Non-OIC			
	Q5	Q25	Q50	Q75	Q95	Q5	Q25	Q50	Q75	Q95
GDP Per capita	-1.153*	-1.288***	-1.247***	-1.041***	-2.033**	-0.703	-0.903**	-0.772***	-0.469*	0.498
	[0.68]	[0.40]	[0.35]	[0.38]	[0.89]	[1.25]	[0.41]	[0.26]	[0.27]	[0.90]
Capital Investment (% of GDP)	0.110**	0.098***	0.103***	0.074***	0.127	0.146	0.156***	0.173***	0.156***	0.223***
	[0.05]	[0.03]	[0.02]	[0.03]	[0.09]	[0.09]	[0.05]	[0.02]	[0.03]	[0.07]
Average Year of Schooling	0.134	0.251	0.390***	0.166*	0.238	-0.875	-0.035	-0.066	-0.084	0.067
	[0.30]	[0.16]	[0.08]	[0.09]	[0.46]	[0.66]	[0.18]	[0.11]	[0.13]	[0.37]
CO ₂ emission per capita (m.ton)	0.177*	0.158***	0.137**	0.241***	0.378***	0.007	-0.083	0.117	-0.002	-0.524**
	[0.10]	[0.05]	[0.06]	[0.07]	[0.08]	[0.53]	[0.22]	[0.08]	[0.12]	[0.21]
Political Stability	5.286	1.311	0.18	2.58	4.895	- 1.55 7	- 2.348	1.568	1.55 7	17.105 ***
	[4.44]	[1.62]	[1.37]	[2.23]	[3.23]	[7.69]	[2.55]	[1.53]	[1.80]	[6.02]

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Table C3 (continued)

	OIC				Non-OIC					
	Q5	Q25	Q50	Q75	Q95	Q5	Q25	Q50	Q75	Q95
Constant	-5.952	5.92	9.201***	6.875	11.658	9.088	10.897*	4.311	4.514	-28.791*
	[8.49]	[3.97]	[3.41]	[5.31]	[7.71]	[19.12]	[6.47]	[3.78]	[4.25]	[16.16]
Observations GDP Per capita	453 -1.364* [0.78]	453 -1.385*** [0.51]	453 -1.500*** [0.36]	453 -0.991*** [0.38]	453 -0.821 [1.25]	487 -0.479 [1.51]	487 -0.976** [0.49]	487 -0.790** [0.33]	487 -0.122 [0.34]	487 0.413 [1.09]
Capital Investment (% of GDP)	0.145***	0.100***	0.108***	0.081**	0.100	0.259***	0.169***	0.169***	0.169***	0.206***
	[0.05]	[0.03]	[0.02]	[0.03]	[0.08]	[0.08]	[0.04]	[0.02]	[0.02]	[0.06]
Average Year of Schooling	0.259	0.242	0.376***	0.197*	-0.061	-0.944	-0.123	-0.053	-0.13	-0.014
	[0.31]	[0.16]	[0.08]	[0.11]	[0.42]	[0.66]	[0.17]	[0.10]	[0.13]	[0.46]
CO ₂ emission per capita (m.ton)	0.128	0.130**	0.151**	0.237***	0.324***	-0.451	-0.008	0.109	-0.01	-0.318**
	[0.12]	[0.06]	[0.07]	[0.06]	[0.09]	[0.48]	[0.23]	[0.09]	[0.09]	[0.12]
Political Risk	2.848	3.195	2.426	- 3.576	- 6.299	16.68 **	4.06	- 0.816	- 4.340 *	- 16.02 ***
	[5.45]	[2.31]	[1.86]	[2.64]	[4.78]	[7.57]	[2.69]	[2.44]	[2.62]	[4.72]
Constant	-1.089	3.999	7.092**	17.182***	24.99***	-26.94**	-0.024	8.831**	12.59***	32.15***
	[9.63]	[3.62]	[3.32]	[4.60]	[7.21]	[13.38]	[5.38]	[3.55]	[3.65]	[5.36]
Observations	440	440	440	440	440	476	476	476	476	476

Notes: Bootstrap (100) Standard Errors. Significance levels at which the null hypothesis is rejected: ***, 1%; **, 5%, and *, 10%

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