

## From Revolutions to Institutions: The Experience of Arab Reform and Economic Growth\*

Islam Abdelbary<sup>a,b,\*\*</sup>, James Benhin<sup>b</sup>

<sup>a</sup> Arab Academy for Science and Technology, Egypt

<sup>b</sup> Plymouth University, Faculty of Business, Cookworthy Building, Plymouth, Devon, PL4 8AA, UK

### Abstract

The Arab region enjoys a strategic geographical location, an abundant natural resource base, a demographic gift of an expanding pool of young and educated labour force, and a dynamic and entrepreneurial population. In spite of these, the region has been unable to achieve sustained and inclusive growth. This failure has strongly been attributed to igniting a wave of protests, popularly referred to as the 'Arab Spring', which spread throughout most of the region. Since then Arab nations have been going through an exceptional time of severe and painful choices that bear far-reaching consequences until it redefines the terms of a new social contract.

This paper argues that the absence of institutional and political reforms underpins this failure. We examine this by applying; an augmented neoclassical growth model framework derived from a production function and a dynamic panel LSDCV estimation, which incorporates aggregated economic and political reform indicators generated by principal component analysis (PCA). The empirical analysis is a comparative assessment of the Arab region as a whole, and the Gulf countries and emerging Arab countries. The objective was to determine the differences in their reform (both economic and institutional) programs and how these reflect on growth outcomes.

The results indicate that economic stabilisations and structural reform are positively associated with growth. Specifically, currency devaluation, reducing budget deficits, encouraging foreign investment and increasing employment rates were among the main determinants of growth. In addition, public investment in health facilities and infrastructure positively impacts on production in GCC countries. Moreover, reforms in governance indicators enhance growth but with different emphasis for the different groups of countries. In this direction, political stability and control of corruption were most significant for the Arab region as a whole, while government effectiveness and the rule of law were significant for Gulf countries, and in emerging Arab economies, voice and accountability, and regulatory quality were the most important governance variables.

The study confirms that reform is simultaneously political, social and economic. Economic reform should not be seen in a vacuum, in isolation from political and social choices that society makes. Looking forward, the Arab reform agenda must address critical governance issues that hinder the effectiveness of reform policies. Better institutions will establish an incentive structure that reduces uncertainty and encourages efficiency, thereby contributing to sustained and inclusive growth.

**Keywords:** Arab region, Arab spring, economic growth, dynamic panel analysis, institutions.

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\*\* Corresponding author at: E-mail addresses: [Islam.abdelbary@plymouth.ac.uk](mailto:Islam.abdelbary@plymouth.ac.uk)

## **1. Background**

In January 2011, Tunisia shocked the world when weeks of popular protest led to the ouster and exile of President Zine el-Abidine Ben Ali after a 23-year-long rule (Brisson, 2012). Inspired by the uprising in Tunisia, the demonstrations moved to Egypt in the same month; a large number of protesters succeeded in ousting the Egyptian President, Hosni Mubarak, after 30 years in office (Bellin, 2012). The ouster of Ben Ali and Mubarak was a landmark event and an undeniable triumph of popular will. A few days later the influences of the Tunisian and Egyptian demonstrations led to a broad wave of protests to large parts of the Arab world, governed for a long time by strong autocratic leaders (Campante and Chor, 2012). These waves of demonstrations have been popularly referred to as the 'Arab Spring' or "Arab revolutions".

The Arab street seemed to have made clear that it is no longer willing to accept these established but non-inclusive development models, and the control and distribution of the region's resources. A primary goal of the protesters everywhere, from Tunisia to Bahrain, was easy to capture from two major slogans of the demonstrators. The first one was, 'the people want to overthrow the regime' and the second, 'bread, freedom and social justice'. These slogans represented what the Arab people have suffered from, especially during the last two decades. They aim to create more participatory and representative political systems, a fairer economic system, and independent judiciaries (Alimi et al., 2016).

Regarding the first slogan, Tunisians succeeded in overthrowing their president, and so did the Egyptians, the Libyans, and the Yemenis (Hissouf, 2014), while the second one which underlines the interdependence of inclusive governance, economic and social inclusion is yet to be achieved. It needs more strategic thinking towards exploring alternative solutions and a range of development policy options to help redress the underlying causes that gave rise to the widespread popular grievances and discontent.

Poor economic growth, deteriorating public budget and balance of payments deficits made several of the Arab economies, in the 1990s and 2000s, to undertake macroeconomic stabilisation and structural reform programs as prescribed by the International Organisations such as the IMF and World Bank. These reforms were primarily intended to: restore macroeconomic balance and reduce inflation; stimulate medium and long-term growth; restructure their markets based on competitive aspects; and promote private sector development to become an engine for growth and employment creation (ADB, 2000).

In spite of these reforms, there has been no significant improvement in the living standards of Arab citizens. Indeed, over the last fifteen years or so, growth performance of the Arab region as a whole has been disappointing. According to Makdisi et al. (2006), the economic growth pattern is inextricably linked to several characteristics of most of the countries in the region notably, their heavy dependence on oil, weak economic base, high population growth and unemployment rates, low rates of returns on investment in physical and human capital, low level of integration in the world economy and underdevelopment of market institutions. Moreover, the reform programs itself have been described as slow and gradual (World Bank, 2008), disappointing and selective (Greenwood, 2008), unenthusiastic (Bellin, 2004), confused (Alissa, 2007), lagging behind and threatening the status quo (Hammoud, 2011). In a sense, the reforms have achieved very little.

This paper argues that the absence of institutions and governance deficiency is the main reason for the repeated failure of Arab reforms, as these created a very poor environment for economic activities. The thriving economic reform programs should be associated with action in each of the three main areas of the business environment; the overall policy-making environment, the bureaucratic and

administrative environment, and the commercial environment. In each of these areas, better institutions can support growth by bolstering accountability and inclusiveness (Nabli, 2003).

The absence good governance in the design of reform programs was a key reason for the failure in their implementation. Majority of reforms were launched and executed through a top-down approach. Affected groups have had little say in the formulation of policy plans. Therefore, constituents have shown minimal commitment to the appropriate implementation of these policies, especially when the associated economic and social costs are painful, such as reducing subsidies, liberalising commodity prices and devaluation of the local currency. Arab states seem first to initiate reform and then consider how it may fit into a comprehensive strategy which is guided by a more visionary framework.

To further understand the origins of and find solutions to the Arab Spring, this paper contributes to the ongoing debate on the effectiveness of reform programs in achieving a sustained and more inclusive growth in Arab countries (ACs). The study evaluates the economic, social and institutional reform effort of the ACs by estimating a conditional convergence equation for economic growth with emphasis on the role of institutions. An assessment is made of ACs as a whole, and comparison between GCC countries and emerging Arab countries. In other words, the research attempts to understand the possible explanation on whether the growth performance of the region has been disappointing because ACs economies have lagged regarding reforms, or due to the reform programs itself lacking critical components such as quality of institutions.

The body of the paper is presented in the following sections. Section two discusses the methodology, while section three illustrates the empirical results which include: the panel unit-root tests, panel cointegration tests, and the estimated results of the empirical models. A critical discussion of the estimated results is presented in section four, with the last section focusing on conclusions and policy implications.

## **2. Methodology**

### **2.1 Theoretical Framework**

Consider the following Cobb-Douglas function which exhibits constant returns to scale ( $0 < \alpha_i < 1$  &  $\alpha_1 + \alpha_2 = 1$ ) but diminishing returns to individual factors.

$$Y_t = K_t^{\alpha_1} H_t^{\alpha_2} (A_t L_t)^{1-\alpha_1-\alpha_2} \quad (1)$$

Where  $Y$  is real output produced by  $K_{it}$ , the physical capital,  $L_{it}$ , the amount of labour and  $H_{it}$ , human capital;  $i$  and  $t$  represents individual countries and time respectively. The term  $A_t$  which in this case is referred to as Total Factor Productivity (TFP). It is designated to capture a host of factors that affect the overall efficiency of the economy. These factors according to Mankiw et al. (1992) reflects not just technology level, but also other factors such as, resource endowments, climate, quality of management and governance, the strength of institutions and property rights, and cultural factors, and so on (the institutional term is added to the list by Campos and Nugent (1999)). Thus, TFP is a composite variable denoting the efficiency and effectiveness of an economy. According to Chenery (1986), the contributions of total factor productivity are 50 % of the overall growth in developed countries whereas this situation indicates 30 % of the total growth for developing countries.

The TFP implicitly assumes an underlying set of good institutions. In this model, the quality of institutions affects output through the effect that institutions have on the productivity of human and physical capital. Therefore, the notion of institutions affecting total factor productivity can be explicitly incorporated into the model via a function of  $A$ , such as (Hall et al., 2010):

$$A_t = A_0 e^{gt} e^{B(l_t - l^*)} \quad (2)$$

Where  $A_0$  represents the basic level of technology,  $e^{B(I_t - I^*)}$  the total effect that institutions have on the productivity of human and physical capital  $k_t^{b1(I_t - I^*)}$  and  $h_t^{b2(I_t - I^*)}$ . Which,  $I^*$  represents the ideal institutions implicitly assumed in the traditional growth model, and  $I$  is the country's current level of institutional quality. Thus,  $(I - I^*)$  measures the degree to which the country's institutions fall short of ideal conditions and could be defined as  $\hat{I}$ . When  $(I = I^*)$  or  $(\hat{I} = 0)$ , with an ideal institutional environment, productive entrepreneurship, investments in human and physical capital and the division of labour are incentivized in a manner necessary to foster innovation and economic growth (Baumol, 1990; Holcombe 1998) such that a country is operating on the Production Productivity Frontier (PPF). TFP is here structured to serve as a production deflator for a country whose institutions are less than ideal,  $(I < I^*)$  or  $(\hat{I} < 0)$ , which can be thought of as operating at a point inside the PPF.

Therefore, if  $A_t = A_0 e^{g_t + \hat{I}}$  Dawson (1998) argues that the specification of the  $A$  function in equation (2) imply differences in institutions have an explicit impact on the level of productivity across countries. One important assumption in this specification is that institutions are considered to affect growth via TFP channel and not only via investment term but also through human capital. Thus, following the same rules as in Solow and its augmented models a growth model based on equation (1) incorporated with equation (2) can be conveniently derived as to obtain the steady-state income per capita:

$$\ln\left(\frac{Y_t}{L_t}\right)^* = \ln A_0 + g_t + \hat{I}_t + \frac{\alpha_1}{1 - \alpha_1 - \alpha_2} \ln s_k + \frac{\alpha_2}{1 - \alpha_1 - \alpha_2} \ln s_h - \frac{\alpha_1 + \alpha_2}{1 - \alpha_1 - \alpha_2} \ln(n + g + \delta) \quad (3)$$

Within this framework, institutions exert a homogenous influence on the productivity of human and physical capital across economies. Equation (3) presents a heuristic way of testing the institutional effects on growth via its impact on factors productivity. This equation can be used to estimate the direct impact of institutions on the level of income per capita and differenced to examine how institutional change affects economic growth.

## 2.2 The Empirical Model

The setup of the empirical model is primarily driven by the Solow-Swan growth model with the estimation approach following "Barro-type regression" (Barro and Sala-I-Martin, 1995).

As mentioned, the primary aim of the model is to evaluate the reform effort of the ACs by estimating a conditional convergence equation for economic growth. Following Berggren et al. (2011), the aggregated economic, social and institutional reform indicators are generated using principal component analysis (PCA). This novel approach allows the computation and categorisation of environmental variables identified by Barro (1995) into six separate groups.

The first composite component is **macroeconomic stability reform** (M) incorporating exchange rate (M1), the deficit (M2), public debt (M3), inflation (M4), and unemployment (M5). The second is **external stability reform** (E) which contains current account balance (E1), the ratio of external debt to exports (E2), total reserves in months of imports (E3), and diversification index (E4). Thirdly, **structural and business reform** (B) consisting of foreign direct investment (B1), domestic credit to the private sector (B2), and the concentration index (B3). Fourthly, human **capital** (H), which includes health expenditures (H1), school enrolment (H2), life expectancy (H3). The fifth is **physical infrastructure** (P), consisting of fixed telephone subscriptions (P1), improved water source (P2), access to electricity for population (P3), and improved sanitation facilities (P4). The last composite component is governance (G), which incorporates voice and accountability (G1), political stability (G2), government effectiveness (G3), regulatory quality (G4), the rule of law (G5) and control of corruption (G6). In addition to other two controlling variables; the annual population growth rate ( $POP_{i,t}$ ), and the ratio of oil rent to GDP

( $oil_{i,t}$ ) are included in the model. The former is a proxy for labour in the growth function and the latter represents natural resource abundance in the ACs which has an influence on the availability of capital.

Real GDP per capita growth is therefore empirically expressed as follows:

$$\ln(Y_{i,t}) = \alpha_0 + \varphi_1 \ln(YY_{i,t-1}) + \theta_1(M_{i,t}) + \theta_2(E_{i,t}) + \theta_3(B_{i,t}) + \theta_4(P_{i,t}) + \theta_5(H_{i,t}) + \theta_6(G_{i,t}) + \theta_7(oil_{i,t}) + \theta_8(POP_{i,t}) + \varepsilon_{i,t} \quad (4)$$

where,  $Y_{i,t}$  represents the economic growth rate in country  $i$  at time  $t$ ;  $\ln(YY_{i,t-1})$  is an  $N \times 1$  vector of logs of initial GDP;  $M_{i,t}$ , macroeconomic stability indicator;  $E_{i,t}$ , external stability indicator;  $B_{i,t}$ , structural and business reform indicator;  $P_{i,t}$ , physical infrastructures indicator;  $H_{i,t}$ , human capital indicator;  $G_{i,t}$ , governance indicator;  $POP_{i,t}$ , population growth rate;  $oil_{i,t}$ , the ratio of oil rent to GDP;  $\alpha_0$  is the intercept,  $\theta_1$  to  $\theta_8$ , are parameters for convergence and the principle components,  $i, t$  denote country and time period respectively and  $\varepsilon_{i,t}$  is the error term.

### 2.3 Description of Data

The study draws upon multiple sources of annual time-series data over 1995 – 2014 on a host of economic, social, political, and institutional indicators for 17 ACs.<sup>1</sup> The approach to the analysis is based on a comparative empirical analysis among the whole Arab countries, and the Gulf countries (rich in natural resources) versus emerging Arab countries (Arab reformers). This approach held to identify the differences in their reform programs and how these reflect in their growth outcomes, in addition to examining the role of governance in in ACs as a whole in the two sub-groups. The data sources for the analysis include the World Development Indicators (WDI), the Economist Intelligence Unit (EIU) CountryData, UNCTAD; World Statistical Database, and the Worldwide Governance Indicators (WGI).

### 2.4 Estimation Procedure

The estimation approach involved four stages: Firstly, panel unit-root test is undertaken based on Levin-Lin-Chu (LLC) (2002) test, and Im et al. (2003), to ensure the variables are integrated of the same order. Secondly, panel co-integration technique based on Pedroni (1999) and Kao (1999) were applied to check whether there is a long-run cointegrating relationship between the variables. The analysis is especially interested in the group statistics, which take into account heterogeneity. Thirdly, the estimation tests the relevance of unobservable individual effects through Lagrange Multiplier and Hausman tests (Baltagi, 2008).

## 3. Empirical results

### 3.1 Panel Unit Root Tests

The panel unit root tests as in Table 1, confirm that all the series have not a panel unit root in the level, except for business reform (B) series, and human capital (H) series which are stationary in the first difference, I (1). First differencing can remove non-stationarity as appears from these two variables. Hence, the co-integration tests can be examined with the intercept only to avoid the potential stationarity of the dependent variable with the trend (Mátyás and Sevestre, 2008; Nosier, 2012).

*Table 1: Panel unit root tests for variables in level (intercept is included)*

TESTS	LEVIN, LIN & CHU (LLC)	IM, PESARAN AND SHIN (IPS)	FINAL RESULT
Variables			

<sup>1</sup> See Appendix 1 for the list of countries.

LY	-4.64600 (0.000)	-7.7851 (0.000)	I(0)
M	-3.73479 (0.001)	-2.66146 (0.0039)	I(0)
E	-2.77880 (0.000)	-3.19758 (0.007)	I(0)
B	-2.33402 (0.0000)	0.32819 (0.6286)	I(1)
H	-1.695 (0.0450)	3.70912 (0.9999)	I(1)
P	-7.28406 (0.0000)	1.10117 (0.0486)	I(0)
G	-5.5056 (0.0000)	-3.526 (0.0002)	I(0)

Source: Authors' calculations using EViews 10 and Stata 14.

Note: Values in parentheses refer to the probability of the test statistics. The null hypothesis of "LLC" t-test assumes common unit root process, while the "IPS" assumes individual unit root process.

### 3.2 Panel Co-Integration Tests

Two different tests of cointegration are performed to explore the co-movement among the variables in the model: the Kao and Pedroni tests of cointegration, taking into consideration the results of the panel unit root tests. Three tests of Pedroni (panel v, panel rho, and group rho) indicate that there is no cointegration among economic growth and its important determinants. In contrast, both Kao test and four other tests of Pedroni, including panel PP, group PP, panel ADF, and group ADF reject the null hypothesis of no cointegration at the 5% level of significance as illustrated in Table 2.

Table 2: Results of panel co-integration tests for all countries

Co-integration Tests	Kao Test	Pedroni Test						
		H1: common AR coefficients (within dimension)				H1: individual AR coefficients (between dimension)		
Test Statistic	ADF	Panel v	Panel rho	Panel PP	Panel ADF	Group rho-	Group PP-	Group ADF-
Intercept	3.0977 (0.010)	-2.2097 (0.9993)	4.2588 (1.000)	-4.047 (0.000)	1.11037 (0.0026)	6.24033 (1.000)	-8.1885 (0.000)	0.82218 (0.008)

Source: Authors' own calculations using EViews.

Note: P-values are given in parentheses. MAIC is used to determine the optimal number of lags to be included in the second stage regression.

According to the Monte Carlo simulation of Pedroni (Arellano and Bond, 1991), the panel ADF and PP, as well as the group ADF and PP, are the most appropriate tests statistics for this model since they are working properly in the case of the middle sample size. Therefore, we can regard the estimation model as being panel co-integrated.

### 3.4 Robustness Analysis

#### 3.4.1 The assumptions of CLRM

Wooldridge (2010) and Baltagi (2008) describe three potential econometric problems that could affect panel data analysis of least squares regression models. These relate to the violations of the assumptions of the classical linear regression model (CLRM); Multicollinearity, heteroscedasticity, and autocorrelation. Table 3 present the tests for these problems.

Table 3: Diagnostic test statistics for study samples

SAMPLE	HETEROSCEDASTICITY	SERIAL CORRELATION	MULTICOLLINEARITY
	White's test (Prob > chi2)	Durbin-Watson statistic	Variance inflation factor (VIF) - Mean
		Wooldridge test (Prob > F)	
ARAB COUNTRIES	129.22 (0.0022)	1.9	1.195 (0.2928)
			2.5

ARAB GULF COUNTRIES	90.51 (0.1224)	1.9	0.991 (0.3652)	3.3
ARAB EMERGING ECONOMIES	77.77 (0.1156)	1.9	1.025 (0.3685)	3.4

Source: Authors' calculations

Regarding heteroscedasticity problem, the results of the White test indicated that the variance-covariance matrixes were heteroscedastic in only the first sample, while the null hypothesis of homoscedasticity could not be rejected in the other samples of Arab sub-groups. Thus, to correct heteroscedasticity in Arab sample, the standardised coefficients, with t-statistics about heteroscedastic-robust standard errors are given in parentheses for the regression for these samples. Additionally, it is necessary to execute autocorrelation tests to find out if the error terms are independently distributed (serial independence), using Durbin-Watson (DW) and Wooldridge tests (Asteriou and Hall, 2016). In all samples, the Wooldridge test is statistically insignificant and confirmed by the DW statistics indicate that all the equations in these models are free from the problem of autocorrelation.

Lastly, to assess whether the independent variables are associated with each other, a correlation matrix was performed. Pearson and Spearman's correlation coefficient are used for this purpose as shown in Appendix 2. Overall the independent variables are not correlated with each other, except in few cases particularly the correlation between governance and physical infrastructure (0.71) and components of physical infrastructure and governance (Appendices 2.6 & 2.7). However, all association relation between the independent variables (except governance components) does not show any particular multicollinearity problem. To ensure that this problem does not exist, the variance inflation factor (VIF) checked that no exact linear relationship exists among explanatory variables included in the model. Concerning governance components, the estimation of each one will run one by one instead of a compacted model to avoid any multicollinearity concern could affect other coefficients in the model.

### 3.4.2 Endogeneity of institutional variables

Empirical institutional studies invariably encounter endogeneity problem due to potential causality issues as governance is thought to be endogenous in the growth model since the reverse causation is possible. Several studies such as Butkiewicz and Yanikkaya (2006); Curtin (1989); Mauro (1995), Acemoglu et al. (2001, 2002); Sachs (2003) tackled this problem by utilising Instrumental Variable (IV) techniques or the Generalized Methods of Moments (GMM) methods.

However, Ahmad and Hall (2017) suggest that most of these instruments often ignores country-specific features of economic growth, which may be correlated with independent variables. Besides, endogenous institutions are invariably challenging to be instrumented as reliable instruments that can be associated only with explanatory variables and not with the error term are short in supply. In addition, none of the instruments used in previous studies is appropriate for Arab countries (Helfer, 2017). In the Arab world, there are limited differences among the people based on race or religions. Arab nations as well have not been under Western colonisation for many centuries or experience different forms of colonialism, or even have different levels of rainfall as most of the region suffers from a dry climate.

Additionally, according to Wooldridge (2013), GMM estimators are not the most suitable procedure as study samples in the whole Arab countries and sub Arab groups are a "long panel" ( $N < T$ ). The estimators will be inconsistent and highly unstable as the period for the analysis is relatively large compared to the number of observations. The source of bias is the relative number of instruments to sample size. Hahn and Hausman (2002) showed that "many instruments problem" occurs due to the magnitude of the bias being proportional to the relative size of the number of instruments to the sample size. The problem is, GMM estimators depend strongly on the ratio of the variance of the individual-specific effects and the variance of the general error term (Abonazel, 2017).

Therefore, to overcome these problems the analysis in this study employs a bias correction to the Least Square Dummy Variable (LSDVC) technique to undertake 100 repetitions of the procedure to bootstrap the estimated standard errors. The estimator for dynamic panel data models help to avoid the endogeneity problem and has relatively low variance hence can lead to an estimator with lower root mean square error after the bias is removed (Abonazel, 2017; Bun and Carree, 2005, 2006; Castro, 2017). Regarding dynamic panel data models(Bun and Carree, 2005; Kiviet, 1995) presented Monte Carlo evidence indicating that the bias-corrected estimator proposed by Kiviet (1995) may outperform IV and GMM estimators. In addition, according to De Vos et al. (2015); Santos and Barrios (2011) using the bootstrap procedure for Dynamic panel data mitigating the bias and inconsistency that these estimators are known to exhibit for small samples.

### 3.5 Testing heterogeneity of panel data

In this section, the analysis run pooled OLS, fixed effects and random effects estimations to check the robustness of the results for each sample in the study. Tables 4.1 – 4.3 contain results of the static panel data models from estimating the baseline growth model formalised in equation (1).

Regarding Table 4.1 for the whole Arab sample, F-statistics are significant for all panel data models. Concerning the pooled OLS model that ignores the potential for unobserved heterogeneity and thus overcomes the panel nature of the data altogether, the estimated LM test indicated the rejection of the null hypothesis of the irrelevance of unobservable individual effects as  $(\text{var}(u) > 0)$  and implied that a pooled OLS regression would not be the most appropriate. Furthermore, the Hausman test was insignificant, and the null hypothesis of the absence of correlation between countries' unobservable individual effects and growth determinants was not rejected, and therefore the random effect model was most suitable. Thus, the analysis of the relationship in equation (1) is a panel model with random effects for all Arab countries.

**Table 4.1: Test of heterogeneity of panel data models for all Arab Countries**

DEPENDENT VARIABLE: GROWTH RATE	POOLED OLS	FIXED EFFECTS	RANDOM EFFECTS
Macroeconomic stability (M)	-0.380*** (0.125)	-0.193 (0.317)	-0.380*** (0.126)
Structural reform (B)	0.311*** (0.104)	0.274 (0.193)	0.311*** (0.0934)
Human capital (H)	-0.900 (0.654)	-1.069 (0.853)	-0.900 (0.859)
Physical infrastructure(P)	-0.144** (0.0681)	-0.115 (0.231)	-0.144** (0.0580)
Pop. growth rate	-0.620*** (0.161)	-0.660*** (0.213)	-0.620*** (0.170)
oil rent	-0.0137 (0.0255)	0.0314 (0.0689)	-0.0137 (0.0125)
External stability (E)	0.0294 (0.0758)	0.165 (0.124)	0.0294 (0.0875)
Lag GDP per capita	-0.144 (0.121)		-0.144** (0.0682)
Arab spring Dummy	-0.527*** (0.161)	-0.565** (0.217)	-0.527** (0.215)
Constant	-0.760 (1.959)	1.394*** (0.235)	-0.760 (1.267)
F	10.08***	5.694***	
chi2			12.66***
R-squared	0.317	0.177	0.317
LM test, chi2			22.72***
Hausman,chi2		9.75	
Observations	279	279	279
Countries	16	16	16

\*\*\*, \*\*, and \* indicate the coefficient is significantly different from zero at 1%, 5%, and 10% respectively



Source: Authors' calculations

**Table 4.2: Test of heterogeneity of panel data models for the sub-sample Arab Gulf Countries**

DEPENDENT VARIABLE: GROWTH RATE	POOLED OLS	FIXED EFFECTS	RANDOM EFFECTS
Macroeconomic stability (M)	-0.376 (0.310)	-0.275 (0.555)	-0.239 (0.222)
Structural reform (B)	0.411** (0.203)	0.169 (0.396)	0.339** (0.167)
Human capital (H)	-1.103*** (0.375)	-1.094** (0.302)	-1.215*** (0.244)
Physical infrastructure(P)	1.445* (0.968)	0.519 (1.437)	1.198** (0.528)
Pop. growth rate	-0.812*** (0.271)	-0.609** (0.208)	-0.625*** (0.207)
oil rent	0.410** (0.245)	0.571 (0.371)	0.370*** (0.132)
External stability (E)	0.164 (0.366)	0.471* (0.205)	0.310 (0.268)
Lag GDP per capita	-0.591 (0.471)	-1.067 (1.175)	-0.615* (0.347)
Arab spring Dummy	-0.372 (0.299)	-0.412 (0.235)	-0.457 (0.286)
Constant	5.794 (6.391)	9.389 (11.74)	7.126 (4.820)
F	6.142***	3.68***	
chi2			46.92***
R-squared	0.506	0.375	.317
LM test, chi2			0.00
Hausman,chi2		3.35	
Observations	106	113	113
Countries	6	6	6

\*\*\*, \*\*, and \* indicate the coefficient is significantly different from zero at 1%, 5%, and 10% respectively

Source: Authors' calculations

The Arab sub-samples estimations as presented in Tables 4.2 and 4.3, shows that all models for Arab Gulf countries and emerging Arab economies are overall significant based on F- and chi2 statistics. There is evidence of potential unobserved heterogeneity across countries owing to the insignificance of the estimated chi2 of the Lagrange Multiplier (LM). Consequently, the null hypothesis cannot be rejected that variances across entities are zero ( $\text{var}(u) = 0$ ).

**Table 4.3: Test of heterogeneity of panel data models for the sub-sample of Arab Emerging Economies**

DEPENDENT VARIABLE: GROWTH RATE	POOLED OLS	FIXED EFFECTS	RANDOM EFFECTS
Macroeconomic stability (M)	-0.561* (0.291)	0.00190 (0.462)	-0.148 (0.388)
External stability (E)	0.453** (0.210)	0.524 (0.279)	0.442 (0.272)
Structural reform (B)	0.473*** (0.164)	0.327 (0.203)	0.294* (0.168)
Human capital (H)	0.336* (0.238)	0.236 (0.149)	0.316** (0.127)
Physical infrastructure(P)	-0.436* (0.281)	0.259 (0.491)	0.00458 (0.210)
Pop. growth rate	-0.188 (0.303)	-0.303** (0.0965)	-0.371*** (0.0759)
oil rent	0.0380 (0.0459)	-0.169 (0.0885)	0.0158 (0.0301)
Lag GDP per capita	-0.784 (0.733)		-1.129 (0.725)
Arab spring Dummy	-1.133*** (0.165)	-1.371** (0.351)	-1.360*** (0.318)
Constant	8.954 (10.22)	0.790 (0.396)	11.16 (10.28)
F		5.66***	
chi2	182.4***		70.79***
R-squared	0.446	0.372	0.436
LM test, chi2			0.00

<b>Hausman,chi2</b>		0.78	
Observations	100	100	100
Countries	5	5	5

\*\*\*, \*\*, and \* indicate the coefficient is significantly different from zero at 1%, 5%, and 10% respectively

Source: Authors' calculations

Moreover, attempting to force the panel effects to be orthogonal to the included variables, getting no explained variance from the panel effect, for instance, the random effect estimator or "the sigma u" is zero and thus the intraclass correlation "rho" is Zero as well. On the other hand, Hausman test for all these samples was statistically insignificant which confirms that there is probably no observed individual heterogeneity.

Therefore, random effect model used for Arab sample, and pooled OLS is appropriate for the two Arab groups. Introducing governance variables to estimation did not change this classification except for the sample of whole Arab countries as fixed effect became the fitting model instead of the random effect.

### 3.6 Panel estimated results

In this section, the estimation of the growth model is based on equation (1) and the results of heterogeneity test as presented in the previous section. Tables 5.1 – 5.3 contain effects of the impact of reform components on economic growth for the three samples of the study. In each table, col. (1) represents the basic model as in the selected model in Tables 4.1 – 4.3, while col. (2) to (6) display the components of the aggregated indicators, which are of more interest and useful to policy. In col. (2), we examine the elements of macroeconomic stability instead. Similarly, col. (3) assesses the components of external stability, col. (4) structural reforms, col. (5) human capital and col. (6) physical infrastructure components.

To examine the influence of reform in governance variables, Tables 6.1 – 6.3 estimate the effect of aggregate institutions variable integrated into the basic model in col. (1), while col. (2) to (7) present the impact of each respective individual governance element in order to avoid the endogeneity problem and the high multicollinearity among governance factors.

#### 3.6.1 Estimated panel data models for all Arab Countries

Based on the random effect analysis in Table 4.1, the results in Table 5.1, present the estimation of all Arab countries in our sample. Firstly, the estimated coefficients of lagged GDP per capita is significant with a negative sign. The estimated coefficient is  $-0.14$  (with standard error (se) = 0.068), so the magnitude of the estimated coefficient implies that convergence occurs at the rate of about 0.14% per year.

As seen in col. (1) the basic model emphasises the significance of reform components on economic growth. The macroeconomic instability (M) and structural reform (B) were highly significant at 1% with the expected signs. However, the physical infrastructure (P) variable has a significant (5% level) but inverse impact on growth. Remarkably, the oil rent variable did not have a significant effect on economic output in the Arab region in the basic model. While it becomes substantial in Col. (4) with the components of structural reform .it implied that increase in oil rent as a percentage of GDP would lead to reducing growth by 0.04% annual. The coefficient of dummy variable of Arab spring years means assuming all other variables being fixed, the years of the Arab spring led to decrease the growth by 41%<sup>2</sup> than the years before 2011.

Regarding the macroeconomic instability' elements in col. (2) only the coefficients of the exchange rate and deficit are statistically significant and have a negative relationship with mainly the same power on

<sup>2</sup>  $[\exp(-0.53) - 1]100 = - 41 \%$

growth reduction (0.07%). Interestingly, current account surplus as in col. (3) has a similar effect but in the opposite direction.

Inward foreign direct investment as a percentage of GDP (FDI) is the most significant variable in the structural reform factor in promoting growth in the Arab World. A 1% change in FDI leads to 0.13% in per capita GDP growth. Furthermore, although the coefficient aggregate indicator of human capital (H) was insignificant, the health expenditure component was statistically significant and negatively affecting GDP per capita at 0.45%. On the contrary, the aggregate variable of physical infrastructure (P) was negative and significant, while none of its factors was statistically significant as presented in col. (6). The estimated coefficient means an increase in one unit of physical infrastructure (P) will increase growth by 0.14%.

**Table 5.1: Estimated models of reform and its components on economic growth for all Arab countries**

	(1) BASIC MODEL	(2) M	(3) E	(4) B	(5) H	(6) P
<b>Macroeconomic instability (M)</b>	<b>-0.380***</b> (0.126)		<b>-0.263**</b> (0.132)	<b>-0.375**</b> (0.147)	<b>-0.357***</b> (0.120)	<b>-0.373***</b> (0.121)
Exchange rate		<b>-0.065**</b> (0.0288)				
Deficit		<b>-0.078*</b> (0.0564)				
Public debt		-0.0472 (0.0961)				
Inflation		-0.0298 (0.0693)				
Unemployment		-0.113 (0.167)				
<b>External stability (E)</b>	0.0294 (0.0875)	0.0731 (0.123)		-0.00606 (0.0928)	0.00360 (0.0803)	0.0247 (0.111)
Current account			<b>0.080***</b> (0.0308)			
External debt			0.0278 (0.0634)			
International reserves			-0.0501 (0.0660)			
Diversification index			0.0605 (0.798)			
<b>Structural reform(B)</b>	<b>0.311***</b> (0.0934)	<b>0.260***</b> (0.0848)	<b>0.311**</b> (0.122)		<b>0.310***</b> (0.0848)	<b>0.261**</b> (0.118)
FDI				<b>0.132***</b> (0.0460)		
Credit to the private sector				-0.0573 (0.123)		
Concentration index				-0.088 (0.186)		
<b>Human capital(H)</b>	-0.900 (0.859)	-1.033 (0.884)	-1.004 (0.932)	-1.007 (0.893)		-0.992 (0.929)
Health expenditure					<b>-0.449**</b> (0.179)	
School enrolment					-0.0266 (0.0393)	
Life expectancy					-0.0341 (0.0334)	

Scientific articles published					0.267 (0.354)	
<b>Physical infrastructure(P)</b>	<b>-0.144**</b> (0.0580)	<b>-0.145**</b> (0.0682)	<b>-0.120*</b> (0.0615)	-0.0864 (0.0569)	-0.0409 (0.0894)	
Fixed telephone						0.087 (0.181)
Improved water source						-0.230 (0.595)
Access to electricity						-0.016 (0.012)
Improved sanitation						0.005 (0.011)
<b>Lag GDP per capita</b>	<b>-0.144**</b> (0.0682)	<b>-0.141*</b> (0.0736)	<b>-0.158*</b> (0.0866)	-0.108 (0.0721)	-0.128 (0.0805)	<b>-0.178**</b> (0.081)
<b>Pop. growth rate</b>	<b>-0.620***</b> (0.170)	<b>-0.641***</b> (0.173)	<b>-0.645***</b> (0.172)	<b>-0.653***</b> (0.181)	<b>-0.596***</b> (0.189)	<b>-0.644***</b> (0.181)
<b>Oil rent to GDP</b>	-0.0137 (0.0125)	-0.0122 (0.0147)	-0.0163 (0.0139)	<b>-0.0365**</b> (0.0155)	-0.0140 (0.0123)	-0.0180 (0.0199)
<b>D. Arab Spring</b>	<b>-0.527**</b> (0.215)	<b>-0.467*</b> (0.242)	<b>-0.446*</b> (0.253)	<b>-0.449*</b> (0.240)	<b>-0.367</b> (0.265)	<b>-0.437*</b> (0.257)
Constant	-0.760 (1.267)	0.106 (1.507)	-0.458 (1.803)	-1.167 (1.288)	8.936 (9.983)	3.695 (2.420)
<b>Observations</b>	279	279	279	279	279	279
<b>Adjusted R2</b>	31.7	31.3	31.7	31.6	33.2	31.3
<b>chi2</b>	<b>12.66***</b>	<b>64.49***</b>	<b>49.12***</b>	<b>14.56***</b>	<b>32.40***</b>	<b>40.71***</b>
<b>Countries</b>	16	16	16	16	16	16

\*\*\*, \*\*, and \* indicate the coefficient is significantly different from zero at 1%, 5%, and 10% respectively

**Table 6.1: Estimated models of reform with the inclusion of governance components on economic growth of all Arab countries**

	(1) BASIC MODEL WITH-G	(2) VA	(3) PS	(4) GE	(5) RQ	(6) RL	(7) CC
<b>Macroeconomic instability (M)</b>	-0.0154 (0.202)	<b>-0.33***</b> (0.124)	-0.202 (0.141)	-0.190 (0.199)	<b>-0.307**</b> (0.125)	<b>-0.277*</b> (0.149)	0.411 (0.362)
<b>External stability (E)</b>	0.0593 (0.0904)	-0.00334 (0.0808)	0.0634 (0.0829)	0.0483 (0.0885)	-0.0147 (0.0767)	0.0230 (0.0784)	0.0705 (0.101)
<b>Structural reform (B)</b>	<b>0.210*</b> (0.114)	<b>0.278***</b> (0.102)	<b>0.284***</b> (0.101)	0.129 (0.152)	<b>0.235**</b> (0.104)	<b>0.258***</b> (0.0995)	0.166 (0.142)
<b>Human capital (H)</b>	<b>-1.361*</b> (0.705)	-0.825 (0.619)	-1.055 (0.642)	-1.016 (0.652)	-0.813 (0.612)	-0.811 (0.619)	<b>-1.837**</b> (0.879)
<b>Physical infrastructure(P)</b>	<b>-0.356***</b> (0.137)	-0.104 (0.0683)	<b>-0.235**</b> (0.0983)	<b>-0.188*</b> (0.105)	-0.110 (0.0671)	-0.149 (0.0999)	<b>-0.33***</b> (0.124)
<b>Governance(G)</b>	<b>0.782**</b> (0.338)						
Voice and accountability		0.0922 (0.352)					
Political stability			<b>0.420*</b> (0.218)				
Government Effectiveness				1.016 (0.852)			
Regulatory quality					0.355 (0.399)		
Rule of law						0.248 (0.354)	
Control of Corruption							<b>2.517***</b> (0.956)
<b>Lag GDP per capita</b>	0.310*** (0.100)	0.185** (0.0920)	0.185** (0.0735)	0.246** (0.0978)	0.204** (0.0799)	0.172** (0.0702)	0.342*** (0.113)
<b>Pop. growth rate</b>	<b>-0.580***</b> (0.158)	<b>-0.55***</b> (0.147)	<b>-0.60***</b> (0.154)	<b>-0.52***</b> (0.147)	<b>-0.59***</b> (0.145)	<b>-0.54***</b> (0.142)	<b>-0.58***</b> (0.177)
<b>Oil rent to GDP</b>	0.0753 (0.0491)	-0.00822 (0.0312)	0.00125 (0.0269)	0.0242 (0.0411)	0.00612 (0.0330)	3.30e-05 (0.0329)	<b>0.122*</b> (0.0645)
<b>Arab Spring Dummy</b>	<b>-0.418**</b> (0.187)	<b>-0.394**</b> (0.191)	<b>-0.454**</b> (0.189)	<b>-0.40**</b> (0.189)	<b>-0.398**</b> (0.189)	<b>-0.403**</b> (0.185)	<b>-0.397**</b> (0.184)
<b>Observations</b>	279	279	279	279	279	279	279
<b>Countries</b>	16	16	16	16	16	16	16

\*\*\*, \*\*, and \* indicate the coefficient is significantly different from zero at 1%, 5%, and 10% respectively

The assessment of the quality of governance indicators on GDP per capita growth in the Arab region are illustrated in Table 6.1. It is worth noting that the inclusion of the governance factor to basic model

as in col. (1) reduced the significant positive coefficients rather than the negative one. For instance, the positive values of both macroeconomic stability and structural reform variables have reduced, even turning negative for macroeconomic stability, while the level of significance for structural reforms has change from 1% to 10%. At the same time the magnitude of negative factors such as human capital and physical infrastructure have increased, and more significant. This observation only applies to the whole Arab sample. The possible explanation for this result is that the governance factor attempted to highlight the defects of mismanagement regarding human capital and the shortage in basic life-supporting facilities which affected the structure of the reform program. The significance of the sub-governance indicators confirms this possibility. While the aggregate governance (G) indicator was associated boosting economic growth by 0.78%, the government effectiveness (GE) variable contributes 0.42%. Nevertheless, the control of corruption (CC) sub-variable has the most potent coefficient within all models of the whole Arab sample with a 1% change leading to a highly significant change in growth by 2.52%.

### **3.6.2 Estimated panel data models for Arab Gulf Countries (GCC)**

The estimates of the basic model for GCC countries as presented in col. (1) of Table 5.2 indicates that state variable (Lag GDP per capita) was not significant. This implies that the convergence force does not affect growth in these countries. Moreover, in the same column, three principal component variables were statistically significant in the model. Both structural reform (B) and physical infrastructure (P) have a positive effect on growth by 0.41% and 1.45% respectively, while human capital variable contributes negatively to output growth by 1.1% at 1% significance level. Importantly, since all economies in this group are oil exporters, the oil rent was significantly favourable at 5% and led to increasing growth by 0.41%. In contrast, different from the other two estimated models in Tables 5.1 and 5.3, the coefficient of the dummy variable, representing the period of the "Arab spring" was not significant.

For stabilisation effect's components, the appreciation of local currencies in GCC member states has led to positive change in growth by 0.28%, which is consistent with the positive impact of international reserves as shown in col. (3). Two main factors increase the instability of these countries; expansion in public debt and unemployment, as they are attributed to reducing growth by 0.31% and 0.42% respectively. As in the other two samples, foreign direct investment in col. (4) was positively associated with growth by 0.13% and statistically significant at 10%.

In spite of the notable progress in the area of human capital in the GCC countries, its full potential has not been realised. This could be seen in the high negative significant coefficients of human capital (H) in col.(1) or its elements in col.(5). Health expenditure and gross primary school enrollment negatively affect growth by 0.41% and 0.03% respectively at significant levels of 10%. Interestingly, aggregate physical infrastructure (P) variable in col.(1) and its sub-component, fixed telephone line subscriptions in col.(6) were significantly positive and led to increase growth by a similar proportion (1.4%) and significant level (10%).

Despite the aggregate governance (G) variable being insignificant, introducing this variable in the regression as in col.(1) in Table 6.2 improved the significant level of macroeconomic stability (M) to 10% and the positive effects of structural reform (B), physical infrastructure (P) and oil rent from 0.41%, 1.4%, and 0.41% to 0.51%, 2%, and 0.50% respectively (Table 6.1 vs. Table 6.2). Government effectiveness (GE) is one of the two significant components of the governance (G) indicators. The variable stimulates growth by 0.75%. The other is the rule of law (RL) variable, which coefficient is positive and statistically significant with a one-unit change in its index leading to a 0.64% increase in growth.

**Table 5.2: Estimated models of reform and its components on economic growth for Arab Gulf Countries (GCC)**

	(1) BASIC MODEL	(2) M	(3) E	(4) B	(5) H	(6) P
<b>Macroeconomic instability (M)</b>	-0.376 (0.310)		-0.310 (0.293)	-0.247 (0.272)	-0.123 (0.345)	-0.284 (0.300)
Exchange rate		<b>0.288**</b> (0.270)				
Deficit		0.0707 (0.0844)				
Public debt		<b>-0.307**</b> (0.266)				
Inflation		-0.0566 (0.133)				
Unemployment		<b>-0.417*</b> (0.266)				
<b>External stability (E)</b>	0.164 (0.366)	0.0926 (0.493)		0.290 (0.339)	-0.0141 (0.376)	0.477 (0.386)
Current account			<b>0.0201*</b> (0.128)			
External debt			0.248 (0.351)			
International reserves			<b>0.512*</b> (0.268)			
Diversification index			-1.978 (1.559)			
<b>Structural reform(B)</b>	<b>0.411**</b> (0.203)	0.200 (0.292)	0.225 (0.224)		<b>0.604**</b> (0.301)	<b>0.389*</b> (0.201)
FDI				<b>0.128*</b> (0.0779)		
Credit to the private sector				-0.0999 (0.856)		
Concentration index				-0.00259 (0.913)		
<b>Human capital(H)</b>	<b>-1.103***</b> (0.375)	<b>-0.980**</b> (0.400)	<b>-1.572***</b> (0.386)	<b>-1.115**</b> (0.450)		<b>-0.990**</b> (0.412)
Health expenditure					<b>-0.408*</b> (0.310)	
School enrolment					<b>-0.0346*</b> (0.0201)	
Life expectancy					-0.238 (0.165)	
Scientific articles published					0.199 (0.275)	
<b>Physical infrastructure(P)</b>	<b>1.445*</b> (0.968)	<b>1.936**</b> (1.189)	<b>1.861**</b> (0.810)	1.218 (0.883)	1.346 (0.975)	
Fixed telephone						<b>1.384*</b> (0.798)
Improved water source						0.0144 (0.111)
Access to electricity						-0.0604 (0.0599)

Improved sanitation						-0.00191 (0.122)
<b>Lag GDP per capita</b>	-0.591 (0.471)	<b>-1.605*</b> (0.856)	<b>-1.216**</b> (0.566)	-0.605 (0.482)	-0.539 (0.503)	-0.866 (0.676)
<b>Pop. growth rate</b>	<b>-0.812***</b> (0.271)	<b>-0.855***</b> (0.308)	<b>-0.558***</b> (0.209)	<b>-0.621***</b> (0.223)	<b>-0.806***</b> (0.288)	<b>-0.556***</b> (0.221)
<b>Oil rent to GDP</b>	<b>0.410**</b> (0.245)	<b>0.587**</b> (0.294)	<b>0.531**</b> (0.224)	0.336 (0.286)	<b>0.446*</b> (0.257)	0.501 (0.330)
<b>D.Arab Spring</b>	-0.372 (0.299)	<b>-0.351*</b> (0.317)	<b>-0.600*</b> (0.311)	-0.397 (0.384)	-0.484 (0.307)	-0.264 (0.295)
Observations	106	106	113	113	106	113
Adjusted R2	50.6	52.6	48.5	46.8	52.6	48.5
F statistic	<b>6.142***</b>	<b>4.661***</b>	<b>7.496***</b>	<b>5.684***</b>	<b>6.218***</b>	<b>5.780***</b>

**Table 6.2: Estimated models of reform with governance components on the economic growth of Arab Gulf Countries (GCC) sample**

VARIABLES	(1) BASIC MODEL WITH-G	(2) VA	(3) PS	(4) GE	(5) RQ	(6) CC	(7) RL
Macroeconomic instability (M)	<b>-0.531*</b> (0.270)	<b>-0.637**</b> (0.285)	<b>-0.546**</b> (0.267)	<b>-0.640**</b> (0.280)	<b>-0.550**</b> (0.268)	<b>-0.478*</b> (0.274)	-0.453 (0.293)
External stability (E)	-0.107 (0.323)	-0.159 (0.337)	-0.118 (0.324)	-0.0718 (0.319)	-0.136 (0.318)	-0.0238 (0.325)	-0.124 (0.322)
Structural reform (B)	<b>0.507**</b> (0.215)	<b>0.466**</b> (0.206)	<b>0.550**</b> (0.210)	<b>0.395</b> (0.243)	<b>0.546***</b> (0.203)	<b>0.473**</b> (0.215)	<b>0.557***</b> (0.191)
Human capital (H)	<b>-1.22***</b> (0.401)	<b>-0.998**</b> (0.440)	<b>-1.17***</b> (0.391)	<b>-1.22***</b> (0.389)	<b>-1.15***</b> (0.400)	<b>-1.35***</b> (0.419)	<b>-1.20***</b> (0.394)
Physical infrastructure(P)	<b>1.989**</b> (0.877)	<b>1.677**</b> (0.707)	<b>1.701*</b> (0.930)	<b>2.236***</b> (0.830)	<b>1.708**</b> (0.720)	<b>2.027***</b> (0.721)	<b>2.038**</b> (0.838)
Governance(G)	0.178 (0.309)						
Voice and accountability		-0.840 (0.698)					
Political stability			0.0052 (0.275)				
Government Effectiveness				<b>0.748*</b> (0.617)			
Regulatory quality					0.0895 (0.573)		
Control of Corruption						0.314 (0.422)	
Rule of law							<b>0.642*</b> (0.767)
<b>Lag GDP per capita</b>	-0.911 (0.618)	-0.461 (0.382)	-0.625 (0.532)	<b>-1.252*</b> (0.636)	<b>-0.643*</b> (0.387)	<b>-0.977*</b> (0.565)	<b>-0.895*</b> (0.478)
<b>Pop. growth rate</b>	<b>-0.65***</b> (0.188)	<b>-0.70***</b> (0.188)	<b>-0.68***</b> (0.183)	<b>-0.59***</b> (0.201)	<b>-0.68***</b> (0.182)	<b>-0.61***</b> (0.213)	<b>-0.66***</b> (0.184)
<b>Oil rent to GDP</b>	<b>0.502**</b> (0.195)	<b>0.564***</b> (0.199)	<b>0.448**</b> (0.188)	<b>0.637***</b> (0.229)	<b>0.471**</b> (0.211)	<b>0.521***</b> (0.190)	<b>0.543**</b> (0.215)
Arab Spring Dummy	0.154 (0.332)	0.101 (0.340)	0.148 (0.338)	0.151 (0.332)	0.148 (0.335)	0.174 (0.334)	0.0857 (0.337)
Observations	106	106	106	106	106	106	106
R-squared	59.2	59.5	59.0	59.3	59.1	59.1	59.5
Countries	6	6	6	6	6	6	6
F statistic	<b>18.39***</b>	<b>17.18***</b>	<b>18.10***</b>	<b>18.50***</b>	<b>18.18***</b>	<b>18.65***</b>	<b>18.32***</b>

\*\*\*, \*\*, and \* indicate the coefficient is significantly different from zero at 1%, 5%, and 10% respectively

### 3.6.3 Estimated panel data models for Arab Emerging Economies

The basic model for Arab emerging economies in col.(1) of Table 5.3 indicates that all socioeconomic reform factors have the most influential power on the economic growth rather than the other control variables. This group, also called Arab reformers, is the most affected by reform programs as they have undergone significant changes in their policy environment over the last 20 years. With the exception of physical infrastructure (P), not only all aggregated reform variables were significant with expected sign, but also many of their sub-elements were statistically significant. Furthermore, the coefficient of

the dummy variable for “Arab spring” years in the basic model, leading to a decline in growth by 67.8%<sup>3</sup> compared to the years before 2011. Both aspects of stabilisation- internal and external, are significant power to enhance economic output by 0.56% and 0.45% respectively. While unemployment was the most severe macroeconomic problem and the main source of internal instability, current account surplus was the root of external stability. Remarkably, the coefficient of unemployment was the highest among all models, as a 1% increase in unemployment led to harm in growth by similar percentage.

The structural reform (B) component was positive and highly significant at 1%. It impacts directly on growth by 0.47%, underpinned by a comparatively highly significant (1%) influence of inward foreign direct investment as seen in col. (4) which positively impacts on growth by 0.18%. With regards to human capital (H), the aggregate variable in col.(1) seems to be significant at 10%. However, the signs of the significant elements of human capital were not the same. While health expenditure as a percentage of GDP was negative at 10% level, the gross primary school enrollment positively affect output by 0.02% at 5% significant level. For the last component of reform, the physical infrastructure (P) aggregate variable in col.(1) and its component, fixed telephone line subscriptions in col.(6), were significantly negative and leads to falls in growth by 0.44% and 0.06% respectively.

Regarding institutional reform - aggregate governance (G) variable and its components, in Table 6.3, only voice and accountability (VA) and regulatory quality (RQ) have a significant impact on growth, while all other factors, including the aggregate governance indicator, had an insignificant effect in the reformers sample. However, RQ has the most significant impact among all variables in of Arab Emerging Economies’ tables with substantial 5% and  $se=0.59$ .

#### **4. Discussion and policy implications**

This section attempts to evaluate the outcomes for each of the three samples highlighting the similarities and differences among Arab regions and implications for policy, in addition to demonstrating how outcomes compare with the existing literature.

##### **4.1 Macroeconomic stability**

The negative signs and highly significant levels of the aggregate macroeconomic instability coefficients and its elements in all samples support the argument that, an economy which has the desired degree of macroeconomic stability would ensure confidence in investors, provide incentives for the most productive destination of inputs and enhance the profitability of investments at reasonable rates of risks (Alguacil et al., 2011; Mohieldin, 1995; Ulvedal, 2013).

The evidence from the Arab countries’ analysis support the argument that the devaluation of domestic currencies make exports more competitive and cheaper to foreigners, thus the demand for exports will increase, which will help boost growth (Kalyoncu et al., 2008; Lambertini and Tavares, 2005). In contrast, the internal stabilisation in Gulf countries was affected positively by currency appreciation. The particular case of this group was due to their exchange rate policy as they have all pegged their currencies to the US dollar for nearly three decades. Since oil is the main commodity in these countries, and the oil price is fixed in dollars, any exchange rate fluctuation could drastically reduce revenue if the currencies were unpegged. In addition, due to sustained high oil prices from the early 2000s to 2014, Gulf countries managed the massive revenue by creating sovereign wealth funds (SWFs) (Bahgat, 2017). According to the Sovereign Wealth Funds Institute, in 2010 GCC countries held funds to a tune of 4.7 trillion US dollars (Hvidt, 2011). Therefore, the current policy avoids currency fluctuation and eliminate uncertainties in international transactions. Consistent with this result, the coefficient of

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<sup>3</sup> Calculates as  $[\exp(-1.133) - 1]100 = - 67.8\%$



international reserves for the same group of countries in col. (3) of Table 5.2 was positive and statistically significant unlike in the other two samples.

The study's results also confirm that unemployment is one of the most problematic issues in both groups of Arab countries. According to Castells-Quintana and Royuela (2012), unemployment could undermine economic growth not only because it is a waste of resources, but also because it creates redistributive constraints and subsequent distortions, drives people to poverty, and erodes self-esteem increasing social dislocation, unrest and conflict.

**Table 5.3: Estimated models of reform and its components on the economic growth of Arab Emerging Economies**

	(1) BASIC MODEL	(2) M	(3) E	(4) B	(5) H	(6) P
<b>Macroeconomic instability (M)</b>	<b>-0.561*</b> (0.291)		<b>-0.789**</b> (0.360)	<b>-0.628**</b> (0.274)	<b>-0.680**</b> (0.278)	-0.133 (0.401)
Exchange rate		-0.179 (0.210)				
Deficit		0.0869 (0.111)				
Public debt		0.366 (0.381)				
Inflation		0.0731 (0.0851)				
Unemployment		<b>-1.004**</b> (0.472)				
<b>External stability (E)</b>	<b>0.453**</b> (0.210)	<b>0.384*</b> (0.208)		<b>0.395**</b> (0.200)	<b>0.501**</b> (0.205)	<b>0.443**</b> (0.221)
Current account			<b>0.121*</b> (0.0640)			
External debt			-0.134 (0.261)			
International reserves			-0.00409 (0.223)			
Diversification index			-1.511 (1.073)			
<b>Structural reform(B)</b>	<b>0.473***</b> (0.164)	<b>0.408**</b> (0.161)	<b>0.505***</b> (0.176)		<b>0.489***</b> (0.164)	<b>0.547***</b> (0.170)
FDI				<b>0.180***</b> (0.0543)		
Credit to the private sector				-0.366 (0.270)		
Concentration index				0.460 (0.329)		
<b>Human capital(H)</b>	<b>0.336*</b> (0.238)	<b>0.636*</b> (0.327)	0.219 (0.268)	<b>0.551**</b> (0.244)		0.331 (0.290)
Health expenditure					<b>-0.275*</b> (0.148)	
School enrolment					<b>0.024**</b> (0.012)	
Life expectancy					-0.070 (0.095)	
Scientific articles published					-0.238 (0.161)	
<b>Physical infrastructure(P)</b>	<b>-0.436*</b> (0.281)	<b>-0.849**</b> (0.365)	-0.344 (0.298)	-0.308 (0.301)	0.307 (0.343)	
Fixed telephone						<b>-0.056**</b> (0.251)
Improved water source						-0.019 (0.043)
Access to electricity						0.017 (0.030)
Improved sanitation						-0.011 (0.028)
<b>Lag GDP per capita</b>	-0.784 (0.733)	-1.176 (2.649)	0.329 (1.232)	-0.0104 (0.758)	-0.758 (0.804)	-1.210 (0.980)
<b>Pop. growth rate</b>	-0.188 (0.303)	-0.336 (0.338)	-0.245 (0.307)	-0.435 (0.330)	-0.472 (0.338)	-0.433 (0.334)
<b>Oil rent to GDP</b>	0.0380 (0.0459)	0.0600 (0.0789)	-0.0206 (0.0643)	-0.0339 (0.0533)	0.00103 (0.0460)	0.0172 (0.0472)

<b>Arab Spring Dummy</b>	<b>-1.133***</b> (0.165)	<b>-0.993***</b> (0.173)	<b>-1.251***</b> (0.185)	<b>-1.176***</b> (0.164)	<b>-0.690***</b> (0.207)	<b>-1.298***</b> (0.226)
Constant	8.954 (10.22)	16.55 (35.69)	-5.220 (15.63)	1.408 (10.06)	14.94 (28.27)	17.97 (16.35)
Observations	100	100	100	100	100	100
Countries	5	5	5	5	5	5
Adjusted R2	44.6	46.5	45.1	45.1	74.2	46.7
chi2	182.4***	241.9***	198.1***	239.1***	205.9***	199.5***

\*\*\*, \*\*, and \* indicate the coefficient is significantly different from zero at 1%, 5%, and 10% respectively

**Table 6.3: Estimated models of reform with governance components on the economic growth of Arab Emerging Economies**

	(1) BASIC MODEL WITH-G	(2) VA	(3) PS	(4) GE	(5) RQ	(6) RL	(7) CC
<b>Macroeconomic instability (M)</b>	<b>-0.208*</b> (0.567)	<b>-0.28**</b> (0.452)	<b>-0.506**</b> (0.554)	<b>-0.245*</b> (0.546)	0.256 (0.415)	<b>-0.215**</b> (0.503)	<b>-0.120**</b> (0.480)
<b>External stability (E)</b>	0.126 (0.286)	<b>0.239**</b> (0.293)	0.0370 (0.304)	<b>0.124*</b> (0.281)	<b>0.299*</b> (0.285)	0.194 (0.293)	0.165 (0.274)
<b>Structural reform (B)</b>	<b>0.826***</b> (0.298)	<b>0.877***</b> (0.306)	<b>0.751**</b> (0.305)	<b>0.838***</b> (0.307)	<b>0.709**</b> (0.301)	<b>0.812***</b> (0.297)	<b>0.834***</b> (0.310)
<b>Human capital (H)</b>	0.178 (0.460)	0.233 (0.460)	0.409 (0.446)	0.216 (0.489)	0.407 (0.411)	0.184 (0.446)	0.168 (0.474)
<b>Physical infrastructure(P)</b>	<b>-0.149*</b> (0.344)	<b>-0.075*</b> (0.339)	<b>-0.312*</b> (0.357)	<b>-0.170*</b> (0.354)	-0.362 (0.323)	-0.0780 (0.363)	-0.141 (0.343)
<b>Governance(G)</b>	-0.231 (0.470)						
Voice and accountability		<b>0.534*</b> (0.301)					
Political stability			-0.696 (0.430)				
Government Effectiveness				-0.488 (0.861)			
Regulatory quality					<b>1.254**</b> (0.596)		
Rule of law						-0.504 (0.589)	
Control of Corruption							-0.151 (0.517)
<b>Lag GDP per capita</b>	<b>-2.228***</b> (0.790)	<b>-1.736**</b> (0.806)	<b>-2.53***</b> (0.718)	<b>-2.20***</b> (0.832)	<b>-2.11***</b> (0.724)	<b>-2.20***</b> (0.687)	<b>-2.08***</b> (0.761)
<b>Pop. growth rate</b>	-0.464 (0.385)	-0.492 (0.386)	-0.356 (0.370)	-0.534 (0.419)	-0.488 (0.377)	-0.449 (0.386)	-0.477 (0.390)
<b>Oil rent to GDP</b>	0.0372 (0.0496)	0.0360 (0.0464)	0.0522 (0.0488)	0.0497 (0.0503)	0.0805 (0.0518)	0.0234 (0.0532)	0.0382 (0.0521)
<b>Arab spring Dummy</b>	<b>-0.930***</b> (0.324)	<b>-1.02***</b> (0.284)	<b>-1.21***</b> (0.351)	<b>-0.95***</b> (0.327)	<b>-0.81***</b> (0.299)	<b>-0.95***</b> (0.312)	<b>-0.88***</b> (0.292)
Observations	95	95	95	95	95	95	95
R-squared	51.3	52.0	53.4	51.4	52.6	51.7	51.2
Countries	5	5	5	5	5	5	5
chi2	<b>204.8***</b>	<b>216.9***</b>	<b>207.9***</b>	<b>203.7***</b>	<b>210.97***</b>	<b>272.7***</b>	<b>234.5***</b>

\*\*\*, \*\*, and \* indicate the coefficient is significantly different from zero at 1%, 5%, and 10% respectively

Remarkably, in the case of Arab emerging economies, unemployment was the only significant variable among the components of macroeconomic instability. Consistent with Wahba and Assaad (2017) employment creation is a major bottleneck for most of the Arab economies in which a growing labour force and narrowing public sector are leading to high youth unemployment. Engaging newcomers to the labour market requires that private sector be willing to generate work opportunities at a much faster rate than the current rate.

Amin et al. (2012) argue that overpopulation relative to the physical resources of capital, land and water, and overprotective labour regulations were the major reasons for that Unemployment rate. Most Arab countries tend to have high hiring bottlenecks involving notice requirements, severance payments and fines for terminating redundant workers. According to the World Bank (2017) 'doing business

measures', the region ranks as the most rigid on the redundancy index and is third from the top on the 'difficulty of hiring' index.

In the GCC case, the employment situation has been shaped by the oil-based growth model. Following the oil prices boom after 1973 and subsequent initiation of ambitious development projects, the hiring of both skilled and unskilled non-national labour has been needed to sustain the rapid economic growth (Nabli, 2007). However, after more than forty years of importing labour, the pace of private sector jobs creation for nationals has been slowing recently, implying a challenging employment outlook. Crockett (2014) shows Gulf countries face persisting high youth unemployment rates reaching 30% in Saudi Arabia, in addition, private firms are suffering from fiscal reforms and government spending is down.

#### **4.2 External stability**

Although the aggregate external stability variable has shown a slight impact on economic growth relative to other components of reform program in all samples, the elements of foreign stabilisation indicated several relevant results. The results were highlighting the importance of current account balance to promote economic growth in the Arab region; the whole Arab sample and for both Arab sub-groups - Gulf countries (oil-rich countries) and emerging economies (resource-scarce nations). The coefficient of the Arab sample was highly statistically significant (1%), while in the other two samples it was 10%. The importance of this indicator in the Arab reformers (emerging economies) group was much higher than the other samples, as it stimulated growth by 0.12%. Furthermore, any applied economic reform in these countries that influences aggregate saving or investment will likely also alter their current account position (Bornhorst and Ivanova, 2012). Additionally, with the steady growth of exports of goods and despite the growth in imports, the Arab countries' current account moved from almost a net balance on the average in the 1990s to a surplus averaging at 7.0% of GDP over the 2001-2007 period (Aristovnik, 2007). Further evidence to support these arguments is the significant positive effect of international reserves for Gulf countries as mentioned in above section.

#### **4.3 Structural reform**

The highly significant structural reform aggregate variable for all samples confirms its importance of as the second most important factor of any successful economic reform. Indeed, the effect of structural reforms itself, and its association with other indicators particularly the stabilisation variables helps improve economic growth, through generating additional indirect benefits to improve the efficiency of reform program. The magnitude of the coefficients varied among regions, as it was 0.31% in full Arab sample, while it was 0.41% in GCC and 0.47% in emerging Arab economies. The results are reasonable, as the latter are a group of reformers who have targeted this kind of reform for many years.

The outcomes verify the IMF literature' conclusion, such as in Abbott et al. (2010); El-Erian et al. (1996); IMF (2014); Kireyev (2000); Swiston and Barrot (2011); Williamson (2004), that structural reforms are essential to promote competition in the economy through maintaining appropriate regulatory frameworks, enhancing the services sector, increase the add value of manufacturing, and achieving stronger integration at the regional and international levels. The other notable result in this context is all coefficients of inward foreign direct investment (FDI, as a percentage of GDP, was positive and statistically significant for all samples without any exception. This finding is consistent with results of earlier studies, which argue that FDI could actively encourage growth whether in industrial or emerging economies (Cieřlik and Anh, 2016; Wisniewski and Pathan, 2014).

#### **4.4 Human capital**

The negative sign of the health expenditure component is explained in the literature as follows. Government health expenses as expenditure items lead to increase aggregate demand and expenditures. However, higher government expenditures negatively impact on growth especially if

they are consumption expenditures (crowding out effect). (Bakare and Olubokun, 2011; Bedir, 2016; Churchill et al., 2015; Lacheheb et al., 2014).

With reference to the gross primary school enrolment, used as a proxy for education, the results were contradictory. While it has a positive effect in the Arab emerging group, it affects growth negatively in the GCC countries. It is well-known role of education in reducing poverty and enhancing economic growth, but such positive impacts are dependent on several factors. For instance, Mingat and Tan (1996) found that higher education has a positive statistically significant impact only in the group of developed countries, while primary education has a positive effect in less advanced, and secondary, a positive impact on developing countries. Similarly, Petrakis and Stamatakis (2002) determined that the growth effects of education depend on the level of income; low-income countries benefit from primary and secondary school while high-income developed countries benefit from higher education. This result is consistent with the scatter plots in Appendix 3 on the relationship between primary school enrolment and economic growth. The plots show positive relationship in emerging Arab countries, while it was obviously negative in the Gulf countries. Based on these explanations, primary education may not be the appropriate proxy for Gulf countries in examining the role of education on growth.

#### **4.5 Physical infrastructure**

The positive impact of infrastructure on growth in Gulf countries is supported by Calderón and Servén (2004); Ismail and Mahyideen (2015); Kodongo and Ojah (2016); Romp and De Haan (2007) who showed that growth was positively affected by infrastructure stocks. In this case, infrastructure changes aggregate output either through infrastructure services entering production as an additional input, or they boost total factor productivity by reducing transaction and other costs thus allowing the more efficient use of standard productive inputs. The GCC group has the highest infrastructure effect in terms of stimulating growth and jobs among all regions, with a 1% change influencing growth by as much as 1.5%. This effect was associated entirely with the volume of public investment including infrastructure in these countries. According to Ianchovichina et al. (2013), because of the largely high oil prices in the last two decades, public investment spending in the GCCC was significantly higher than in most developing regions (except East Asia) and double the size of OECD average. In particular, expenditure on infrastructure boosted employment in the construction sector, which was a major source of job growth in the 2000s compared to other sectors and countries (Vivien and Briceño-Garmendia, 2010). Construction created about 30% of the jobs in MENA (most of which are from the GCCC), which was twice the average for fast growing, high investment countries such as Indonesia and Brazil (Estache and Garsous, 2012).

Inadequate supply of infrastructure or unreliability in services may inhibit the investment of productive capital, thus restrict and reduce the economic output (O'Fallon, 2003). This is the case in most emerging economies in the Arab region that affected the overall results for the full Arab sample. Since the availability of proper infrastructure is particularly essential vis-à-vis its impact on production costs for small and medium enterprises, poor quality or unreliable infrastructure service provision in these countries may mean private sector is reluctant to invest productive capital or have to reduce such investment in favour of "complementary" capital to compensate for the lack of infrastructure (Nijkamp and Poot, 2004).

#### **4.6 Governance**

The overall outcomes of institutional reform are consistent with the main conclusion emerging as; governance is positive and statistically significant determinants of economic growth. However, there were significant differences in the components of the governance indicators relevant for GCCCs and emerging Arab economies. Aggregate governance indicator, political stability and control of corruption are significant for the full Arab sample, government effectiveness and the rule of law

significant for GCCCs while for Arab emerging economies, it is voice and accountability, and regulatory quality.

In particular, the government effectiveness component is the most potent factor regarding all governance variables. It captures the capacity of government to produce and achieve sound policies as well as the provision of public goods and services which determines the extent of a country's development. The inability to deliver efficiently on these public goods, even in an environment of stable macroeconomic policies, creates a hostile environment which retards development (Pushak et al., 2007). Moreover, the inability to control corruption impedes economic growth by discouraging foreign and domestic investment, dampening entrepreneurship, decreasing tax revenues, lowering the quality of public infrastructure, diverting public talent into rent-seeking, and distorting the composition of public expenditure (Evrensel, 2010).

As noted before, despite these similarities, there were significant differences between the two regions examined. For Arab countries as a whole, control of corruption was the most significant and largest factor boosting growth by 2.5% within all economic and political indicators. This outcome agrees with other studies focusing exclusively on corruption in the Arab world (Baklouti and Boujelbene, 2015; Guetat, 2006; Kutan et al., 2009; Saha and Ben Ali, 2017; Touati, 2014). It is a confirmation that corruption distorts the economy and legal environment leading to an unfair distribution of state resources and services. Eliminating corruption leads to better government effectiveness and promotion of positive incentives in the society and equal opportunities for all citizens, and ultimately ensuring more sustained growth.

Government effectiveness was the most influential regarding Gulf countries group by raising growth by 0.75%, while it was not significant in Arab emerging economies. The reason for this result are programs aimed to improving the quality of governmental bureaucracy in GCCCs (ESCWA, 2017). In addition, it have applied very promising public investment projects especially in "social infrastructure" (such as schools, hospitals) and "economic infrastructure" (such as network utilities, energy, water, transport, and digital communications) (Ianchovichina et al., 2013). All of these public investment schemes are considered as essential ingredients for the success of any modern economy (Stewart, 2010). Moreover, concerning the rule of law in GCC countries, they have enhanced the legal infrastructure, particularly the quality of contract enforcement, reliable protection of property rights and the independence of commercial courts (Looney, 2013). Other serious efforts increased the public's confidence in the rules of society such as Traffic Law. Also, it has significantly succeeded in reducing rates of violence and crime in its communities (Saif, 2009).

By contrast, the results in emerging Arab countries were slightly different; the source of increased growth from governance components are voice and accountability, and regulatory quality (0.53% and 1.25% respectively). These results are expected given the economic and political conditions in these countries. Firstly, the outcome of voice and accountability, used as a proxy for democracy, reflects the political situation in these countries. In 2011, the decisive moments that changed the region forever were the downfall of Tunisian President Ben Ali and Egyptian President Mubarak. Following this, a massive wave of non-violent demonstrations and protests, which called for more involvement of the populace in the political environment of these countries (Davis, 2013).

The aim of the democratic movement was more than political. People, especially the youth, were frustrated by their ineffective and corrupt states, and a society where they cannot apply their talents and ingenuity, and achieve their ambitions (Acemoglu and Robinson, 2013). They recognised that the roots of these problems were the way political power is exercised and monopolised by a narrow elite. In addition, there were other related issues such as the manipulation of election processes, political intervention in the judicial system, the excess force used by the military, security agencies and police, widespread violations of human rights and systematic repressions against all opposition (Malik and Awadallah, 2013).

The above result is consistent with numerous studies confirming the positive relationship between democracy and growth (Abdel-Latif et al., 2014; Heo and Tan, 2001; Jaunky, 2013; Rachdi and Saidi, 2015; Sen et al., 2006). The positive changes of democracy, such as delegation of authority and regulations of social conflicts, on economic growth, heavily outweigh the adverse and restrictive effects of autocracy. According to Nobel laureate Amartya Sen, democracies enrich individual lives through the granting of political and civil rights and do a better job in improving the welfare of the poor (Acemoglu et al., 2008). Second, they provide political incentives to rulers to respond positively to the demands of the citizens since the right to rule is derived from popular support manifested in competitive elections (Lake and Baum, 2001).

Another key outcome for Arab emerging countries (or Arab reformers) was the strong positive linkage between regulatory quality and growth. This relationship results from the strict structural reform programs, such as the liberalisation of the market and banking system, and financial sector deregulation, that these countries have implemented in order to promote competition in the economy and improve growth (Spilimbergo et al., 2009). Regulatory quality complements these transitions by capturing how governments encourage market-friendly environment especially private sector development (Kaufmann et al., 2006).

Similar results are demonstrated by Djankov et al. (2004); Djankov et al. (2006); Jalilian et al. (2007); Messaoud and Teheni (2014). They conclude that the provision of a regulatory regime which encourages rather than constrain economic growth is an essential part of good governance. The ability of the state to provide sufficient regulatory institutions can be expected to be a determinant of how well markets and the economy perform.

In the same context, regulatory quality complements voice and accountability. Dowdle (2017); Parker (1999) argue that a well-functioning regulatory system is one that balances accountability and transparency. Accountability requires regulatory agencies to be accountable for the consequences of their actions, to operate within their legal powers, and to observe the rules of due process when arriving at their decisions. Transparency relates to regulatory decisions being reached in a way that is accessible to interested parties. The third process, which provides regulatory legitimacy, is consistency. Inconsistent regulatory decisions lead to uncertainty for investors, raises the cost of capital and may severely damage the willingness to invest.

## **5. Conclusion**

The primary objective of this paper was to contribute to understanding the economic, social and institutional reform effort of the Arab region and the extent to which these influence the level and differences in their economic growth. The focus was to understand how popular revolutions, such as the Arab Spring, may lead to better reforms and institutions, and therefore sustained and more inclusive growth. A conditional convergence equation for economic growth was estimated for three groups: All Arab countries (full sample); Arab Gulf countries (GCC), and Arab emerging countries (Arab reformers). The reliability and consistency of the analysis were tested using several econometric approaches. Before testing for the existence of a long-run cointegrating equilibrium among the variables, the integration properties of each panel was examined by Levin, Lin & Chu (LLC) and Im, Pesaran and Shin (IPS) tests. The panel unit roots tests did not confirm panel unit roots in level in all the series, except for structural reform, and human capital which were stationary in the first difference. The nature of the co-integration was examined by the Kao and Pedroni tests. Additionally, four potential econometric problems which could affect panel data analysis of least squares regression models; multicollinearity, heteroscedasticity, and autocorrelation, endogeneity were assessed with the appropriate tests. Taking into consideration the heterogeneity of the sample, random effect model was found to be most appropriate for full Arab region sample, and pooled OLS was most appropriate for the other two Arab sub-groups.

The significance of the macroeconomic instability variables in all three groups support the argument that, an economy which has the desired degree of macroeconomic stability would ensure trust in investors and promote business activities. The result also shows that currency devaluation may improve growth in most Arab countries, but currency appreciation was more efficient for the stabilisation of the GCCC. Furthermore, the relation between budget deficit and public debt, and growth tended to be negative respectively for the whole Arab sample and GCCCs. The analysis also confirms that unemployment is one of the most problematic issues not only for Arab emerging countries but also for GCCCs.

Moreover, the study found a highly significant role of structural reforms for growth in all the groups. Within its components, the coefficients of inward foreign direct investment (FDI) was positive and statistically significant for all groups. Remarkably, public health expenditures were negative and statistically significant for all groups possibly due to the crowding out effect of government expenditure.

Output contribution of infrastructure varied across study samples. The effect of infrastructure was positive and statistically significant in GCCC. This effect could be associated entirely with the volume of public investment including infrastructure in these countries. Inadequate supply of infrastructure may inhibit investment of productive capital, thus restrict and reduce the economic production. This is the experience of Arab emerging or other Arab countries, which reflected in the results for the whole Arab region sample.

The overall outcomes of institutional reform were consistent with current literature that governance is positive and statistically significant determinants of economic growth. For the whole Arab region, political stability and control of corruption were most significant, while government effectiveness and rule of law was important for GCCCs, and voice and accountability, and regulatory quality were the most significant influences on growth in emerging Arab countries. We can therefore conclude that economic, and more importantly institutional reforms, are needed for sustained and inclusive growth in the Arab world, and in order to avoid popular revolutions such as the Arab Spring. Moreover, different institutional variables may be relevant to the different parts of the Arab world. It is therefore important for each of the countries to identify and focus on improving these variables to help with their development.

## **6. References**

- Abbott, Philip, Thomas Barnebeck Andersen, and Finn Tarp. 2010. "IMF and economic reform in developing countries." *The Quarterly Review of Economics and Finance* 50 no. 1: 17-26.
- Abdel-Latif, Hany, Tapas Mishra, and Anita Staneva. 2014. "Arab Countries Between Winter and Spring: Where Democracy Shock Goes Next!" *Available at SSRN*.
- Abonazel, Mohamed. 2017. "Bias correction methods for dynamic panel data models with fixed effects." *International Journal of Applied Mathematical Research* 6 no. 2: 58-66.
- Acemoglu, Daron, Simon Johnson, and James A Robinson. 2001. "The colonial origins of comparative development: An empirical investigation." *American Economic Review* 91 no. 5: 1369-401.
- . 2002. "Reversal of fortune: Geography and institutions in the making of the modern world income distribution." *The quarterly journal of economics* 117 no. 4: 1231-94.
- Acemoglu, Daron, Simon Johnson, James A. Robinson, and Pierre Yared. 2008. "Income and Democracy." *American Economic Review* 98 no. 3: 808-42.

- Acemoglu, Daron, and James A Robinson. 2013. *Why nations fail: The origins of power, prosperity, and poverty*: Crown Business.
- ADB. 2000. "Economic Reform and Structural Adjustment Programme " In: African Development Bank Group, OPERATIONS EVALUATION DEPARTMENT.
- Ahmad, Mahyudin, and Stephen G. Hall. 2017. "Economic growth and convergence: Do institutional proximity and spillovers matter?" *Journal of Policy Modeling* 39 no. 6: 1065-85.
- Alguacil, M., A. Cuadros, and V. Orts. 2011. "Inward FDI and growth: The role of macroeconomic and institutional environment." *Journal of Policy Modeling* 33 no. 3: 481-96.
- Alimi, Eitan Y, Avraham Sela, and Mario Sznajder. 2016. *Popular Contention, Regime, and Transition: Arab Revolts in Comparative Global Perspective*: Oxford University Press.
- Alissa, Sufyan. 2007. *The challenge of economic reform in the Arab world: Toward more productive economies*: Carnegie Endowment for International Peace.
- Amin, Magdi, Ragui Assaad, Nazar al-Baharna, Kemal Dervis, Raj M Desai, Navtej S Dhillon, Ahmed Galal, Hafez Ghanem, and Carol Graham. 2012. *After the spring: Economic transitions in the Arab world*: Oxford University Press.
- Arellano, Manuel, and Stephen Bond. 1991. "Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations." *The review of economic studies* 58 no. 2: 277-97.
- Aristovnik, Aleksander. 2007. "Short-and medium-term determinants of current account balances in Middle East and North Africa countries."
- Asteriou, Dimitros, and Stephen G Hall. 2016. *Applied Econometrics*. London: Palgrave.
- Bahgat, Gawdat. 2017. "Sovereign Wealth Funds in the Persian Gulf States." In *The Oxford Handbook of Sovereign Wealth Funds*.
- Bakare, AS, and Sanmi Olubokun. 2011. "Health care expenditure and economic growth in Nigeria: An empirical study." *Journal of Emerging Trends in Economics and Management Sciences (JETEMS)* 2 no. 2: 83-87.
- Baklouti, Nedra, and Younes Boujelbene. 2015. "Exploring the Relationship between Democracy, Corruption and Economic Growth in MENA countries." *Acta Universitatis Danubius. Œconomica* 11 no. 3.
- Baltagi, Badi. 2008. *Econometric analysis of panel data*: John Wiley & Sons.
- Barro, Robert J, and X. Sala-I-Martin. 1995. *Economic Growth*. New York: McGraw-Hill.
- Baumol, W. J. 1990. "Entrepreneurship: Productive, Unproductive, and Destructive." *Journal of Political Economy* 98 no. 5: 893-921.
- Bedir, Serap. 2016. "Healthcare Expenditure and Economic Growth in Developing Countries." *Advances in Economics and Business* 4 no. 2: 76-86.
- Bellin, Eva. 2004. "The Robustness of Authoritarianism in the Middle East: Exceptionalism in Comparative Perspective." *Comparative Politics* 36 no. 2: 139-57.
- . 2012. "Reconsidering the robustness of authoritarianism in the Middle East: Lessons from the Arab Spring." *Comparative Politics* 44 no. 2: 127-49.
- Berggren, Niclas, Andreas Bergh, and Christian BjØRnskov. 2011. "The growth effects of institutional instability." *Journal of Institutional Economics* 8 no. 2: 187-224.



- Bornhorst, Fabian, and Anna Ivanova. 2012. "Current Account Imbalances: Can Structural Policies Make a Difference?" *IMF Working Papers*.
- Brisson, Zack; Krontiris, Kate;. 2012. "Tunisia - From revolutions to institutions (Vol. 1 of 2)." In. Washington DC: World Bank.
- Bun, Maurice J. G., and Martin A. Carree. 2005. "Bias-Corrected Estimation in Dynamic Panel Data Models." *Journal of Business & Economic Statistics* 23 no. 2: 200-10.
- . 2006. "Bias-corrected estimation in dynamic panel data models with heteroscedasticity." *Economics Letters* 92 no. 2: 220-27.
- Butkiewicz, James L., and Halit Yanikkaya. 2006. "Institutional quality and economic growth: Maintenance of the rule of law or democratic institutions, or both?" *Economic Modelling* 23 no. 4: 648-61.
- Calderón, César, and Luis Servén. 2004. *The effects of infrastructure development on growth and income distribution*: World Bank Publications.
- Campante, Filipe R, and Davin Chor. 2012. "Why was the Arab world poised for revolution? Schooling, economic opportunities, and the Arab Spring." *Journal of Economic Perspectives* 26 no. 2: 167-88.
- Campos, Nauro F, and Jeffrey B Nugent. 1999. "Development performance and the institutions of governance: evidence from East Asia and Latin America." *World Development* 27 no. 3: 439-52.
- Castells-Quintana, David, and Vicente Royuela. 2012. "Unemployment and long-run economic growth: The role of income inequality and urbanisation." *Investigaciones Regionales* 12 no. 24: 153–73.
- Castro, Vitor. 2017. "Functional components of public expenditure, fiscal consolidations, and economic activity." *Economics & Politics*.
- Chenery, Hollis. 1986. "Growth and transformation." *Industrialization and growth: A comparative study*.
- Churchill, Sefa Awawoyi, Siew Ling Yew, and Mehmet Ugur. 2015. "Effects of government education and health expenditures on economic growth: a meta-analysis."
- Cieřlik, Andrzej, and Nguyen Thi Ngoc Anh. 2016. "Determinants of Foreign Direct Investment from OECD to ASEAN." *Forum for Research on Empirical International Trade* FREIT987.
- Crockett, Teddy. 2014. "Rethinking Arab employment: a systemic approach for resource-endowed economies." In: World Economic Forum, Geneva, Switzerland.
- Curtin, Philip D. 1989. *Death by migration: Europe's encounter with the tropical world in the nineteenth century*: Cambridge University Press.
- Davis, John. 2013. "The Arab Spring and Arab Thaw Unfinished Revolutions and the Quest for Democracy." In. Farnham :: Ashgate Publishing Ltd.
- Dawson, John W. 1998. "Institutions, investment, and growth: New cross-country and panel data evidence." *Economic Inquiry* 36: 603-19.
- De Vos, Ignace, Gerdie Everaert, and Ilse Ruysen. 2015. "Bootstrap-based bias correction and inference for dynamic panels with fixed effects." *Stata Journal (forthcoming)*: 1-31.
- Djankov, Simeon, Caralee McLiesh, and Michael U Klein. 2004. *Doing business in 2004: understanding regulation*: World Bank Publications.
- Djankov, Simeon, Caralee McLiesh, and Rita Maria Ramalho. 2006. "Regulation and growth." *Economics Letters* 92 no. 3: 395-401.

- Dowdle, Michael W. 2017. "Public accountability: conceptual, historical, and epistemic mappings." *REGULATORY THEORY*: 197.
- El-Erian, Mohamed A., Sena Eken, Susan Fennell, and Jean-Pierre Chauffour. 1996. *Growth and stability in the Middle East and North Africa*: International Monetary Fund.
- ESCWA. 2017. "The Innovation Landscape in Arab Countries : A Critical Analysis." In: Economic and Social Commission for Western Asia (ESCWA).
- Estache, Antonio, and Grégoire Garsous. 2012. "The impact of infrastructure on growth in developing countries." *IFC Economics Notes* 1.
- Evrensel, Ayşe Y. 2010. "Corruption, growth, and growth volatility." *International Review of Economics & Finance* 19 no. 3: 501-14.
- Greenwood, S. 2008. "Bad for business? Entrepreneurs and democracy in the Arab world." *Comparative Political Studies* 41 no. 6: 837-60.
- Guetat, Imene. 2006. "The Effects of Corruption on Growth Performance of the MENA Countries." *Journal of Economics and Finance* 30 no. 2: 208-21.
- Hahn, Jinyong, and Jerry Hausman. 2002. "Notes on bias in estimators for simultaneous equation models." *Economics Letters* 75 no. 2: 237-41.
- Hall, Joshua C., Russell S. Sobel, and George R. Crowley. 2010. "Institutions, Capital, and Growth." *Southern Economic Journal* 77 no. 2: 385-405.
- Hammoud, Jamil Ali. 2011. "Toward a Framework for Arab Economic Reform: Learning from the Evidence." In *Globalisation, Democratisation and Radicalisation in the Arab World*: Springer.
- Helper, Helena. 2017. "Democratic Institutions and Prosperity: The Special Case of the MENA Countries." In *The 37th Annual Meeting of the Middle East Economic Association*,. Chicago.
- Heo, Uk, and Alexander C Tan. 2001. "Democracy and economic growth: A causal analysis." *Comparative Politics*: 463-73.
- Hissouf, Abdellatif. 2014. "Moroccan Soft Revolution in the Era of the Arab Spring: Reforms, Assessment, and Prospects." In. Ann Arbor: Walden University.
- Hvidt, Martin. 2011. "Economic and Institutional Reforms in the Arab Gulf Countries." *The Middle East Journal* 65 no. 1: 85-102.
- Ianchovichina, Elena, Antonio Estache, Renaud Foucart, Grégoire Garsous, and Tito Yepes. 2013. "Job Creation through Infrastructure Investment in the Middle East and North Africa." *World Development* 45: 209-22.
- Im, Kyung So, M. Hashem Pesaran, and Yongcheol Shin. 2003. "Testing for unit roots in heterogeneous panels." *Journal of Econometrics* 115 no. 1: 53-74.
- IMF. 2014. "Sustaining long-run growth and macroeconomic stability in low-income countries- the role of structural transformation and diversification." In. Washington, D.C: The International Monetary Fund
- Ismail, Normaz Wana, and Jamilah Mohd Mahyideen. 2015. "The Impact of Infrastructure on Trade and Economic Growth in Selected Economies in Asia." In *ADB Working Paper* 553.
- Jalilian, Hossein, Colin Kirkpatrick, and David Parker. 2007. "The Impact of Regulation on Economic Growth in Developing Countries: A Cross-Country Analysis." *World Development* 35 no. 1: 87-103.

- Jaunky, Vishal Chandr. 2013. "Democracy and Economic Growth in Sub-Saharan Africa: A Panel Data Approach." *Empirical Economics* 45 no. 2: 987-1008.
- Kalyoncu, Huseyin, Seyfettin Artan, Selman Tezekici, and Ilhan Ozturk. 2008. "Currency devaluation and output growth: an empirical evidence from OECD countries." *International Research Journal of Finance and Economics* 14 no. 2: 232-38.
- Kao, Chihwa. 1999. "Spurious regression and residual-based tests for cointegration in panel data." *Journal of Econometrics* 90 no. 1: 1-44.
- Kaufmann, Daniel, Aart Kraay, and Massimo Mastruzzi. 2006. "Governance matters V: aggregate and individual governance indicators for 1996 - 2005." *World Bank policy research working paper* no. 4012.
- Kireyev, Alexei. 2000. "Comparative Macroeconomic Dynamics in the Arab World " In: International Monetary Fund.
- Kiviet, Jan F. 1995. "On bias, inconsistency, and efficiency of various estimators in dynamic panel data models." *Journal of Econometrics* 68 no. 1: 53-78.
- Kodongo, Odongo, and Kalu Ojah. 2016. "Does infrastructure really explain economic growth in Sub-Saharan Africa?" *Review of Development Finance* 6 no. 2: 105-25.
- Kutan, Ali M, Thomas J Douglas, and William Q Judge. 2009. "Does Corruption Hurt Economic Development?: Evidence from Middle Eastern, North African and Latin American Countries." In *Economic Performance in the Middle East and North Africa: Institutions, Corruption and Reform*. London and New York: Routledge.
- Lacheheb, Miloud, Norashidah Med Nor, and Imdadullah Baloch. 2014. "Health Expenditure, education and Economic Growth in MENA Countries."
- Lake, David A, and Matthew A Baum. 2001. "The invisible hand of democracy: political control and the provision of public services." *Comparative Political Studies* 34 no. 6: 587-621.
- Lambertini, Luisa, and José A Tavares. 2005. "Exchange Rates and Fiscal Adjustments: Evidence from the OECD and Implications for the EMU." *Contributions in Macroeconomics* 5 no. 1.
- Levin, Andrew, Chien-Fu Lin, and Chia-Shang James Chu. 2002. "Unit root tests in panel data: asymptotic and finite-sample properties." *Journal of Econometrics* 108 no. 1: 1-24.
- Looney, Robert E. 2013. "Governance Constrained Growth in the MENA." In *Governance in the Middle East and North Africa: A handbook.*, ed. A. Kadhim: Routledge.
- Makdisi, Samir, Zeki Fattah, and Imed Limam. 2006. "Chapter 2 Determinants of Growth in the MENA Countries." In *Contributions to Economic Analysis*, ed. B. N. Jeffrey and M. H. Pesaran: Elsevier.
- Malik, Adeel, and Bassem Awadallah. 2013. "The Economics of the Arab Spring." *World Development* 45 no. 0: 296-313.
- Mankiw, N. Gregory, David Romer, and David N. Weil. 1992. "A contribution to the empirics of economic growth." *The quarterly journal of economics* 107 no. 2: 407-37.
- Mátyás, László, and Patrick Sevestre. 2008. *The econometrics of panel data: fundamentals and recent developments in theory and practice*: Springer Science & Business Media.
- Mauro, Paolo. 1995. "Corruption and growth." *The quarterly journal of economics*: 681-712.
- Messaoud, Boudhiaf, and Zribi El Ghak Teheni. 2014. "Business regulations and economic growth: What can be explained?" *International Strategic Management Review* 2 no. 2: 69-78.

- Mingat, Alain, and Jee-Peng Tan. 1996. "The full social returns to education." *Estimates based on Countries Economic Growth Performance, Human Capital Development Papers*. Washington: World Bank.
- Mohieldin, Mahmoud. 1995. "On financial liberalisation in LDCs: the case of Egypt, 1960-93." In *Dept. of Economics*: University of Warwick.
- Nabli, Mustapha K, and Charles Humphreys. 2003. *Better governance for development in the Middle East and North Africa: Enhancing inclusiveness and accountability*. Washington, D.C: World Bank.
- Nabli, Mustapha Kamel. 2007. *Breaking the Barriers to Higher Economic Growth: Better Governance and Deeper Reforms in the Middle East and North Africa*. Washington, D.C: World Bank.
- Nijkamp, Peter, and Jacques Poot. 2004. "Meta-analysis of the effect of fiscal policies on long-run growth." *European Journal of Political Economy* 20 no. 1: 91-124.
- Nosier, Shereen Adel Hassan. 2012. "Estimating the international tourism demand for Egypt: an econometric approach." In: University of Hull.
- O'Fallon, Carolyn. 2003. "Linkages between infrastructure and economic growth." *Pinnacle Research prepared for the Ministry of Economic Development of New Zealand, December*.
- Parker, David. 1999. "Regulation of privatised public utilities in the UK: performance and governance." *International Journal of public sector management* 12 no. 3: 213-36.
- Pedroni, Peter. 1999. "Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors." *Oxford Bulletin of Economics and Statistics* 61 no. S1: 653-70.
- Petrakis, Panagiotis E, and Dimitrios Stamatakis. 2002. "Growth and educational levels: a comparative analysis." *Economics of Education Review* 21 no. 5: 513-21.
- Pushak, Taras, Erwin Tiongson, and Aristomene Varoudakis. 2007. "Public finance, governance, and growth in transition economies: Empirical evidence from 1992-2004."
- Rachdi, Houssein, and Hichem Saidi. 2015. "Democracy and Economic Growth: Evidence in MENA Countries." *Procedia - Social and Behavioral Sciences* 191: 616-21.
- Romp, Ward, and Jakob De Haan. 2007. "Public capital and economic growth: A critical survey." *Perspektiven der Wirtschaftspolitik* 8 no. S1: 6-52.
- Sachs, Jeffrey D. 2003. "Institutions don't rule: direct effects of geography on per capita income." In: National Bureau of Economic Research.
- Saha, Shrabani, and Mohamed Sami Ben Ali. 2017. "Corruption and Economic Development: New Evidence from the Middle Eastern and North African Countries." *Economic Analysis and Policy* 54: 83-95.
- Saif, Ibrahim. 2009. *The Oil Boom in the GCC Countries, 2002-2008: Old Challenges, Changing Dynamics*: Carnegie Endowment for International Peace.
- Santos, Lorelied A, and Erniel B Barrios. 2011. "Small sample estimation in dynamic panel data models: A simulation study." *American Open Journal of Statistics* 1 no. 02: 58.
- Sen, Kunal, Lant Pritchett, Sabyasachi Kar, and Selim Raihan. 2006. "Democracy versus dictatorship? The political determinants of growth episodes."
- Spilimbergo, Mr Antonio, Mr Alessandro Prati, and Mr Jonathan David Ostry. 2009. *Structural reforms and economic performance in advanced and developing countries*: International Monetary Fund.
- Stewart, James. 2010. "The UK National Infrastructure Plan 2010." *EIB Papers* 15 no. 2: 28-32.

- Swiston, Andrew J, and Luis-Diego Barrot. 2011. "The role of structural reforms in raising economic growth in Central America." *IMF Working Papers*: 1-20.
- Touati, Kamel. 2014. "Determinants of Economic Corruption in the Arab Countries: Dangers and Remedies." *Journal of Economics Studies and Research* 2014: 1-15.
- Ulvedal, Pål B. 2013. "Macroeconomic stability and economic growth in developing countries."
- Vivien, Foster, and Cecilia Briceño-Garmendia. 2010. "Africa's Infrastructure: A Time for Transformation." *World Bank (Washington DC: 2010)*.
- Wahba, Jackline, and Ragui Assaad. 2017. "Flexible labor regulations and informality in egypt." *Review of Development Economics* 21 no. 4: 962-84.
- Williamson, J. 2004. "Economic and financial crises in emerging market economies." *Journal of economic literature* 42 no. 3: 822-37.
- Wisniewski, Tomasz P., and Saima K. Pathan. 2014. "Political environment and foreign direct investment: Evidence from OECD countries." *European Journal of Political Economy* 36: 13-23.
- Wooldridge, Jeffrey M. 2010. *Econometric analysis of cross section and panel data*. Cambridge, Mass. :: MIT Press.
- . 2013. *Introductory econometrics : a modern approach*. Mason, OH :: South-Western Cengage Learning.
- World Bank. 2008. "Economic Developments and Prospects: Job Creation in an Era of High Growth." In: Washington, DC, Banque mondiale.
- . 2014. "The Worldwide Governance Indicators (WGI) " In. Washington, D.C.
- . 2017. "Doing Business 2017 : Equal Opportunities for All." In. Washington: International Bank for Reconstruction and Development/The World Bank.

## 7. Appendices

### Appendix. 1: List of countries included in the analysis

Arab Countries	Gulf Countries	Emerging Arab countries
- Algeria	- Bahrain	- Egypt
- Bahrain	- Kuwait	- Jordan
- Egypt.	- Oman	- Lebanon
- Iraq	- Qatar	- Morocco
- Jordan	- Saudi Arabia	- Tunisia
- Kuwait	- United Arab Emirates	
- Lebanon		
- Libya		
- Morocco		
- Oman		
- Qatar		
- Saudi Arabia		
- Sudan		
- Syrian		
- Tunisia		
- United Arab Emirates		
- Yemen, Rep.		

### Appendix 2:

#### Appendix 2.1: Spearman's Correlation Coefficient of the Independent Variables of main model

	M	E	B	H	P	G	lrent	D.t3fc	D.t4
M	1								
E	-0.29*	1							
B	-0.13*	0.19*	1						
H	0.11*	-0.02	-0.16*	1					
P	-0.39*	0.29*	0.44*	-0.21*	1				
G	-0.41*	0.14*	0.55*	-0.18*	0.71*	1			
lrent	-0.10*	0.14*	-0.52*	0.08*	-0.27*	-0.52*	1		
D.t3fc	-0.03	0.10*	0.05	0.03	0.02	-0.01	0.01	1	
D.t4	-0.02	0.12*	0.036	-0.05	0.0245	-0.03	0.05	-0.21*	1

#### Appendix 2.2: Pearson's Correlation Coefficient of the Independent Variables of Macroeconomic stability components

	IM1	IM2	IM3	IM4	IM5
IM1	1				
IM2	0.0483	1			
IM3	-0.1085	-0.3955	1		
IM4	0.1712	-0.0985	-0.0448	1	
IM5	0.0431	-0.2249	0.1473	0.1375	1

**Appendix 2.3: Pearson's Correlation Coefficient of the Independent Variables of External stability components**

	LE1	LE2	LE5	LE6
LE1	1			
LE2	-0.5257	1		
LE5	0.3279	-0.3057	1	
LE6	0.1276	0.0183	-0.0918	1

**Appendix 2.4: Pearson's Correlation Coefficient of the Independent Variables of Structural reform components**

	LB2	LB3	LB6
LB2	1		
LB3	0.0652	1	
LB6	-0.0898	-0.493	1

**Appendix 2.5: Pearson's Correlation Coefficient of the Independent Variables of Human capital components**

	LH2	LH3	LH5	LH9
LH2	1			
LH3	0.2287	1		
LH5	0.4475	0.3151	1	
LH9	0.4897	0.1368	0.5385	1

**Appendix 2.6: Pearson's Correlation Coefficient of the Independent Variables of Physical infrastructure components**

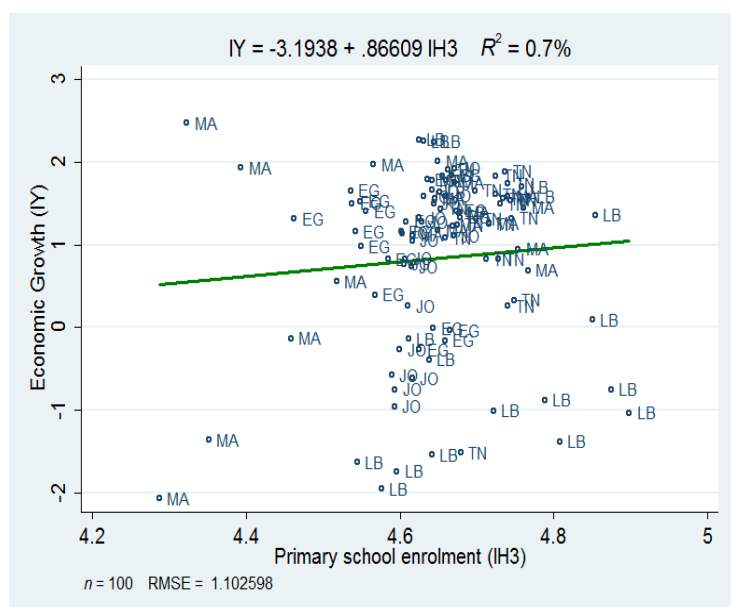
	LP2	LP3	LP5	LP6
LP2	1			
LP3	0.6376	1		
LP5	0.592	0.6074	1	
LP6	0.6174	0.5549	0.6014	1

**Appendix 2.7: Pearson's Correlation Coefficient of the Independent Variables of Governance components**

	VA	PS	GE	RQ	RL	CC
VA	1					
PS	0.6772	1				
GE	0.814	0.7773	1			
RQ	0.8364	0.7357	0.9323	1		
RL	0.8161	0.8117	0.9573	0.9245	1	
CC	0.7836	0.7894	0.952	0.8874	0.9494	1

**Appendix 3: The relationship between economic growth and sanitation in advanced economies**

**Emerging Arab countries**



**B. GCC countries**

