

Economic Growth and Financial Stability in MENA Countries: Does Exporting Oil Matters?

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Abstract

Using system panel GMM dynamic panel on a sample of nineteen MENA countries over the period 1990 – 2014, the study estimates the effect of financial stability on economic growth. Using the principal component analysis to create a composite index of financial stability consisting of a banking crisis dummy variable, the ratio of credit to government and state-owned enterprises to GDP, and the ratio of domestic credit to private sector as a percent of GDP, the estimation results show financial stability in the MENA region is important for boosting economic growth in the region. Furthermore, when dividing the sample between oil and non-oil exporters, the results suggests no statistically significant difference between the two groups in terms of the impact of financial stability on economic growth. Our results are robust to the use of different fixed effects and random effects estimation methodologies.

JEL Classification Numbers: O16; O40; N25

Keywords: Financial Stability; Economic Growth; System GMM; Fixed Effects; MENA Countries

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1. Introduction:

The collective GDP of MENA countries amounts have to around \$3.3 trillion every year, which accounts for about 4.5% of the world’s total economy. Most of the population in the MENA region concentrates in middle-income countries, which claim about 60% of oil and 45% of natural gas in the world. These countries thus play an important role for the global economic outlook. Eight of 12 OPEC member countries are part of the MENA region.

MENA countries include the Arab states in the Middle East and North Africa—Algeria, Bahrain, Djibouti, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Mauritania, Morocco, Oman, Qatar, Saudi Arabia, Somalia, Sudan, the Syrian Arab Republic, Tunisia, the United Arab Emirates, and Yemen—plus the Islamic State of Afghanistan, the Islamic Republic of Iran, Pakistan, and the West Bank and Gaza. While the region is best known for producing oil and oil business significantly impacts the economy, it has a highly diverse economy and some countries are already experiencing a post-oil economy. Meanwhile, both IMF and the World Bank have described the banking system in the MENA region as steadier and less inflationary than the conventional system, based on a “z-scores” analysis.

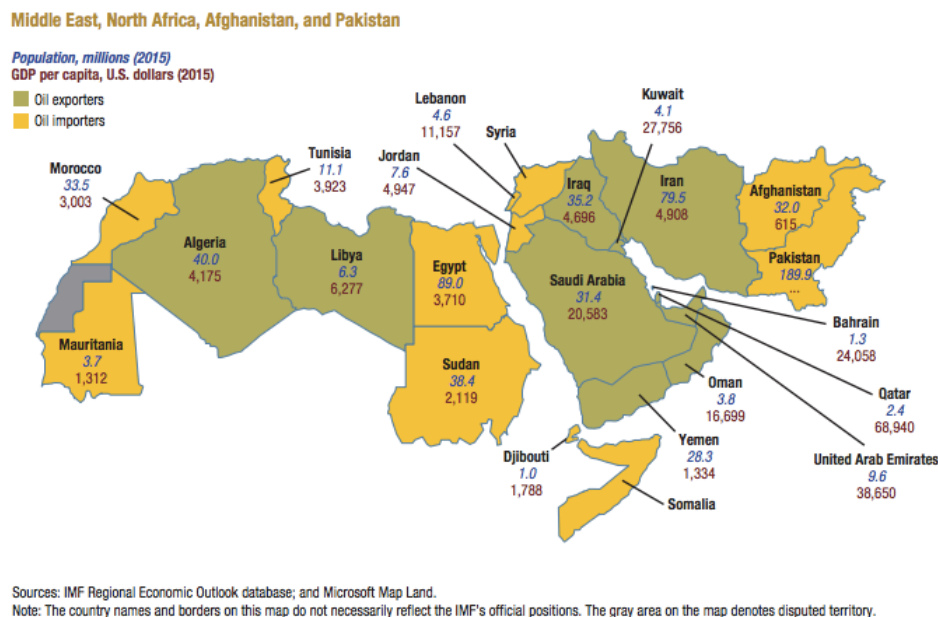


Figure1: Population and GDP per capita of MENA countries

The economic development of the MENA countries was very sluggish, and almost all countries remained at the level of agriculture and animal husbandry until the 1970s. At that time, vigorous exploration on oil mining began, heralding a new phase. The MENA region led the world in producing and exporting oil. Huge oil foreign exchange earnings created some of the world's richest countries. The agriculture industry nearly disappeared from the region while mining, manufacturing, construction, and

services sectors became important pillars of national economies. The implementation of economic restructuring and foreign trade liberalization has created a basically steady growth in GDP above 3% in the region topping the average growth rate of 2.1% in the 1980. Between 2000 and 2013, global crude oil prices rose sharply, from about \$20 a barrel in 1990s to about five times as much. This greatly improved the balance of revenue and expenditure in the region's fiscal and current accounts and has contributed to the region's economic growth.

While overall growth remains steady, the development of different economies in the MENA is not balanced. For instance, Saudi Arabia and the UAE's GDP growth rates fell from 2.4% and 1.4% in 1996 to 1.8% and 0.8% in 1997 respectively. This economic slowdown continued until a sharp rise in world oil prices brought relief in the second half of 1999. At the same time, some non-oil export countries, reached the level of rapid development at the time. For example, Egypt, Syria, and Algeria as well as others undertook ongoing economic restructuring and reform and successfully adapted to the new international environment despite having faced economic difficulties early in the nineties. Egypt and Tunisia's economic growth rate reached as high as 6%. As the investment environment improved, not only did private sector investment increase, but the external investment also climbed significantly. According to statistics, by the mid-1990s, the proportion of foreign investment in non-oil-exporting countries in the MENA region increased from 4% in the early 80s to 50%. Foreign capital not only made up for the shortage of funds in these countries, but also brought new technologies and international markets to revitalize these countries' economies.

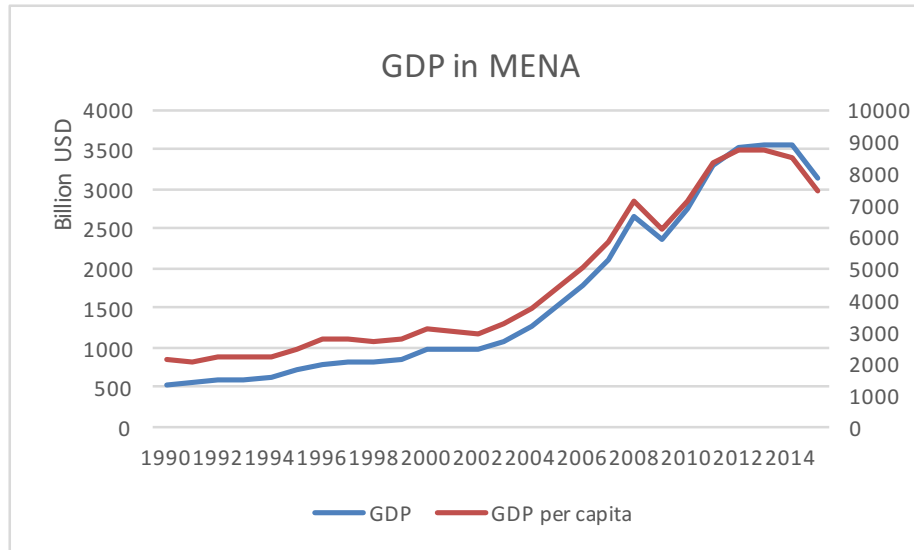


Figure 2: Total GDP and GDP per capita of MENA countries

Source: WDI, World Development Indicator

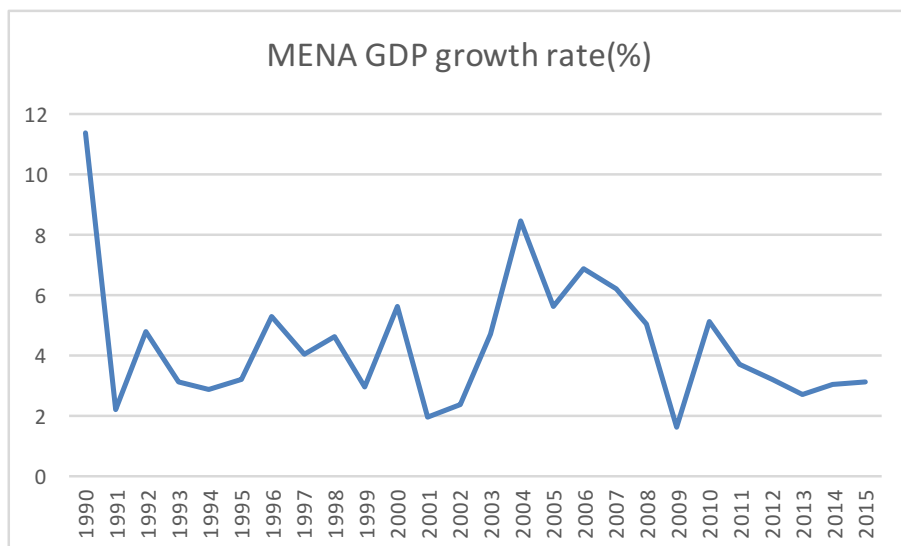


Figure 3: GDP growth rate of MENA countries

Source: WDI, World Development Indicator

There are four important factors made economic growth in the region difficult. First, oil prices have remained below \$45 a barrel because global oil supply and demand are seriously imbalanced. International oil market prices have therefore plummeted due to many reasons but particularly due to the falling demand. For instance, The United States was once the world’s largest oil importer, but the so-called “shale gas revolution” has significantly reduced US dependence on oil imports. North America as a whole actually has been a net energy export area since 2015. Lower than expected economic growth in the Euro area, Japan, and Russia have failed to compensate. Secondly, supply has increased. OPEC considered cutting production among member countries in November 2014 but did not. Major oil-producing countries have been pushing oil production close to the upper-limit of capacity, flooding the market. While the impact is greatest on the oil exporting MENA countries, importers also feel the impact.



Figure 4: Crude Oil Price from 1990 to 2015

Source: www.tradingeconomics.com

Secondly, the regional security challenges have contributed to the low growth in the MENA region. Syria, Iraq, Libya, and Yemen are now in civil war. These conflicts have led to the largest refugee crisis since World War II in which people flee these countries for their economically fragile neighbors. The Islamic State's siege of Baghdad in Iraq in 2014 had significant spillover effects. Conflict destroys monetary, human, and social capital. The impact can be long-lasting; Lebanon's GDP has not fully recovered from the civil war of 1975–1990, although evidence suggests that oil exporting countries will recover more quickly. A UN report showed that more than 13 million children in conflict-ridden MENA countries do not attend school. The Syria Center for Policy Research estimated the capital stock damage in Syria between 2011 and 2014 at USD 72 billion.

The spillover effects from economic challenges in the rest of the world is the third reason adding to the difficulty in achieving economic growth in the MENA region. The debt crisis in the Euro zone economy has continued to deepen and its economic growth is almost stagnant. This not only dampens global economic recovery, but also negatively impacts the tourism industry in the MENA region. Shrinkage in tourism, foreign aid, and investment have all undermined MENA economic performance.

Finally, the Quantitative easing in the United States is another factor constraint on economic growth in the region. With the policy makers' expectation of an interest rate hike in the United States and with the recovery from the financial crisis of 2007-2009, the tapering of quantitative easing will negatively impact the MENA economy due to the appreciation of the dollar, capital outflow, and underinvestment. The depreciation of currencies linked to the US dollar, including in Iran, Morocco, Tunisia, and Turkey since June 2014 is a harbinger of greater trouble to follow, and it has already had a similar level of impact as the oil price slump.

In the face of the crash in oil prices from its peak of \$115 per barrel in June 2014 to under \$35 at the end of February 2016, which led to a fall in fiscal revenues and currency shortages, MENA governments have introduced austerity measures including cutting capital and current spending. Saudi Arabia cancelled infrastructure projects that would have cost \$20 billion. during that period, unemployment was stubbornly high in Egypt, Iran, Iraq, Jordan, Morocco, and Tunisia. Most countries in the region were running significant fiscal and trade deficits. GDP has dropped deeply in all six Gulf Cooperation Council countries. In a vicious cycle dropping tax revenue has led to austerity measures that hurt growth.

2. Literature Review

Over the last two decades, economists and scholars have tried assess financial stability through some key indicators as a way to assess financial risk. For example, IMF (2006) provides a set of Financial Soundness Indicators, Hawkins and Klau (2000), Nelson and Perli (2005) and Gray et al. (2007) used measuring variables which focus on market pressures, external vulnerability, and banking system vulnerability. Illing and Liu (2003) and Van den End (2006) described how to build a composite indicator of financial stability and criteria for which variables to include.

While significant research has addressed financial development and its relationship with economic growth, there is no consensus as to the nature of this relationship or the direction of causality within it. King and Levine (1993) studied the credit allowance and its influence on economic growth in 80 countries during 1960 to 1980 and they found a strong, positive correlation between them. Achy (2004) researched the relationship between financial development and economic growth for five MENA countries in the period of 1970–1997 by controlling variables such as private investment, human capital, and policy related to variables of trade openness, inflation rate, and the burden of external debt. The empirical results show that financial depth indicators fail to explain economic growth in the MENA countries. Al-Tamimi et al. (2002) examined the causal relationship between the indicators of financial development and economic growth by using time-series analysis for selected Arab countries. The results showed that financial development and real GDP growth are correlated in the long term but the Granger causality test and impulse response function indicates that the link is weak in the short term. Creane et al. (2004) examined financial sector development in the MENA region. They collected data from a wide range of financial indicators, including a survey of economists from MENA countries in IMF 2001-2003 that proposed several approaches to enhance the sector’s performance. They constructed new indices of financial development for MENA and found out that there is a substantial variation in the degree of financial development. Compared to experiences from most other developing countries, the MENA region performs well, but it ranks far behind the industrialized countries and East Asia. Al-Avad and Harb (2005), investigated the relationship between financial development and economic growth for ten MENA countries during period 1969-2000 using a panel cointegration approach. They concluded that long term financial development and economic growth may be related but that there is little or no evidence of a relationship in the short-run. These papers also do not reveal how financial *stability*, which is simply one crucial branch of financial development, relates to economic growth.

3. Data

The dataset consists of a sample of nineteen MENA countries, listed on Table 1, over the period 1990 – 2014. Our dependent variable is the real GDP per capita with a set of independent variables that consists of two macroeconomic indicators including consumer price index, openness of economy (imports and exports in % of GDP), and three financial stability indicators including banking crisis dummy (1=banking crisis, 0=none), credit to government and state owned enterprises to GDP (%), domestic credit to private sector (% of GDP). All macroeconomic indicators are collected from the World Development Indicator (WDI) and all the financial stability indicators are collected from the Global Financial Development Database (GFDD) of the World Bank. The complete list of variables used are listed in Table 2.

Table 1: List of MENA countries

Country	Code	Country	Code
Algeria	DZA	Morocco	MAR
Bahrain	BHR	Oman	OMN

Egypt, Arab Rep.	EGY	Qatar	QAT
Iran, Islamic Rep.	IRN	Saudi Arabia	SAU
Iraq	IRQ	Sudan	SDN
Israel	ISR	Syrian Arab Republic	SYR
Jordan	JOR	Tunisia	TUN
Kuwait	KWT	United Arab Emirates	ARE
Lebanon	LBN	Yemen, Rep.	YEM
Libya	LBY		

According to the Global Financial Development Database, a banking crisis is defined as systemic if it meets two conditions: a. Significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations), b. Significant banking policy intervention measures in response to significant losses in the banking system. The first year that both criteria are met is considered to be the year when the crisis became systemic. The end of a crisis is defined the year before both real GDP growth and real credit growth are positive for at least two consecutive years.

Table 2: Indicators or variables used in analysis

Indicators	Abreviation	Measurement	Source
GDP per capita (Current USD)	GDP	Macroeconomy	WDI
Consumer price index (2010=100, average)	CPI	Macroeconomy	WDI
Openness of economy (imports and exports in % of GDP)	OPN	Macroeconomy	WDI
Banking crisis dummy (1=banking crisis, 0=none)	BCD	Financial Stability	GFD D
Credit to government and state owned enterprises to GDP (%)	CGS	Financial Stability	GFD D
Domestic credit to private sector (% of GDP)	DCP	Financial Stability	GFD D

Credit to government and state-owned enterprises to GDP is the ratio between credit by domestic banks to the government and state-owned enterprises and GDP. Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, which establish a claim for repayment. For some countries these claims include credit to public enterprises.

In terms of the selection of financial stabilities, the above indicators are not necessarily the best and most efficient indicators to incorporate all the aspects of financial stability. The credit to GDP gap, which is calculated by the Bank of International Settlements, is regarded as one of the best indicators to of financial stability or risk at the country level. However, the data is unavailable for most of MENA countries. There are numerous good indicators for financial stability such as bank Z-score that captures the probability of default of a country's commercial banking system, provisions to nonperforming loans, etc. However, due to the restricted data availability to these indicators, it is impossible and nonsense to draw biased conclusions from the largely incomplete data of these indicators and particularly for MENA countries.

Despite the fact that the two indicators of credit to government- and state-owned enterprises and domestic credit to the private sector are indirectly measuring the financial stability via financial depth and credit accumulation, they could provide insight into the underlying reasons at the root of financial risks. In addition, the banking crisis dummy actually reflects the current financial stability and therefore could objectively represent the country's financial stability profile together with the two other indicators that measures the credit risks.

4. MODEL SPECIFICATION & METHODOLOGY

The analysis of the relationship between economic growth and financial stability in the MENA region can be divided into three parts. First, using the whole sample and the dynamic Panel System GMM methodology, the study examines the impact of changes in financial stability index, estimated the Principal Component Analysis (PCA), on economic growth. Second, the study re-estimates the model after dividing the sample into two groups samples: oil exporters and non-oil exporters. Finally, a robustness check is implemented using fixed and random effects estimation methodology.

It is known in the literature, economic growth models are best estimated by dynamic panel system GMM (Caselli, Equivel and Lefort (1996) and Holtz-Eakin, Newey and Rosen (1988)) which is a methodology proposed by Arellano and Bover (1995), Blundell and Bond (1998), and Blundell, Bond, and Windmeijer (2000). More details on the estimation methodology is available at Emara and El Said (2015). The estimated regression function of the economic growth is as follows,

$$GDPgr_{it} = lGDPgr_{it} + \beta_1 OPN_{it} + \beta_2 CPI_{it} + \beta_3 FS_{it} + \varepsilon_{it} \quad (1)$$

Where $GDPgr_{it}$ is the GDP per capita annual growth in this case $lGDPgr_{it}$ is the AR(1) term, OPN_{it} is the openness index, CPI_{it} is the consumer price index, and FS_{it} is the composite index of financial stability, as discussed in details below, and ε_{it} is a general disturbance, which includes unobservable effect, time specific factor, and idiosyncratic disturbances.

The Principal Component Analysis is used to develop the composite index of financial stability based on the data of 3 individual financial stability indicators: banking crisis dummy, credit to government and state-owned enterprises to GDP, and domestic credit to private sector. The reason to use Principal

Component Analysis (PCA) to derive a single index to measure the financial stability of MENA countries is that using a single index as the proxy of financial stability is simple and straightforward in subsequent regression analysis. Furthermore, almost all of the indicators measuring financial stability are highly correlated, which makes their coefficients biased in explaining the accurate effects of each indicator and the financial stability as a comprehensive factor. Principal Component Analysis (PCA) reduces the dimension of the data and the Composite Financial Stability Index is calculated by summarizing extracted principal factors using the corresponding variance contribution as the weights. Specifically,

$$FS_{it} = PC1_{it} \times \omega_{pc1} + PC2_{it} \times \omega_{pc2} + PC3_{it} \times \omega_{pc3} \quad (2)$$

where FS_{it} is the Composite Financial Stability Index of Country i at time t , $PC1_{it}$ is the first extracted principal component of Country i at time t , and ω_{pc1} is the percentage of explained variance by PC1. Principal Component Analysis (PCA) is a statistical methodology to convert a set of correlated observations into a set of linearly uncorrelated variables (extracted Principal Components) by using the procedure of orthogonal transformation. The presumption of using PCA is that vectors or variables in the dataset are highly correlated, otherwise it is unnecessary to conduct the PCA analysis and to derive the Principal Component where the proportion of each component could be used as the weight to calculate the Composite Financial Stability Index. Specifically, the formula is as follows:

$$FS_{it} = PC1_{it} \times 0.4030 + PC2_{it} \times 0.3292 + PC3_{it} \times 0.2679 \quad (3)$$

Next, the robustness check is performed by re-estimating the model using fixed and random effects estimation methodologies as shown below,

$$GDPgr_{it} = \beta_0 + X_{it}\beta + Z_i\gamma + \alpha_i + u_{it} \quad (4)$$

Where the dependent variable is the same as in model (1), X_{it} is the time-variant regressor, Z_i is the time-invariant regressor, it cannot be estimated directly by the fixed effect model but could be estimated via the random effect model; α_i is the unobserved individual effect and u_{it} is the error term.

5. Estimation Results

Using the GMM methodology could simultaneously address the issue of unobserved intercept heterogeneity and regressor endogeneity. The reason is that GMM on panel data can use the lagged values as valid instruments, which can incorporate the time series variation as well as cross section information. If we use the OLS on a single cross-section of countries, the estimated coefficients are inconsistent if the regressors are endogenous or correlated with the unobserved in individual effects.

The results of GMM estimation methodology are shown in Table 3 below. As can be seen that the best fitted model is One-Step System GMM because: 1) System GMM is preferred to Difference GMM either for one-step model or two-step model since the Sargan Test cannot reject the null hypothesis for all System GMM models as p-value is 0.391. In other words, the instruments are valid, uncorrelated with the error term. For Difference GMM models the Sargan Test P value is 0.024, less than 0.05 and the null

hypothesis is rejected, or instruments are invalid. 2) For one-step System GMM model, it has serial correlation of order one according to AB test for AR(1) P value of 0, which means the null hypothesis of no serial correlation is rejected while for order 2 we cannot reject the null hypothesis, or in other words, there is autocorrelation of order 2 or beyond. Even if the one-step System GMM with robust standard error has more significant coefficients for FINindex and CPI, the p-value of AB test for AR(2) is so close to 10% that almost violate the criteria that there should be autocorrelation of order 2 or beyond.

Table 3: Financial Stability and Economic Growth
 Dependent variable: Per Capita GDP Growth Rate
 Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel One Step System GMM.

Regressions	One-Step DF GMM	Two-Step DF GMM	One-Step SYS GMM	Two-Step SYS GMM	One-Step SYS GMM, Robust
L.GDPgr	0.00026 (0.00)	-0.00354 (-0.15)	0.0527 (0.94)	-0.00703 (-0.09)	0.0527 (0.96)
FINindex	-0.100*** (-3.62)	-0.165** (-2.90)	-0.0501** (-2.88)	-0.152* (-1.10)	-0.0501*** (-4.18)
Openness	0.155** (2.73)	0.104 (1.13)	0.0327 (1.47)	0.137 (1.20)	0.0327* (2.04)
CPI	-0.000542 (-1.96)	-0.000155 (-0.34)	-0.000488* (-1.99)	-0.000563 (-1.12)	-0.000488*** (-2.25)
_cons			0.0620* (2.48)	-0.0120 (-0.19)	0.0620** (2.99)
N	288	288	307	307	307
Sargan Test	0.024	0.024	0.357	0.357	0.357
p value of Arellano-Bond test for AR(1)	0.000	0.002	0.000	0.008	0.001
p value of Arellano-Bond test for AR(2)	0.128	0.067	0.230	0.103	0.106

Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively.
 Numbers in round parentheses (.) are the robust standard errors.

The one-step estimator assumes independent and homoscedastic error term across countries and time. The two-step estimator is asymptotically more efficient in presence of heteroscedasticity of the error term ϵ_{it} . Monte Carlo simulation in Arellano and Bond (1991) and Blundell and Bond (1998) shows that standard errors associated with the two-step method are downward biased in small samples. Therefore, inferences based on the two-step System GMM tends to be inaccurate and one-step GMM estimator with standard errors corrected for heteroscedasticity is preferred. Therefore, the One-Step System GMM without robust standard error is used.

From the regression results, It is obvious that coefficient of FINindex is statistically significant and negative in every model adopted in the analysis, which means the result is robust that financial stability can promote economic growth in MENA countries. In contrast to the results derived in the static panel analysis that openness plays an important role in economic growth, the GMM model analysis shows that CPI is a significant control variable for the economic growth but with almost neutral effect (negative coefficient very close to 0).

Since petroleum plays an important role in economic growth of MENA countries, it is necessary to examine whether the financial stability affects economic growth differently between oil exporters and non-oil exporting MENA countries. By looking at the oil industry and exporting value to GDP ratio, we can classify MENA countries as either oil exporting or non-oil exporting. Specifically, petroleum exporting MENA countries include: Algeria, Bahrain, Iran, Iraq, Isreal, Libya, Kuwait, Oman, Qatar,UAE and Saudi Arabia. MENA Countries without oil including, Egypt, Jordan, Lebanon, Mauritania, Morocco, Sudan, Tunisia, and Yemen. Using System GMM estimation methodology, the MENA sample is divided into petroleum exporters and non-petroleum exports of MENA countries and the estimation results are shown in Table 4.

Table 4: Financial Stability and Economic Growth: Oil exporting vs. non-oil-exporters
 Dependent variable: Per Capita GDP Growth Rate
 Estimation Method: Arellano-Bover/Blundell-Bond Dynamic Panel One Step System GMM.

Regressions	SYS GMM Oil exporter	SYS GMM Non-oil-exporting countries
L.GDPgr	0.0341 (0.49)	0.133 (1.53)
FINindex	-0.0548* (-2.41)	-0.0551* (-2.20)
Openness	0.0299 (0.99)	0.0506 (1.8)
CPI	-0.000705* (-2.08)	0.0000684 (0.25)
_cons	0.0797* (2.34)	0.00736 (0.25)
N	204	103
Sargan Test	0.391	0.137
Hansen Test		
p value of Arellano-Bond test for AR(1)	0.000	0.000

p value of Arellano-Bond test for AR(2)	0.155	0.822
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Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively. Numbers in round parentheses (.) are the robust standard errors.

As can be seen from Table 4, the instruments are valid in the one-step system GMM model for both oil exporting and non-oil-exporting MENA countries. The FINindex is statistically significant at 5% in both models and the coefficients are very close to each other: -0.0548 and -0.0551. That is to say, we do not observe any significant differences between oil exporting and non-oil-exporting MENA countries in terms of the influence of financial stability on economic growth.

As a robustness check on our results, fixed and random effects models are adopted in order to remove or reduce the omitted variable bias by measuring changes within observation groups. By controlling the measurement of group (across time), a number of potential omitted variables unique to the group could be controlled. Therefore, the fixed effects model could not be used to investigate time-invariant, or entity characteristics causes of the dependent variables. Theoretically fixed effects model is preferred to the random effects model because MENA countries seem to have many similar entity characteristics such as the role played by the Islamic banks which have been discussed previously, culture, religion and geopolitics, all of which could possibly affect how financial stability could influence the economic growth via the similar channels. Therefore, these time-invariant common characteristics of the sample countries are not meant to be studied in this paper but instead the causes of the changes within entities are of interest.

Table 5: Financial Stability and Economic Growth
 Dependent variable: Per Capita GDP Growth Rate
 Estimation Method: Fixed and Random Effects Models

Regressions	Fixed Effects	Random Effects
FINindex	-0.067*** (0.02)	-0.054*** (0.01)
Openness	0.1198** (0.052)	0.038* (0.02)
CPI	-0.0004* (0.00)	-0.0004* (0.00)
_cons	-0.014 (0.04)	0.052** (0.23)
N	319	319
F -Test	7.48	17.53
p- value Hausman Test		0.07

Notes: ***, ** and * denotes statistical significance at the 1%, 5% and 10% levels respectively.

Numbers in round parentheses (.) are the robust standard errors.

Table 5 shows the results of fixed effects model. Despite that r-square is relatively low due for within, between and overall values, its F-statistic is significant at 1% significance level. In terms of the coefficients estimations, the coefficient of FINindex is statistically significant at 1% significance level and negative. This result is consistent with the expectation that financial stability could improve the economic growth. The reason that coefficient for FINindex is negative is that FINindex is an inverse indicator, larger value of FINindex actually stands for more financial instability since all components of the FINindex are inverse indicators: higher value of Banking crisis dummy of 1 means financial instability, higher value of GovCredit as well as PrivateCredit stand for higher credit risks and more vulnerability of the financial sector. The control variable Openness is also statistically significant at 5% significance level with a positive coefficient of 0.1197. In other words, according to the fixed effects model, more openness could contribute to higher economic growth rate. Nevertheless, the CPI is insignificant with slightly negative coefficient of -0.0003.

The results of the random effects model is also shown on Table 5, where this model imposes additional assumptions that $cov(x_{it}, a_i) = 0$, where x_{it} is regressor and a_i is unobserved factor. The rationale that random effects model based on is that the variation across entities is considered to be random and therefore it is uncorrelated with the predictor or independent variables. If we believe in the difference in entities (MENA sample countries in the analysis) could have some influence on the dependent variable, we should adopt the random effects model. However, as has been discussed before, the MENA countries have similar culture, banking system, geopolitics and other time-invariant characteristics that make the little difference among entities and therefore little influence on dependent variables.

From the Table 5 above we could see that compared to the fixed effects model, random effects model has a larger R squared statistic due to the model methodology. The CPI becomes statistically significant at 10% significance level with a coefficient close to zero. Besides these differences, FINindex is still statistically significant at 1% significance level in random effects model with negative coefficient.

The null hypothesis for Hausman test is that the unique errors are not correlated with the regressions, in which case the preferred model is random effects rather than fixed effects. As could be seen from Table 5, the p-value is 0.07, which is less than 0.1 and the null hypothesis is rejected at 10% significance level. Therefore, the fixed effects model should be used. The result of Hausman test perfectly supports the previously discussed preferred model of fixed effects maybe because MENA countries share time-invariant similarities or these time-invariant characteristics do not affect the economic growth significantly.

It is important to note that both fixed effects and random effects models do not consider the lagged effects of variables. For small sample size, fixed effect and first differencing estimation are with substantial downwards bias as the demining process creates a correlation between regressor and error. Therefore, GMM should be used as it uses the Arellano-Bond conditions and is the most robust: It only uses the moment conditions implied by the AR(1) model, and it properly removes the heterogeneity.

6. Conclusion

Using dynamic panel System GMM for 19 MENA countries over the period 1990-2014, the results suggest that financial stability is an important factor in boosting economic growth in the region where the financial stability is computed by the principal component analysis of three measures of banking crisis dummy, credit to government and state-owned enterprises to GDP (%), and domestic credit to private sector (% of GDP). The results of the model are robustly consistent with the fixed effects model.

Furthermore, to check whether exporting oil affects the impact of financial stability on economic growth, our results on splitting our sample between oil exporting and non-oil-exporting MENA countries shows that there is no statistically significant difference between oil exporters and other MENA countries in terms of the impact of financial stability on economic growth. Again, the results of the model are robust to the use of fixed effects estimation methodology.

Appendix

Table A1: Descriptive statistics for original and derived variables

Variable abbr.	Variable Name	Obs	Mean	Std. Dev.	Min	Max
BankDummy	Banking crisis dummy	475	0.0274	0.1633	0	1
GovCredit	Credit to government and state owned enterprises to GDP (%)	424	15.7042	13.9726	0.0091	73.537
PrivateCre~t	Domestic credit to private sector (% of GDP)	455	38.3903	24.3592	1.2669	103.304
GDP per capita	GDP per capita	447	11078.23	15184.05	256.5929	94944.09
CPI	Consumer Price Index	420	75.8865	35.1979	0.0306	298.5092
Openness	(imports+exports)/GDP	401	0.8209	0.3297	0.0385	2.6741
lnGDP	Log of GDP per capita	447	8.4887	1.3525	5.5475	11.461
GDPgr	GDP per capita growth rate, calculated as the lagged term of lnGDP	425	0.0506	0.1341	-0.7714	0.4318
pc1	Principal Component 1	424	0	1.0995	-1.8558	4.2435
pc2	Principal Component 2	424	0	0.9937	-1.2453	5.851
pc3	Principal Component 3	424	0	0.8964	-2.8699	2.0088
FINindex	Financial Stability Index	424	0	0.6009	-0.6754	3.3653

Samples Description

Table A2 Dependent Variable: GDP per capita growth				Table A3 Independent Variable: Banking crisis dummy			
Country	Period		No.Obsr	Country	Period		N.Obsr
	From	To			From	To	
Algeria	1990	2014	25	Algeria	1990	2014	25
Bahrain	1990	2014	25	Bahrain	1990	2014	25
Egypt	1990	2014	25	Egypt	1990	2014	25
Iran	1990	2014	23	Iran	1990	2014	25
Iraq	2004	2014	12	Iraq	1990	2014	25
Israel	1990	2014	25	Israel	1990	2014	25
Jordan	1990	2014	25	Jordan	1990	2014	25
Kuwait	1990	2014	22	Kuwait	1990	2014	25
Lebanon	1990	2014	25	Lebanon	1990	2014	25
Libya	1990	2011	22	Libya	1990	2014	25
Morocco	1990	2014	25	Morocco	1990	2014	25
Oman	1990	2014	25	Oman	1990	2014	25
Qatar	1990	2014	25	Qatar	1990	2014	25

Saudi Arabia	1990	2014	25	Saudi Arabia	1990	2014	25																																																																																																																																																																																				
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<p>Table A4 Independent Variable: Credit to government and state-owned enterprises to GDP (%)</p> <table border="1"> <thead> <tr> <th rowspan="2">Country</th> <th colspan="2">Period</th> <th rowspan="2">N.Obsr</th> </tr> <tr> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr><td>Algeria</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Bahrain</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Egypt</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Iran</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Iraq</td><td>-</td><td>-</td><td>0</td></tr> <tr><td>Israel</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Jordan</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Kuwait</td><td>1995</td><td>2014</td><td>20</td></tr> <tr><td>Lebanon</td><td>1990</td><td>2012</td><td>13</td></tr> <tr><td>Libya</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Morocco</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Oman</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Qatar</td><td>1993</td><td>2014</td><td>22</td></tr> <tr><td>Saudi Arabia</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Sudan</td><td>1990</td><td>2014</td><td>24</td></tr> <tr><td>Syrian</td><td>1990</td><td>2010</td><td>21</td></tr> <tr><td>Tunisia</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>United Arab Emirates</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Yemen</td><td>1990</td><td>2013</td><td>24</td></tr> <tr> <td colspan="3"></td> <td>Total</td> </tr> <tr> <td colspan="3"></td> <td>424</td> </tr> </tbody> </table>				Country	Period		N.Obsr	From	To	Algeria	1990	2014	25	Bahrain	1990	2014	25	Egypt	1990	2014	25	Iran	1990	2014	25	Iraq	-	-	0	Israel	1990	2014	25	Jordan	1990	2014	25	Kuwait	1995	2014	20	Lebanon	1990	2012	13	Libya	1990	2014	25	Morocco	1990	2014	25	Oman	1990	2014	25	Qatar	1993	2014	22	Saudi Arabia	1990	2014	25	Sudan	1990	2014	24	Syrian	1990	2010	21	Tunisia	1990	2014	25	United Arab Emirates	1990	2014	25	Yemen	1990	2013	24				Total				424	<p>Table A5 Independent Variable: Domestic credit to private sector (% of GDP)</p> <table border="1"> <thead> <tr> <th rowspan="2">Country</th> <th colspan="2">Period</th> <th rowspan="2">N.Obsr</th> </tr> <tr> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr><td>Algeria</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Bahrain</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Egypt</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Iran</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Iraq</td><td>1990</td><td>2014</td><td>11</td></tr> <tr><td>Israel</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Jordan</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Kuwait</td><td>1990</td><td>2014</td><td>24</td></tr> <tr><td>Lebanon</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Libya</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Morocco</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Oman</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Qatar</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Saudi Arabia</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Sudan</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Syrian</td><td>1990</td><td>2014</td><td>21</td></tr> <tr><td>Tunisia</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>United Arab Emirates</td><td>1990</td><td>2014</td><td>25</td></tr> <tr><td>Yemen</td><td>1990</td><td>2013</td><td>24</td></tr> <tr> <td colspan="3"></td> <td>Total</td> </tr> <tr> <td colspan="3"></td> <td>455</td> </tr> </tbody> </table>				Country	Period		N.Obsr	From	To	Algeria	1990	2014	25	Bahrain	1990	2014	25	Egypt	1990	2014	25	Iran	1990	2014	25	Iraq	1990	2014	11	Israel	1990	2014	25	Jordan	1990	2014	25	Kuwait	1990	2014	24	Lebanon	1990	2014	25	Libya	1990	2014	25	Morocco	1990	2014	25	Oman	1990	2014	25	Qatar	1990	2014	25	Saudi Arabia	1990	2014	25	Sudan	1990	2014	25	Syrian	1990	2014	21	Tunisia	1990	2014	25	United Arab Emirates	1990	2014	25	Yemen	1990	2013	24				Total				455
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Jordan	1990	2014	25																																																																																																																																																																																								
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<p>Table A6 Control Variable: Consumer price index</p> <table border="1"> <thead> <tr> <th>Country</th> <th>Period</th> <th>N.Obsr</th> </tr> </thead> </table>				Country	Period	N.Obsr	<p>Table A7 Control Variable: Openness (Import+Export)/GDP</p> <table border="1"> <thead> <tr> <th>Country</th> <th>Period</th> <th>N.Obsr</th> </tr> </thead> </table>				Country	Period	N.Obsr																																																																																																																																																																														
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	From	To			From	To	
Algeria	1990	2014	25		Algeria	1990	25
Bahrain	1990	2014	25		Bahrain	1990	24
Egypt	1990	2014	25		Egypt	1990	25
Iran	1990	2014	25		Iran	1990	25
Iraq	2004	2014	25		Iraq	2004	7
Israel	1990	2014	25		Israel	1990	25
Jordan	1990	2014	25		Jordan	1990	20
Kuwait	1991	2014	25		Kuwait	1991	25
Lebanon	2008	2014	7		Lebanon	2008	17
Libya	1990	2014	25		Libya	1990	16
Morocco	1990	2014	25		Morocco	1990	25
Oman	2000	2014	15		Oman	2000	25
Qatar	1990	2014	25		Qatar	1990	25
Saudi Arabia	1990	2014	25		Saudi Arabia	1990	25
Sudan	1990	2014	25		Sudan	1990	0
Syrian	1990	2013	24		Syrian	1990	21
Tunisia	1990	2014	25		Tunisia	1990	25
United Arab Emirates	1990	2014	8		United Arab Emirates	1990	23
Yemen	1997	2014	16		Yemen	1997	23
		<u>Total</u>	<u>420</u>			<u>Total</u>	<u>401</u>

References

- Achy, L. (2004) *Financial Liberalization, Saving, Investment and Growth in MENA Countries*.
- Al-Avad, M., Harb, N. (2005) Financial deepening and economic growth in the Middle East. *Applied Financial Economics* 15, 1041–1051
- Al-Tamimi, H.A.H., Al-Awad, M., Charif, H.A. (2002) Finance and growth: evidence from some Arab countries. *Journal of Transnational Management Development* 7 (2), pp3–18
- Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of econometrics*, 68(1), 29-51.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics*, 87(1), 115-143.
- Calderón, C., & Liu, L. (2003). The direction of causality between financial development and economic growth. *Journal of development economics*, 72(1), 321-334.
- Čihák, M (2007): “Systemic loss: a measure of financial stability”, *Czech Journal of Economics and Finance*, no 57, vol 1–2, pp 5–26.
- Emara N. & El Said, A. (2015). Revisiting Sovereign Ratings, Capital Flows, and Financial Contagion in Emerging Markets. *World Journal of Applied Economics*, 1(2): pp 3–22.
- Gadanecz, B., & Jayaram, K. (2008). *Measures of financial stability-a review*. Irving Fisher Committee Bulletin, 31, 365-383.
- Goaied, M., & Sassi, S. (2010). Financial development and economic growth in the MENA region: What about Islamic banking development. Institute des Hautes Etudes Commerciales, Carthage.
- Gray, DF, RC Merton and Z Bodie (2007): “New framework for measuring and managing macrofinancial risk and financial stability”, NBER Working Paper no 13607, November.
- Hassan, M. K., Sanchez, B., & Yu, J. S. (2011). Financial development and economic growth: New evidence from panel data. *The Quarterly Review of economics and finance*, 51(1), 88-104.
- Hawkins, J and M Klau (2000): “Measuring potential vulnerabilities in emerging market economies”, BIS Working Papers, no 91, October.
- Illing M and Y Liu (2003): “An index of financial stress for Canada”, Bank of Canada Working Paper no 2003–14, June.
- International Monetary Fund (2012), Saudi Arabia: Financial System Stability Assessment—Update, International Monetary Fund, Washington, DC, [online] available at: https://www.imf.org/~media/Websites/IMF/imported-full-text-pdf/external/pubs/ft/scr/2012/_cr1292.ashx
- Nelson, W R, Perli, R (2005): “Selected indicators of financial stability”, 4th Joint Central Bank Research Conference on “Risk Measurement and Systemic Risk”, ECB Frankfurt am Main, November.
- Samargandi, N., Fidrmuc, J., & Ghosh, S. (2014) Financial development and economic growth in an oil-rich economy: The case of Saudi Arabia. *Economic Modelling*, 43, 267-278.