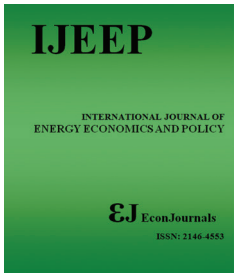

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Investigating the Determinants of Financial Development in OPEC Countries: An Application of Bayesian Model Averaging Approach

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ABSTRACT

The purpose of this study is to investigate the most significant determinants of financial development in OPEC countries during 2014-2016. To this end, this paper considered 34 explanatory variables including several economic and policy variables determining four different aspects of financial development as the degree of depth, efficiency, stability and quality of financial services. In order to obtain more reliable results and overcome the uncertainty problem in this study, we applied Bayesian Model Averaging (BMA) technique. The results indicated that better institutional indicators such as rule of law, government effectiveness, and corruption avoidance are associated with greater financial depth, efficiency, and stability. More importantly, the results revealed that the development in the oil sector could support financial development, and in particular contribute to greater depth and efficiency of the stock market. There are some important implications in this research for policymakers to promote financial development in OPEC countries.

Keywords: Financial Development, Oil, OPEC, Bayesian Model Averaging
JEL Classifications: G10, G20, C11

1. INTRODUCTION

While the positive effect of financial development on economic development is highly accepted but, the most important determinants of financial developments remained incompletely understood. Countries with the same level of economic growth, experiencing different bank-based or market-based financial structures! What accounts for differences in financial development index in countries which have the same level of per capita income and same geographic conditions? Why resource-abundant economies witness different development levels and why some of the poorly resourced countries benefit a very deep and developed financial sector and enjoy high financial development levels?

These complexities are more obvious in oil exporting countries. In according to World Bank's reports in 2018, although, on average, the investment rate of the oil exporting countries is as high as investment rate in non-oil economies, the average per capita income for oil exporting countries has fallen by % 30 over last 20 years! Sala-I-Martin et al. (2004) also observed this contrast and confirmed the nexus of larger investment rate-lower growth rate in oil exporting countries and titled it as a puzzling issue. Recently a bulk of studies tried to survey the indirect effects of natural resources on investment and growth throughout the financial development channel. For example, Gylfason and Zoega (2006) indicate that more dependent economies on natural resources experience lower economic growth because of weak financial developments. Also, Levin (1997) presents two direct and indirect channels in which financial development could affect economic growth. The direct channel emphasizes on predominant role of financial institutions in the allocation of revenues comes from oil exports and it finally could enhance the efficiency of investment

and the indirect channel emphasizes on the role of financial markets in the mobilization of household savings that could affect the scale of investment and improve economic growth.

Therefore, the development of the financial sector is considered as a major tool for economic development and prosperity such that Pradhan (2010) argues the financial systems as a backbone of economic systems. This highlights the significance of the research into what is essential to the development of financial markets and this question is more acute in countries with richer natural resource endowments, where there are more different channels in which resource rents affect financial developments as they are more likely to have severe social and economic divisions and weak effective institutional capacities. Most of the empirical evidence has shown that the majority of oil-dependent countries have the low level of financial development; thus, they are much more volatile in exposed to the oil shocks and "oil curse." The average of financial development index presented by IMF (2018) for OPEC countries in the period of (1999-2016) is reported in the Table 1.

Table 1 shows that Saudi Arabia, the United Arab Emirates and Kuwait are benefiting high financial development index compared to other members. In addition, a brief investigation of the financial development index reveals some notable facts about financial development status in OPEC countries. First: the average of financial development index in OPEC countries (0.22) is lower than the average of the world's financial development index (0.31). Second: More than 70% of OPEC members experiencing lower financial development index than that of the global average and they witness 21% or less! Third: Half of these countries experience <50% of the world's average of financial development index. These findings indicate that financial development in OPEC countries is inappropriate when compared to the rest of the world. This fact highlights the necessity of research to investigate predominant factors determining financial development in OPEC countries.

Against this background, the purpose of this study is to investigate the fundamental determinants of financial development in OPEC countries. We considered a wider assortment of 34 potential determinants of financial development under several heading of economic, institutional, financial, regulatory, political, social, demographic, geographical and cultural issues than previous studies. Certainly, only some of these bulk of determinant variable could be robust and rest of them are fragile in determining financial developments and the problem of selecting important explanatory variables from a large number of variables in this study has been resolved by using Bayesian Model Averaging (BMA) technique in order to obtain more reliable conclusions. Also, a large number of explanatory variables may affect the model's certainty, resulting in misinterpretations. Therefore, the BMA was applied to check this issue. Consequently, there was no need for selecting model specifications, and interpretations would be based on the weighted average of the regressions. Also, the financial development indicator is argued in four distinct dimensions of efficiency, depth, stability, and quality in this study.

The structure of this paper is as follows. Section 2 reviews theoretical background. Section 3 presents the methodology, while Section 4 explains the outcomes and Section 5 concludes.

2. LITERATURE REVIEW

A growing body of studies has focused on uncovering the effect of financial development on economic growth. These studies could be traced back to Bagehot (1873) who claimed the role of capital markets in channeling resources toward more productive investments. Lately, other researchers continued his idea and highlight the critical role of banking systems and financial markets in mobilizing savings into productive investments that could stimulate economic growth. While the positive effects of financial development on economic growth are widely confirmed by researchers, however, they still have an insufficient understanding on what determines financial developments and why some countries display more developed financial systems than others. So, researchers have done a wide variety of studies and examined lots of potential variables in determining financial development as economic and policy variables, institutional and political variables, Geographic and cultural variables and other variables. The main findings from this literature can be summarized as follows.

2.1. Economic and Policy Variables

2.1.1. Financial liberalization

In according to the theoretical background, McKinnon (1973) support financial liberalization idea against financial repression in provoking financial development, as financial openness can increase investment and foster economic growth but financial repression could reduce the quantity and quality of investment and its productivity. In addition, opening banking markets could improve the functioning of the national banking system and the quality of the financial system and benefiting banking customers who could invest easily and cause financial development.

Table 1: Average of Financial development index in 1999-2016

Country	Average of financial development index in 1999-2016	Country	Average of financial development index in 1999-2016
Kuwait	0.41	Venezuela	0.19
United Arab Emirates	0.42	Congo	0.06
Saudia Arabia	0.45	Gabon	0.10
Iran	0.32	Equatorial guinea	0.09
Equador	0.17	Algeria	0.14
Nigeria	0.21	Libya	0.14
Angola	0.13		

Average of OPEC countries: 0.22, Average of world: 0.31

2.1.2. Trade openness

In the context of trade openness – financial development nexus, several papers introduce many channels in which trade openness could spark financial development. For example as argued by Huang and Temple (2005), although, trade openness in developing countries could affect financial development through the channel of increasing demand for restructuring and investment which raises the demand for external finance, but, greater openness may lead to heightened vulnerability of domestic economic fluctuations to external shocks, which may worsen capital market imperfections and hence impede financial development. Rajan and Zingales (2003) and Braun and Raddatz (2005) also, explore the political channel further and demonstrate that trade liberalization reduces the power of groups most interested in blocking financial development and it heads to improve the financial system.

2.1.3. Economic growth

In the nexus of economic growth- finance theory researches hint that there may be a nonlinear link between income and financial development. As income increases in a developing country, the economy offers more investment opportunities and the demand for financial services and intermediaries would be increased in the early stage of development. Further increase in GDP may have an inconsequent effect on financial development in the next stage of development (Ehigiamusoe et al., 2019, Huang and Lin, 2009).

2.1.4. Inflation

According to the theoretical background, inflation also has a negative impact on financial sector development. Huang et al. (2010) argued that lower inflation and higher investment are conducive to financial developments and small and inefficient banks and inactive equity markets are the results of high inflation. Besides this theoretical review on the impact of economic factors on financial developments, there is a large body of empirical research aiming to identify the economic determinants of financial development. For example, Ehigiamusoe et al. (2019) investigates the effect of inflation and income on financial development in a panel of 129 countries and indicate that GDP could positively affect financial development in high and middle-income countries; on the other hand, inflation has a negative effect on financial development in high and medium inflationary countries. Also, Badeeb and Lean (2017), Mondher and Chiristian (2016) and Bzhalava and Horvath (2014) investigate the negative effect of inflation and positive effect of real per capita income on financial development. However, Boyd et al. (1996), Khan and Senhadji (2001), Keho (2009), Huang et al. (2010), Khan and Senhadji (2001) and Kim et al. (2010) introduced a threshold value for inflation, which lower and higher values of inflation from its threshold level have different effects on financial development.

Elkhuizen et al. (2018) argued financial liberalization and social capital as determining factors of financial development in 82 counties and they claim that social capital may substitute for formal institutions as a prerequisite for effective financial liberalization policies. In addition, Rajan and Zingales (2003), Chinn and Ito (2002, 2006), Baltagi et al. (2009) and Law and Muzafar (2009) emphasized on the effect of a higher level of liberalization in both goods and financial markets on financial developments.

Ibrahim and Sare (2018) relying on their evidence in African countries largely suggests that human capital accumulation and trade openness are substitutable in influencing financial development in Africa. Madsen et al. (2017) emphasize on inequality as a key variable in financial development in 21 OECD countries that affects the saving rates, investment, education and knowledge production and determine financial development levels. Horvath et al (2017) also argue income inequality as a key variable spurring financial market development. Mehmood (2017) argues money supply and investment opportunities as the major factors affecting financial development in emerging economies specifically in India. Naceur et al. (2014) explore a wide range of macroeconomic, fiscal and institutional factors such as growth rate, investment, inflation, saving rates, trade openness, and financial liberalization factors that play a predominant role in financial development in MENA countries.

Wamboye and Mookerji (2014) introduce Manufactured exports as an important economic variable that affect financial development and claim that countries with specialized production in sectors with scale economies may demand external finance, thereby, promoting financial development. In addition, investigate the effect of education on financial development and claim that education could positively affect financial development.

2.2. Institutional and Political Variables

In this case, the financial market operation is explained under different legal and regulatory environments. As legal and regulatory origins protect property and creditor rights and involve contract enforcement, then could help financial system development. La Porta et al. (1997-1998), claim that different origins of the legal code have different influence on the efficiency of contract enforcement and creditors and shareholders rights. They also compare the efficiency of two different French civil law and British legal origins in protecting private property owners and contract enforcement environment and they show that French civil low act inefficiently in the financial system and lead to the less developed financial system compared to British law. Among others, Dwumfour and Gyamfi (2019), Damette and Saghir (2018), Bhattacharyya and Hodler (2014) emphasized on political institutions and natural resources as key determinant variables in financial developments and conclude that natural resource revenues may deteriorate contract enforcement if political institutions are weak. Also, Horvath et al (2017), Khalfaoui (2015), Bzhalava and Horvath (2014) and Huang et al. (2010) highlighted the pivotal rule of law, legal and institutional framework, democracy and political freedom and political institutions as key variables motivating financial developments, respectively. Hassan (2013) investigates the impact of natural resource dependence and abundance on financial sector development in MENA countries and he shows that better institutional quality of government plays an important role in changing the interaction between resource dependence and financial sector development.

2.3. Geographic and Cultural Variables

In according to theoretical review, many country characteristics like geography, the degree of ethnic diversity (Easterly and Levine, 1997) and the type of religion practiced by the majority of the

population (Stulz and Williamson, 2003) also could affect the level of financial development (Beck et al., 2003). In ethnic provision and tribalism area, researchers argue that nations with high ethnic diversity are less likely to develop strong financial systems owing to contradictory positions. In addition, Households in counties with high historical antisemitism have similar savings rates but invest less in stocks, hold lower bank deposits, and are less likely to get a mortgage (see for example: D Acunto, 2017, Grosfeld et al., 2017, Anderson et al., 2017, Tedika and Asongu 2015, Guiso et al. 2004).

Among other empirical studies in this area, Tedika et al (2017) exploit pre-historic cross-country geographical isolation differences in order to assess its effect on financial development across the globe and he finds that pre-historic geographical isolation has been beneficial to development because it has contributed to contemporary cross-country differences in financial development. Ashraf (2010) studied the relevance of cultural, geographic, religious fractionalization, as well as linguistic, ethnic, globalisation and colonisation features in financial development.

In addition, the effect of geographical features as tropical location, landlocks, distance from large markets and resource endowments on the extent of financial sector development has been investigated by Gourinchas et al (2012), Lin (2010), Aggarwal et al. (2006), Jian (2006), Zhao, (2003) and Acemoglu et al. (2001, 2002).

In the resource endowment- financial development nexus, researchers argue that resource endowment could have an influence on financial development through a channel in which natural resource endowment is linked to different export structures which could determine institutional capacities in coping with external shocks and finally institutional quality affect financial system (Huang et al., 2010). In this context: Khan et al (2019) investigates the ambiguous relationship among natural resource rent and financial development by emphasizing on the role of institutional quality in the US. The results indicate that although the natural resource rent negatively affects financial development but, institutional quality moderates the natural resource rent and financial development nexus. Dwumfour and Gyamfi (2019), examined the resource curse hypothesis in 38 African countries and show that the effect of natural resources on the financial developments in mentioned countries is ambiguous and the quality of institutions can reduce the negative effects of rents on financial developments. Kurronen (2015) analysis the financial sector characteristics in resource-based countries and shows that the performance of banking sector in resource-based economies are meaner and resources are harmful to the domestic banking sector and then it would be hindering economic diversification and intensifying resource curse. Bhattacharyya and Hodler (2014) highlight the vital role of institutions in explaining the effect of natural resource revenues on financial development and indicate that sound institutions moderate this effect through contract enforcement.

3. DATA, MODEL AND METHODOLOGY

Our database includes 34 explanatory variables including several economic, institutional, financial, regulatory, political, social, demographic, geographical and cultural determinants[1] and considers 4 different dimensions of financial development measurement. Also, our case study countries includes: Iran, Saudi Arabia, Nigeria, Algeria, Qatar, and United Arab Emirates. According to the finance and growth literature[2], the measures of financial development are constructed as 3-year averages over the period 2014-2016 to reduce the effects of possible one-off shocks to the data. The explanatory variables are based on data prior to 2013. Accordingly, it is examined how past determinants influence the current level of financial development.

The following dimensions of financial development are used and they are classified into measures of efficiency, depth, stability, and quality in consonance with Cihak et al. (2013) and Horvath et al. (2017):

- Efficiency indicators of financial development include *stock* trade (turnover ratio of domestic shares (%)) and net interest margin (%), in stock sector and banking system, respectively.
- Domestic credit to private sector by banks (% of GDP), Stock traded, total value (% of GDP) and Stock market capitalization to GDP (%) are belonged to the depth measures of financial development.
- The number of ATMs per 100,000 Adults is considered as a proxy for the quality of financial services.
- Bank Z-score is evaluated as an index for financial stability.

The large number of explanatory variables can cause some problems related to the model uncertainty, leading to misinterpretations. In order to tackle these problems, the averaging technique known as BMA has been employed. This means that model specifications are no longer to be selected, and that interpretations are done on a weighted average of the regressions[3]. In other words, the problem of selecting important explanatory variables from a large number of variables introduced in the literature and the empirical studies has been resolved by using BMA.

A set of completing models are presented as: $\mu = \left\{M_1, M_2, \ldots, M_2^K\right\}$, where K is the number of explanatory variables. The interpretation of each parameter δ in BMA is as follows:

$$p\left((\delta)\,|\,y\right) = \sum_{j=k}^{2^k} p\left((\delta)\,|\,M_j, y\right) p\left(\left(M_j\right)\,|\,y\right) \qquad (1)$$

Where p (.|y) represents posterior distribution and p (.|M_j, y) represents posterior distributions under the assumption that M_j is the proper model. The interpretation of parameters, or combinations of parameters, δ is conducted based on $M_j j=1,\ldots,2^k$ models. Hence, the estimations are done based on their probability of posterior models, or $p((M_j)\,|\,y)$. These (normalized) probabilities can be obtained in a Bayesian set by applying the integral likelihood $p(y\,|\,M_j)=\int p(y\,|\,M_j,\theta_j)p(\theta_j\,|\,M_j)d\theta_j)$ and the corresponding model prior or $\bar{p}(M_l)$. We also have

1 The detailed data definitions including the dependent and explanatory variables are reported in the Appendix.

2 See the survey by Valickova et al. (2015).

3 Bayesian model averaging was used for the first time by Raftery (1995) and Raftery et al. (1997) in the social sciences. The models are widely employed in studies on the determinants of economic growth. For example, see Fernandez et al. (2001b), Sala-I-Martin et al. (2004), and Durlauf et al. (2008).

$$p\left(M_j \mid y\right) = \frac{p\left(y \mid M_j\right)\bar{p}\left(M_j\right)}{\sum_{l=1}^{2^k} p\left(y \mid M_l\right)\bar{p}\left(M_l\right)} \quad (2)$$

A basic measure in BMA is the posterior inclusion probability (PIP) of a covariate, which is defined as follows:

$$PIP_Z \equiv \sum_{\mu:m_z=1}^{2^k} p\left(M_i \mid y\right) \quad (3)$$

Thus, m_z=1 specifies that the variable z is in the model. Therefore, the PIP for a special variable shows the possibility that variable entered in the model can explicate the dependent variable. Expressly, the PIP indicates the percentage of models including the variable on which the intended variable has a significant effect. In order to obtain a more efficient interpretation of the PIP, the measure introduced by Eicher et al. (2011) has been employed. According to their definition, the PIP is categorized as a poor (in 50-75%), remarkable (in 75-95%), strong (in 95-99%), or decisive (in 99%) criterion. While the direct calculation of the sum in Equation (3) is difficult for a large number of explanatory variables (K), the birth-death Markov Chain Monte Carlo (MCMC) algorithms offer to resemble the PMP distribution and provide 3 million iterations and 1 million burn-ins to verify the approximation of the sampler (Madigan and York, 1995, Fernandez et al., 2001a).

The forfeit of entering each new variable in the model can be controlled by the hyperparameter g in the marginal likelihood. According to Feldkircher and Zeugner (2009) and Ley and Steel (2012), fixing g in a specified value must be avoided, and it should rely on data and a hyper g-prior. Using this method, there will be less noise in the data analysis (Feldkircher and Zeugner (2012). Finally, by following Fernandez et al. (2001b) and Horvath et al. (2017), the uniform model as the model prior is chose.

4. RESULTS

In this section, the results on the main determining factors on financial development in the selected OPEC countries are described. This section arranged into some sub-sections indeed, the findings for determinants of the efficiency, depth, stability of financial sector and access to finance are reported in this part.

4.1. The Determinants of Financial Efficiency

The determinants of the financial efficiency are examined according to two indicators: (1) stock turnover ratio of domestic shares as a measure of stock market efficiency, and (2) the net interest margin as an indicator of banking sector efficiency. The results are reported in Tables 2 and 3, respectively. For the sake of brevity, only the 10 most robust variables for each estimation are presented.

The findings demonstrate that low income inequality, greater oil rent, and better rule of law are major factors positively associated with the stock market turnover ratio as the efficiency indicator of stock sector. As well as that, more current account balance and economic development are relevant, which is well in line with former evidence confirming the important role of trade openness and economic development in financial activity (Baltagi et al., 2009; Horvath et al., 2017).

Table 2: The determinants of financial efficiency

Dependent variable: Stock traded (turnover ratio of domestic shares [%])			
Indicators	**PIP**	**Post . Mean**	**Post . SD**
Gini index	0.95	−4.224504e+00	3.869596e+00
Oil rent	0.88	1.515942e-03	3.431724e-03
Rule of law index	0.78	6.405070e-01	1.753155e+00
Current account balance	0.65	3.774858e-05	1.784818e-04
Uneven economic development	0.53	2.917740e-02	2.061891e+00
Mean years of schooling	0.43	−5.169683e-02	1.909711e+00
Black market premium	0.42	−9.641815e-02	2.450944e+00
Urban	0.17	−2.421234e-04	1.167664e-01
Innovations index	0.12	1.525659e-01	1.474291e+00
Financial openness index	0.04	−2.650555e+00	2.832368e+01

PIP is an abbreviation of posterior inclusion probability, post mean signifies posterior mean AND Post SD indicates the posterior standard deviation. The results are subject to 3 million iterations of the MCMC sampler after getting rid of 1 million burn-in iterations for convergence

Table 3: The determinants of financial efficiency

Dependent variable: Stock traded (turnover ratio of domestic shares [%])			
Indicators	**PIP**	**Post . Mean**	**Post . SD**
Gini index	0.95	5.007531e-02	1.770019e-01
Oil rent	0.88	−9.982909e-03	3.515813e-02
Rule of law index	0.78	3.734311e-02	1.397291e-01
Current account balance	0.65	−2.289586e-02	6.016931e-02
Uneven economic development	0.53	−1.188787e-01	4.561115e-01
Mean years of schooling	0.43	−4.995137e-03	2.136445e-02
Black market premium	0.42	−2.863851e-03	1.510489e-02
Urban	0.17	4.288350e-01	1.793264e+00
Innovations index	0.12	−9.290785e-03	5.873467e-02
Financial openness index	0.04	7.431851e-02	4.639630e-01

PIP is an abbreviation of posterior inclusion probability, post mean signifies posterior mean and Post SD indicates the posterior standard deviation. The results are subject to 3 million iterations of the MCMC sampler after getting rid of 1 million burn-in iterations for convergence

The negative relationship between income inequality and financial development corroborates the theoretical literature which suggests that in developing countries, the enormous majority of people are poor and experience credit restriction or even are unable to contribute to financial investment and production activity. Under these situations, with expansion of the income gap in the society, there is a high probability for political and social vulnerability which ends in diminished economic growth and financial development (Shin, 2012).

In regard to the importance of oil sector effect, the results have been congruent with research suggesting that the oil price has been a main driver of business and financial sectors in the Gulf Cooperation Council (GCC) economies (Khandelwal et al., 2016) as well as the existence of a long run relationship between oil dependence and financial development in some developing countries (Bamidele et al., 2018). Concerning the positive

influence of the rule of law, the finding supports previous studies on the remarkable impact of institutional quality on financial expansion (Chinn and Ito, 2006; Horvath et al. 2017, Dwumfour and Grifen 2018).

Furthermore, in the banking system efficiency part, the findings reveal that the religious variables with high PIPs have been introduced as the remarkable determinants for the net interest margins. These results advocate that the role of cultural features, especially religious ones, should not be simply neglected.

4.2. The Determinants of Financial Depth

The results on the determining factors of domestic credit to private sector ratio are presented in Table 4, defined as a measure of the banking system depth. In addition the findings for stock market depth are provided in Tables 5 and 6.

Domestic credit to private sector by banks is applied as the depth of financial institution. The mean years of schooling is a primary determinant of this measure, while more corruption avoidance and inflation as well as manufacture exports are significantly relevant to financial development depth. In case of corruption avoidance as an institutional factor and mean years of schooling as an education determinant, it can be stated that these results comply with studies by Guiso et al. (2004) and Horvath et al. (2017). They found that the effects of social capital on financial development are related to the degree of education and improvement in institutional factors such as the rule of law.

The determinants of the total stock market value traded to GDP are reported in Table 5. The results demonstrate that better rule of law and more income equality are the most significant factors which improve the depth in stock market. In terms of the positive impact of the rule of law, the finding confirms former evidence on the importance of institutional quality for financial development (Rajan and Zingales, 2003a; Chinn and Ito, 2006; Horvath et al., 2017; Nasreen et al., 2017). Also, oil sector development and current account balance are robust determinants of the mentioned sector.

However, the negative effect of income inequality on the dependent indicator is contrary to previous studies including Horvath et al. (2017), Kumhof et al. (2015), Perotti and von Thadden (2006), and Perotti and Schwienbacher (2009). They found that more wealth inequality in the past has been beneficial for state-funded pension systems and reduced investor protection; however, it is worth mentioning that they were based on a global sample, while in this study specific developing countries have been employed. As to literature and the poverty condition in our sample of countries, the results regarding the negative impact of income inequality on the finance sector may not be surprising.

Based on our findings in Table 6, the added value of industry production and urban ratio are positively related to stock market capitalization. Moreover, black market premium and the number of revolution and coups in the counties of our sample are negatively relevant to it, but their PIPs are <0.70 and not strong enough. Other variables have displayed PIPs below 0.5 and thus are not strongly related to the dependent variable.

Table 4: The determinants of financial depth

Dependent variable: Domestic credit to private sector by banks (% of GDP)			
Indicators	**PIP**	**Post . Mean**	**Post . SD**
Mean years of schooling	0.94	3.524467e+00	7.223466e+00
Corruption avoidance measure	0.84	3.430525e+00	1.054949e+01
Inflation	0.81	7.409151e-02	2.689495e-01
Manufactures exports	0.79	−1.098383e+00	1.125194e+00
Catholics population	0.59	−2.198395e+00	1.162907e+01
Demographic pressures index	0.58	−1.098383e+00	6.473787e+00
Muslims population	0.48	−4.150368e-01	2.266723e+00
Government effectiveness index	0.48	1.380312e+00	9.148993e+00
LnGDP	0.27	6.379446e-01	6.173993e+00
Fuel export	0.27	−4.762900e-02	2.265841e-01

PIP is an abbreviation of posterior inclusion probability, post mean signifies posterior mean and Post SD indicates the posterior standard deviation. The results are subject to 3 million iterations of the MCMC sampler after getting rid of 1 million burn-in iterations for convergence

Table 5: The determinants of financial depth

Dependent variable: Stock traded, total value (% of GDP)			
Indicators	**PIP**	**Post . Mean**	**Post. SD**
Rule of law index	0.93	1.506409e+00	1.7693003536
Gini index	0.93	−1.119938e+00	2.1141335660
Oil rent	0.81	7.019573e-04	0.0020612375
Current account balance	0.7	4.853117e-05	0.0001574943
LnGDP	0.43	−2.366871e-01	2.9287394204
Corruption avoidance measure	0.33	9.447077e-02	2.0604672084
Black market premium	0.32	−1.070238e-01	1.8021865266
Former British colony	0.22	−6.398536e-01	5.9607294760
Innovation index	0.12	3.800414e-02	0.5326938345
Government effectiveness index	0.09	−1.208754e-02	2.1498690860

PIP is an abbreviation of posterior inclusion probability, post mean signifies posterior mean and post SD indicates the posterior standard deviation. The results are subject to 3 million iterations of the MCMC sampler after getting rid of 1 million burn-in iterations for convergence

Table 6: The determinants of financial depth

Dependent variable: Stock market capitalization to GDP (%)			
Indicators	**PIP**	**Post . Mean**	**Post . SD**
Industry, value added	0.946	6.945110e-01	1.023128e+00
Urban	0.885	1.251563e-01	5.115244e-01
Black market premium	0.665	−1.221769e+00	5.642373e+00
Revolutions and coups	0.664	−3.529134e+00	4.205468e+01
Innovation index	0.547	1.349989e-01	7.694450e-01
Financial Openness Index	0.345	2.836400e+00	1.693328e+01
Corruption avoidance measure	0.344	9.042102e-01	5.843945e+00
Population growth rate	0.144	3.000701e-01	1.830796e+00
Muslims population ratio	0.093	−1.042077e-02	3.552219e-01
Catholics population ratio	0.041	5.338332e-02	2.352220e+00

PIP is an abbreviation of posterior inclusion probability, post mean signifies posterior mean and post SD indicates the posterior standard deviation. The results are subject to 3 million iterations of the MCMC sampler after getting rid of 1 million burn-in iterations for convergence

4.3. The Determinants of Financial Access

The results on determinants of accessibility to finance are demonstrated in Table 7. The measure of ATMs per 100,000 adults is of use to proxy for the access to finance extent of financial development or a proxy for the quality of financial services.

The results suggested that the level of exports of manufactured products and education are strongly related to permeation of ATMs. The findings are mainly in line with the results of Horvath et al. (2017) and Beck et al. (2007), who found that educated people demand more accessibility for financial services. It was also observed that inflation and innovation index are both significantly and positively associated with the financial accessibility indicator in this research.

4.4. The Determinants of Financial Stability

The results on the determinants of bank Z-score as the financial stability index are presented in Table 8. According to findings, less inflation and more trade openness as well as more government effectiveness are strongly associated with a lower probability of banking sector insolvency.

Table 7: The Determinants of financial access (quality)

Dependent variable: ATMs per 100,000 adults			
Indicators	**PIP**	**Post . Mean**	**Post . SD**
Manufactures exports	0.87	1.418002e+00	2.551978e+00
Mean years of schooling	0.80	1.377841e+00	5.785937e+00
Inflation	0.79	9.132433e-02	3.925880e-01
Innovation index	0.79	2.730860e-01	2.258714e+00
Financial openness index	0.69	3.147750e+00	4.229162e+01
LnArea	0.59	−5.455963e-01	3.109300e+00
Employment ratio	0.49	3.829970e-02	3.303535e-01
LnGDP	0.49	1.425606e+00	9.430731e+00
Civil liberties index	0.38	1.630103e+00	7.725363e+00
Corruption avoidance measure	0.28	1.903048e+00	1.025751e+01

PIP is an abbreviation of posterior inclusion probability, post mean signifies posterior mean and Post SD indicates the posterior standard deviation. The results are subject to 3 million iterations of the MCMC sampler after getting rid of 1 million burn-in iterations for convergence

Table 8: The determinants of financial stability

Dependent variable: Bank Z-score			
Indicators	**PIP**	**Post . Mean**	**Post . SD**
Inflation	0.961	−5.403941e-02	1.163911e-01
Openness	0.927	1.110051e-02	4.452840e-02
Government effective index	0.756	7.276056e-01	3.430471e+00
Manufactures exports	0.597	−6.711101e-02	3.000170e-01
Ethno linguistic fractionalization	0.488	−8.101952e-01	3.712060e+00
Employment ratio	0.387	1.458422e-02	7.514045e-02
Black market premium	0.379	−2.674669e-01	1.488469e+00
Uneven economic development	0.177	−2.211976e-01	1.470599e+00
Mean years of schooling	0.114	−4.046402e-02	9.681991e-01
Effective democracy index	0.074	4.236377e-02	2.239583e-01

PIP is an abbreviation of posterior inclusion probability, post mean signifies posterior mean and Post SD indicates the posterior standard deviation. The results are subject to 3 million iterations of the MCMC sampler after getting rid of 1 million burn-in iterations for convergence

It was observed that inflation has a positive effect on the depth part of the banking system, while more inflation disrupted the stability of the banking sector. The different effect of inflation rate may be attributed to the threshold level of inflation as mentioned in the literature (Boyd et al., 1996). According to Boyd et al. (1996) and Keho (2009), in inflation-financial development relationship, there is certain critical levels of inflation, above which inflation affects financial development differently than below it. In regard to Huang et al. (2010), Khan and Senhadji (2001), and Kim et al. (2010) findings, for rates of inflation below the threshold level, the effect of inflation on financial activity (especially the depth aspect of it) is small and positive. Meanwhile, for rates of inflation beyond the threshold level, the growth in the rate of inflation leads in detrimental effects on financial development**.**

The results also showed the significant role of policy and institutional factors (openness and government effectiveness) in financial stability. Indeed, these results are in line with Horvath et al. (2017), supporting the pivotal role of institutional determinants in hampering the collapse of the banking sector.

5. CONCLUSION

The aim of this paper is to examine the most important determinants of various financial development features across some major oil-exporting countries in recent years. Previous evidence has proposed different descriptions for the reason why some countries display more developed financial systems than others. Rajan and Zingales (2003a), Chinn and Ito (2006), and Baltagi et al. (2009a) emphasized trade and financial openness, La Porta et al. (1998) supported the legal traits of financial development, Guiso et al. (2004) stressed the role of cultural factors, Huang et al. (2010) underscored the importance of political institutions matter, and recently Horvath et al. (2017) highlighted the pivotal roles of income inequality and rule of law. On the other hand, some of the previous studies had investigated the role of oil sector in financial development.

By considering these various theories and analyzing their significance within a BMA method, the determining factors of financial development in the selected OPEC countries were specified. Following Horvath et al. (2017), almost 40 different possible determinants and 7 different indicators of financial development were used. Moreover, a valuable set of financial development indicators was employed which measured the financial depth and efficiency, quality, and stability.

Based on our findings, institutional factors including rule of law, government effectiveness, and corruption avoidance respectively are the major indicators influencing financial development in the stock market depth and efficiency, banking system stability, and banking sector depth. Consequently, better institutional quality is relevant to more financial development, with these results being largely in line with Horvath et al. (2017) and La Porta et al. (1998) findings, who supported the significant linkage between law and finance.

Furthermore, in contrast to some previous studies, our results indicated that lower income inequality is associated with greater

stock market depth and efficiency. This is not surprising as far as development level and significant low-income ratio in our sample are concerned. Furthermore, it was observed that the oil sector had a pivotal role in greater depth and efficiency of stock sectors. This finding corroborates the results reported by Khandelwal et al. (2016) who confirmed the major role of oil sector development in expanding financial sectors in the Gulf Cooperation Council countries.

More importantly, the results supported two adverse effects of inflation on different aspects of financial development. In other words, while it had a positive impact on the banking sector depth and access to finance, high inflation was not conducive to banking system stability, which is congruent with the outcomes reported by Boyd et al. (1996), Khan and Senhadji (2001), Keho (2009), Huang et al. (2010), and Kim et al. (2010), on the existence of a threshold value for inflation, above which inflation influences financial development differently than below it.

In addition, education was introduced as a significant determinant of the banking system depth and stability. These findings have been largely congruent with Guiso et al. (2004) and Horvath et al. (2017) findings, who confirmed the impact of social capital, particularly education on some financial development features. Also, manufacture exports and innovation index were both significantly and positively relevant to the financial accessibility indicator and these results supported the importance of R&D and IT development to the expansion of financial quality in our sample countries. Besides, another our substantial finding was the major influence of religious factors on the banking sector efficiency. Hence, it is suggested that the role of cultural features be considered in modifying the efficiency aspect of the banking system.

Broadly speaking, development of oil sector, education, and institutional factors, controlling the inflation, and income inequality will be the major indicators to have better financial systems in our sample of OPEC countries. Also, future studies can compare these results to the findings for developed countries which have rich natural resources. Moreover, the threshold values for inflation rate can be investigated.

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APPENDIX

Explanatory variables		
Variable	**Description**	**Source**
Manufactures exports	Manufactures exports (% of merchandise exports)	The World Bank
Fuel exports	Fuel exports (% of merchandise exports)	The World Bank
Inflation	Consumer prices (annual %)	The World Bank
GDP per capita growth	(Annual %)	The World Bank
Industry, value added	Industry, value added (% of GDP)	The World Bank
Financial Openness Index	Measuring a country's degree of capital account openness (Chinn-Ito index, 1¼ most open)	Aizenman et al. (2008), http://www.web.pdx.edu/~ito/trilemma_indexes.htm
Current account balance	The sum of net exports of goods and services, net primary income, and net secondary income	The World Bank
Openness index	Trade (% of GDP)	The World Bank
Uneven economic development index	0 (low) - 10 (high)	Fund for peace, TheGlobalEconomy.com
Civil liberties index	7 (weak) - 1 (strong)	The Freedom House
Corruption avoidance measure	High index level=Low level of corruption	ESI Yale Columbia index
Government effectiveness index	(−2.5 weak; 2.5 strong)	The World Bank, TheGlobalEconomy.com
Rule of law index	(−2.5 weak; 2.5 strong)	The World Bank, TheGlobalEconomy.com
Political rights index	7 (weak) - 1 (strong)	The Freedom House
Mean years of schooling	Average years of school of population aged 15 and over	Barro Lee Education Dataset
Former British colony	Mostly from Treisman	"The causes of corruption: A cross-national study," Journal of Public Economics, June 2000
War_years	Number of armed conflicts, external and internal, in which the government was involved, average of years 1995-2000	Quality of Government Database, at Quality of Government Institute, Goteborg University
Revolutions and coups	Revolutions and coups per year, 60-88	Easterly, 2001
Effective democracy index	Democracy measure	ESI Yale Columbia Index http://www.sedac.ciesin.columbia.edu/es/esi/
Innovations index	(0-100) High index level=High level of innovation	Cornell University, INSEAD, and the WIPO
lnArea	Logarithm of land area in sq.km	The World Bank
Demographic pressures	0 (low) - 10 (high)	Fund for Peace, TheGlobalEconomy.com
Catholics population ratio	Catholic Christians as percent of the total population	The Cline Center for Democracy
Muslims population ratio	Muslims as percent of the total population	The Cline Center for Democracy
Protestants population ratio	Protestant Christians as percent of the total population	The Cline Center for Democracy
Ethno linguistic fractionalization	Ethno linguistic fractionalization	Quality of Government Database, at Quality of Government Institute, Goteborg University
Life expectancy	Life expectancy at birth, total (years)	The World Bank
Population growth	(Annual %)	The World Bank
Gini_Market	Estimate of Gini index of inequality in equivalized (square root scale) household market (pre-tax, pre-transfer) income	Luxembourg Income Study data
Oil rent	The difference between the value of crude oil production at world prices and total costs of production	The World Bank
Black market premium	Average 1980-1999	Easterly, 2001
Urban	Urban population (% of total)	The World Bank
Employment to population ratio	Employment to population ratio, 15+, total (%) (modeled ILO estimate)	The World Bank
lnGDP	Logarithms of GDP, PPP (constant 2011 international $)	The World Bank