Journal of Economic Cooperation and Development, **41**, 2 (2020), 113-140

Oil prices and Islamic banks performance in the OIC countries: Evidence from the Dynamic GMM approaches

Sutan Emir Hidayat[1] and Muhammad Rizky Prima Sakti[2]

This study uses an extensive data set consisting of 81 Islamic banks from Muslim countries with historical yearly data (2006 to 2015) and examines the extent to which the oil production can affecting the performance of Islamic banks in those countries. Using the Dynamic GMM model as a baseline results, we find that only 4.2% to 4.8% of the Islamic banks profitability react directly to the change in oil prices. However, we observe that 46% to 60% of the Islamic banks profitability react indirectly to the change in oil prices through the macroeconomic factors. The results pass several robustness tests.

Keywords: Oil, Islamic Banks, Performance, GMM, Muslim Countries

1. Introduction

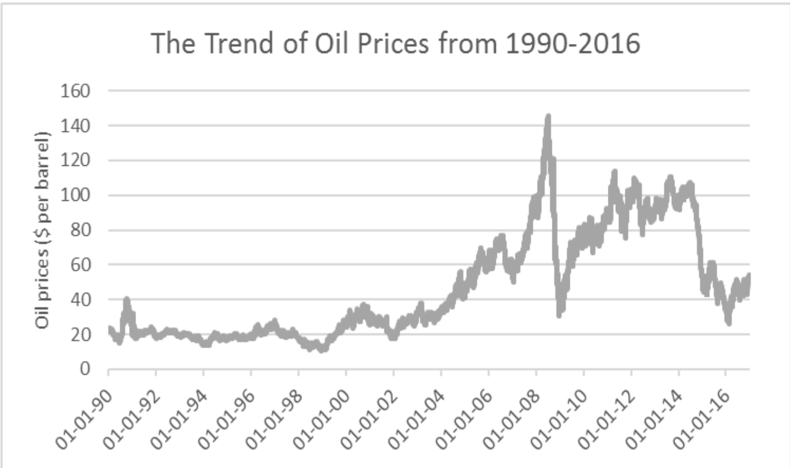
The current unfavourable trends in the oil market have raised the attention of governments, investors, and academicians on the issue of financial systems of Muslim countries and the resilience of the Islamic financial industry. The slumping in oil prices is likely to influence the structural imbalances for developing economies, including Muslim countries. Notably, most of the Muslim countries in Gulf Co-operation Council (hereinafter referred to as GCC) and Association of South-East Asian Nations (hereinafter referred to as ASEAN) are suffering due to the drop in oil prices. It was evidenced that the budget deficits in oil-exporting countries in GCC region were doubled from 2.7% in 2013 to 5.2% in

[1] Department of Islamic Economics, Universitas Gunadarma, Depok, Indonesia
Komite Nasional Ekonomi dan Keuangan Syariah (KNEKS)
E-mail: sutan.knks@gmail.com (*corresponding author*)
[2] Department of Business Administration. University College of Bahrain (UCB). Kingdom of Bahrain

2013[3]. This essentially presents a serious problem to Muslim countries on how they can preserve the economy during the falling oil prices.

As reported by The Reuters[4] and Wall Street Journal[5], the unprecedented plumb in oil prices fuelling a deepening rout of global financial markets. Oil prices dropped from USD 115 to as low as USD 27 per barrel for the first time since 2003. This is probably due to persistent oversupply in oil production, a slowdown in the Chinese economy, an appreciation of USD, and global geopolitics (OPEC, 2016). Figure 1 below shows the fluctuation of oil prices for the last two decades.

Figure 1: The trend of oil prices from 1990 – 2016



Source: DataStream

Bringing in the issue of Islamic banks (hereinafter referred to as IB), the current IB global market stood an estimated USD 1,346 billion in 2014 with an average growth of 12% (Thomson Reuters, 2015). Thomson Reuters (2015) also predicted that the size of IBs could reach USD 2,610 billion by 2020. The size of IBs is account for three-quarter of total Islamic finance industry assets. It is believed that the influx of IBs liquidity coming from substantially from oil production in most of the Muslim countries typically in ASEAN and GCC region. As reported by

[3] See 'State of The Global Islamic Economy Report 2015/16' published by Thomson Reuters in collaboration with Dinar Standard.
[4] http://www.reuters.com/article/us-global-oil-idUSKCN0UY04U
[5] https://www.wsj.com/articles/oil-sinks-below-28-a-barrel-to-12-year-low-1453267718

Arouri, Lahiani, & Nguyen (2011), the inter-relationships among oil, public spending, and banks in the GCC region will be reducing the liquidity of banking system, which in turn affecting the credit expansion and banks profitability. Similarly, the Islamic Financial Services Board (IFSB, 2015) stated that the slump of oil prices is likely affecting the asset quality and profitability of IBs. Consequently, the prolonged drop in oil prices will have a crucial impact on the financial system.

One might ask how the shortfall in oil revenue will affect the financial sectors of oil-producing countries. As mentioned by Nagayev (2017), the slump in oil revenue will give a pressure on bank liquidity as they lose their deposits particularly from those who are actively engaged in the oil-related business. Another possible reason because the public sector might have a deficit funds due to lower tax collection, which in turn affecting government spending, and hence, influencing the demand from non-oil sector for private credit. If we look at the companies from the oil-related industry, they possibly adjust their budgets and lowering their expenditures, thus, affecting the demand for private credit. Aside from that, a slump in oil prices will be putting shocks on corporate borrowers into bankruptcy, therefore, augmenting the number of non-performing assets and reducing bank profitability.

Significantly, the aforementioned factors have a crucial impact on bank profitability. It suggests that oil windfall positively related to the financial sector performance (bank profitability). Higher oil revenues boost the financial sector, whereas, the slump in oil revenues putting the financial sector into negative shocks. Although voluminous research done on natural resources and their impact on economic growth, financial markets, and institutions (Zhang, 2008; Sachs & Warner, 2011; Arouri, Jouini, & Nguyen, 2012), however, the evidence on the linkage between oil revenue and IBs performance is limited. Given the importance of IB institutions in the current global financial market, and the instability of financial system emanating from the oil market, it is of great interest to understand the nature of linkages between oil revenue and IB performance. The main objective of this present study, therefore, to study the relationship between oil revenue and the performance of IB. The specific research question for this present study is: what is the relationship between oil rents and the performance of IB? This inquiry is important to the policymakers and regulators whose particularly concerned on the stability of the Islamic financial system.

The structure of this paper consists of five sections which are organized as follows. The current section explains the introduction together with the motivation of the study. Section 2 discusses the relevant literature related to oil rents and IBs performance. Section 3 elaborates on the data & methodology used for the analysis and followed by section 4 which reports the empirical findings and discussion. Finally, section 5 concludes the paper.

2. Literature Review

In this section, we provide the previous literature on the association between oil revenue and the financial sector, and also discuss the performance of IB.

2.1. Oil Revenue, Financial Development, and Bank Profitability

A plethora of studies has addressed the effect of resource-dependence and financial sector performance (Sachs & Warner, 2001; Kurronen, 2015; Ibrahim & Ahmed, 2014; Gylfason & Zoega, 2006). In the banking sector, Kurronen (2015) examines the association between resource-dependence and banking sector growth. By using a panel data of 128 countries from 1995 to 2009, he finds a negative relationship between resource-dependence and banking growth. If the financial sector is engaged with resource-based activities, it will disseminate negative effects on businesses, therefore, discouraging economic diversifications. Another research by Ibrahim & Ahmed (2014) also points the similar avenue. Using Malaysia as a case study, they find that oil volatility has a negative effect on aggregate investment and real output. Back in 2006, Gylfason & Zoega (2006) posit that the higher natural to physical capital ratio leads to lower the quantity and quality of investments. In other words, giving pressure on the financial sector and impeding economic growth.

On another issue, prior literature has investigated the impact of resource-dependence on the economy. Sachs & Warner (2001) investigate the effect of resource dependence on the growth of economic output. They find evidence that resource-intensive countries are likely to be high-price economies which leave behind export-led growth. The research by Bittencourt (2011) documents an evidence that inflation has a negative influence on the financial sector. The similar result also documented by Boyd, Levine, & Smith (2001). They find that inflation has an adverse impact on financial sector development, which disrupts the ability of financial institutions to allocate resources efficiently. Dehesa, Druck, & Plekhanov (2007) posit that lower inflation rate and stronger credit protection may positively influence the credit expansion. Ismail (2010) studying the impact of oil price shocks on the manufacturing sector. He finds that the persistent increase in oil price has an adverse effect on manufacturing output, in other words, suggesting the Dutch Disease effect. In the Middle East region, Albassam (2015) finds that oil price fluctuation in Saudi Arabia is significantly influenced the growth of the private sector. The higher is the oil price will lead to an increase in government expenditure, in turn, affecting the private sector business to reap benefits from their involvement on government projects.

Having discussed the literature on the oil revenue and financial development, we are now moving to the crux of the literature review: oil revenue and bank performance. To the best of author's knowledge, the seminal paper by Hesse & Poghosyan (2009) is one of few studies that investigate the linkage between oil revenue and bank performance. Using MENA countries as a sample from 1994-2008, they compared the impact of oil revenue and performance of an investment, commercial, and Islamic banks. They reveal that oil price fluctuations have an indirect effect on bank profitability through macroeconomic indicators. Oil price shock is significantly affecting the performance of investment banks. In contrast, they find no evidence of its impact on the performance of Islamic and commercial banks. As for bank-specific variables, they find that capitalization and liquidity are positively related to bank performance, whereas efficiency is negatively related to the bank performance. In addition, several macroeconomic indicators such as inflation and fiscal stance are positively related to bank profitability.

2.2. *The Performance of Islamic Banks*

Prior studies on bank performance are concerned either on bank-specific or country-specific determinants (Petria, Capracu, & Ihnatov, 2015; Chowdury, Haque, & Masih,2017). The most common variables used as internal proxies are bank size, capitalization, asset quality, liquidity, and management efficiency. Meanwhile, inflation and economic growth are commonly used as external factors. Nonetheless, some common elements allow a further investigation of the determinants.

There is abundant literature examining conventional banks performance over the years (Petria et al, 2015; Dietrich & Wanzenried, 2014; Pasiouras & Kosmidou, 2007). In European countries, for example, Petria et al (2015) examining the determinants of European banks profitability from 2004-2011. The author's find that ROA and ROE are significantly affected by both internal factors: asset quality, liquidity, efficiency, and external factors: economic growth and concentration. This is supported by Dietrich and Wanzenried (2014) suggest that internal and external factors influencing bank profitability. The authors extend the study by way of comparing bank profitability across low-, middle-, and high-income economies. They find that internal and external factors of bank profitability vary concerning the income level of corresponding countries. Similarly, Pasiouras & Kosmidou (2007) find evidence that both internal bank-characteristics and macroeconomic factors significantly influence on bank profitability.

Bringing in the issue of IB performance, it is essential to note that the empirical research on IB and finance are still in the infancy stage (Chowdhury, Haque, & Masih, 2016). Another issue in IB research is the lack of rigorous statistical techniques (El-Gamal & Inanoglu, 2005). Following the conventional banks, empirical studies on the determinants of IB performance are focused on profitability and efficiency. These studies aimed at investigating the performance of IBs in Malaysia (Rosly & Bakar, 2003), Indonesia (Firdaus & Hosen, 2013), Pakistan (Moin, 2008), Bahrain, Egypt, and Saudi Arabia (Al-Jarrah & Molyneux, 2003).

For bank-specific characteristics or internal factors, researchers found mixed results of IBs profitability. A group of scholars (Asma et al., 2011; Bashir, 2003; Al-Jarrah & Molyneux, 2003; Ahmad & Ahmad, 2004) find evidence that bank internal factors significantly influence the performance of IBs. Typically, bank size, risky assets ratio, and management efficiency are significantly affect the profitability of IBs (Ahmad & Ahmad, 2004). In a similar vein, Bashir (2003) documents that the capital adequacy ratio has a positive relationship with IBs performance. Another study conducted by Hassan and Bashir (2003) show that loan activities and capital adequacy ratio are positively influenced IBs performance. In contrast, another scholar (Asutay & Izhar, 2007) finds a difference that internal factors have no significant relationship with IBs performance.

As for the macroeconomic variables or external factors, prior studies also point to a different view of IBs performance. On the one hand, several scholars (Sauders et al, 1990; Berger et al, 1995; Kok et al, 2012; Srairi, 2009) find that numerous external factors such as economic growth, money supply, and inflation are positively influenced bank profitability. On the other hand, however, Al-Khouri (2012) find that inflation has no significant relationship to the performance. Meanwhile, Kosmidou et al (2005) point out a negative relationship between inflation and bank performance.

A subset of the literature on bank performance is focused on measures of efficiency. Ariff, Bader, Hassan, & Shamsher (2009) examine the performance of Islamic and conventional banks using cost, revenue, and profit efficiency. By using a sample of 43 banks in 21 Muslim-dominated countries from 1992-2005, the author's find that IB has steady cost efficiency, but the revenue efficiency is somewhat volatile. They also documented that there is no significant difference in financial performance between IBs and conventional banks. Another research by Rosly & Bakar (2003) also find the same results for Malaysian IBs. They argue that there is no significant advantage in the performance between Islamic and mainstream banks. This is because Islamic credit finance possesses mainstream attributes such as contractual profit and legal charge on asset purchase. Besides, the paper also finds that IBs are relatively more efficient than mainstream banks in Malaysia.

In the case of Pakistan, Moin (2008) investigates the performance of IB and conventional banks for the period 2003-2007. The author finds that IB is less profitable, less risky, and less efficient rather than conventional banks. There is no significant difference in term of liquidity between the two types of banks. Nonetheless, the findings on this study only belong to one Islamic bank (Meezan bank) and have a very limited sample size, therefore, cannot be applied to IBs in others region. Another study conducted by Beck et al. (2013) examines the business model, efficiency, asset quality, and stability of IBs and conventional banks across 22 countries. They find that the business orientation of IBs is significantly different from conventional banks since IBs are better capitalised, have higher asset quality, and less cost-effective. In contrast, Chong & Liu (2009) find that IBs are not different from conventional banks on the light of profit-loss sharing (PLS). In Malaysia, IBs allow using non-PLS modes that are permissible under the shariah principle. The returns on Islamic deposits are highly correlated to the return on the conventional counterpart. The similar line of research by Charap & Cevik (2011) argue that the return on IBs seems not so much different to the return on conventional and statistically significant in the case of Malaysian and Turkish IBs.

Another research by Yudistira (2004) concludes that in most cases IBs are more efficient than conventional banks. Particularly, small and medium IBs are less efficient and encouraged to be merger due to economies of scale. He also reports that IBs in Middle-East is less efficient compared to the outside region. Sufian (2009) states that MENA IBs have higher technical efficiency compared to Asian Islamic banks. In Indonesian, Firdaus & Hosen (2013) find that IBs do not reach the optimum level of efficiency.

3. DATA & METHODOLOGY

3.1. Data

All data to construct the indicators for bank-specific characteristics and performance of IBs are sourced from Orbis Bank Focus database from Bureau Van Dijk Company[6]. The oil prices and macroeconomic variables are retrieved from the World Bank website. We include 81 Islamic banks from Muslim countries. Our dataset spans from 2006 until 2015.

[6] Orbis Bank Focus is a new banking database product from Bureau Van Dijk Company since 1 January 2017. Previously, it was known as BankScope database. As of 1 January 2017, BankScope is no longer available.

Table 1: Description of variables & source of data

Symbol	Variables	Source
(P)	**Bank Performance: Dependent variable**	
P_ROA	Return on assets (ROA)	Orbis Bank Focus
(O)	**Oil Revenue**	
O_OIL	Oil rents as % of GDP	World Bank
(B)	**Bank-specific characteristics**	
B_SIZE	Size: Log of total assets	Orbis Bank Focus
B_CAP	Capitalization: Ratio of equity to total assets	Orbis Bank Focus
B_LIQ	Liquidity: Ratio of loans to total assets	Orbis Bank Focus
B_ASQUL	Asset quality: impaired loans to gross loans	Orbis Bank Focus
B_EFF	Efficiency: cost to income	Orbis Bank Focus
B_CRE	Credit risk: Loan loss provision to total assets	Orbis Bank Focus
(M)	**Macroeconomic variables**	
M_INF	Inflation: CPI	World Bank
M_ECGR	Economic growth: Real GDP growth	World Bank
M_CON3	Concentration: assets of 3 banks to total banking assets	World Bank
M_PCRB	Banking sector development: private credit by banks as % of GDP	World Bank

3.2. Methods & Empirical Model

3.2.1. Static and Dynamic Panel Estimations

A panel regression can be categorized into two major structures, that is (i) static panel, and (ii) dynamic panel regression. In static panel regression, one could estimate the coefficients in the model specification based upon 'random effect' (RE) estimator and 'fixed effect' (FE) estimator (Baltagi, 2008). Under the dynamic panel, the coefficients could be predicted through the 'generalized method of moments' (GMM) and 'seemingly unrelated regressor' (SUR). In this regard, this study does not employ SUR estimator since the panel data used is relatively short. Based on the rule, the SUR is based on a larger number of periods, that is, T that approaches infinity compared to the number of cross-sections. The FE is the preferred estimator because the RE probably can be invalid or inconsistent estimator when several regressors are associated with the unobserved heterogeneity effect. Nonetheless, this FE model cannot compute the time-invariant coefficients.

Arellano & Bond (1991) provide seminal work to solve the presence of endogeneity problem in panel data. They proposed using a dynamic panel estimator based on the Generalized Method of Moments (GMM) estimation that effectively uses the linear moment restrictions implied by a dynamic panel model. The dynamic GMM estimator is primarily an instrumental variable estimator that uses lagged value of all endogenous regressors as well as lagged and current values of all strictly exogenous regressors as their instruments. Equations can be estimated through the level or first differences of variables. Moreover, Arellano & Bond (1991) proposed two estimators, that is one-step and two-step estimators.

The one-step estimator, also known as first-differenced GMM, use the difference of each variable for both dependent and independent variables in the regressions and create instrument variables from the lagged levels of the independent variables. These lagged levels could be a weak instrument if there is a presence of serial correlation in the error term. Because of this, the first difference GMM might give inconsistent or even biased estimators. To solve this problem, Arellano & Bover (1995) were introduced the system GMM. This system GMM, to a certain extent, can provide efficient and consistent estimators, especially when the period is smaller than the number of cross-sections. There are two types of simultaneous equations in the System GMM, namely (i) equation in levels that comprise the lagged difference of the dependent variable as an instrument, (ii) equation in a first difference that contains the lagged levels of dependent variables as instruments. With regard to time-invariant variables, the system GMM take out the effect of time-invariant variables in first difference but estimates in levels.

The instrumental variables are essentially the lagged variables among the explanatory variables in the GMM estimation. It is unlikely that this lagged variable would be associated with the unobserved heterogeneity effect. Thus the dynamic panel regression solves the presence of endogeneity problem. For this reason, this study opts for the dynamic panel regression as it is a more robust, unbiased and efficient estimator, and particularly in solving endogeneity problem in a panel data. This study employs the system Generalized Method of Moments (GMM) estimator proposed by Arellano & Bover (1995) and Blundell & Bond (1998), which is viewed to be superior in dealing with dynamic panel modelling[7]. Blundell and Bond (1998) show that the system GMM has relatively small variances and more consistent and efficient, hence improving the precision in the estimator. On top of that, the dynamic panel based on GMM addresses the problems of endogeneity, heteroscedasticity, and autocorrelation in the panel data.

It is also important to note some necessary assumption before proceeding with the GMM estimator. The premise that there is no second-order serial correlation in the first differences of the error term is needed. To produce efficient and consistent estimates, the GMM estimator requires that assumption be satisfied. Having the instruments as lagged variables, the existence of second-order correlation in the model will render such instruments invalid. As for the specification tests, the GMM estimator uses the Sargan test of over-identifying restrictions and the test of lack of residual serial correlation. As the Sargan test is based on the sample analogue of the moment conditions, it can use to determine the validity of determinacy assumption, endogeneity, and exogeneity.

This study uses both difference and system GMM to examine the impact of oil rents nad bank-specific characteristics on performance of IBs. The equation for both difference and system GMM can be written as follows:

$$ROA_{it} = \alpha_i + \beta 1\, ROA_{it-1} + \beta 2\, OIL_{it} + \beta 3\, X_{it} + \beta 4\, Z_{it} + \varepsilon_{it} \quad (1)$$

$$\varepsilon_{it} = \mu_{it} + \nu_{it} \quad (2)$$

Where:

ROA_{it} = The return on assets of Islamic bank *i* in period *t*

[7] According to Baum (2006), the system GMM estimator can solve the important issues concern like fixed effects, endogeneity problem, and avoiding panel bias. In this regard, we use the system GMM since this model can handles our modeling concern with regard to fixed effect. As we discussed earlier, the static panel based on fixed effect (FE) estimator cannot predict the time invariant coefficients such as individual banking system used in the model of this study. Specifically, two-step system GMM can predict the time-invariant coefficients.

ROA_{it-1}	=	The lagged of return on assets
α	=	A scalar
OIL_{it}	=	Oil rents as % of GDP
X_{it}	=	A vector of bank-specific variables
Z_{it}	=	A vector of macroeconomic variables
ε_{it}	=	A random error term which consists of two components
μ_{it}	=	The unobservable time-invariant individual or bank-specific effects
ν_{it}	=	The remainder disturbance

3.2.2. *Quantile Regressions*

Quantile Regression is firstly introduced by Bassett & Koenker (1978) to transform a conditional distribution function into a conditional quantile function by disaggregating it into different segments. Each segment show the cumulative distribution of dependent variable *Y* given the independent variables *X* across each quantile. Quantile Regression is more robust to non-normal errors and outliers, while OLS can be inefficient if the error terms are highly non-normal. Quantile regression provides a richer characterisation of the data, enable us to examine the impact of a covariate on the entire distribution of *Y*, not its conditional mean. Assuming that θ quantile of the conditional distribution of explanatory variables. The conditional quantile regression can be written as follows.

$$Y_i = X'_i.\ \beta_0 + \mu_{\theta i}$$
$$Quant_{\theta}(y_i \mid x_i) = \inf \{y : F_i(y|x)\ \theta\} = x'_i.\ \beta_0$$
$$Quant(\mu_{\theta i} \mid x_i) = 0$$

where $Quant_{\theta}(y_i \mid x_i)$ represents the θ conditional quantile of Y_i. β_0 is the coefficient estimates. $\mu_{\theta i}$ is the disturbance terms.

4. FINDINGS AND DISCUSSION

4.1. Preliminary Analysis

Table 2 exhibits descriptive statistics of bank performance, oil rents, bank-specific characteristics of IBs, and macroeconomic factors. In particular, the table presents the number of observations, mean, standard deviation, minimum, and maximum figures for each of the indicators from GCC and ASEAN countries. On average, the ROA of 53 IBs in this study is 0.84%. We observe that IBs in the sample have a high level of liquidity ratio with 52.87%. IBs have higher capitalization with the capital ratio of 29.11% and have lesser non-performing loans with the proportion of impaired loans to total gross loans of 6.7%.

Similarly, the credit risk is relatively low with the ratio of loan-loss provisions to total assets of 0.7%. However, IBs have greater cost-inefficient indicating that IBs are less efficient. This is basically in line with the results of Beck et al (2013) suggesting that IBs have higher capitalization, better asset quality, but less efficient compared to conventional banks. Presumably, these internal characteristics of IBs might help them to withstand the oil price shocks.

Table 2: Descriptive Statistics

Variables	Obs	Mean	Std.Dev	Min	Max
Bank Performance					
Return on assets (ROA)	598	0.84	6.68	-45.31	35.10
Oil Revenue					
Oil rents as % of GDP	810	20.24	17.17	0.59	59.61
Bank-specific characteristics					
Bank Size	690	14.61	1.68	9.40	18.25
Capitalization	601	29.11	28.19	-1.90	99.92
Liquidity	633	52.87	22.88	0.42	125.70
Efficiency	565	71.23	91.69	10.09	950.00
Assets quality	396	6.77	12.47	0.00	100.00
Credit risk	574	0.70	2.51	-27.59	34.10
Macroeconomic factors					
Inflation	820	3.85	10.03	-26.81	33.75
Economic growth	820	4.92	4.16	-7.08	26.17
Private credit by banks as % of GDP	820	66.84	28.26	23.87	125.17
Concentration (3 banks)	497	77.56	13.34	45.48	92.49

Source: own contribution

Table 3 presents the pairwise correlation coefficients among the variables in this study. Based on the pairwise correlation matrix, it is interesting to highlight that there are both positive and negative correlations between oil rents, bank-specific characteristics, macroeconomic factors, and performance of IBs.

The result suggests that oil rents might have a positive association with IBs profitability. Subsequently, when we examining the association of each bank-specific characteristics, the result indicates that performance has a significant positive correlation with bank size and liquidity. Whereas, efficiency, asset quality, and credit risk have a significant and negative correlation with the IB performance. As for macroeconomic factors, inflation and economic growth appear to have a significant positive correlation with IBs profitability, while private credit and market concentration have a significant negative association.

Table 3: Pairwise Correlation

	p_roa	o_oil	b_siz	b_cap	b_liq	b_eff	b_asqul	b_cre	m_infc	m_ecgr	m_pcrb	m_con3
p_roa	1											
o_oil	0.0488	1										
b_siz	0.0927*	0.1050*	1									
b_cap	-0.0314	0.2046*	-0.6692*	1								
b_liq	0.1754*	-0.2302*	0.2790*	-0.3705*	1							
b_eff	-0.5393*	0.0967*	-0.3211*	0.3061*	-0.3164*	1						
b_asqul	-0.4174*	0.1545*	-0.3261*	0.2816*	-0.5245*	0.3226*	1					
b_cre	-0.3680*	-0.0724	-0.1038*	0.1082*	-0.0513	0.1174*	0.1179*	1				
m_infc	0.1342*	0.1310*	-0.0800*	0.0136	-0.0073	-0.0850*	0.0221	-0.0241	1			
m_ecgr	0.2447*	-0.1050*	-0.0333	0.0784	0.0745	-0.1615*	-0.0894	-0.0675	0.4293*	1		
m_pcrb	-0.1092*	-0.2991*	0.1250*	-0.2505*	0.0355	-0.0246	-0.0458	-0.0052	-0.3196*	-0.2535*	1	
m_con3	-0.1274*	0.0109	-0.3235*	0.1663*	-0.3266*	0.1534*	0.2099*	0.0212	-0.0672	0.1095*	0.1004*	1

Source: own contribution

4.2. *Empirical Findings*

In the static model, we run several post-estimator selection process to select the proper and efficient model. At first, we run the Breusch-Pagan Lagrange Multiplier (BPLM) test on the pooled model. The p-value is greater than 5%, meaning that the null hypothesis of no unobserved effects was rejected. Thus, the use of Pooled-OLS is not appropriate. In other words, the use of fixed effect (FE) and random effect (RE) method lie ahead. Next, to choose between the FE and RE and find a proper panel estimation technique, we use the Hausman test. The p-value of the Hausman test is below alpha 5%, therefore, the use of FE estimator is more efficient, *vice versa*. Table 4 shows the results of the estimator selection which include the BPLM and Hausman test.

Table 4: Estimator Selection

	FE	RE
BPLM test		0.0365**
Hausman test	0.000***	

Notes: ***, **, * significant at 1%, 5%, and 10% alpha respectively

Having selected the estimator selection process, this study opts FE in a static panel model. Table 5 presents the results for the baseline specification for both static and dynamic panel models. We report two FE models in the table; model (1) only uses only bank-specific characteristics, while model (2) uses both bank-specific and macroeconomic factors. The result of FE estimator in the model (1) and (2) shows that oil rent, capitalization, efficiency, and credit risk have a significant impact on the performance of IBs in all samples. Meanwhile, bank size, liquidity, and asset quality have no significant relationship with the profitability of IBs.

Table 5: Baseline Results: Fixed Effect and Dynamic GMM Models

Variables	**Fixed Effect (1)**	**Fixed Effect (2)**	**Difference GMM (3)**	**System GMM (4)**
Oil rent	0.066***	0.065*	0.048*	0.042**
	[0.02]	[0.04]	[0.09]	[0.02]
Bank-specific characteristics				
Size	-0.388*	-0.797	0.300	-0.043
	[0.23]	[0.49]	[1.34]	[0.29]
Capitalization	0.053***	0.064*	0.091	0.002
	[0.02]	[0.03]	[0.06]	[0.02]
Liquidity	0.004	0.007	0.023	-0.026
	[0.01]	[0.02]	[0.03]	[0.02]
Efficiency	-0.069***	-0.077***	-0.074***	-0.070***
	[0.00]	[0.01]	[0.02]	[0.02]
Assets Quality	-0.050**	-0.031*	0.055	0.013
	[0.02]	[0.03]	[0.08]	[0.03]
Credit risk	-1.112***	-1.148***	-0.928*	-1.136**
	[0.15]	[0.25]	[0.53]	[0.45]
Macroeconomic factors				
Inflation		0.01	-0.015	0.006
		[0.01]	[0.04]	[0.04]
Economic growth		-0.04	0.038	0.057
		[0.05]	[0.22]	[0.17]
Private credit by banks as % of GDP		0.07*	0.185**	0.047***
		[0.02]	[0.09]	[0.02]
Concentration		-0.005*	-0.029*	-0.087***
		[0.03]	[0.09]	[0.03]
L.ROA			0.079**	0.080**
			[0.03]	[0.03]
Constant	9.141**	14.443*		10.331
	[3.72]	[7.63]		[6.99]
Year Effect	No	No	Yes	Yes
Observations		174	123	174
No. of instruments			23	28
No. of groups			41	47
Arellano-Bond: AR(1)			0.903	0.396
Arellano-Bond: AR(2)			0.206	0.202
Hansen test (p-val)			0.530	0.309

Notes: ***, **, * significant at 1%, 5%, and 10% alpha respectively
Standard error in brackets [ ]
Source: own contribution

The findings of a static panel reveal that capitalization has a positive relationship with IBs performance. This is affirmed the prior researches by Chowdhury et al (2016), Kosmidou (2005) who posit that better-capitalized banks have lower bankruptcy costs, hence lower cost of funds, resulting in higher performance. The coefficient of efficiency and asset quality show negative and significant signs. As we expected, the negative relationship prevails between inefficiency and profitability of IBs. A higher level of operating costs includes administrative and fixed costs, such as salaries and property expenses, reducing the profitability of IBs. The negative sign of asset quality implying that a higher level of impaired loans to gross loans puts pressure on the profitability of IBs. Credit risk, as measured by the loan-loss provision to total asset, has a negative and significant relationship with IBs profitability. This is indicating that IB with higher exposure to credit risk is likely to have a lower profitability level. As mentioned by Berger (1995), bad management of banks causes a higher credit risk level, therefore tend to exhibit lower performance. It is also to be noted here that the coefficient of bank size is negatively significant, whereas liquidity has no significant relation with the profitability of IBs.

Next, moving to the crux of this research, we find that oil rent has a positive and significant relationship with IBs performance. The oil rents exert not only direct but also an indirect impact on the profitability of IBs through macroeconomic variables (see model 2). In model (2), both private credits by banks appears to be positively associated with profitability of IBs while market concentration is negatively associated. Economic growth seems to have no significant relationship with IBs profitability. This is probably due to the measure of oil rents has already absorbed this effect.

In dynamic models, we use both difference and system GMM (see column 3 and 4). The specification tests show the appropriation of the GMM estimators in the model (3) and (4). The null hypothesis of no first-order autocorrelation (AR1) is rejected for both difference and system GMM. What is more important in dynamic GMM is the second-order autocorrelation. The serial correlation test (autocorrelation test) does not reject the null of second-order autocorrelation (AR2). Eventually, the residual of level equation (prior differencing) does not suffer from the autocorrelation problems. The Hansen test of over-identification restrictions examines the validity of instruments. For all cases, the validity of instruments is never rejected, indicating that the models are well specified. Therefore, both Hansen and autocorrelation tests tend to affirm the model estimated using the GMM estimation approach.

Based on the difference and system GMM analysis in the model (3) and (4), our result shows that inefficiency (the cost to income) and credit risk have a significantly negative impact on IBs performance. This is confirmed the results of the static panel model. The significant coefficient of inefficiency indicating that IBs management quality is a crucial determinant influencing the performance of IB. The higher the level of inefficiency, the higher is bank operating costs that absorbing the profitability of IBs. A higher level of credit risk gives pressure on the profitability of IBs. Asset quality, as measured by impaired loans to gross loans, yielded mixed results. There is a positive impact on profitability using FE static model, but for GMM it is a negative impact. It is said that IBs may have insufficient loan-loss provision due to the weak association of asset quality on profitability. However, the coefficient of asset quality is not statistically significant for both difference and system GMM. Similarly, we find no evidence for the significance of size, capitalization, and liquidity to IBs performance. This is consistent with the findings of Nagayev (2017) and Petria et al (2015). As mentioned by Petria (2015), bank size and capitalization can significantly influence the ROE only, whereas in this study we use ROA to measure the profitability of IBs.

Bringing in the impact of external factors on IBs performance, we observe that market concentration is negatively associated with the profitability of IB. Market concentration, as measured as total assets of the three largest banks to total banking assets, is unlikely to put pressure on returns of IBs. This is similar to previous results conducted by Petria et al (2015) and Nagayev (2017). The growth of private credit, which reflects banking sector development, is positively related to IBs performance. As mentioned by Tan & Flores (2012), the higher level of credit, more liquidity is available for the banks, therefore positively affecting the bank's profitability. Inflation and economic growth are not related to IBs performance, perhaps due to the measure of oil rents absorbed this effect.

Our focus variable (oil rents) positively determines the IBs profitability. However, only 4.2% to 4.8% of the IBs profitability react directly to the changes in oil prices. The positive impact between oil rents and IBs profitability, presumably, can be explained due to high exposure of IBs to construction and household sectors; personal financing and mortgages (Nagayev, 2017). The higher the income stems from oil production, the more increase in the prices of real estate, therefore affecting the profitability of IBs. This result is in line with Hesse and Poghosyan (2009) argue that investment banks benefit the most from the boost in economic activities due to the favourable oil price shocks.

4.3. *Robustness Tests*

To have a clear picture whether oil rents affecting the relationship between macroeconomic factors and IBs performance, we introduce the interactive terms of oil rents with the macroeconomic factors such as inflation, economic growth, private credit, and market concentration. Table 6 shows the result of the indirect effect of oil to performance.

Table 6: Indirect effect between oil rents and performance.

Variables	**Difference GMM**	**System GMM**
l rent	0.462*	0.609*
	[5.82]	[0.45]
Bank-specific characteristics		
Size	0.711	-0.525
	[1.82]	[0.53]
Capitalization	0.337	-0.012
	[0.68]	[0.03]
Liquidity	0.038	-0.085***
	[0.07]	[0.03]
Efficiency	-0.099**	-0.103***
	[0.12]	[0.02]
Assets Quality	0.184	0.032
	[0.68]	[0.10]
Credit risk	-1.229	-0.749
	[1.06]	[0.76]
Macroeconomic factors		
Inflation	0.285	0.099
	[1.17]	[0.17]
Economic growth	1.46	0.323
	[5.84]	[0.28]
Private credit by banks as % of GDP	0.034	0.06
	[0.71]	[0.07]
Concentration	-0.351	-0.137
	[1.79]	[0.15]

Interactive terms		
Oil x Inflation	0.007	0.004
	[0.03]	[0.00]
Oil x Economic Growth	0.038	0.022***
	[0.12]	[0.01]
Oil x Private Credit	0.003*	0.009***
	[0.03]	[0.00]
Oil x Concentration	-0.028*	-0.014**
	[0.08]	[0.01]
Constant		4.074
		[15.16]
Observations	123	174
No. of instruments	17	28
No. of groups	41	47
Arellano-Bond: AR(1)	0.683	0.059
Arellano-Bond: AR(2)	0.637	0.277
Hansen test (p-val)	0.219	0.67

Notes: ***, **, * significant at 1%, 5%, and 10% alpha respectively
Standard error in brackets [ ]
Source: own contribution

First, we focus on interactive terms of oil rents. We include each macroeconomic factors and its interaction with the oil rents into the baseline model. We start with the interaction between oil rents and inflation. The coefficient of this interactive oil x inflation is not significant. Therefore, oil rent has no significant impact in affecting the relationship between inflation and IB performance. Further, we observe that increasing oil rents amplified the relationship between private credit and profitability, as indicated by the positive and significant coefficient of oil x private credit. The negative relationship between market concentration and IBs performance is amplified as the oil rents increase. As for economic growth, the results yielded mixed-results. There is a positive and significant impact of oil rents on this link using system GMM, but for difference GMM is not substantial.

These results suggest that some macroeconomic factors have indirect channels in affecting the linkage between oil revenue and IBs profitability. A total of 46% to 60% of the IBs profitability react indirectly to the change in oil prices through macroeconomic factors. In short, the performance of IBs is likely to be influenced by oil rents through the impact of private credit and concentration.

Table 7: Quantile Regressions

Variables	OLS	Q20	Q40	Q60	Q80
Oil rent	0.003	0.003	0.002	0.017	0.09*
Bank-specific characteristics					
Size	0.111*	0.288*	0.232	-0.077	-0.287
Capitalization	-0.011	-0.003	-0.001	-0.006	-0.015
Liquidity	-0.029*	-0.012	-0.027	-0.016	-0.032
Efficiency	-0.077***	-0.044***	-0.053***	-0.060***	-0.068
Assets Quality	-0.006	-0.029	-0.027	-0.008	0.027
Credit risk	-0.953***	-0.805***	-0.726***	-0.968***	-1.014***
Macroeconomic factors					
Inflation	0.003	0.003	0.006	0.003	-0.001
Economic growth	0.011*	0.062*	0.049	0.009	0.022
Private credit	-0.010	0.000	0.002	-0.008*	-0.007*
Concentration	-0.022*	-0.012*	-0.016*	-0.011*	-0.031
Constant	11.034	0.301	3.242	8.156	14.002

Notes: ***, **, * significant at 1%, 5%, and 10% alpha respectively

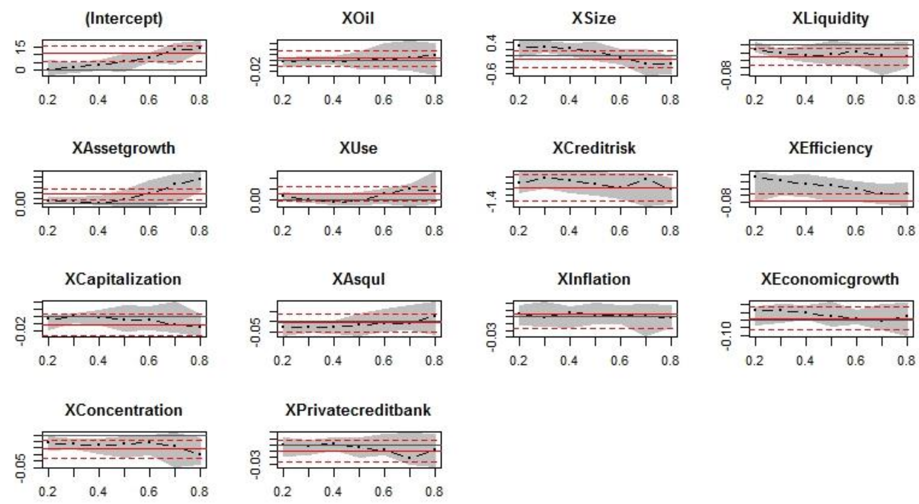
Aside from that, this study also employs the quantile regression for robustness test. Table 7 presents the result of the quantile regression model for the impact of oil rents, bank-specific, and macroeconomic variables on the IBs performance at different percentiles. For comparison, the OLS estimation is also presented. We notice that the results of quantile regressions vary at different percentiles, except for credit risk. Both OLS and quantile regressions indicate a negative and significant impact of credit risk and profitability of IBs. This linkage is also consistent at different percentiles. Similarly, the coefficient of efficiency is negatively and significantly related to IBs performance under OLS and quantile regressions, except at 80 percentiles.

Based on OLS estimation, bank size has a positive and have a significant impact on IBs performance. However, this link is found to be significant at 20 percentiles only. As for the liquidity, the results also differ between

OLS and quantile estimation. The coefficient of liquidity is found to be significant only at OLS estimation, whereas quantile regressions show no meaningful relationship. Further, we find no substantial evidence of capitalization and asset quality for both OLS and quantile estimations. As for macroeconomic variables, both OLS and quantile regressions also yielded mixed results. We notice that market concentration has a negative and significant relationship with IBs performance for both OLS and quantile, except at 80 percentiles. Meanwhile, private credit has a different impact on performance across different percentiles.

Moreover, the coefficients of quantile regressions are plotted as lines varying across different percentiles. If the quantile coefficient is beyond the OLS confidence interval, it is implying that there are significant differences between quantile and OLS estimations. Figure 2 shows the OLS and quantile regression estimates of each variable.

Figure 2: OLS vs Quantile Regressions across different variables



According to Figure 2, most of the variables (oil rents, bank-specific, and macroeconomic factors) are plotted within the confidence intervals, except for size, efficiency, capitalization, and inflation. We also observe that oil rents, asset quality, efficiency, private credit, and market concentration vary at different percentiles. For example, oil rent is found to be insignificant at 20 and 40 percentiles, however, it becomes significant at higher percentiles (80 percentiles). Whereas, efficiency has significant coefficient at the 20, 40, and 60 percentiles, however, it becomes insignificant at 80 percentiles.

5. Conclusion and Policy Recommendations

We examine the impact of oil rents and bank-specific characteristics on the performance of IBs. Using the Dynamic GMM as baseline results and bank-level panel data set of 81 IBs from 2006-2015, we find that oil rent has a significant and positive determinant of IBs profitability in Muslim countries. However, only 4.2% to 4.8% of the IBs profitability react directly to the changes in oil prices. Next, we also observe that some macroeconomic factors have indirect channels in affecting the linkage between oil revenue and IBs profitability. A total of 46% to 60% of the IBs profitability react indirectly to the change in oil prices through macroeconomic factors, particularly private credit and market concentration. Private credit is negatively related to IBs performance and this relationship is amplified as the oil rents increases, and oil is likely to mitigate the negative impact of market concentration on IBs performance. As for bank-specific characteristics, we find that efficiency, credit risk, and capitalization have a significant relationship with the profitability of IBs. We find no evidence of significant relationship between bank size and performance.

Our results suggest that oil rent is a significant and positive determinant of IBs profitability in Muslim countries. Therefore, we postulate that the performance of IBs is likely to reduce due to a slumped in oil prices. As mentioned by IFSB (2015), the sharp decline in oil prices might have negative impact on performance and asset quality of IBs. Moreover, our results imply that the importance of monitoring oil prices and its production could help in the formulation of macroprudential policies towards the stability of IB system, particularly in oil-producing countries. As mentioned by Hesse and Poghosyan (2009), the link between bank capitalization and oil revenue can help in reducing the procyclicality of bank lending behaviour.

References

Albassam, B. A. (2015). Economic diversification in Saudi Arabia: Myth or reality? *Resources Policy*, *44*, 112-117.

Ahmad, N.H. and Ahmad, S.N. (2004), Key Factor Influencing Credit Risk of Islamic Bank: A Malaysian Case, http://staf.uum.edu.my/shahrul/kuim%20paper-30-1-04(nha).pdf

Al-Jarrah, I. & Molyneux, P. (2003) *Efficiency in Arabian banking*. Paper presented at the International Seminar on Islamic Wealth Creation, University of Durham, UK.

Al-Khouri, R. (2012). Bank characteristics and liquidity transformation: The case of GCC banks. *International Journal of Economics and Finance*, *4*(12), 114-120.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), 277–297.

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, *68*(1), 29–51.

Ariff, M., Bader, M. K., Hassan, T., & Shamsher, M. (2009). Financial performance of Islamic banks versus conventional banks: International evidence.

Arouri, M. E. H., Lahiani, A., & Nguyen, D. K. (2011). Return and volatility transmission between world oil prices and stock markets of the GCC countries. *Economic Modelling*, *28*(4), 1815-1825.

Arouri, M. E. H., Jouini, J., & Nguyen, D. K. (2012). On the impacts of oil price fluctuations on European equity markets: Volatility spillover and hedging effectiveness. *Energy Economics*, *34*(2), 611-617.

Asma, Asari, F., and Taufik, N., (2011), “Determinant of Islamic Banking Institutions’ profitability in Malaysia”, *Word Applied Sciences Journal*

Asutay, M., & Izhar, H. (2007). Estimating the profitability of Islamic banking: evidence from bank Muamalat Indonesia. *Review of Islamic Economics*, *11*(2), 17-29.

Baltagi, B. (2008). *Econometric analysis of panel data*. John Wiley & Sons.

Bashir, A. H. M. (2003). Determinants of profitability in Islamic banks: Some evidence from the Middle East. *Islamic economic studies*, *11*(1).

Bassett Jr, G., & Koenker, R. (1978). Asymptotic theory of least absolute error regression. *Journal of the American Statistical Association*, *73*(363), 618-622.

Bittencourt, M. (2011). Inflation and financial development: Evidence from Brazil. *Economic Modelling*, *28*(1), 91-99.

Beck, T., Demirgüç-Kunt, A., & Merrouche, O. (2013). Islamic vs. conventional banking: Business model, efficiency and stability. *Journal of Banking & Finance*, *37*(2), 433–447.

Berger, A. N. (1995). The relationship between capital and earnings in banking. *Journal of money, credit and Banking*, *27*(2), 432-456.

Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of econometrics*, *87*(1), 115-143.

Boyd, J. H., Levine, R., & Smith, B. D. (2001). The impact of inflation on financial sector performance. *Journal of monetary Economics, 47*(2), 221-248.

Charap, J., & Cevik, S. (2011). The Behavior of Conventional and Islamic Bank Deposit Returns in Malaysia and Turkey. *IMF Working Papers*, *11*(156), 1.

Chong, B. S., & Liu, M.-H. (2009). Islamic banking: Interest-free or interest-based? *Pacific-Basin Finance Journal*, *17*(1), 125–144.

Chowdhury, M. A. F., Haque, M. M., & Masih, M. (2016). Re-Examining the Determinants of Islamic Bank Performance: New evidence from Dynamic GMM, Quantile Regression and Wavelet Coherence Approaches. *Emerging Markets Finance and Trade*, *938*

Dehesa, M., Druck, P., & Plekhanov, A. (2007). Relative price stability, creditor rights, and financial deepening.

Dietrich, A., & Wanzenried, G. (2014). The determinants of commercial banking profitability in low-, middle-, and high-income countries. *The Quarterly Review of Economics and Finance*, *54*(3), 337-354.

El-Gamal, M. A., & Inanoglu, H. (2005). Inefficiency and heterogeneity in Turkish banking: 1990–2000. *Journal of Applied Econometrics*, *20*(5), 641-664.

Firdaus, M. F., & Hosen, M. N. (2013). Efisiensi bank umum syariah menggunakan pendekatan two-stage dat envelopment analysis. *Bulletin Ekonomi Moneter Dan Perbankan*, *16*, 167–188.

Gylfason, T., & Zoega, G. (2006). Natural resources and economic growth: The role of investment. *The World Economy*, *29*(8), 1091-1115.

Hassan, M.K., & Bashir, A.H.M. (2003). Determinants of Islamic Banking Profitability. Paper presented at the *Economic Research Forum (ERF) 10th Annual Conference*, 16th-18th December 2003, Marrakech: Morocco.

Hesse, H., & Poghosyan, T. (2009). *Oil Prices and Bank Performance: Evidence from Major Oil-Exporting Countries in the Middle East and North Africa* (Vol. 9, p. 227). Working Paper.

Ibrahim, M. H., & Ahmed, H. J. A. (2014). Permanent and transitory oil volatility and aggregate investment in Malaysia. *Energy policy*, *67*, 552-563.

IFSB (2015). *Islamic Finacial Services Industry Stability Report* 2015. Islamic Financial Services Board. Kuala Lumpur.

Kok, Y. T., Tan, S. Y., Yong, M. S., & Tan, K. W. (2012). *The determinants of Islamic banks profitability in Malaysia* (Doctoral dissertation, UTAR).

Kosmidou, K., Tanna, S., & Pasiouras, F. (2005). Determinants of profitability of domestic UK commercial banks: panel evidence from the period 1995-2002. In *Money Macro and Finance (MMF) Research Group Conference* (Vol. 45, pp. 1-27).

Kurronen, S. (2015). Financial sector in resource-dependent economies. *Emerging Markets Review*, *23*, 208-229.

Moin, M. S. (2008). Performance of Islamic banking and conventional banking in Pakistan: a comparative study.

Nagayev, R. (2017). Oil Revenue and Financial Development: The Role of Institutions (Doctoral Dissertation, INCEIF, Malaysia)

OPEC (2016). Annual Statistical Bulletin 2016. *Organization of Petroleum Exporting*.

Pasiouras, F., & Kosmidou, K. (2007). Factors influencing the profitability of domestic and foreign commercial banks in the European Union. *Research in International Business and Finance*, *21*(2), 222-237.

Petria, N., Capraru, B., & Ihnatov, I. (2015). Determinants of banks' profitability: evidence from EU 27 banking systems. *Procedia Economics and Finance*, *20*, 518-524.

Rosly, S.A., & Bakar, M.A.A. (2003). Performance of Islamic and mainstream banks in Malaysia. *International Journal of Social Economics*, *30*(12), 1249-1265.

Sachs, J. D., & Warner, A. M. (2001). The curse of natural resources. *European economic review*, *45*(4), 827-838.

Saunders, A., Strock, E., & Travlos, N. G. (1990). Ownership structure, deregulation, and bank risk taking. *the Journal of Finance*, *45*(2), 643-654.

Srairi, S. A. (2009). Factors influencing the profitability of conventional and Islamic commercial banks in GCC countries. *Review of Islamic Economics*, *13*(1), 5-30.

Sufian. (2009). The efficiency of Islamic banks: empirical evidence from the MENA and Asian Countries islamic banking sectors. *Working Paper*.

Tan, A. Y., & Flores, C. (2012). Bank profitability and inflation: The case of China. Journal of Economic Studies, 39(6), 675_696.

Thomson Reuters (2015). *State of Global Islamic Economy Report 2015*. Dubai: Thomson Reuters & Dinar Standard.

Yudistira, D. (2004). Efficiency in Islamic Banking: An emprical analysis of eighteen banks. *Islamic Economic Studies*, *12*(1), 1–19.

Zhang, D. (2008). Oil shock and economic growth in Japan: A nonlinear approach. *Energy Economics, 30*(5), 2374-2390.