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Article

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Academic journal of economic studies

Provided in Cooperation with:
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Reference: Ahmed Rufai Mohammad/Bin Hidthiir, Mohamad Helmi et. al. (2019). Assessing the effect of change in oil prices, macroeconomics on the banking sector stability in oil-producing countries. In: Academic journal of economic studies 5 (4), S. 88 - 93.

This Version is available at:
http://hdl.handle.net/11159/4120

Academic Journal of Economic Studies
Vol. 5, No. 4, December 2019, pp. 88–93
ISSN 2393-4913, ISSN On-line 2457-5836

Assessing the Effect of Change in Oil Prices, Macroeconomics on the Banking Sector Stability in Oil-Producing Countries

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Abstract The paper investigates the effect of oil price change and other cyclical factors on the stability difference of conventional and Islamic banks. The study espouses to two separate stability measurement in order to differentiate the effect of change in oil price on bank stability. The results of the paper provide evidence that oil price change affects the stability of conventional banks better when measured with accounting approach, while the change of oil price affects the banking stability when measured with market-based stability measures. Moreover, the result reveals a positive relationship between banking stability of Islamic banks and GDP coexists with a negative relationship on the conventional banks. It reveals that banking stability is affected by inflation negatively. The findings of this paper have significant policy implication for banking stability in Middle East and other oil-producing emerging countries.

Key words Banking stability, oil price change, conventional banks, Islamic banks, GMM

JEL Codes: G21,G33

Received: 28 September 2019 **Revised: 18 October 2019** **Accepted: 22 October 2019**

1. Introduction

The economic growth and development of oil-exporting states in the Middle East and North Africa are deeply dependent on the recurring change of oil price. In these set of countries, fluctuation of oil price reflected the level of government income and expenditure which also the support the banking sector liquidity reserves (Alodayni, 2016; Effendi, 2019; Kandil and Markovski, 2018; Moshiri, 2015; Omojolaibi, 2014). Following this proposition, any increase in global oil price may have a corresponding positive influence on the economy of oil-exporting states and can improve the stability of their banking sector. The considerable increase of gross domestic product of the 1980s of oil-exporting countries in the Middle East is currently following the same trend with oil price change (Hamilton, 2011; Said, 2015). However, the sharp decrease in universal oil price in the year 2009 and mid-2014 to 2016 has caused a dramatic decrease in economic growth in the countries and also the decrease of oil price has affected the stability of the banking sector through the oil and energy sector bankruptcies forcing a significant number of loan defaults. Several energy firms were on able to repay their debts obligations, invariably because they have to turn down some of their projects that were funded by banks(Frost, 2016; Hesse and Poghosyan, 2016).

Following the account of Hamilton (2011) and Xu and Xie (2015), indicated that the macroeconomic and change in oil price had played a decisive role in affecting the profitability of the banking sector. Indicating that a spike of oil price can increase commercial banks stability by providing much required financial resources for economic progress. The bank return forms a significant part in the computation of banking stability. The stability measurement is Z-score (the sum of return on assets and equity to assets ratio over the volatility of asset return). Contrary to this study, Alqahtani and Mayes (2018) found unrelated findings in the stability banking sector in the GCC region. Their outcome found macroeconomic, and global crude price of oil did not affect banking stability directly.

Meanwhile, the persistent stability of the banking sector heavily relies on cyclical macro factors (Kandil and Markovski, 2018). The reason behind that is all the items used in measuring banking stability are on the asset and liability part of the balance sheet. Following Alodayni (2016) conventional and their peer Islamic banks, both were dramatically affected by the oil price slid. Kandil and Markovski (2018) reported that Islamic banks in the UAE shaded significant revenue part of their revenue par beyond conventional banks. Following these inconsistencies in the literature, our study wishes to profoundly investigate the banking stability of conventional and Islamic banks in oil-exporting countries like Algeria, Bahrain, Kuwait, Qatari, Kingdom of Saudi Arabia (KSA) and United Arab Emirate (UAE). These states are the major hubs of Islamic finance and the major oil exporters among the OPEC countries in the Middle East. The objective is to

determine the effect of change in oil price and macroeconomic attributes on the stability of the banking system. However, the outcome could serve as a guide to researchers and regulators in the Middle East and other oil-exporting countries pursuing an understanding on the effect of change in oil price and other cyclical indicators on banking stability variation between conventional and Islamic banks.

2. Literature review

Change in oil price has every tendency to affect the banking solvency directly through the upsurge in oil-related projects loan packages, oil exploration connected business operations or liquidity reservations. All the set of these oil countries use the combination of conventional and Islamic banking system to run the intermediation process in the economy. The increase in oil prices can have transformed into higher domestic consumption, which leads to a high volume of banking activities, and regular credit repayment rates. Practically, Islamic banks tend to finance most of their operations with sharia products like Sukuk and other sharia related deposits (Poghosyan and Hesse, 2016). Similarly, Effendi (2019) relates Islamic banking liquidity with the bigger change of oil prices, and therefore, such funds could be converted to loans facilities. Thus it is expected that the change in oil price will attract a definite link with banking stability and profitability. On a similar account, Alqahtani and Mayes (2018) using the bank data of 76 GCC state from the year 2000 to 2013, found oil price to affect banking stability z-score adversely. In addition to the change of oil market prices, the cyclical country conditions are also sensitive to have a positive effect on banking stability Z-score. In terms of the cyclical macroeconomic indicators, scholars have reveal a relationship between GDP and inflation on the stability of conventional and Islamic banks (Bustaman *et al*., 2017; Cubillas and Gonzalez, 2014; Ghenimi *et al.*, 2017; Korbi and Bougatef, 2017; Nguyen and Nghiem, 2015; Ozsuca and Akbostanci, 2016; Wahid and Dar, 2016).

3. Methodology of research

3.1. Data source

The information for this paper was sourced from the secondary data of bank business statements of 49 conventional banks and 40 Islamic banks in 6 oil reach courtesies such as Algeria, Bahrain, Kuwait, Qatari, Kingdom of Saudi Arabia (KSA), and United Arab Emirate (UAE). This annual data coverage is from 2008 to 2016. The financial bank data obtained from Bloomberg, while a change of oil price and macroeconomic data from the IMF and World Bank.

3.2. Measurement and variable scales

Despite contradictions on the indicator best to explain of banking stability, previous research centered their investigation on a single measure of banking stability as in (Beck *et al*., 2013; Cihak and Hesse, 2010; Gonzalez, 2017; Ghosh, 2014; Wahid and Dar, 2016). To capture the real impact of the variables, two commonly measures of detecting banking stability are put to test i.e. Probability of default (market-centered stability) and Zscore (Accounting based stability) as in (Kabir *et al*., 2015; Miller, 2009; Zhichao *et al*., 2015). For the Probability to default (PD), we follow the modified KML-Merton model of forwarding intensity developed by (Duan *et al*., 2012).

$$PD = \frac{log\left(\frac{Vt}{D}\right)}{\partial^{\wedge}\sqrt{T-t}} \quad (1)$$

The *VT* denotes the bank value of an asset, *D* is the value of bank liability, *∂^* is the volatility of assets, *Tt* stands as expiration period for a year. The banking stability Z-score is calculated with formula return on assets plus equity to total assets all over the volatility of return assets as in (Beck *et al.*, 2013; Kabir and Worthinton, 2017). To avoid the value of Z-score to truncate to zero, the transformed ln (1+z-score) is used following (Beck *et al*., 2013).

$$Z-score = {Roa + \frac{Eqt}{TA}}/{\delta(Roa)} \quad (2)$$

Where the return on asset is Roa, equity as a percentage of total asset is represented by Eqt, total assets of the bank stand as TA, while the velocity of bank return stand as δ (Roa).

The variable change of oil price is calculated using the formula of an average of 365 rates of growth on US dollar spot (*frt*) proposed by (Hamilton, 2008).

$$Cht = \frac{\sum_{i=1}^{365}[\mathrm{Log}(fr_t) - \mathrm{Log}(fr_{t-1})] \times 100}{365} \quad (3)$$

On the part of the macroeconomic factor, GDP is measured as the sum of total state income, consumption, expenditure minus net state imports. Inflation variable is seen as the index of Laspeyres, calculated as last year price of items multiple by last year quantities over the current year price multiples by the current volume of items.

3.3. Specification of the econometrics model

The model is specification expresses the relationship that exists between the variables:

$$Stability_{ity} = ßoStability_{ity-1} + ß1Oil_{ty} + ß2GDP_{ty} + ß3IF_{ty} + ß4TA_{ity} + ß5ME_{ity} + ß6DI_{ity} + u_t + \varepsilon_{ity} \quad (4)$$

Where stability denotes Z-score and PD measures of banking stability, *Oil* denotes a change in oil price, change in economic growth stand as GDP, *IF* denote inflationary rate, while *TA, ME* and DI are the control variables representing Total asset, managerial efficiency, and diversification of income. u_t signify unobserved parameters $_{ity}$ denote the error terms. While the subscripts (*i, t, y*) denote the banks, set of Middle East countries and period.

3.4 Empirical methodology

This paper uses the Generalized System Method of Moment testing approach. The approach is best used when the cross-sections in the series are higher than the time (Arellano and Bond, 1991). GMM approach exploits the orthogonal factors as an instrument out of the unobserved error terms and is appropriate for dealing with heteroscedasticity in the series in the short run relation (Roodman, 2009).

4. Data analysis

4.1. Descriptive statistics

The preliminary result in Table 1 display that conventional banks on average have a higher Zscore value of (3.41%) when compared to their Islamic peers with (2.72%) based on the mean equality test indicates a significant difference between the banks in terms of exposure to financial instability. The findings are consistent with (Beck *et al*., 2013; Cihak and Hesse, 2010; Korbi, 2017; Sraira, 2013). However, on the part of market stability in Table 2, the conventional banks are also havening higher value of probability to default indicating Islamic banks are more resilient than their conventional peers. The findings are in line with the work of (Kabir *et al*., 2015).

Conventional banks have on the average higher value of lnTA (16.16%) than Islamic banks with (14.97%) although size is not a guarantee to banking instability of conventional banks. These outcomes suggest that conventional banks are large and more prolonged in operation in the region than Islamic banks. Similarly, on the part business diversification, conventional banks appeared to have larger average value than Islamic banks counterparts. Thus Islamic banks have a higher value of managerial efficiency (4.01%) than conventional banks with (3.57%), indicate improvement in the operational quality of Islamic banks in the region compared to the findings of (Beck *et al*., 2013; Johnes *et al*., 2009).

Table 1. Descriptive comparison of conventional and Islamic banks

	Conventional Banks				Islamic Banks			
Variables	**Mean**	**Max**	**Min**	**St.D**	**Mean**	**Max**	**Min**	**St.D**
Z-score	3.41	5.28	-2.47	.875	2.72	5.51	-2.64	1.05
GDP	25.9	27.35	23.86	1.01	25.53	27.35	23.86	1.17
INF	.034	.151	-.047	.032	.032	.151	-.049	.035
Oil	82.39	109.45	40.68	24.84	82.39	109.45	40.68	24.86
lnTA	16.16	19.10	10.37	1.57	14.97	18.27	11.18	1.55
ME	3.57	5.81	2.76	.33	4.01	6.88	2.03	.65
DI	11.67	15.03	0	2.64	8.75	15.97	0	4.61

Table 2. Descriptive comparison of conventional and Islamic banks

	Conventional Banks				Islamic Banks			
Variables	**Mean**	**Max**	**Min**	**St.D**	**Mean**	**Max**	**Min**	**St.D**
PD	2.29	5.09	-3.56	1.33	1.86	5.07	-8.96	2.45
GDP	26.15	27.35	23.86	.942	25.85	27.35	23.86	0.99
INF	.035	.151	-.049	.033	.034	.151	-.049	.031
Oil	82.39	109.45	40.68	24.84	82.39	109.45	40.68	24.86
lnTA	16.95	19.10	14.87	.915	15.56	18.27	11.18	1.46
ME	3.67	4.39	2.76	.26	3.86	6.65	2.13	.59
DI	12.70	15.02	0	1.45	11.39	14.56	0	1.95

5. Regression results

To make a comparison on the level of stability between the conventional and Islamic banks in response to change in oil price and macroeconomic factors. Table 3 present the system GMM result of the relationship between the variables, all the sample countries are oil-producing, and the revenue generated from oil constituted the more significant portion of their income. Using the historical stability measurement (Zscore), a one-dollar increase in oil price leads to 0.003 percent significant increase in banking stability of the combine sample group and 001 percent on the conventional banks. This is because conventional banks finance the oil-related project and make a significant gain in such deals. The finding corroborated with previous findings in Alqahtani and Mayes (2018) for a sample of Gulf Cooperation Council states banks. While the result of Islamic bank reveals no significant relationship between oil price and bank Zscore. However, on the part of market stability measurement, a one-dollar increase in oil price lead to banking stability by 0.002 in the combined sample of banks, 0.001 in conventional banks and 0.04 in Islamic banks. Moreover, the effect of oil on banking stability is more relevant if measured with PD, implying that the probability of default explains Islamic bank stability better than Zscore concerning a change in oil price.

In table 3 a one percent increase in (GDP) in a zscore model will lead to decrease in conventional bank stability by 0.2 percent and a similar increase in GDP will result into 0.1 percent increase in Islamic bank stability. The positive consequence of GDP on the banking stability indicates that Islamic have been able to attain a given level of stability with an increase in volume of economic activities in the countries, which is found challenging for the conventional bank to achieve. This result of Islamic bank is consistent with Ibrahim and Rizvi (2017), while the result of conventional banks corroborated with Cubillas and Gonzales (2014). Though, on the part of PD model a one percent increase in GDP results in to decrease instability of conventional bank and a corresponding increase in the stability of Islamic banks. The result is found consistent with Kabir et al. (2015) from the Islamic bank experience. Therefore, the PD does not reflect any significant difference between conventional and Islamic banks with Zscore model about the impact of GDP.

In the regression equation in table 3, a one percent increase in INF in the Zscore model show a compounding decrease in banking stability in both (conventional and Islamic banks) and the conventional banks in PD model. The decreasing coefficient of INF in both Zscore and market models imply that at the event of a persistent price increase the oil-producing states are unable to preserve stability. The negative effect of INF on banking stability indicates that banking institution is unable project future INF and shuns its destabilizing impacts. More so, the coefficient of INF is stronger on Islamic banks than conventional using historical model, while the coefficient of INF is stronger on conventional banks looking from a market perspective. Our outcomes are consistent with (Kabir *et al*., 2015).

Table 3. System GMM Estimation

Variables	FS Zsore	CB Zscore	IB Zscore	FS PD	CB PD	IB PD
L1. Z-score	0.661***	0.539***	0.652***	0.484	0.342***	1.250***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Oil Price	0.003***	0.001***	0.005	-0.002***	-0.001***	-0.04***
	(0.000)	(0.000)	(0.371)	(0.000)	(0.000)	(0.000)
GDP	0.078***	-0.199***	0.079***	0.039***	0.024***	-2.43***
	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)
INF	-0.311***	-1.623***	-3.744***	2.44***	2.016***	0.104
	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)	(0.924)
LnTA	-0.066***	0.114***	-0.136***	-0.120***	-.0.092***	0.63***
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
ME	0.217***	-0.449***	0.615***	-0.210***	-0.189***	1.41***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DI	0.038***	0.047)***	0.061***	0.001	0.011	0.062
	(0.000)	(0.000)	(0.000)	(0.885)	(0.000)	(3.27)
Cons-	1.622	1.920	0.105	1.588	1.553	-7.047
	(0.000)	(0.000)	(0.879)	(0.000)	(0.000)	(0.000)
Statistics	**Coefficient**	**and**	**Probability**			
Wild Chi2 (13)	56694.07	23966.39	4018.38	18960.83	19674.00	1622.34
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ar2	0.119	0.332	0.102	0.129	0.252	0.248
Hassan J	0.444	0.356	0.487	0.108	0.259	0.489
Year Dummy	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	656	344	312	638	454	184
Group	85	43	39	85	58	27
Instruments	79	38	38	70	55	27

6. Conclusions

The objective of the paper centered on the effect of the oil price change and other cyclical factors on the stability difference between conventional and Islamic banks. While the earlier literature investigated the stability difference using only the accounting measures, this study employs combination of accounting and market-based measures and compares these financial stabilities to the dual banking system. The market-based measures are built on the modified forward intensity KML-Merton model of probability to default, while accounting is built on Zscore. In the study we apply the sample of six oil-producing countries in the Middle Eastern region over the period 2008 to 2016. Following the result, it appeared very challenging to conclude that conventional banks achieved higher stability than their Islamic counterpart. In general, based on the Zscore model, we find change in oil price affects the stability of conventional bank positively. While on the PD model, Islamic are appeared to achieve higher stability than their conventional peers. One of the enormous contributions is demonstrated on the use of measurement of banking stability.

Although oil is the primary source of revenue to the sample countries, we suggest the countries under review to diversify their portfolio towards tourism and technology so that revenue will not be fixated towards the natural endowments. On the stability measurement, policy regulators should employ the use of both sets of measurement in access the financial institution stability to encourage multiple predictions.

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