

Further Exploration of "Oil, Foreign Exchange Swaps and Interest Rates in the GCC Countries"

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In Almaskati (2022) study, it was mentioned that there is a correlation between oil prices, foreign exchange (FX) swaps, and interest rates among the member countries of the Gulf Cooperation Council (GCC).

The possible reasons for the correlation are:

- The majority of their foreign exchange comes from revenue generated by oil exports
- Oil exports constitute a significant portion of GDP and government revenue, and government entities, public investment funds, and sovereign wealth funds
- Those entities are major liquidity providers for local banks

- Amano and Van Norden (1998) observed that the trends in oil prices significantly impact the real exchange rate of the United States.
- Zhang et al. (2008) noted a long-term correlation between oil prices and the US dollar exchange rate, suggesting that it is the US dollar exchange rate that influences oil prices.
- Reboredo, Rivera-Castro, and Zebende (2014) found a long-term contagion effect between oil prices and the US dollar exchange rate, exacerbating the 2008 global financial crisis.
- Eslamloueyan and Kia (2015) discovered that oil prices play a crucial role in determining the real exchange rates of GCC member countries in the long term.

Data description

We extracted the daily closing prices of several financial assets from Datastream during the period from May 2009 to May 2024. The data includes:

- The 3-month FX swaps of GCC countries and euro
- The 3-month interbank offered rates of United Arab Emirates (EIBO3M) and the London (USDL3M)
- The daily closing prices of the 3-month Kuwaiti dinar, Omani rial, Qatari rial, Saudi rial, and United Arab Emirates dirham FX swaps
- Spot and futures commodity prices (oil/gold/gas)
- SP 500 U.S. stock index (SPX) and MSCI Emerging Markets Index (MSCI-EM)

Then we calculated and use the daily returns of these assets.

We regress oil prices, FX swap, local interbank offered rates, SP500, gold prices, and LIBOR using a vector autoregression model (VAR).

The model is as follows:

$$\mathbf{y}_t := (\Delta \log \text{FXswap}_t, \Delta \log r_t, \Delta \log \text{Oil}_t, \dots)^T \in \mathbb{R}^p,$$

$$\mathbf{y}_t = \mathbf{A}_{-1}\mathbf{y}_{t-1} + \mathbf{A}_{-2}\mathbf{y}_{t-2} + \dots + \mathbf{A}_{-k}\mathbf{y}_{t-k} + e_t.$$

Table: Summary Statistics of the Return rates ¹

Name	Mean	Maximun	Minimun	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	ADF	PP
OMR3M	0.000368	4.580394	-3.126833	0.321510	1.127371	33.667119	0.000000	0.000000	0.000000
BHD3M	0.000178	1.471405	-1.590376	0.152445	-0.123410	16.192026	0.000000	0.000000	0.000000
KWD3M	-0.000181	2.921430	-2.821397	0.241882	-0.075060	18.478365	0.000000	0.000000	0.000000
QAR3M	0.000023	5.930881	-5.955600	0.300399	-1.029339	125.294164	0.000000	0.000000	0.000000
SAR3M	0.000030	0.435031	-0.461680	0.025713	0.564578	75.888848	0.000000	0.000000	0.000000
AED3M	-0.000012	0.295667	-0.258926	0.012378	0.727567	171.852696	0.000000	0.000000	0.000000
EUR3M	-0.005693	2.567288	-2.242401	0.527834	0.047230	1.589542	0.000000	0.000000	0.000000
EIBO3M	0.019403	44.497508	-49.061664	4.340056	-0.578778	33.842150	0.000000	0.000000	0.000000
Gold	0.023873	5.133427	-9.596165	0.971210	-0.455444	5.634502	0.000000	0.000000	0.000000
Oil	-0.020409	123.677917	-305.966065	5.886999	-33.463558	1913.033934	0.000000	0.000000	0.000000
MSCI EM	0.011127	5.581817	-6.943303	1.026245	-0.399815	3.778718	0.000000	0.000000	0.000000
SPX	0.045251	8.968316	-12.765214	1.081019	-0.707849	13.183011	0.000000	0.000000	0.000000
USDL3M	0.047995	24.885484	-27.263636	1.702867	-0.801945	48.911574	0.000000	0.000000	0.000000
GAS	-0.032772	38.172675	-69.314718	3.662205	-1.330571	39.500504	0.000000	0.000000	0.000000

¹Jarque-Bera statistic, Augmented Dickey-Fuller (ADF) test, and Phillips-Perron (PP) test for each variable. The Jarque-Bera statistic tests the null hypothesis that the data is normally distributed, while the ADF and PP tests examine the null hypothesis that the data has a unit root.

Table: Correlation of the Return rates

	OMR3M	BHD3M	KWD3M	QAR3M	SAR3M	AED3M	EUR3M	EIBO3M	Gold	Oil	MSCI EM	SPX	USDL3M	GAS
OMR3M	1.000000													
BHD3M	0.064175	1.000000												
KWD3M	-0.004342	0.048295	1.000000											
QAR3M	-0.032026	0.014369	0.021553	1.000000										
SAR3M	0.075297	0.038707	0.016946	0.024471	1.000000									
AED3M	0.073529	0.018838	0.087568	0.002695	0.064088	1.000000								
EUR3M	0.007711	0.010918	-0.202587	0.010328	0.000726	-0.025512	1.000000							
EIBO3M	-0.011979	-0.014450	-0.010113	-0.013793	0.013951	-0.004707	0.021393	1.000000						
Gold	0.037293	0.004764	-0.084953	0.002930	0.003426	-0.016769	0.363884	0.023088	1.000000					
Oil	0.058072	0.036930	-0.018069	-0.002890	0.082453	0.014696	0.049036	-0.000047	0.045790	1.000000				
MSCI EM	-0.000011	-0.000820	-0.064095	-0.016388	-0.003269	0.012727	0.292853	-0.004832	0.210766	0.100368	1.000000			
SPX	0.047305	-0.009077	-0.067865	-0.029824	0.027595	-0.007703	0.162321	-0.009381	0.068460	0.138281	0.453554	1.000000		
USDL3M	0.042462	-0.031377	-0.007134	-0.033063	-0.000350	-0.014125	-0.070792	-0.018465	-0.078611	-0.023823	-0.041639	0.009709	1.000000	
GAS	-0.012172	0.004382	-0.025919	0.024487	0.017694	-0.015924	0.024572	-0.034489	0.000870	0.005898	0.042040	0.070901	-0.025984	1.000000

Table: VAR Model Results($\alpha = 5\%$)²

	OMR3M	BHD3M	KWD3M	QAR3M	SAR3M	AED3M	EIBO3M	Oil	USDL3M
L1.OMR3M	-0.388544	0.026061	0.035832		0.002620			-0.773951	
L1.BHD3M	0.093795	-0.415733							
L1.KWD3M	0.043305		-0.258733			-0.001989			0.320108
L1.QAR3M	0.036584			-0.445284			0.469332		
L1.SAR3M	0.584286	0.256249			-0.428796	0.016081			
L1.AED3M			-1.053435			-0.559541			
L1.EIBO3M	-0.002523						-0.367572		0.027283
L1.Oil								-0.253198	
L1.USDL3M							0.204014		0.132099
L2.OMR3M	-0.092432		0.039735				-0.463412	-1.363542	
L2.BHD3M		-0.171601							
L2.KWD3M	0.048206	0.021473	-0.093834		0.004291				
L2.QAR3M				-0.159426				-0.854648	
L2.SAR3M					-0.239815				
L2.AED3M						-0.285123			
L2.EIBO3M							-0.140055	0.055453	0.012622
L2.Oil	-0.002001		-0.001964		-0.000847			-0.123944	
L2.USDL3M							0.181734		0.208902

²We find that the AIC and BIC results are quite different. The AIC suggests a lag of 9, while the BIC suggests a lag of 2. We choose the lag of 2 as it is more conservative.

Table: Granger Causality Test Results

Variable	Causality direction	Variable	p value
Oil	\rightarrow / \leftarrow	AED3M	0.11/0.67
Oil	\rightarrow / \leftarrow	BHD3M	0.67/0.31
Oil	\rightarrow / \leftarrow	OMR3M	0.00/0.03
Oil	\rightarrow / \leftarrow	QAR3M	0.12/0.48
Oil	\rightarrow / \leftarrow	SAR3M	0.00/0.00
Oil	\rightarrow / \leftarrow	KWD3M	0.03/0.01
Oil	\rightarrow / \leftarrow	EIBO3M	0.48/0.03






The results show that oil prices Granger-cause OMR3M, SAR3M, and KWD3M. The results also show that OMR3M, SAR3M, KWD3M, and EIBO3M Granger-cause oil prices. When we introduce covariates such as other countries' FX swaps into the model, the predictive power of oil prices on FX swaps is reduced or even negligible.

The combined results further imply that the Granger causality relationship between oil prices and FX swaps is biased by the omitted variable, which is the FX swaps of other countries.

Conclusion

- The FX swaps have a significant impact on oil prices, but interest rates do not.
- The FX swaps of these countries, Oman and Qatar, impact oil prices the most.
- The powerful impact of Oman and Qatar's FX swaps on oil prices is a mystery that requires further investigation.

Reference

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