

Financialization of Commodities: the case of the MENA Region

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1. Motivation: Contagion



1. Motivation: MENA Equity Markets and Oil Price Fluctuations

- Financial press has linked the ebbs and flows in equity markets to oil price fluctuations.
- Dependence of the economies of *oil-exporting* countries on the price of oil implies that oil price changes are likely to affect the equity returns in these countries.
- The economies of the Middle East and North Africa (MENA) countries, in particular, have been susceptible to oil price increases and decreases over the last half of the decade.
 - The fluctuations in the price of oil and other energy commodities might directly affect or spill over (i.e., indirectly affect) to the equity returns of MENA countries.

1. Motivation: Stylized features

- A sizeable academic literature scrutinizes the relationship between oil price fluctuations and the equity returns of developed, emerging and Gulf Cooperation Countries' (GCC) markets.
- The academic and practical interest was spurred, in part, by the attention that the 'financialization' debate has garnered in the policy and academic circles.
- Prior to 2008:
 1. Commodity futures, as an asset class, have been known to exhibit a negative correlation with equity and fixed income markets (Gorton and Rouwenhorst, 2006; Bhardwaj, Gorton and Rouwenhorst, 2015)
 2. Cross-commodity correlations have been low (Erb and Harvey, 2006).
- The latter stylized features imply that commodity futures are good diversifiers in a fixed income and equity portfolio.

1. Motivation: Financialization of Commodity Markets

- The testimony of Master's (2008) before the US Senate triggered a reexamination of the stylized features relating to the correlations among commodities as well as the correlation of commodities.
- The salient empirical features appeared to lend initial support to Master's (2008) hypothesis:
 - Cheng and Xiong (2014) note that cross-commodity correlations soared from a pre-2004 average of -0.2 to 0.2 to 0.7 in mid-2008.
 - Tang and Xiong (2012) report an increase in the correlation between energy and non-energy commodities as well as an increase in cross-commodity correlation for the 'indexed commodities'.

1. Motivation: Financialization of Commodity Markets

- Consensus emerging from existing research appears to cast doubt on the 'financialization' view (Stoll and Whaley, 2010, 2011; Fattouh, Kilian and Mahadeva, 2013; Irwin and Sanders, 2012 a,b).
- Existing studies also view the empirical evidence ascribing the increase in cross-commodity and commodity-equity correlations to commodity index trader participation with skepticism (Irwin and Sanders, 2011; Lombardi and Ravazzolo, 2016, Hamilton and Wu, 2015; Irwin, Sanders and Merrin, 2009; Kilian and Murphy, 2014; Kilian and Lee, 2014).
- The reliance of MENA economies on oil revenues or imports implies that, irrespective of 'financialization' of commodity markets, the equity markets of the MENA markets are expected to respond to oil and, more generally, energy price fluctuations

2. Motivation and Contribution

- Building on the work of Zhang, Chevallier, Guesmi (2017), as well as on the modeling approach of Guesmi, Abid, Creti and Chevallier (2018), this paper examines whether fluctuations in the price of oil affects MENA equity market returns.
- We augment the model of Guesmi, Abid, Creti and Chevallier (2018) with gas prices to assess the role of natural gas price fluctuations in dampening or increasing the effects of oil price fluctuations on MENA equity markets.
- This study is the first to examine contagion effects from oil price fluctuations to MENA equity returns.
- Furthermore, it is the first study to assess the role of natural gas price fluctuations in dampening or exacerbating contagion from oil to MENA equity markets.

3. Preview of the Results

- Our results provide strong evidence of contagion effects originating from the US equity markets toward the MENA equity markets.
- Effect becomes evident when considering correlations, in which the comovements with the US are the strongest, and in the contagion results with respect to the US index residuals.
- The role of oil and gas is found to be significant in the variance decomposition and in the dynamic correlations, giving evidence of a factor that can amplify financial contagion, whenever it exists.

4. Related Literature: Volatility Spillovers between Oil Price Fluctuation and MENA or GCC Markets

- The following studies examine volatility transmission between oil to equity markets:
 - Arouri and Nguyen (2010), Aloui, Nguyen and Njeh (2012), Arouri, Jouini and Nguyen (2011; 2012), Hammoudeh, Dibooglu and Aleisa (2004) and Filis, Degiannakis and Floros (2011), Malik and Ewing (2009) provide empirical evidence of significant volatility transmission from energy to equity markets.
 - Arouri, Lahiani and Nguyen (2011) provide evidence of significant volatility spillovers between oil and GCC equity return.
 - Malik and Hammoudeh (2007) show that, with the exception of Saudi Arabia, GCC equity markets are recipients of oil volatility.
 - Jouini and Harrathi (2014) present evidence that volatility interactions among GCC equity markets and oil price fluctuations are more pronounced than first moment interactions.
 - Awartani and Maghyereh (2013) uncover evidence of bi-directional volatility transmission between GCC equity markets and oil price fluctuations.
 - Bouri (2015a) provides evidence that oil volatility transmits to the volatility of the Jordanian equity market.

4. Related Literature: Contagion Effects for MENA and GCC Markets

- Studies examining contagion effects include:
 - Guesmi and Fattoum (2014) measure the conditional correlation between oil price changes and the equity returns of nine countries, three of which are GCC countries.
 - The authors provide evidence of a positive correlation between oil price changes and equity returns which, in turn, suggests that oil is not a “safe haven” investment vis-à-vis equity markets
 - Guesmi *et al.* (2018) measure contagion effects across four geographical regions. The authors report that oil price fluctuations are an important factor that can amplify contagion.

5. Econometric Model and Modeling Strategy

- As in Bekaert et al. (2005), we use a four-factor model with time-varying loadings: the U.S. market return, the oil, gas prices and the regional equity portfolio return.
- We take into account in our framework a local risk source in addition to oil and gas risks.
- We assume that Purchasing Power Parity (PPP) holds and that the U.S. market acts as benchmark for the international market

5. Econometric Model and Modeling Strategy

- The model is given by:

$$r_{i,t} = \underbrace{\delta'_i Z_{i,t-1} + \beta_{i,t-1}^{US} \mu_{US,t-1} + \beta_{i,t-1}^{Oil} \mu_{Oil,t-1} + \beta_{i,t-1}^{Gaz} \mu_{Gas,t-1} + \beta_{i,t-1}^{Reg} \mu_{Reg,t-1}}_{\text{The conditional expected excess returns}}$$

The conditional expected excess returns

$$\underbrace{+ \beta_{i,t-1}^{US} \varepsilon_{US,t-1} + \beta_{i,t-1}^{US} \varepsilon_{US,t-1} + \beta_{i,t-1}^{Oil} \varepsilon_{Oil,t-1} + \beta_{i,t-1}^{Gaz} \varepsilon_{Gas,t-1} + \beta_{i,t-1}^{reg} \varepsilon_{Reg,t-1} + \varepsilon_{i,t}}_{\text{The unanticipated return}}$$

The unanticipated return

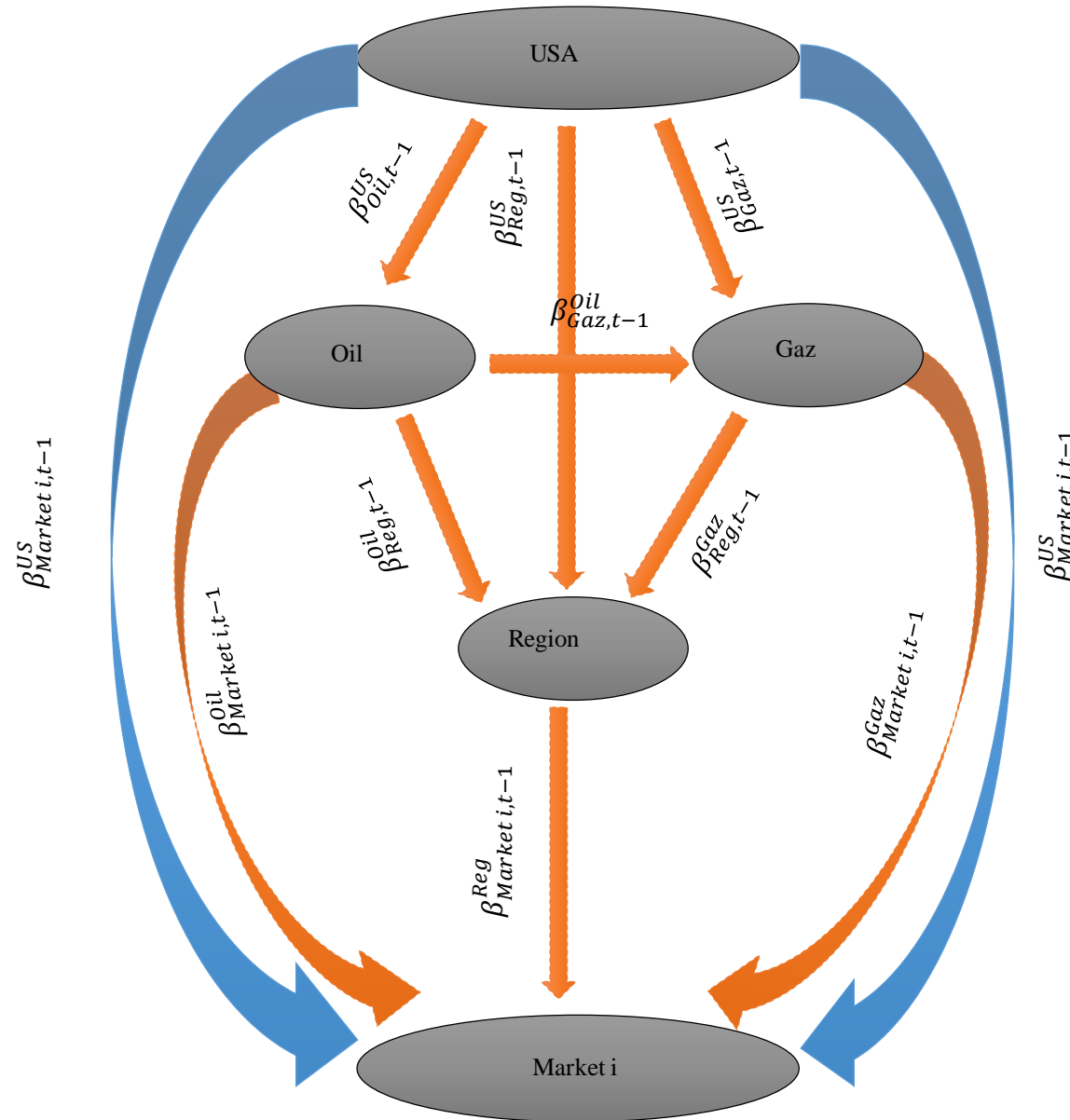
with $\varepsilon_{i,t} / I_{t-1} \sim N(0, \sigma_{i,t}^2)$: is the idiosyncratic shock of any market i .

- $Z_{i,t-1}$ is the set of local information variables available until the date $t - 1$.
- $\beta_{i,t-1}^{US}$, $\beta_{i,t-1}^{Reg}$, $\beta_{i,t-1}^{Gaz}$ and $\beta_{i,t-1}^{Oil}$ are the sensitivities of the market i to the U.S. market the regional one, the oil and the gas prices

5. Econometric Model and Modeling Strategy

- $\mu_{US,t-1}$, $\mu_{Oil,t-1}$, $\mu_{Gas,t-1}$ and $\mu_{Reg,t-1}$ are respectively the conditional expected excess returns on the U.S., the oil price, the gas price and regional markets.
- $\varepsilon_{US,t}$, $\varepsilon_{Oil,t}$, $\varepsilon_{Gas,t}$ and $\varepsilon_{reg,t}$ are, in the order, the unanticipated returns of the global market, oil prices, gas price and the regional market; $\varepsilon_{i,t}$ is the idiosyncratic shock of any market i .
- $Z_{i,t-1}$ is the set of local information variables available until the date $t - 1$.
- $\beta_{i,t-1}^{US}$, $\beta_{i,t-1}^{Reg}$, $\beta_{i,t-1}^{Gas}$ and $\beta_{i,t-1}^{Oil}$ are the sensitivities of the market i to the U.S. market the regional one, the oil and the gas prices

5. Graphical Summary of the Model



5. Econometric Model and Modeling Strategy

- The effect of world market information originating from the United States on market i 's expected return has four components:
- A direct impact, as measured by $\beta_{Market\ i,t-1}^{US}$
- An indirect effect via its influence on the oil market, as measured by $\beta_{Oil,t-1}^{US}(\beta_{Market\ i,t-1}^{Oil} + \beta_{Reg,t-1}^{Oil}\beta_{Market\ i,t-1}^{Reg} + \beta_{Market\ i,t-1}^{Reg}\beta_{Gaz,t-1}^{Oil}\beta_{Reg,t-1}^{Gaz})$
- An indirect effect via its influence on the gas market, as measured by $\beta_{Gaz,t-1}^{US}(\beta_{Market\ i,t-1}^{Gaz} + \beta_{Market\ i,t-1}^{Reg}\beta_{Reg,t-1}^{Gaz})$
- A regional market effect measured by:
 $\beta_{Reg,t-1}^{US}\beta_{Market\ i,t-1}^{Reg}$

6. Data

- Monthly observations
- Nearest (front) futures contract prices on natural and oil

Gulf Cooperation Council (GCC) countries

- Tadawul index of Saudi Arabia
- the Dubai financial market index of the United Arab Emirates
- the KIC general market index for Kuwait
- the Qatari stock market index
- the Muscat securities market index for Oman
- all share price index for Bahrain.

MENA countries

- BLOM stock market index of Lebanon
- the EGX 30 index of Egypt
- the Amman stock index of Jordan
- the BIST national 30 index of Turkey
- Tunisian and Moroccan equity indexes.
- We benchmark our results for the MENA countries against the US and Russia, for which we use, respectively, the S&P 500 and MOEX indexes.
- Russia is included as a comparator in our cross-section given that it is both a gas and oil exporting country.

6. Data

Following Bekaert, Harvey and Ng (2005), we employ a set of local instruments:

- the monthly growth rates in the money supply, proxied for by the growth in M1
- Inflation
- Our sample spans the period 2004 to 2018. The starting date of our sample is dictated by the availability of the money supply and inflation data for the MENA countries.

7. Results: Betas

	β_i^{Gaz}		β_i^{Oil}		β_i^{US}		β_i^{Reg}	
	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.	Mean	Std.Dev.
OMAN	0,010	0,054	0,062	0,050	0,075	4.3 E-05	0,344	0,088
QATAR	-0,013	0,049	0,072	0,054	0,061	0,060	0,467	0,076
SAUDI								
TADAWUL	0,020	0,069	0,121	0,073	0,125	0,071	0,483	0,097
BAHRAIN	0,019	0,048	0,032	0,046	0,030	0,037	0,198	0,032
DUBAI	0,031	0,052	0,057	0,039	0,097	0,078	0,550	0,116
LEBANON	0,027	0,028	0,073	0,032	0,010	1.22E-09	0,193	0,071
EGYPT	0,013	0,061	0,035	0,012	0,077	0,062	0,510	0,089
BIST	0,020	0,058	0,130	0,086	0,280	0,065	0,521	0,088
AMMAN	0,008	0,029	0,075	0,027	0,026	1,10E-08	0,277	0,053
TUNISIA	0,006	0,039	0,053	0,029	0,007	1,06E-09	0,143	0,020
MOROCCO	0,018	0,056	0,085	0,056	0,016	0,033	0,181	0,024
RUSSIA	0,065	0,075	0,289	0,140	0,303	0,111	0,578	0,118
S&P500	0,033	0,083	0,242	0,100	-	-	0,265	0,108

7. Variance Decomposition

Higher volatility in one country's stock market will automatically increase the unconditional correlation in returns with another country

If volatility in one country increases, even if the transmission mechanism between the two countries is constant, a larger share of the return in the second country will be driven by the larger, idiosyncratic shocks in the first country

	VR(US,i)%	VR(Gaz,i)%	VR(Oil,i)%	VR(Reg,i)%
OMAN	7,908 (0,085)	24,817 (0,254)	27,817 (0,246)	39,280 (0,231)
QATAR	6,052 (0,070)	16,844 (0,236)	25,638 (0,230)	50,882 (0,247)
SAUDI TADA	10,522 (0,115)	19,048 (0,188)	33,689 (0,244)	35,635 (0,232)
BAHRAIN	7,420 (0,111)	35,091 (0,294)	21,998 (0,228)	35,444 (0,237)
DUBAI	9,089 (0,101)	17,593 (0,205)	17,603 (0,173)	54,552 (0,238)
LEBANON	0,645 (0,009)	32,567 (0,317)	18,324 (0,209)	45,395 (0,298)
EGYPT	7,285 (0,088)	24,056 (0,238)	13,583 (0,144)	54,254 (0,225)
BIST	27,727 (0,172)	13,858 (0,178)	27,539 (0,216)	30,340 (0,200)
AMMAN	2,792 (0,030)	20,722 (0,222)	9,964 (0,146)	65,659 (0,246)
TUNISIA	0,358 (0,004)	36,779 (0,288)	24,743 (0,232)	37,889 (0,253)
MOROCCO	4,609 (0,078)	41,899 (0,304)	23,896 (0,256)	29,332 (0,245)
RUSSIA	15,779 (0,132)	12,990 (0,179)	51,329 (0,259)	19,452 (0,187)
USA	- -	23,059 (0,283)	65,989 (0,313)	10,814 (0,163)

8. Contagion Effect

As in Bekaert et al. (2005), we estimate the unexplained returns of the various markets to study contagion effects. We test the hypothesis of contagion by modeling the unexpected returns as follows:

$$\hat{e}_{i,t} = \pi_i + \lambda_{i,t}\hat{e}_{m,t} + \phi_{i,t}$$

$$\lambda_{i,t} = p + q_1 D_{1t} + q_2 D_{2t}$$

$$\hat{e}_{m,t} = \hat{e}_{US,t}, \hat{e}_{Reg,t}, \hat{e}_{Oil,t}, \hat{e}_{Gaz,t}$$

By adding the crisis dummy, we allow a dynamic movement to the coefficients during tranquil and crisis periods. If there is evidence for such a change, we call this phenomenon contagion.

$$\{\pi_i = 0\} \forall i = 0$$

7. Contagion Effect

Oil. Return Residuals ($\hat{e}_{m,t} = \hat{e}_{Oil,t}$)					
Country	P	q_1	q_2	$\{\pi_i = 0\} \forall i$	Wald Test
					$p = q_1 = q_2 = 0$
OMAN	-0.013 (0.0051)	0.790 (0.016)	0.009 (0.105)	5,021 (1,008)	0.007*** (0.003)
QATAR	-0.010 (0.002)	0.897 (0.009)	0.066 (0.037)	3,111 (0,035)	0.854*** (0.007)
SAUDI TADAWUL	-0.011 (0.002)	0.997 (0.001)	0.027 (0.042)	7,434 (1,130)	0.027*** (0.0042)
BAHRAIN	-0.011 (0.0041)	0.990 (0.018)	0.066 (0.071)	8,024 (2.211)	0.056*** (0.0065)
DUBAI	-0.007 (0.007)	0.011 (0.033)	-0.034 (0.132)	6,114 (1,089)	-0.011* (0.006)
LEBANON	-0.015 (0.001)	0.945 (0.008)	0.067 (0.031)	5,567 (1,022)	0.067** (0.031)
EGYPT	-0.010 (0.003)	0.945 (0.011)	0.067 (0.044)	6,567 (1,008)	-0.011*** (0.002)
BIST	-0.015 (0.0042)	0.989 (0.019)	0.048 (0.072)	7,024 (1,211)	0.066 (0.0071) ***
AMMAN	0.011 (0.0032)	0.730 (0.002)	0.10 (0.111)	4,022 (0.786)	0.227*** (0.000)
TUNISIA	0.012 (0.001)	0.392 (0.001)	0.145 (0.032)	4,781 (0.123)	0.854*** (0.000)
MOROCCO	0.024 (0.013)	0.697 (0.012)	0.210 (0.051)	6,912 (1.230)	0.657*** (0.000)
RUSSIA	0.012 (0.004)	0.451 (0.022)	0.077 (0.021)	7,024 (0.112)	0.345*** (0.000)
USA	0.011 (0.0032)	0.730 (0.002)	0.10 (0.111)	4,022 (0.786)	0.227*** (0.000)

8. Conclusion

- Contagion effects are evident from the significance of q_1 and q_2 .
- The regional effect is largest followed by the US and oil effects as evinced by the betas
- Variance decompositions confirm the previous results:
- Oil risk is a macroeconomic factor that strengthens the link with the USA, which is itself the source of a contagion effect.
- Oil cannot be considered as a factor that allows diversification, especially after 2005 in all countries considered. This link should not be overlooked, especially in periods where oil volatility is very high.

8. Conclusion

Contagion is the level of correlation over and above the level that is “expected”.

We take a stand, using an asset pricing model, on the “expected” correlation that allows for world as well as regional factors and time-varying betas.