



الجامعة الأهلية
AHLIA UNIVERSITY
BAHRAIN

Gold Prices, Oil Prices and US Stock Market Indices: Volatility Transmissions and Hedging Strategies Using VAR-GARCH

Your
global
future
begins
here

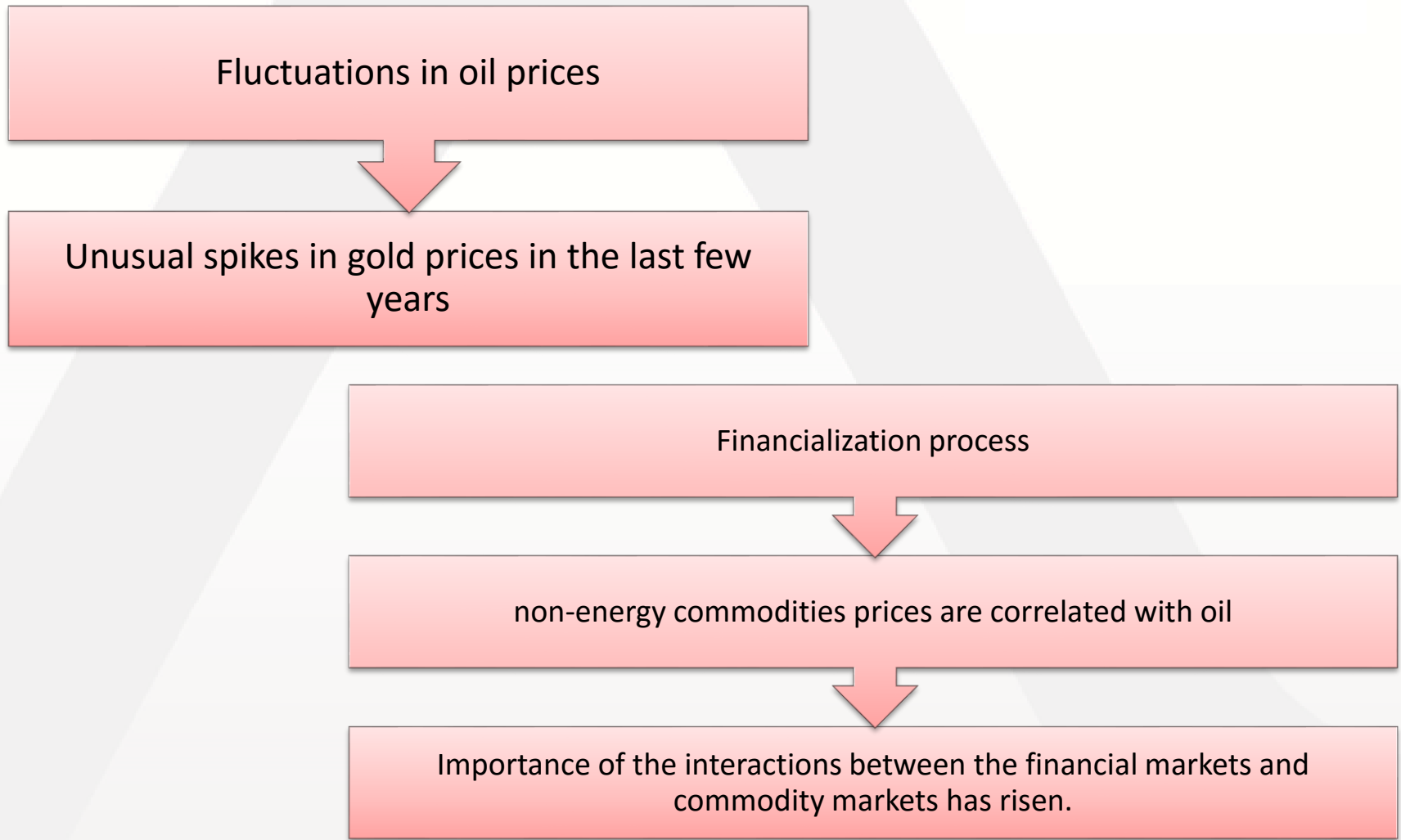
College of
Business and
Finance

Dr Fatema Alaali and Dr Hanan Naser

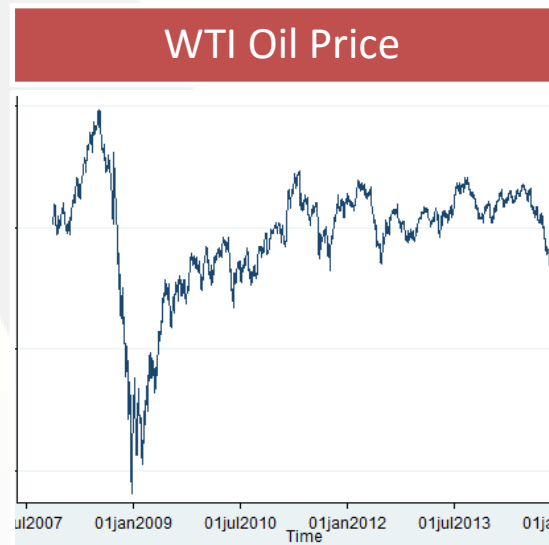
Table of Contents

- Introduction
- Estimation Process
- Data
- Results
- Conclusion

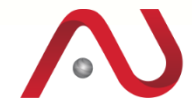
- Role of Gold in Macroeconomic World
 - Central banks and international financial institutions maintain gold for:
 - Diversification
 - Economic Security
 - Insurance against market crisis
 - Inclusion of gold holdings for more balanced portfolios.
 - Widely accepted as an inflation hedge.



S&P500 stock index, WTI crude oil prices, Gold prices

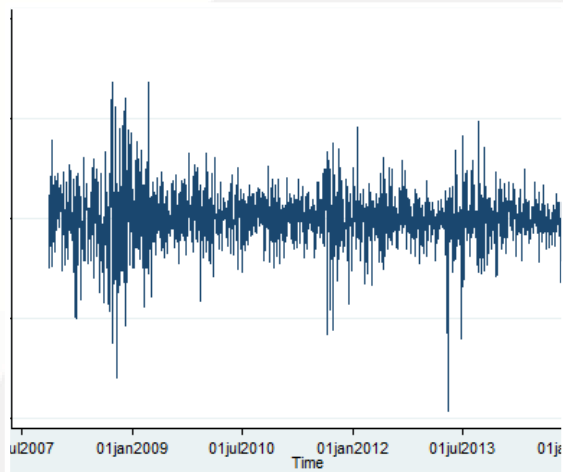


Returns of S&P500 stock index, WTI crude oil prices and Gold prices

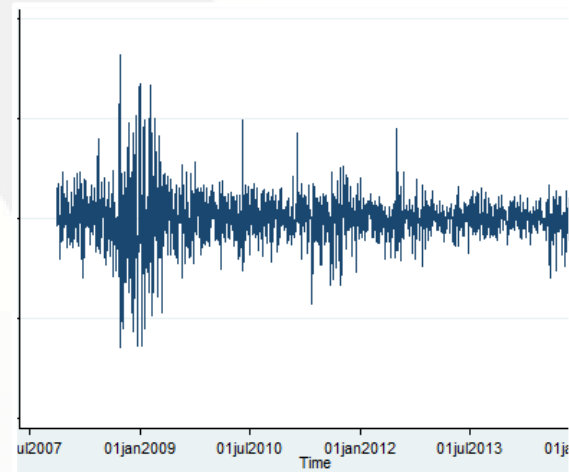


الجامعة الأهلية
AHLIA UNIVERSITY
BAHRAIN

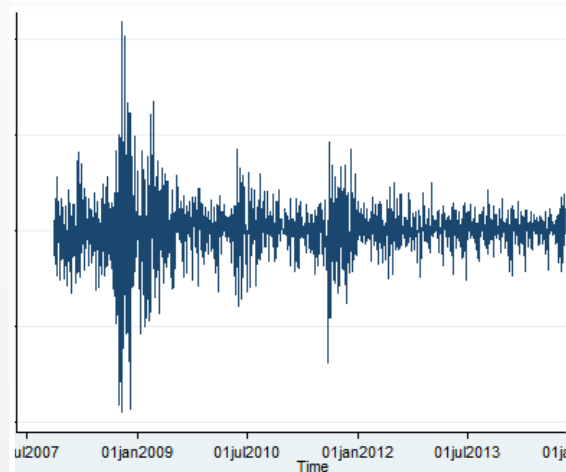
Gold Price Returns



WTI Oil Price Returns



Returns of S&P 500 stock index



- Portfolio Diversification and Hedging Strategies Literature

- Stock market and gold prices

Hammoudeh et. al. (2010), Hood and Malik (2013), Mensi et. al. (2013), Arouri et. al. (2015), among others

- Stock market and oil prices

Arouri et. al.(2011), Mensi et.al. (2013), Sadorsky (2014)

- Oil prices and Gold prices

Ciner et. al. (2013) and Reboredo (2013)

Objectives of the study:

- Examine the volatility transmissions between the different indices of stock market, oil prices and gold prices using VAR-GARCH model.
- Employ the results of the VAR-GARCH model in analyzing portfolio diversification and hedging effectiveness across stock market, oil and gold assets.

- **VAR(1)-GARCH(1,1) model for stock market returns, gold returns and oil price returns**
- Conditional mean equation:

$$R_t = \mu + \Psi R_{t-1} + \epsilon_t$$
$$\epsilon_t = H_t^{1/2} \nu_t$$

where:

- $R_t = (r_t^{stock}, r_t^{gold}, r_t^{oil})'$
- $\Psi = \begin{pmatrix} \psi_1 & 0 & 0 \\ 0 & \psi_2 & 0 \\ 0 & 0 & \psi_3 \end{pmatrix}$
- $\epsilon_t = (\epsilon_t^{stock}, \epsilon_t^{gold}, \epsilon_t^{oil})'$
- $\nu_t = (\nu_t^{stock}, \nu_t^{gold}, \nu_t^{oil})'$ (i. i. d)
- $H_t = \begin{pmatrix} h_t^s & h_t^{sg} & h_t^{so} \\ h_t^{sg} & h_t^g & h_t^{go} \\ h_t^{so} & h_t^{go} & h_t^o \end{pmatrix}$

- **VAR(1)-GARCH(1,1) model for stock market returns, gold returns and oil price returns**
- **Conditional variance equation:**

$$h_t^i = C_i + \sum_{m=1}^3 a_{im} (\epsilon_{t-1}^i)^2 + \sum_{m=1}^3 b_{im} h_{t-1}^i + \sum_{m=1}^3 d_{im} (\epsilon_{t-1}^i)^2 I_{\epsilon < 0}(\epsilon_{t-1}^i)$$

- S & P composite stock price index
- Dow & Jones Industrial Average
- NASDAQ
- Russell 200 stock price index
- WTI crude oil spot prices \$/BBL
- Gold prices of Handy & Harman Base \$/Troy Oz
- Period 15/11/2007 to 24/4/2015 with 1943 observations

- Significant volatility spillovers between oil price and stock market and oil price and gold.
- Optimal portfolios should have stocks outweigh oil assets and that the stock investment risk can be hedged with relatively low hedging.
- Optimal portfolios of stock and gold should have gold outweighs stock assets and that the stock investment risk can be hedged by relatively low hedging.
- The importance of diversifying investor portfolio to make it more effective.