



The effect of crude oil prices on the valuation of energy companies

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Motivation

Oil prices are volatile and have experienced several shifts.

- Pindyck (2001)
- Kilian (2009)
- Hamilton (2009, 2013)

Valuation of any financial derivative is the sum of its future discounted cash flows.

- Misund and Mohn (2009)
- Osmundsen et al. (2006)
- Kumar and Sukumaran (2016)
- Misund et al. (2008)

In this paper we try to answer:

Is the valuation of petroleum companies related to short-term changes in the oil price?



Data

35 energy companies in S&P 500 with stock valuation from May 1996 until March 2017. Total 4 820 observation per price series.

45 energy companies in Oslo Stock Exchange (OSE) with observations starting in June 2001 until March 2017, providing 3 590 observations per price series.

We differentiate the companies using the Global Industry Classification Standard (GICS-code) and aggregate the stock series into value-weighted category series.



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Data

Table 1. Summary of aggregated data per GICS category for both S&P 500 and OSE. Note that the first column per variable concerns S&P 500 and the second column concerns OSE. Mean log-return and volatility is annualized. Average value is in billion USD.

Category	GICS-code	Number of series		Mean log-return		Volatility		Average value	
Oil & Gas Drilling	10101010	2	8	-0.013	-0.043	0.404	0.656	6.0	0.28
Oil & Gas Equipment & Services	10101020	5	24	0.044	-0.028	0.366	0.360	39.4	0.58
Integrated Oil & Gas	10102010	4	1	0.065	0.059	0.254	0.325	142.2	54.2
Oil & Gas Exploration & Production	10102020	21	7	0.041	-0.005	0.285	0.588	22.7	0.75
Oil & Gas Storage & Transportation	10102040	3	5	-0.018	-0.031	0.187	0.558	27.8	0.57

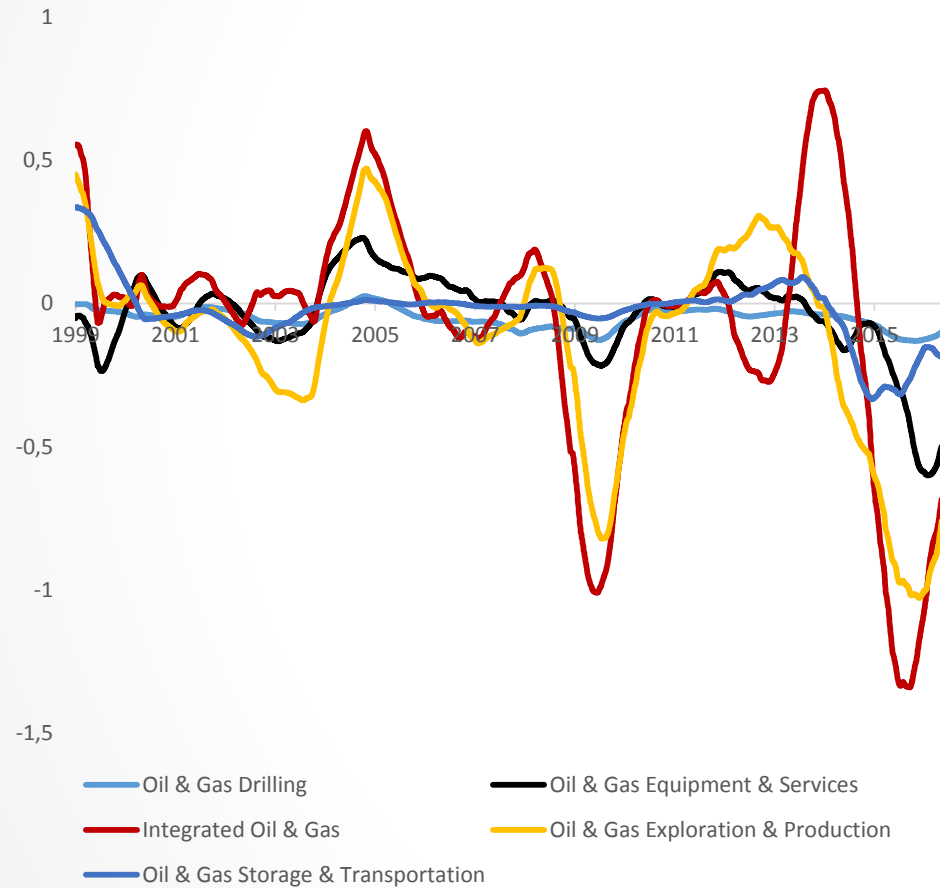
Empirical results

- First, a correlation table confirms a long-term relationship between S&P 500 integrated oil companies and exploration & production. However, OSE companies seems not correlated.

	Oil & Gas Drilling	Oil & Gas Equipment & Services	Integrated Oil & Gas	Oil & Gas Exploration & Production	Oil & Gas Storage & Transportation
WTI - S&P 500	0,05	0,08	0,83	0,80	-0,11
Brent - S&P 500	-0,03	0,03	0,81	0,75	-0,10
WTI - OSE	0,20	0,33	0,39	0,11	0,18
Brent - OSE	0,05	0,10	0,16	0,05	0,08

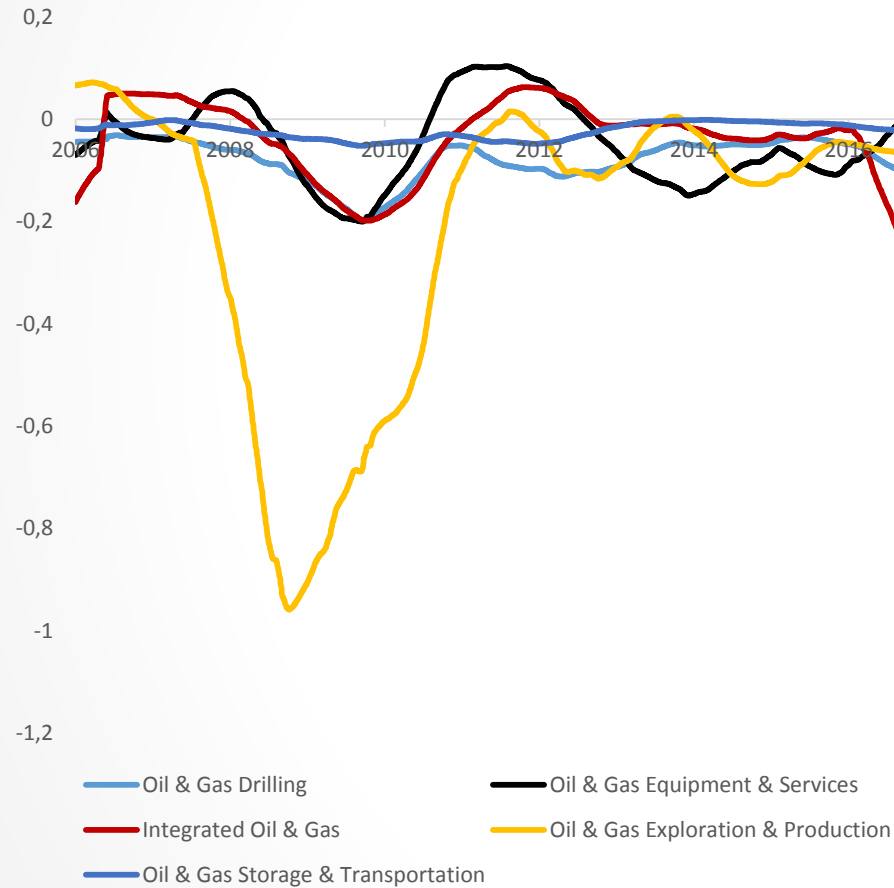
- Next, apply a vector error correction model and create a rolling cointegration matrix using an observation period of 250 days.
- Estimate the rolling alpha for short run relation between changes in the oil price and valuation of companies in a sector.

WTI price and S&P 500 oil companies



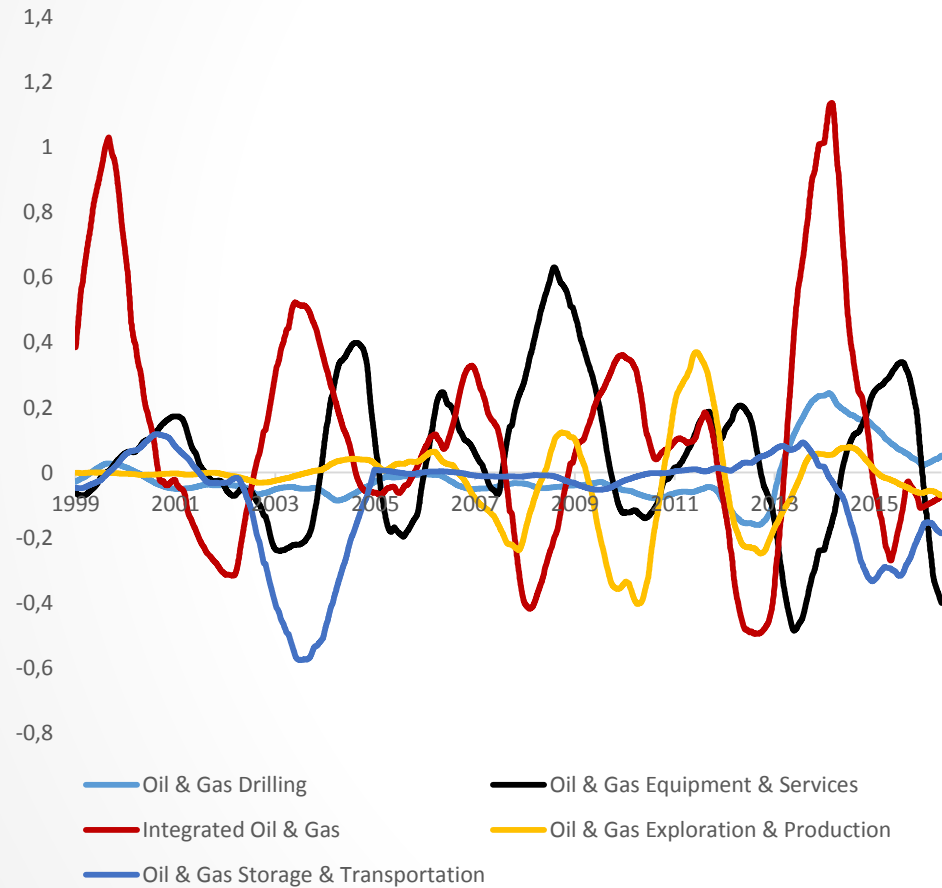
- Most vulnerable to WTI price
 - Integrated Oil & Gas
 - Oil & Gas Exploration & Production
- Periods of strong relation
 - Positive in 2004 - 2005
 - Negative in 2008 - 2009
 - Positive in 2014
 - Negative in 2015 - 2016

WTI price and OSE oil companies



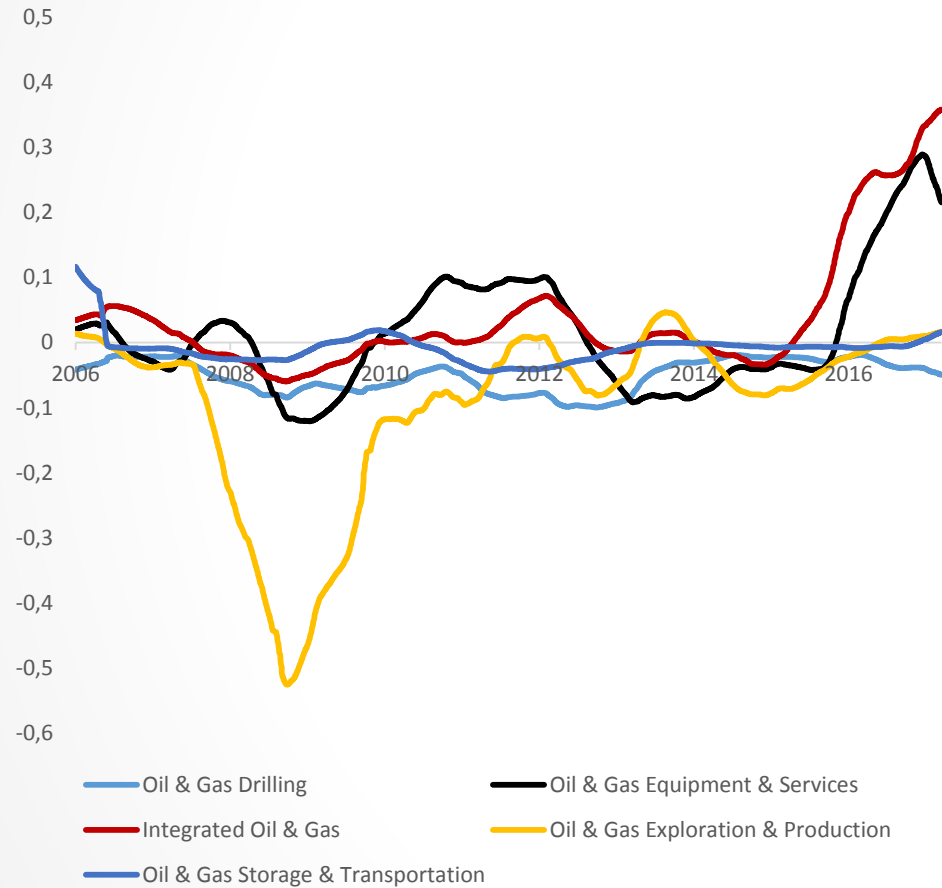
- OSE oil companies less affected (in the short run) by WTI crude oil prices.
- Periods of strong relation
 - Negative in 2008 - 2010 for Oil & Gas Exploration & Production

Brent price and S&P 500 oil companies



- Most affected by Brent prices
 - Integrated Oil & Gas
- Periods of strong relation
 - Positive in 2000
 - Positive in 2014

Brent price and OSE oil companies



- OSE companies experience limited vulnerability to Brent price (in short run)
- Periods of strong relation
 - Negative in 2008 - 2010 for Oil & Gas Exploration & Production

Concluding remarks

- Significant results found for S&P 500 and WTI crude oil prices for integrated oil companies and exploration & production.
 - Periods of increasing oil price have positive adjustment
 - Periods of oil price drops have negative adjustment
- For all markets, we find that exploration & production companies had negative adjustment to oil price news during the financial crisis.
- Brent oil price has less (short-term) effect on both valuation of both OSE and S&P 500 oil companies.
- OSE companies less affected by WTI crude oil prices.

