Discussion of: The Economic Impact of Oil on Industry Portfolios

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Summary

- Objective: Study the effect of oil price shocks on industry portfolios
- Model with multiple transmission channels. Oil impacts
  - Interest rates
  - Risk premia
  - Current and future cash flows
- Estimation by maximum likelihood on 13 industry portfolios
- Main finding: Significant impact of oil price shocks on returns
  - Positive for oil industry
  - Negative for non-oil industries

The model

- Pricing kernel

$$\begin{aligned} \frac{d\Lambda_t}{\Lambda_t} &= -r_t dt - \lambda_t dZ_{1,t} \\ r_t &= \alpha_0 + \alpha_S \log(S_t) + \alpha_y y_t \\ \lambda_t &= \theta_0 + \theta_S \log(S_t) + \theta_y y_t \end{aligned}$$

- Dynamics of oil price and other macro factor

$$\begin{aligned} \frac{dS_t}{S_t} &= \kappa_S(\bar{s} - \log(S_t)))dt + \sigma_S dZ_{2,t} \\ dy_t &= -\kappa_y y_t dt + dZ_{3,t} \end{aligned}$$

- Firm cash flows

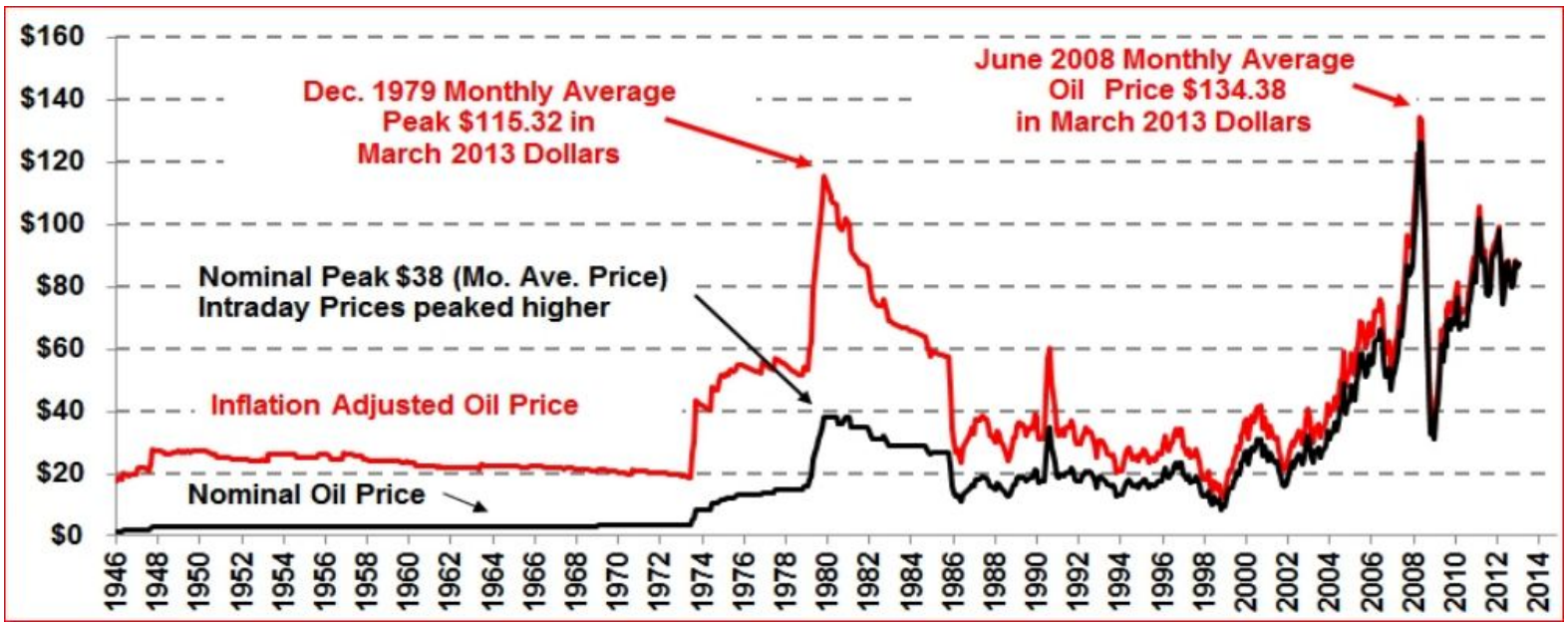
$$\begin{aligned} D^i(X^i, q^i, S_t) &= X_t^i (q_t^i)^{\gamma_i} - S_t q_t^i \\ \frac{dX_t^i}{X_t^i} &= (\mu_0^i + \mu_S^i \log(S_t))dt + \sigma_X^i dZ_{4,t} \end{aligned}$$

Parameter estimates

Parameter	Estimate	t-stat
σ_m	0.162	26.04
α_0	0.037	3.18
α_S	-0.007	-1.75
α_y	0.162	19.31
θ_0	1.692	4.02
θ_S	-0.445	-3.46
θ_y	-0.878	-7.87
$\bar{s}$	3.476	9.10
κ_S	0.124	2.30
σ_S	0.289	25.81
ρ_S	-0.049	-1.48
κ_y	8.146	7.90
ρ_y	-0.169	-3.20

The negative oil price-MPR relation

- Recessions are preceded by spikes in oil prices (Hamilton)
  - May explain negative oil price-MPR relation
- However, secular bull market from 1980 to 2000 (partly due to lower risk premia) coincides with downward trend in real oil prices
  - Argues for positive oil price-MPR relation



The role of the second state variable

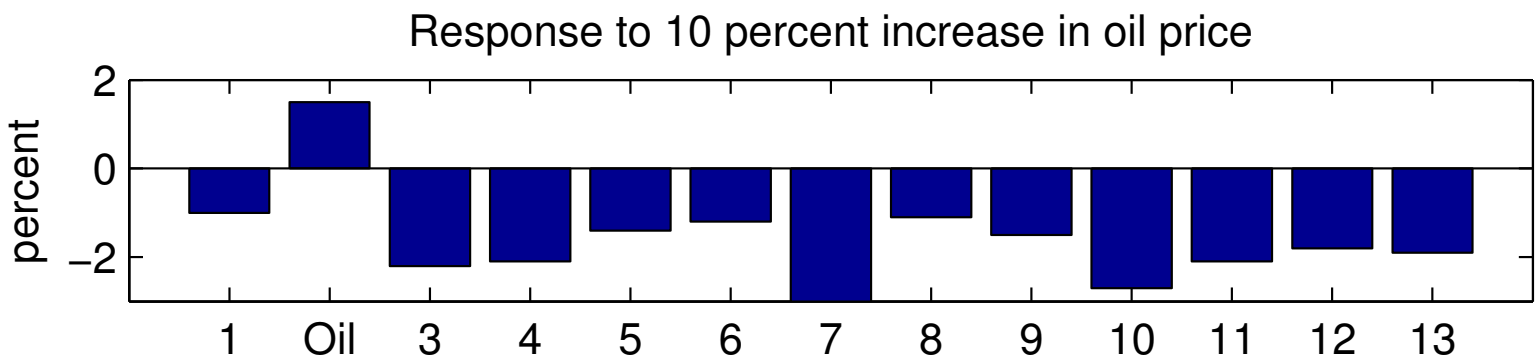
- y "captures other macro effects not related to the oil price"
  - But which macro-factors exhibit so fast mean-reversion that shocks have a half-life of approx. one month?
- Ideally y should capture the effect of known variables driving the time-series and cross-sectional variation in expected excess returns
  - By not doing so, perhaps the effect of oil is overstated?
- BTW: since y is identified from the real rate, its very low persistence is surprising

Decomposition of the effect of oil shocks

- Analysis can be understood in terms of the Gordon growth formula

$$P^i = \frac{D^i}{\mu^i - g^i}$$

- CH use their model to quantify the effect an oil shock on each component
- For all industries, an oil shock causes a
  - decrease in D^i,
  - decrease in μ^i,
  - larger (except for the oil industry) decrease in g^i

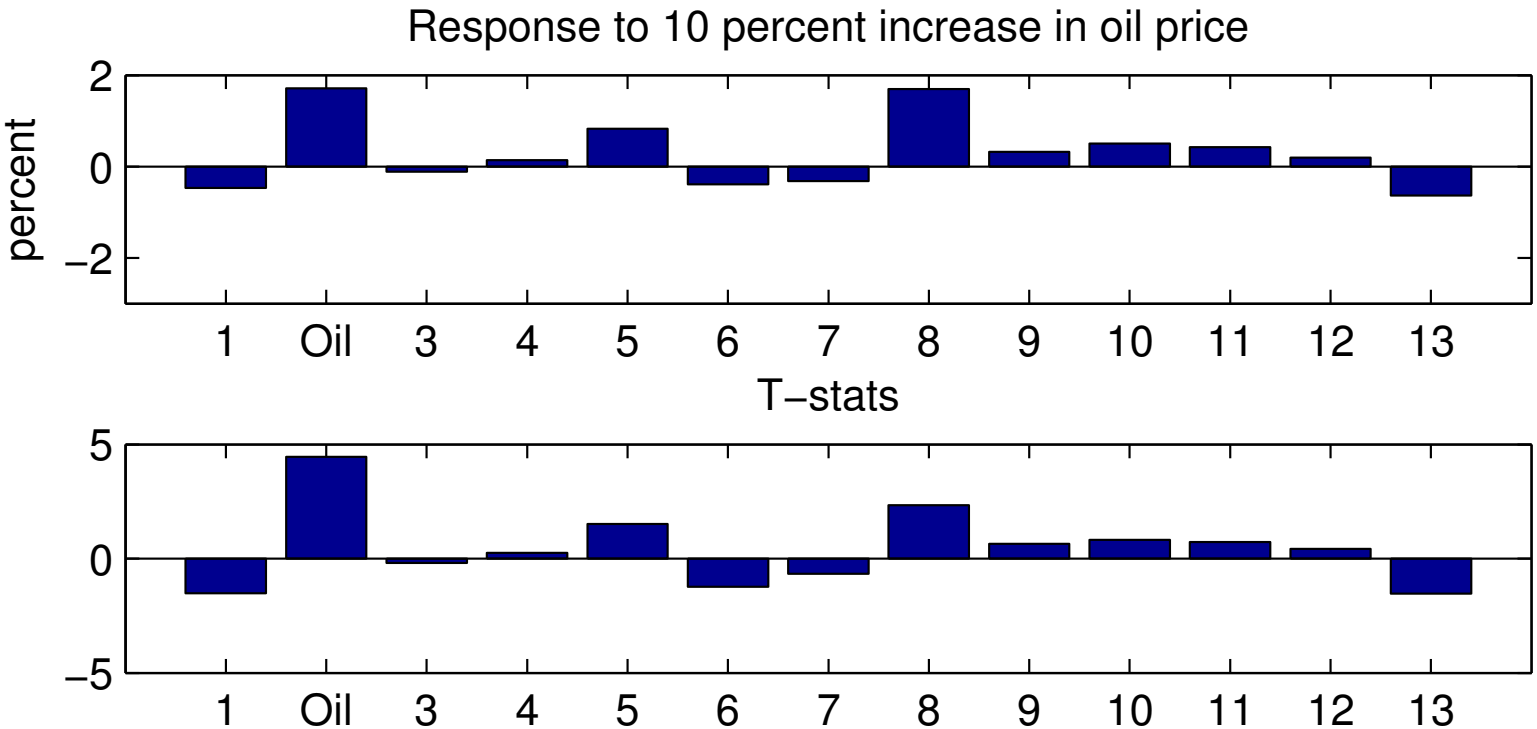


Robustness

- Suggestion: Analyze the robustness of results
  - Specification analysis
  - Model-independent analysis
- Regression:

$$R_t^i = \beta_0 + \beta_1 \Delta \log(P_t) + \epsilon_t$$

  - Monthly data from 1984:01 to 2013:06



Oil as a priced risk factor?

- Current model is conditional CAPM style
- What about oil as separate priced risk factor
- Chen, Roll, and Ross (1986) "Economic Forces and the Stock Market"

TABLE 7 **Pricing with Oil Price Changes**

Years	OG	MP	DEI	UI	UPR	UTS	Constant
1958–84	2.930	12.728	−.095	−.391	11.844	−8.726	4.300
	(.996)	(1.406)	(−1.193)	(−1.123)	(4.294)	(−2.770)	(1.340)
1958–67	4.955	14.409	.078	.119	8.002	−1.022	2.663
	(1.978)	(.921)	(1.102)	(.204)	(2.604)	(−.421)	(.556)
1968–77	1.038	4.056	−.223	−1.269	16.170	−16.055	−1.344
	(.251)	(.296)	(−2.737)	(−2.975)	(3.839)	(−3.154)	(−.243)
1978–84	2.738	22.718	−.159	.134	11.152	−9.264	14.702
	(.303)	(1.228)	(−.598)	(.156)	(1.465)	(−1.024)	(2.240)

NOTE.—CG = growth rate in real per capita consumption; OG = growth rate in oil prices; VWNY = return on the value-weighted NYSE index; EWNY = return on the equally weighted NYSE index; MP = monthly growth rate in industrial production; DEI = change in expected inflation; UI = unanticipated inflation; UPR = unanticipated change in the risk premium (Baa and under return − long-term government bond return); and UTS = unanticipated change in the term structure (long-term government bond return − Treasury-bill rate). *t*-statistics are in parentheses.