

Energy Prices and the Global Business Cycle: Challenges and New Opportunities

Korea Development Institute, May 24th, 2016

Hilde C. Bjørnland

Centre for Applied Macro and Petroleum economics (CAMP)

Key questions

1. The oil price decline and the global economy?
2. What are the prospects for resource rich economies?
3. Policy implications for Korea

Sources for talk:

- ❑ Aastveit, K.A., H.C. Bjørnland and L.A. Thorsrud (2015) “What drives oil prices? Emerging versus developed economies” *Journal of Applied Econometrics*, 30, 1013-1028.

http://www.bi.edu/InstitutterFiles/Samfunns%C2%B0konomi/CAMP/Working_CAMP_2-2012.pdf

- ❑ Bjørnland, H.C. and L.A. Thorsrud (2016) “Boom or gloom? Examining the Dutch disease in two-speed economies”, forthcoming *Economic Journal*

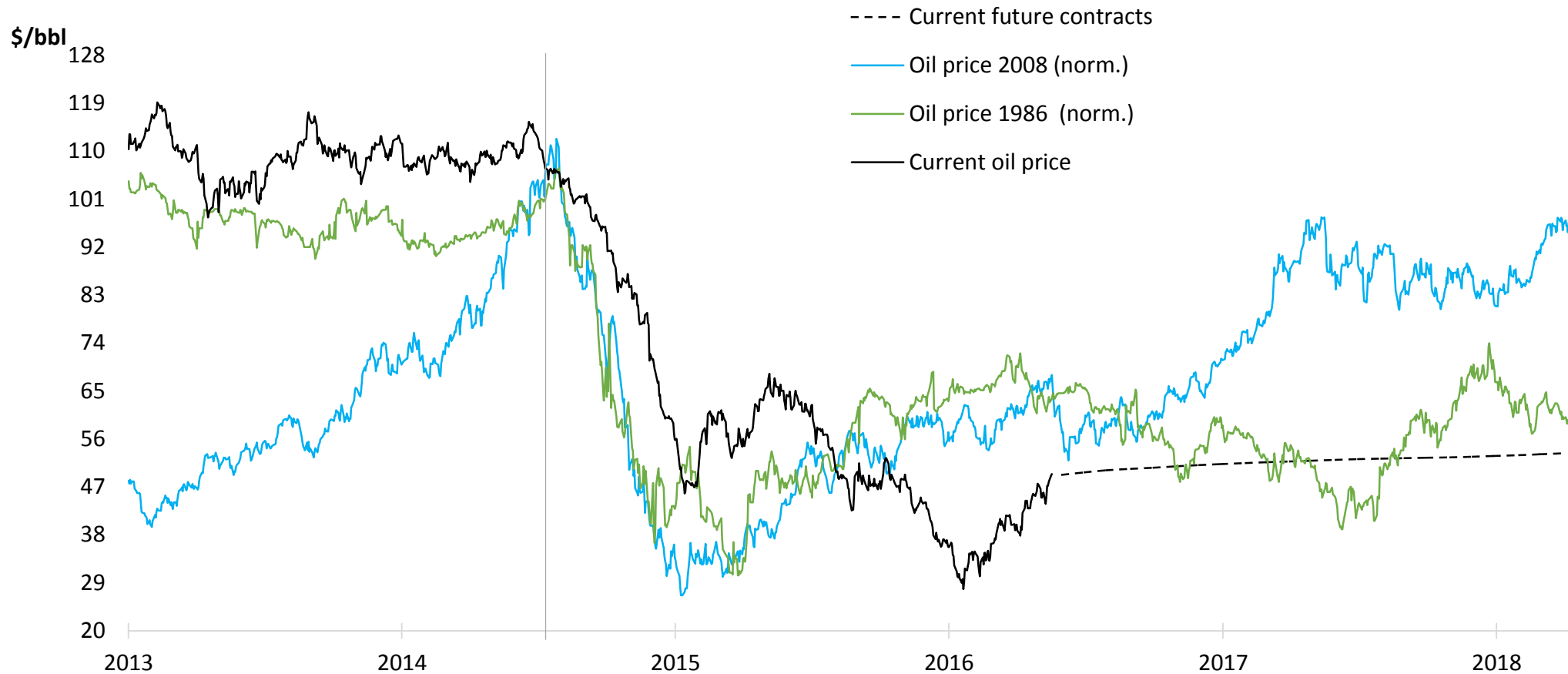
http://www.bi.edu/InstitutterFiles/Samfunns%C2%B0konomi/CAMP/Working_CAMP_6-2014.pdf

- ❑ Bjørnland, H.C., F. Ravazzolo and L.A. Thorsrud (2016) “Forecasting GDP with global components. This time is different”, Forthcoming in *International Journal of Forecasting*.

http://www.bi.edu/InstitutterFiles/Samfunns%C2%B0konomi/CAMP/Working_CAMP_1-2015.pdf

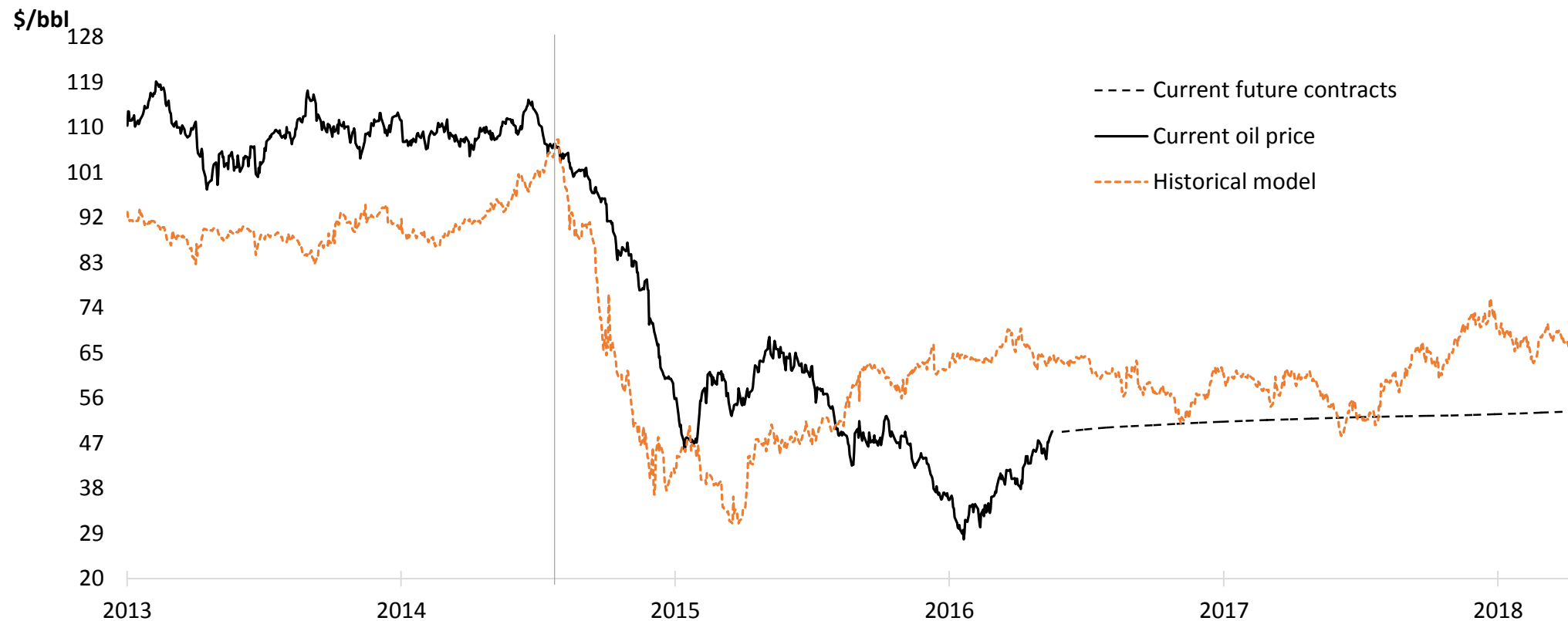
1. How do commodity and energy prices affect the global economy?

Long way to recovery! The current oil price decline versus the (supply driven) decline in 1986 and the (demand driven) decline in 2008;
Crude oil - Brent



Source: Datastream and Hilde C Bjørnland

Long way to recovery! The current oil price decline versus historical averages; Crude oil - Brent



Source: Datastream and Hilde C Bjørnland

Oil prices and the macroeconomy –

Aastveit, Bjørnland and Thorsrud (JAE, 2015)

Data:

- Quarterly data for 33 countries (18 developed, 15 emerging). Transformed to be stationary and then standardized
- GDP and industrial production for each country
- Sample: 1992.01 – 2009.04 ($N = 66$, $T = 72$)

Model (FAVAR):

- **Observation equation:**

$$X_t = \Lambda F_t + e_t, \quad (1)$$

where $X_t = [\text{oilProd} \quad \text{GDP}^{US} \quad \text{GDP}^{China} \quad \text{oilPri} \quad Y]'$ and

$F_t = [\text{oilProd} \quad \text{devAct} \quad \text{emeAct} \quad \text{oilPri}]'$

- **Transition equation:**

$$F_t = \beta(L)F_{t-1} + u_t, \quad (2)$$

Identifying structural shocks in the SVAR

4 shocks: oil supply, developed demand, emerging demand and oil specific demand

	Short run				Sign Restriction
	ε^{oilSup}	ε^{devDem}	ε^{emeDem}	ε^{oilDem}	
oilProd	+	0	0	0	
devAct	x	+	+	0	$\varepsilon^{devD}: devAct - emeAct > 0$
emeAct	x	+	+	0	$\varepsilon^{emeD}: emeAct - devAct > 0$
oilPri	x	x	x	+	

Note: $u_t = A_0 \varepsilon_t$, the restrictions refer to the structure of A_0 . The sign restrictions are imposed to hold for 2 quarters

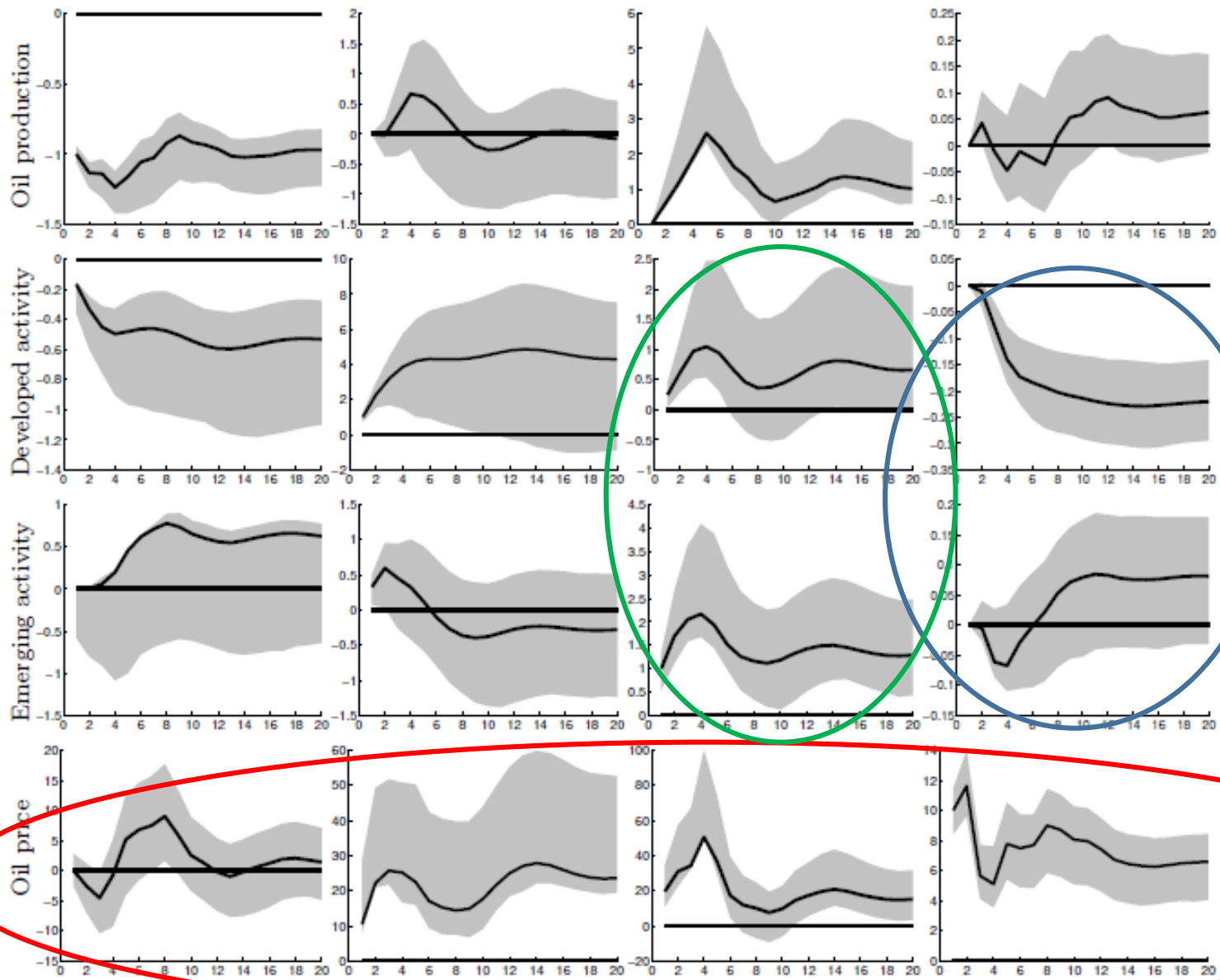
Shocks

Oil supply

Developed demand

Emerging demand

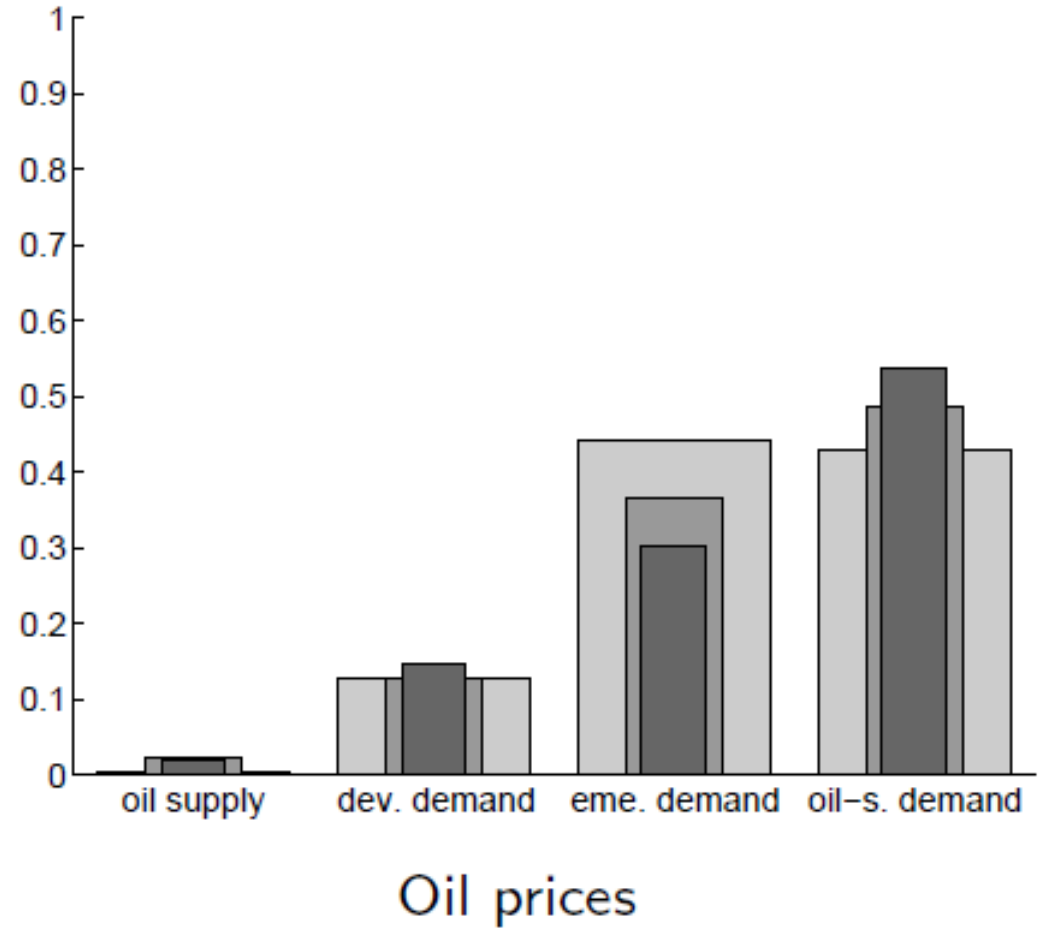
Oil-specific demand



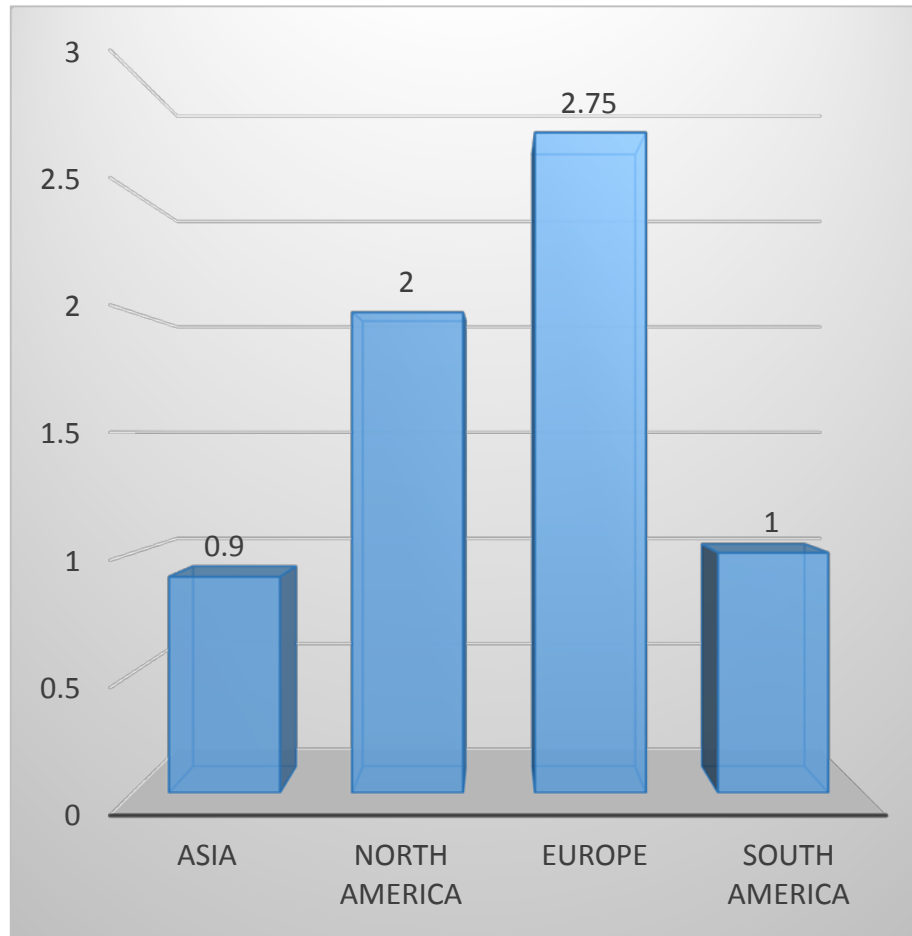
Variance decomposition: Contributions to oil prices

50% of the variation in oil prices during the period 1996 -2013 is attributed to changes in demand from emerging Asian countries.

Oil specific demand equally important



The effect of a 50% decline in oil prices due to an oil specific shock ...?



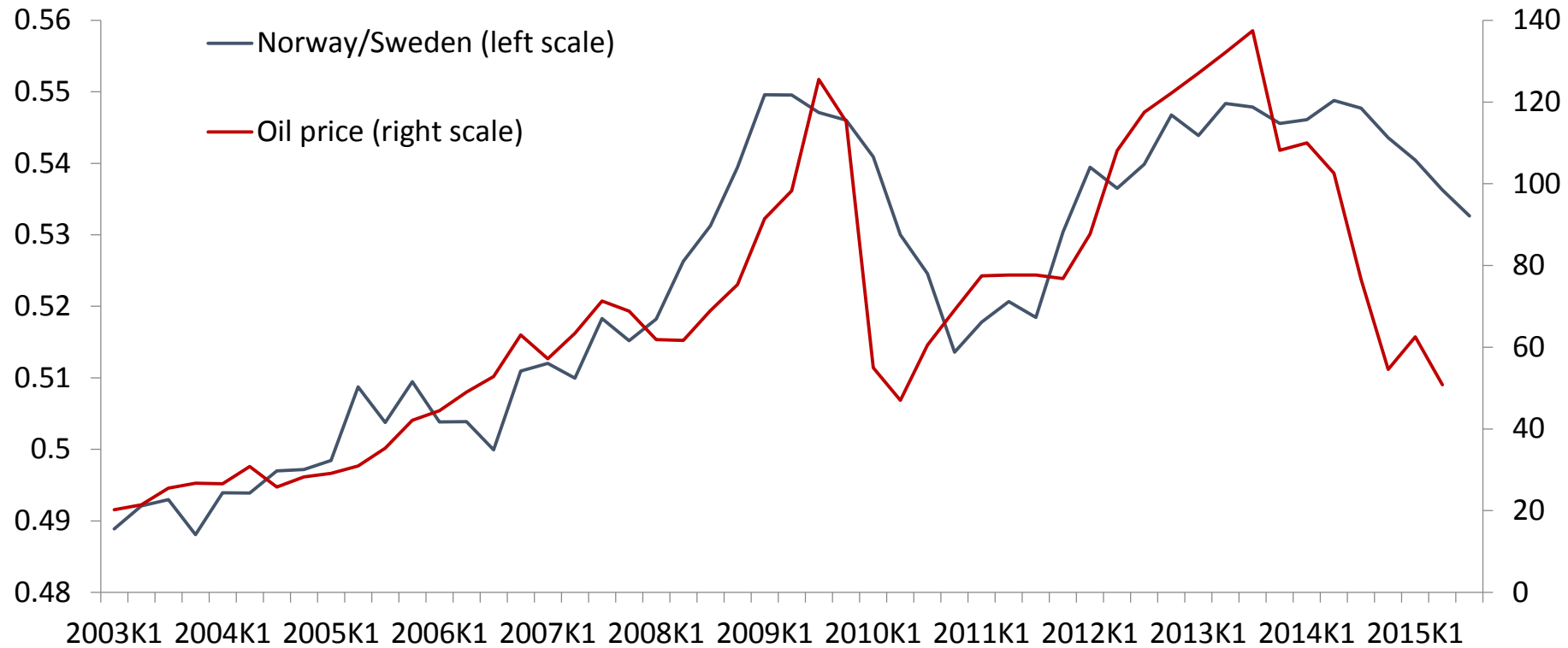
Boost to consumers.... So why has the world not done better?

Source: Aastveit, Bjørnland and Thorsrud (JAE, 2015)

Boost to consumers... but trapped producers

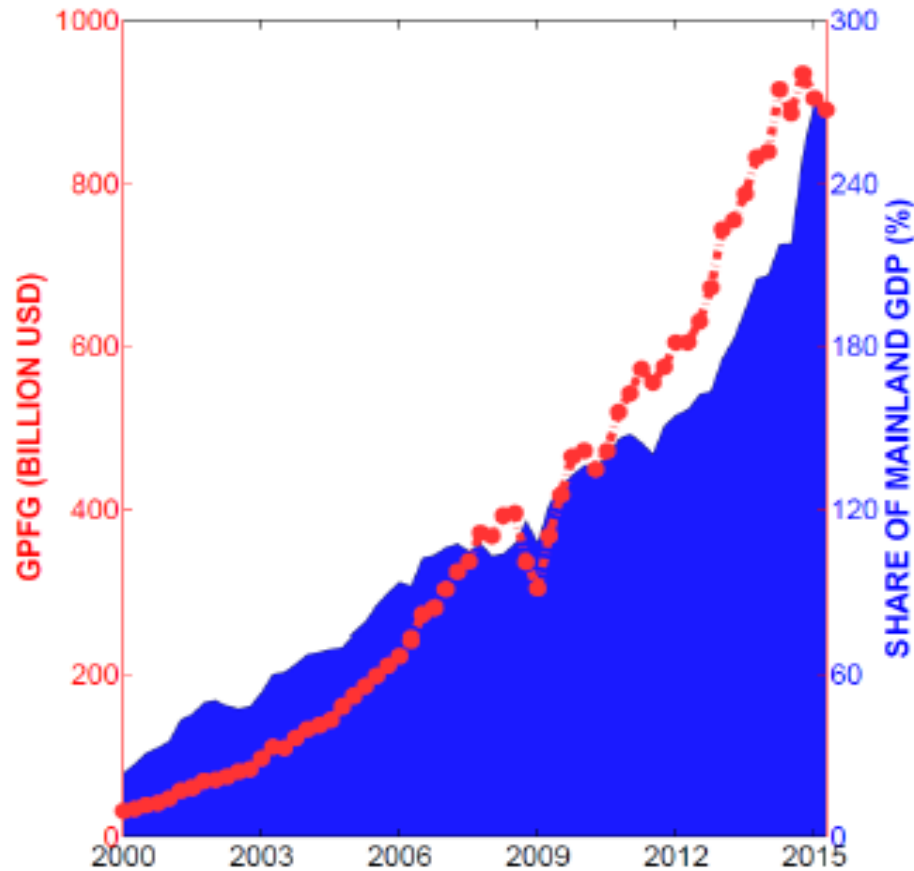
- Decline in commodity prices is also due to declining **global demand**. Other commodity prices are down
- Low interest rates: Real rates can not go much lower
- **BUST for energy firms, and their stock prices.** Effects beyond the energy sector: Companies in the energy sector behind much of the capital investment at a time when other sectors have been less willing to invest.
- Capital investment faces a significant scaling back.
- Spillovers to companies and their stock prices in other sectors, manufacturing, housing markets, hotels and restaurants etc.

Oil exporters versus importers: Oil price and value added (mainland) Norway relative to Sweden



Source: SSB, SCB and Hilde C. Bjørnland

Government Pension Fund Global (GPFG)



Invest in 9,000 companies
and have investments in 78
countries.

Source: Norges Bank

2. What are the prospects for commodity and energy exporters?

Spillovers in developed research rich economies versus resource curse literature...

- Is it useful to compare Norway with Nigeria?
- Bjørnland and Thorsrud (EJ, 2016): Large spillovers from resource sector...
 - *E.g., Norway: Offshore oil extraction demands complicated technical solutions which could in itself generate positive knowledge externalities that benefit other sectors.*
- Share of GDP and productivity growth explained by resource boom: **Norway** 30/45 versus **Australia**: 15/6

Observation equation:

$$y_t = \lambda_0 f_t + \dots + \lambda_s f_{t-s} + \epsilon_t$$

Transition equation:

$$f_t = \phi_1 f_{t-1} + \dots + \phi_h f_{t-h} + u_t$$

with

$$\begin{bmatrix} \epsilon_t \\ u_t \end{bmatrix} \sim i.i.d.N \left(\begin{bmatrix} 0 \\ 0 \end{bmatrix}, \begin{bmatrix} R & 0 \\ 0 & Q \end{bmatrix} \right)$$

and autoregressive errors:

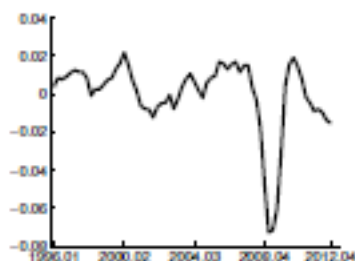
$$\epsilon_{t,i} = \rho_{1,i} \epsilon_{t-1,i} + \dots + \rho_{l,i} \epsilon_{t-l,i} + \omega_{t,i}$$

Restricting (see Bai and Ng (2013) and Bai and Wang (2012)):

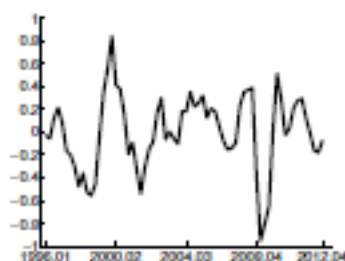
$$\lambda_0 = \begin{bmatrix} \lambda_{0,1} \\ \lambda_{0,2} \end{bmatrix} \quad \lambda_{0,1} = I_4 \quad (8)$$

Implication: All restrictions on the loadings - factors allowed to be correlated - facilitates SVAR analysis on the factors' law of motion and identification of structural shocks

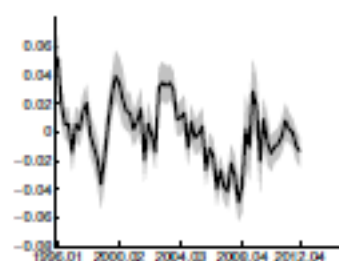
Global activity



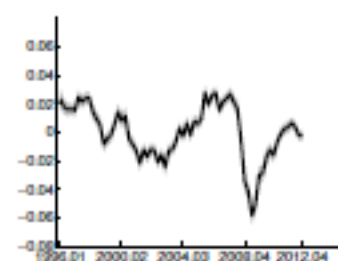
Real oil price



Resource activity



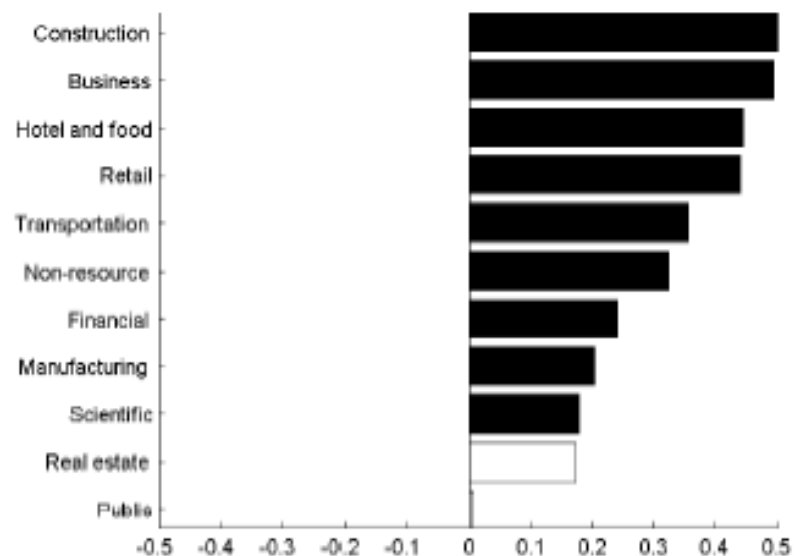
Domestic activity



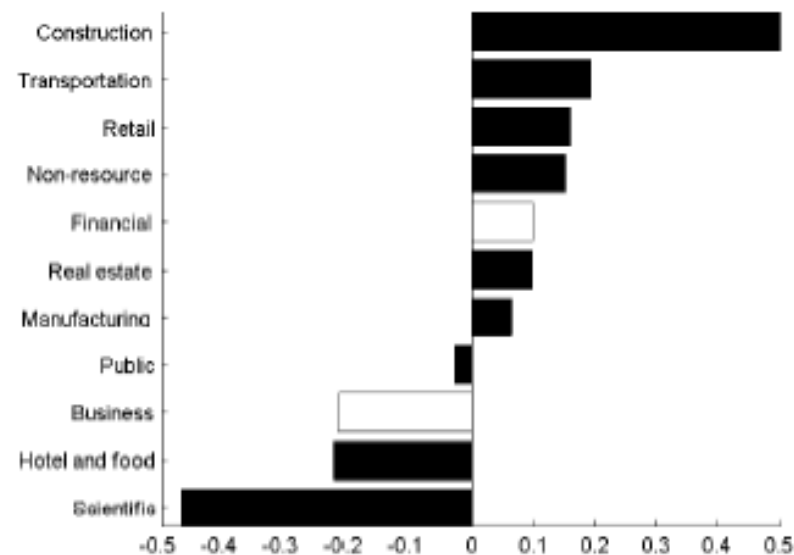
Note: The figures display the estimated latent factors. The black solid lines are median estimates. The grey shaded areas are 68 percent probability bands

Large spillovers to other industries: Average effect of a 1% resource boom after three years, percent

Norway



Australia

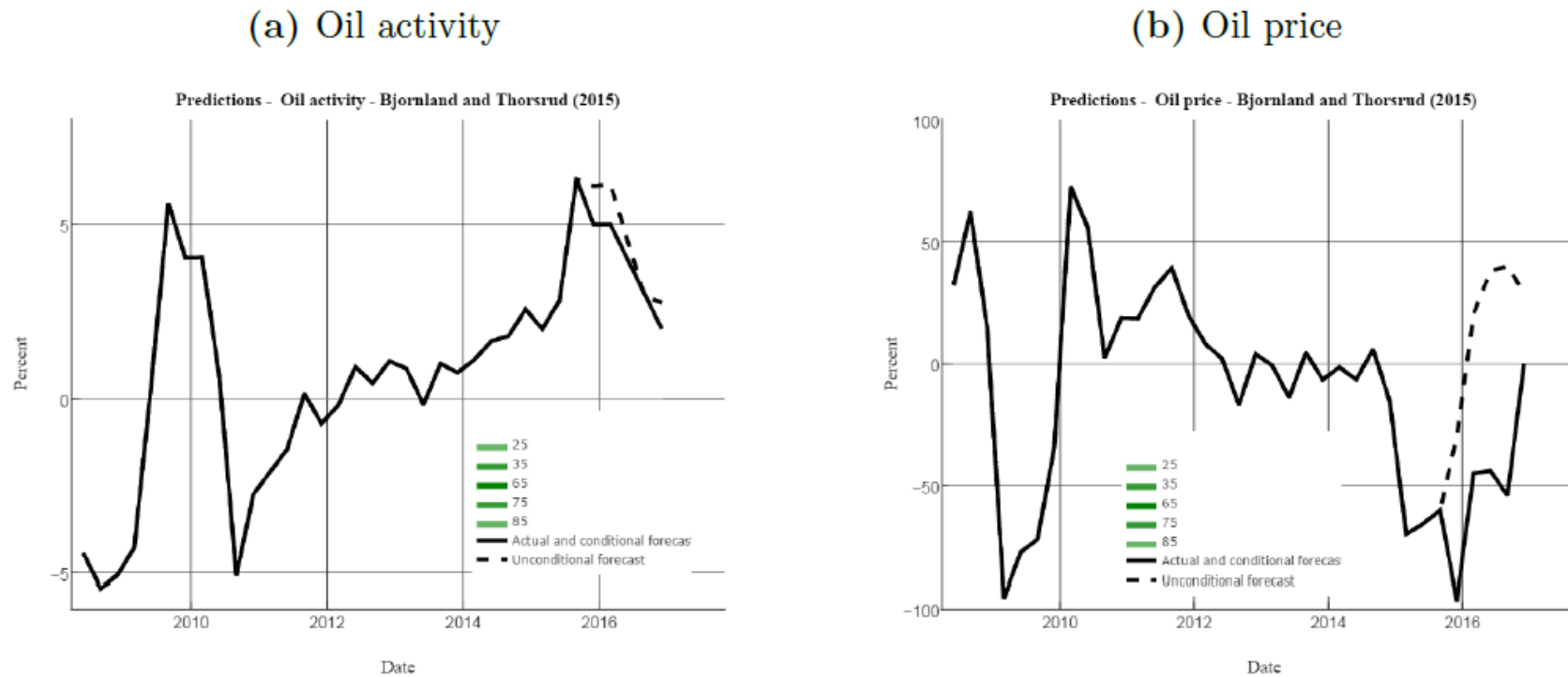


Source: Bjørnland and Thorsrud (EJ, 2016)

Conditional forecast ... What if oil prices remain at 36
USD barrel?

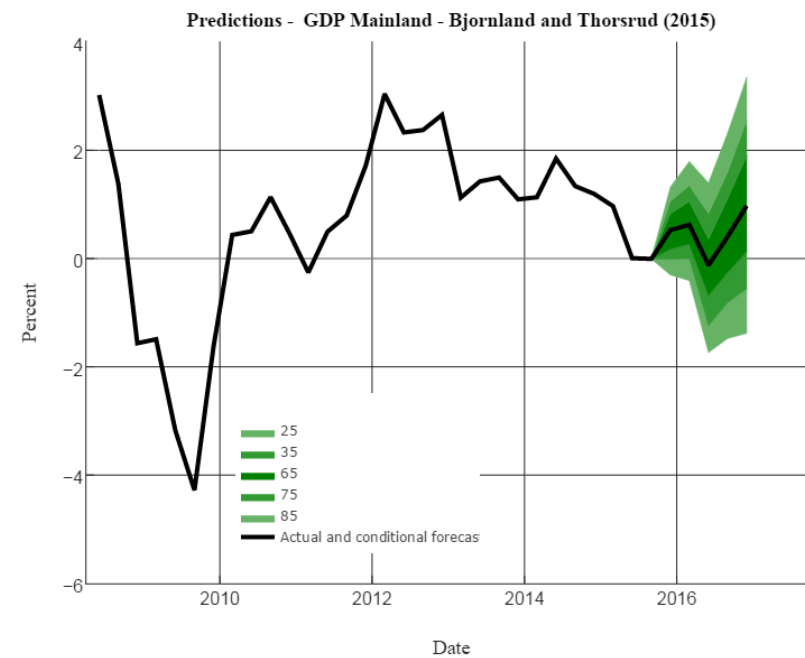
Predictions for oil prices and oil activity 2016 - Unconditional and conditional forecast

Figure 1. Forecasts of factors



Kilde: Bjørnland og Thorsrud (2015)

Now the signs are reversed - Predictions for 2016, for Norway... Conditional forecast



Kilde: Bjørnland og Thorsrud (2015)

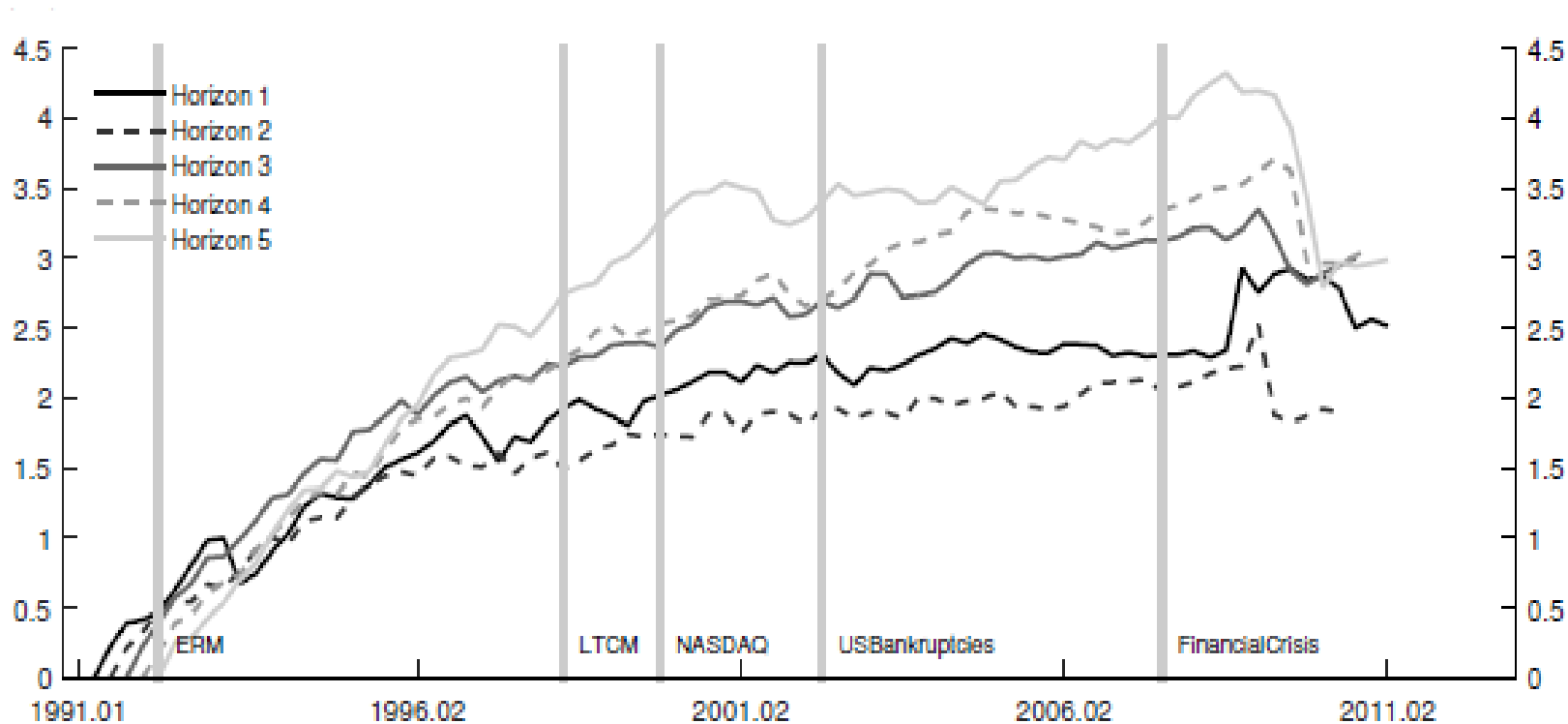
3. Policy implications for Korea

Policy implications for Korea

- Oil importer and developed – small positive effects from current oil price decline
- Capital investments declining – hurt tradables
- Korea is related to both the global and the Asian business cycle

Forecasting GDP with global components – CRPS score

Relative out-of-sample forecasting performance

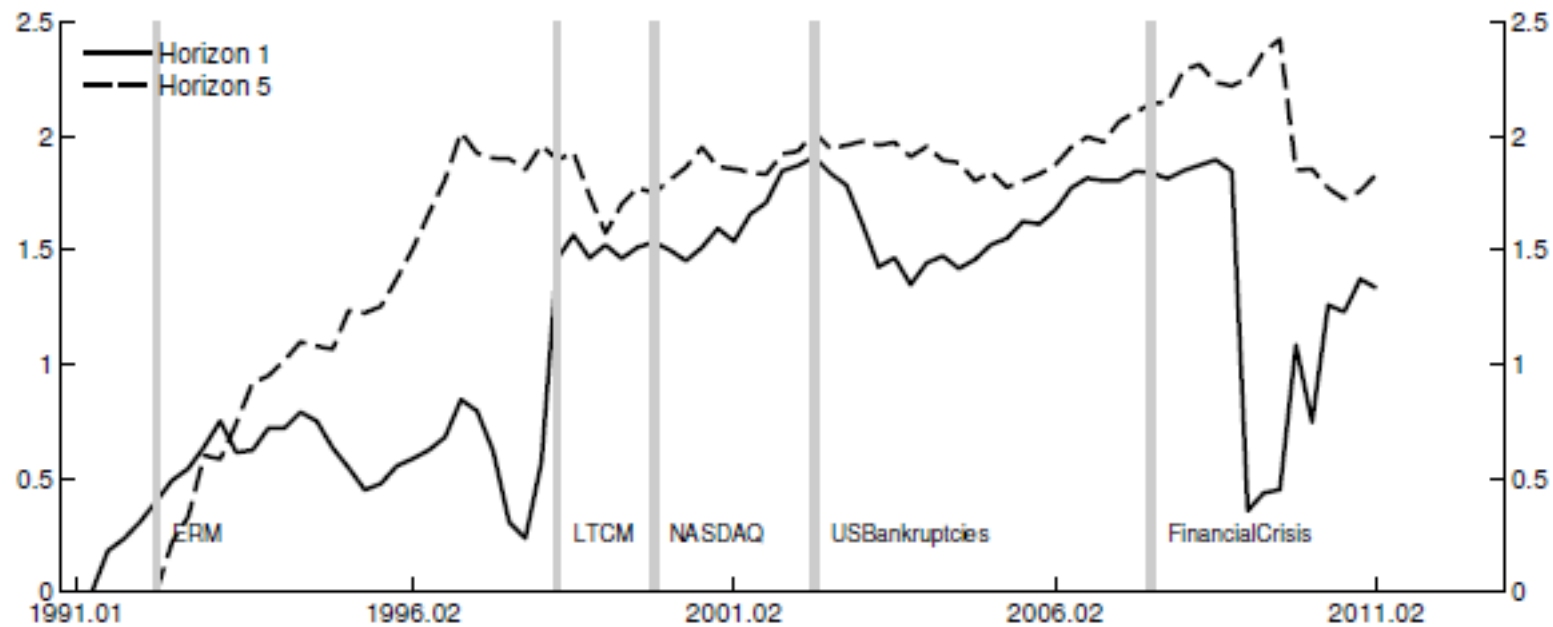


Forecasting GDP with global components. This time is different
Bjørnland, H.C., F. Ravazzolo and L.A. Thorsrud (JIF,2016)

Forecasting Asia with regional components – CRPS score

Relative out-of-sample forecasting performance

(d) Asia

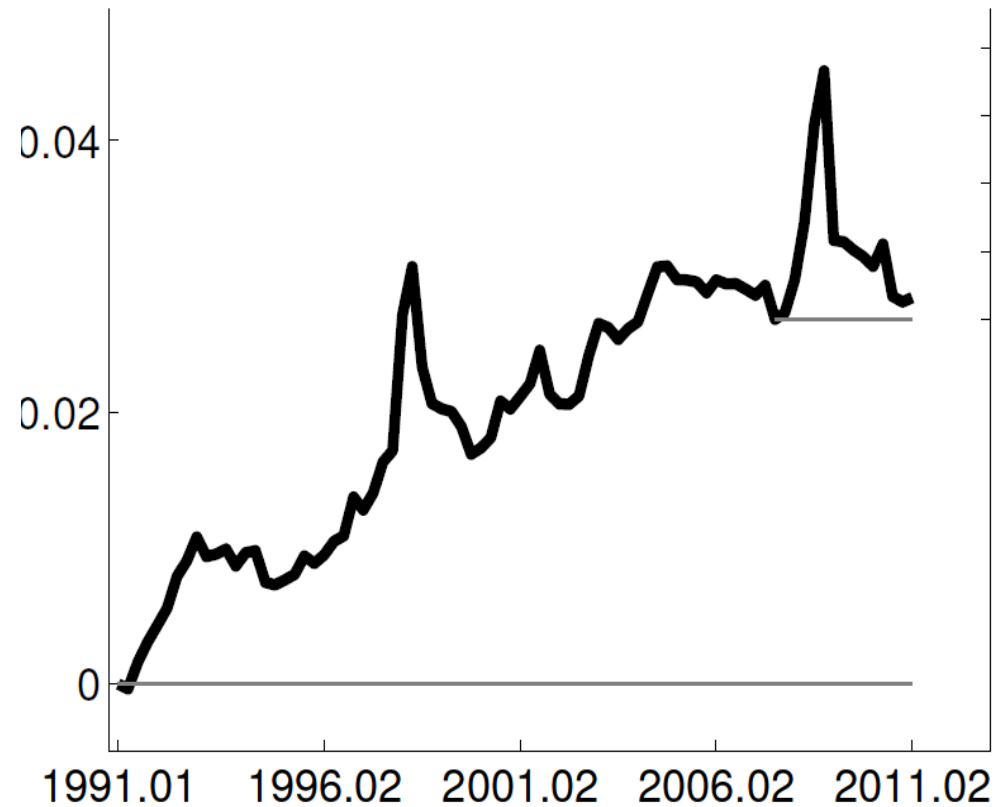


Forecasting GDP with global components. This time is different
Bjørnland, H.C., F. Ravazzolo and L.A. Thorsrud (JIF,2016)

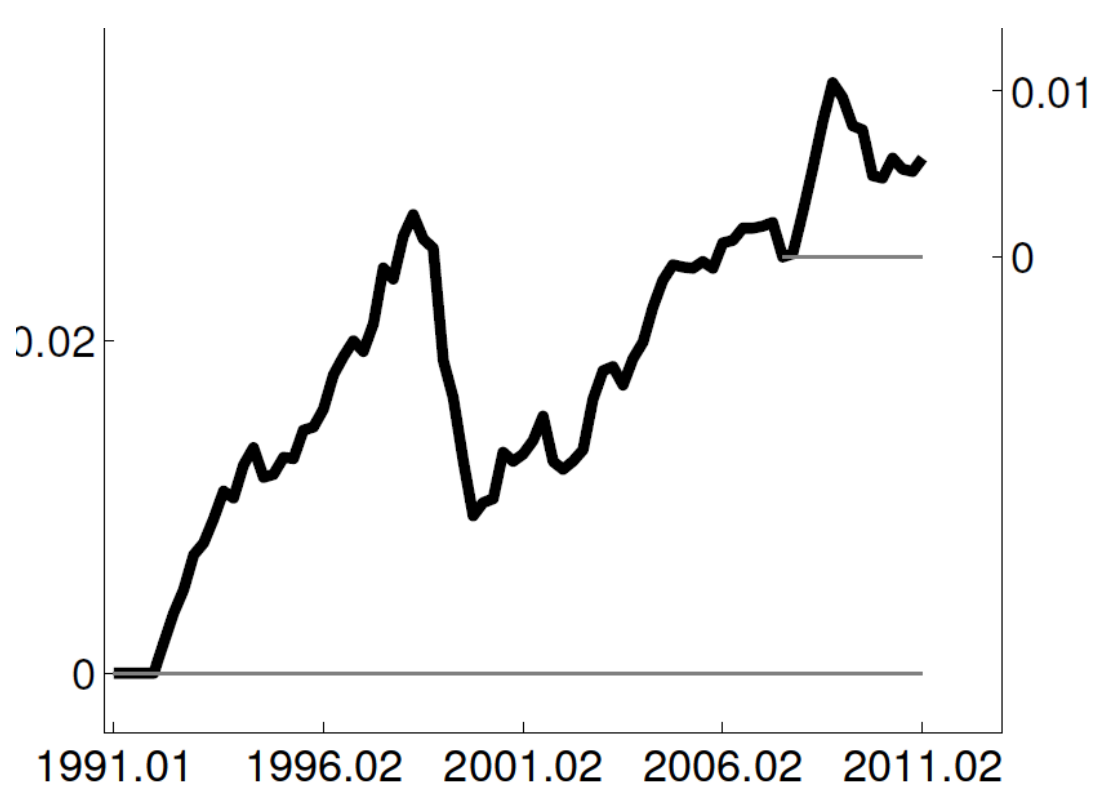
Forecasting Korea with global and regional components

1-step ahead - Relative out-of-sample forecasting performance

1 -step ahead



5- steps ahead



Thank you!