Modeling fiscal policy in a small, open, resource-rich economy

Norwegian experiences

Ådne Cappelen
Statistics Norway

Outline

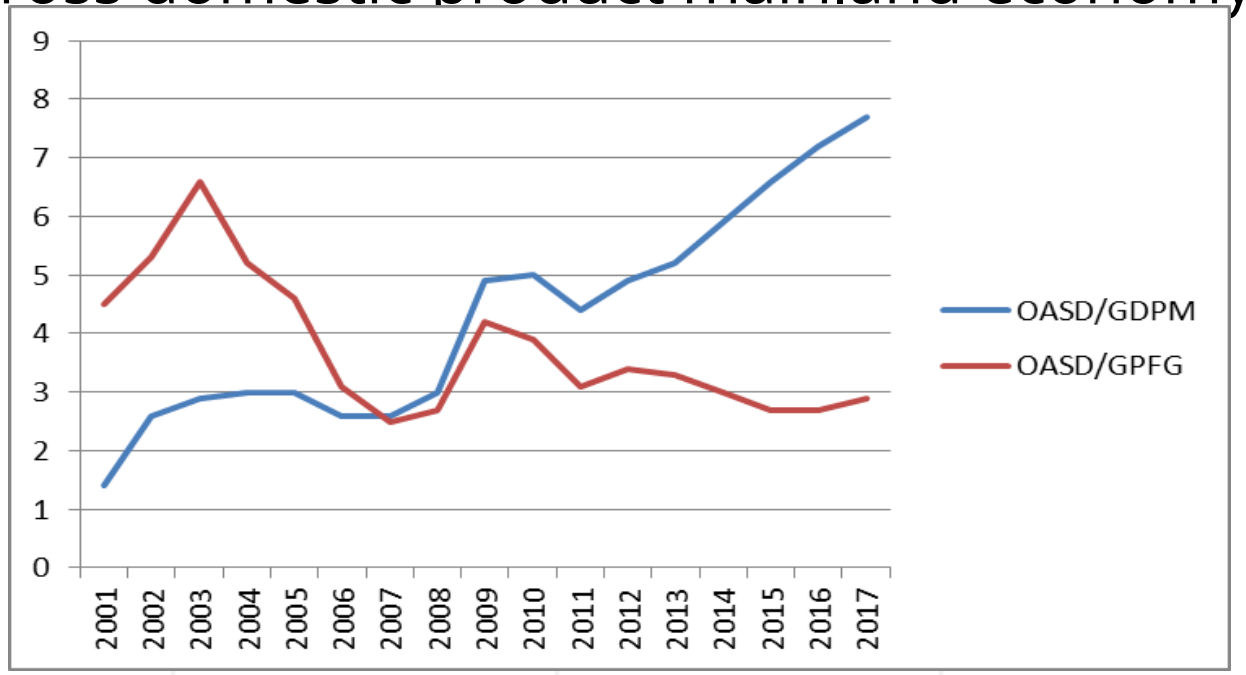
- Resource richness and fiscal policies
  - Implications for private spending?
- Openness and fiscal policy
  - Trade and factor mobility
- Modeling fiscal policies , micro-macro vs. short-run long-run issues

Modeling fiscal policy – many aspects and models

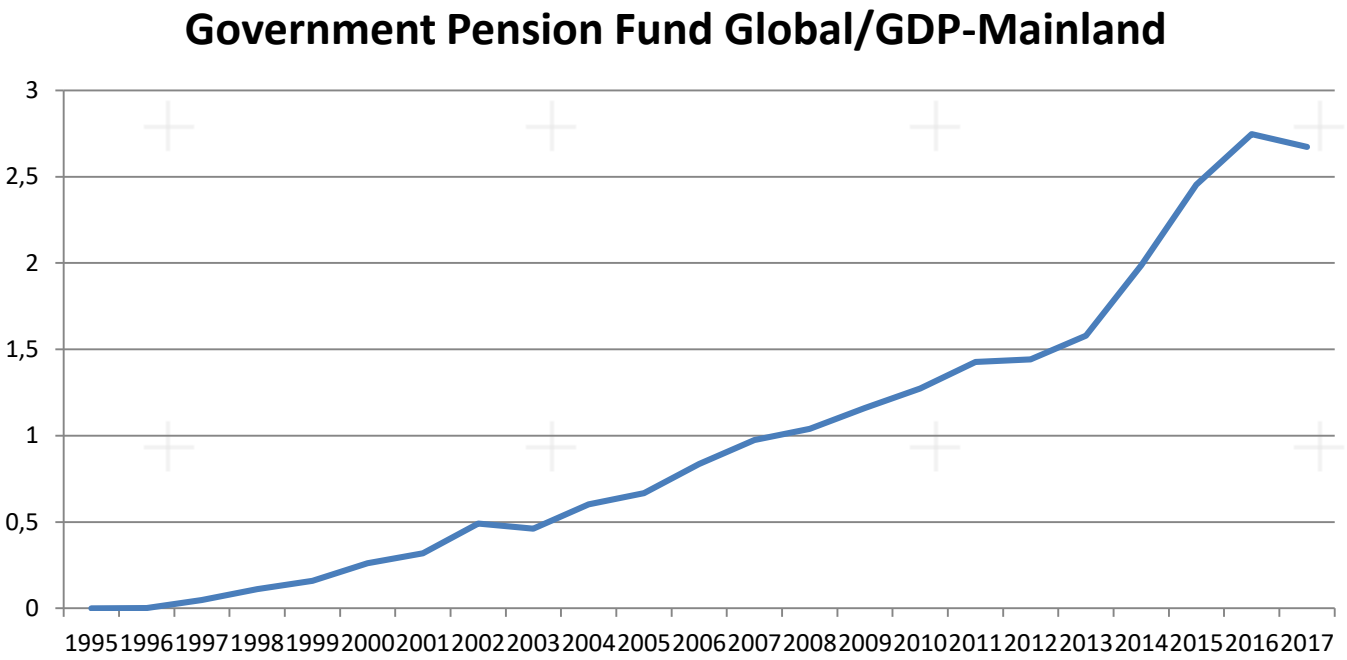
- Effects of government spending
  - «macro-issues» - macromodels (short/long-run)
  - «micro-issues» - education, R&D, pensions…
- Effects of taxation
  - «macro-issues» - macromodels (short/long-run)
  - «micro-issues» - income distribution, labour supply, direct vs. indirect taxes
- No single model can handle all these issues well. You need a suite of models. SN currently uses 8 different models for various fiscal policy analyses. With a suite of models, consistency becomes an issue. A recursive structure is obviously wrong
- In addition to fiscal policy oriented models, SN uses large multicountry models to handle resource and environmental issues (that have links to fiscal policies!)
- My focus will be on macro-issues only

Revenues from resource extraction have been invested abroad and enabled sustained fiscal expansion

- Oil Adjusted Structural budget Deficit = OASD
- Government Pension Fund Global = GPFG
- Gross domestic product mainland economy = GDPM



«Are government bonds net wealth?»
What about foreign «bonds» or claims on governments that will not tax you in the future?



Implications for modeling fiscal spending

- Norway has a budget spending rule similar but with a growing GPFG unbalanced spending policies must be analysed
- Budget rule NOT based on PIH but a «bird in hand» idea that gradually approaches PIH
- Can GPFG change/increase a lot without large effects on private spending within a standard macro horizon?
- If yes, what kind of household model should we use? If no, how has household spending actually responded to GPFG and oil prices in general?

Modeling household consumer spending

- A crucial mechanism in propagating fiscal (and monetary) policy changes is the size of the Marginal Propenisty to Consume (MPC)
- Other important mechanisms are «sticky prices» and staggered wage setting due to bargaining patterns etc. as well as the timing of fiscal policy reponse to balance the budget in the longer run
- How does consumer spending react to changes in taxes/income and wealth?

A new concensus on MPCs?

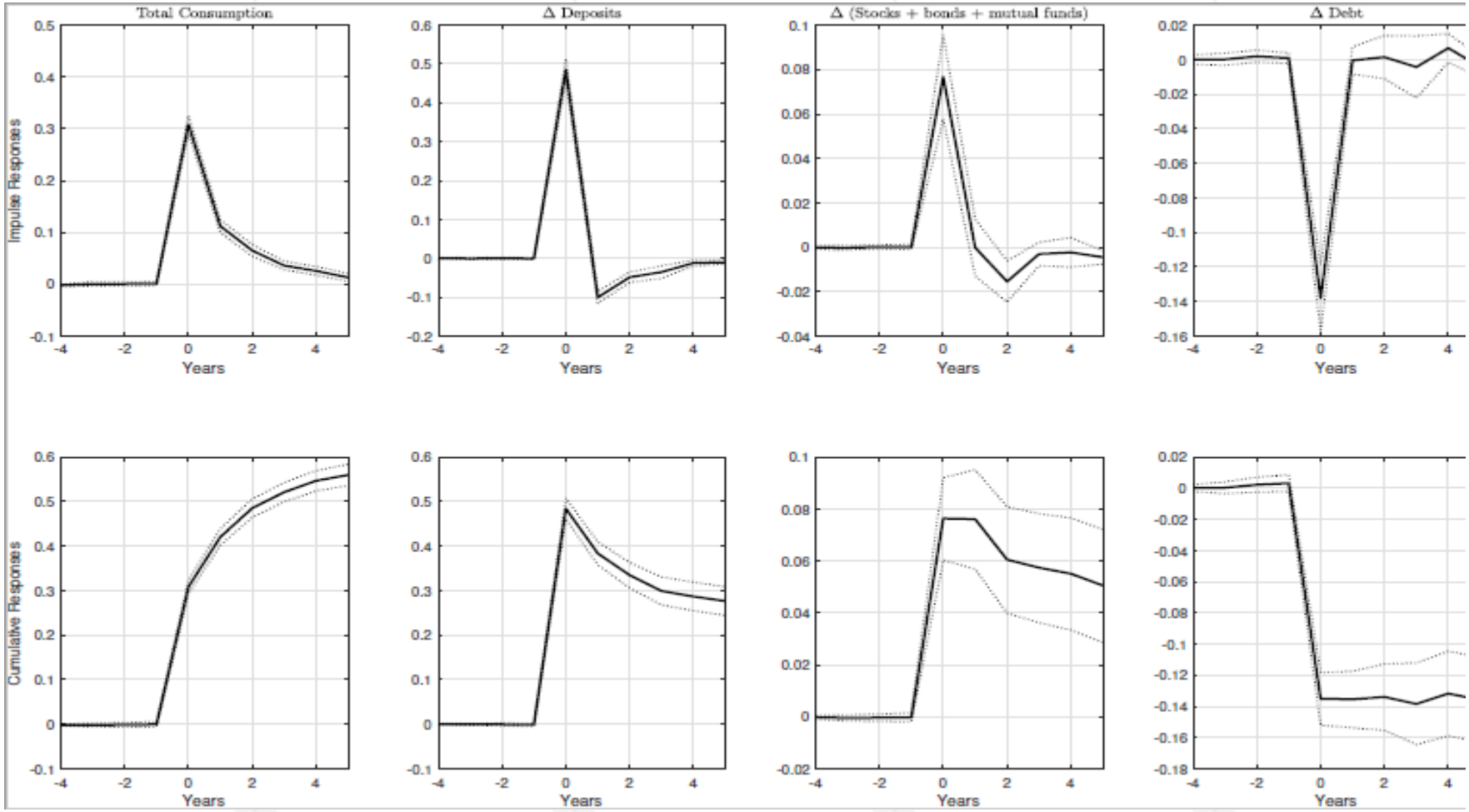
- The «excess sensitivity» model of consumer behaviour from the 1980s and early 1990s was not included in «modern» macromodels until quite recently
- As new microdata became available, it became clear that the representative agent-model even with some modifications, did not match data well
- Recent studies have shown that «hand-to-mouth» households can excist across a broad range of the income and net wealth distribution without relying on borrowing restrictions
- Carroll et al. (2017), Ahn et al. (2017), and Jappelli & Pistaferri (2010) and (2014) for surveys

A «microfounded» study

Fagereng, Holm and Natvig (2016)

- Household data (1993-2006) based on reported tax data containing balance sheets, income statements and other household characteristics. (Fagereng & Halvorsen 2017)
- These data linked to 20 000 Norwegian lottery winners
- Lotteries are close to an unexpected income shock. What is the consumption response?
- Save almost everything or spend substantial parts?

First year MPC = 1/3. (=Friedman 1963!) Debt reduction & increased gross assets



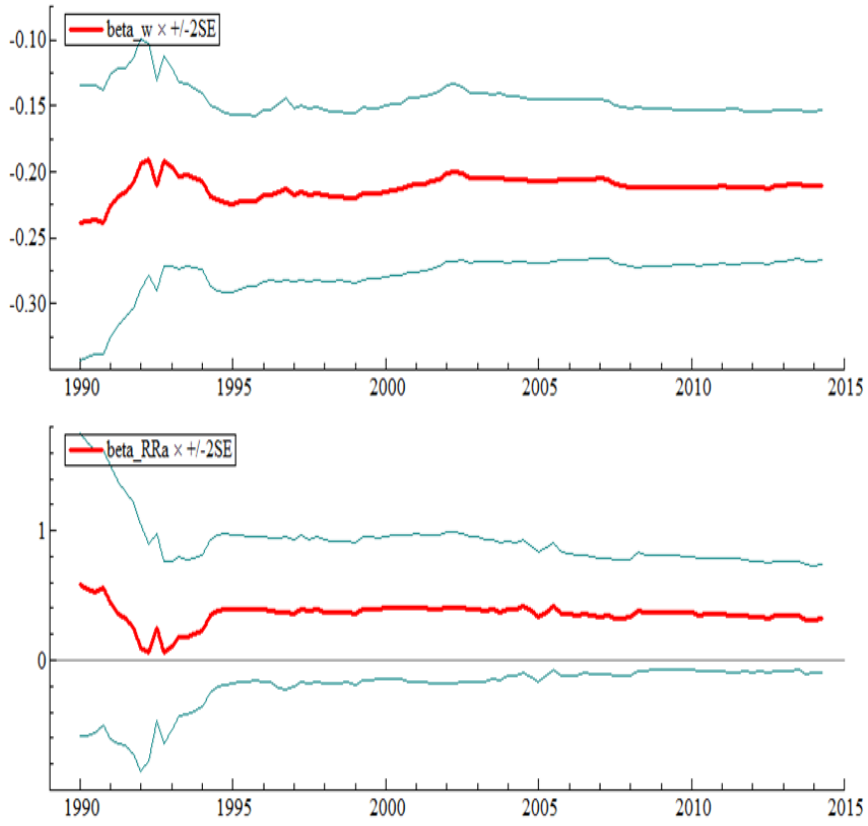
Heterogeneity matters

- The response of households varies according to a number of characteristics
- Households with low liquid holdings consume more of the lottery prize than liquid households
- «Wealthy hand-to-mouth» consumers seem important
- Household models should include a role for liquid assets?
- Fiscal policy implication? Stabilization policies should take heterogenous reponses into account (in order to maximize impact per krone in budget deficit)

Evidence based on macro-data

- Start out with a general specification that nests alternatives in the literature ("consumption function", martingale, habit formation, "hand to mouth")
- Cointegration represents a common ground between the CF, (causal link from income to consumption), and the permanent income/life cycle theories, which imply an EE for consumption (a link from consumption to income). The discriminating feature is their implications for the direction of equilibrium correction ("weak exogeneity")
- Start with a well specified VAR in levels using seasonally unadjusted data (1970-2014) and test, using the likelihood criterium, the implications of forward-looking restrictions on the coefficients of the VAR, cf. Johansen and Swensen (1999, 2004, 2008):
- We find a cointegrating relationship between household income, consumption, wealth and after tax real interest rate, after adjusting for breaks (deregulation of credit markets in the mid 1980s and the financial crises)

Long run parameter estimates of the cointegrating equation



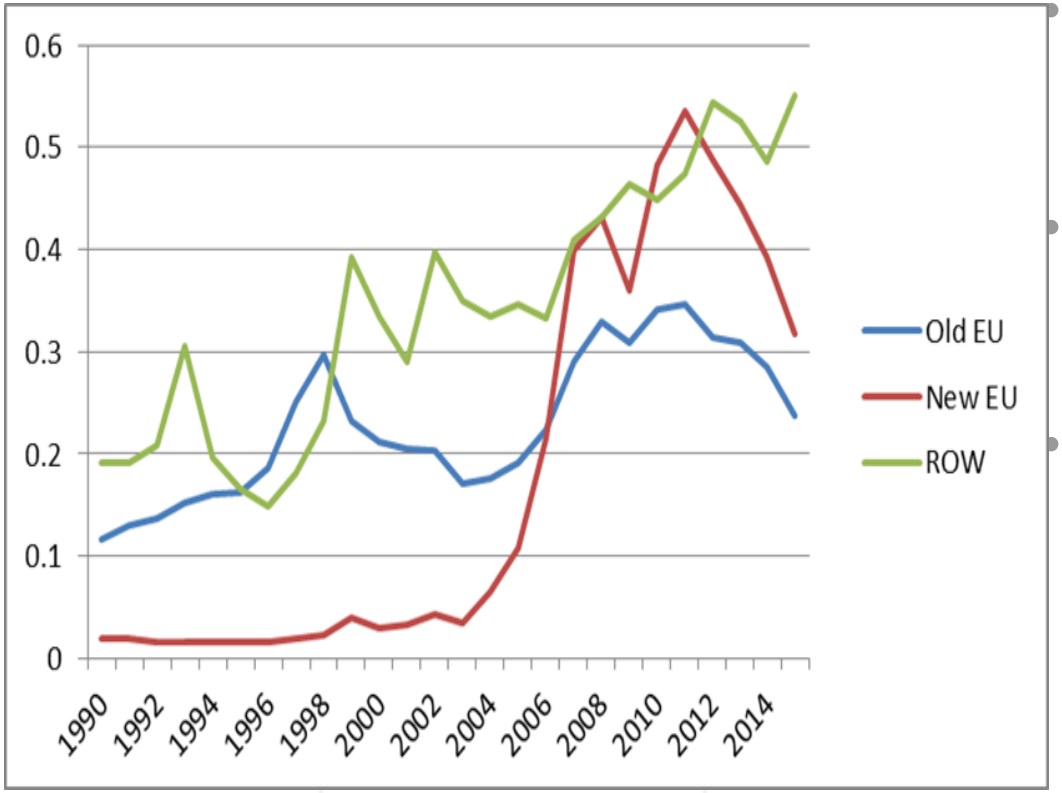
- El C_Y =.8 ; El C_W = .2
- These estimates are robust to the introduction of the fiscal policy rule in 2001 and huge changes in oil-prices and GPFG
- Lacks a disaggregation of wealth in liquid vs. illiquid assets
- Is this model useful for fiscal policy analyses given what has happened to OASD and GPFG?

Further results

- A dynamic eqcm-model that includes the long run equation has a first year MPC of .3 in line with the “new consensus”. We find macro results that are very similar to Fagereng et al.
- We cannot find a forward-looking representation of a consumption function with parameter estimates that have economic meaning (both before and after the financial crises in 2008), cf. Boug et al. (2017)
- A similar result is found when testing the New Keynesian Phillips Curve; Taking into account the long run CI-term, the forward looking term has no economic interpretation. Sticky prices and wages are important in our model

How does labour migration affect the Norwegian oil economy?

- Immigration in percent of total population

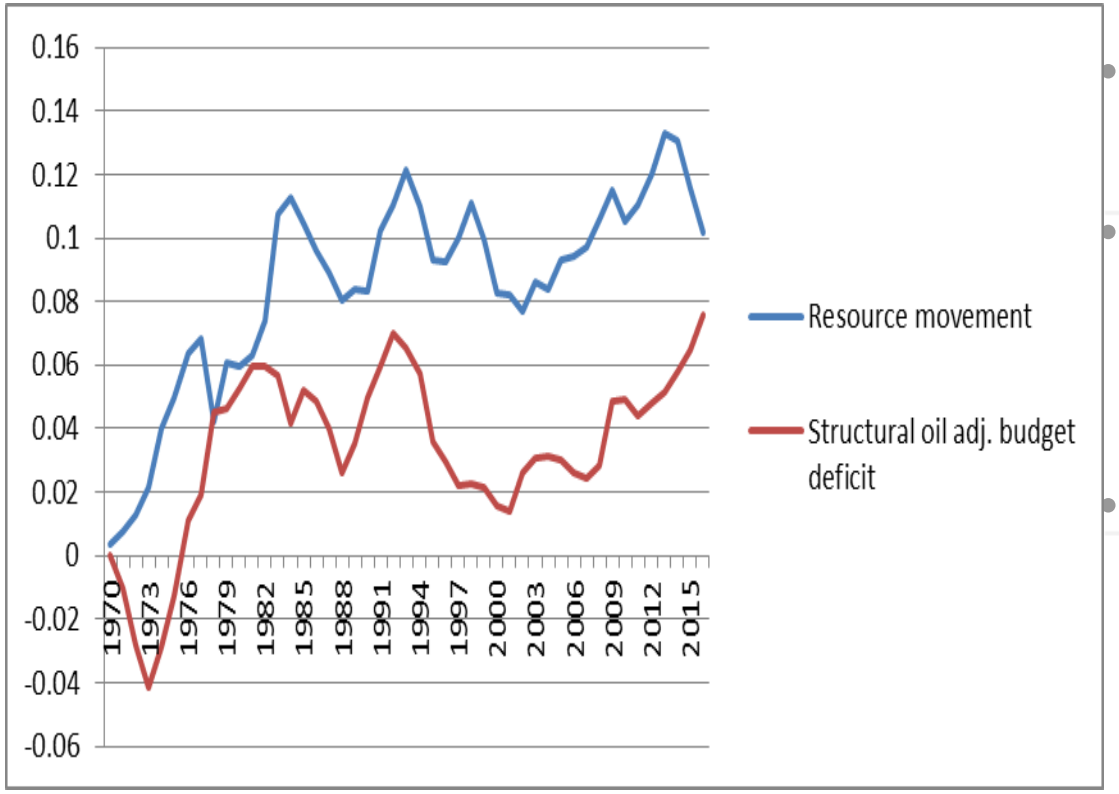


EU-enlargement in 2004: a structural change affecting the Norwegian labour market

Massive inflow of workers from Eastern Europe that previously had little access

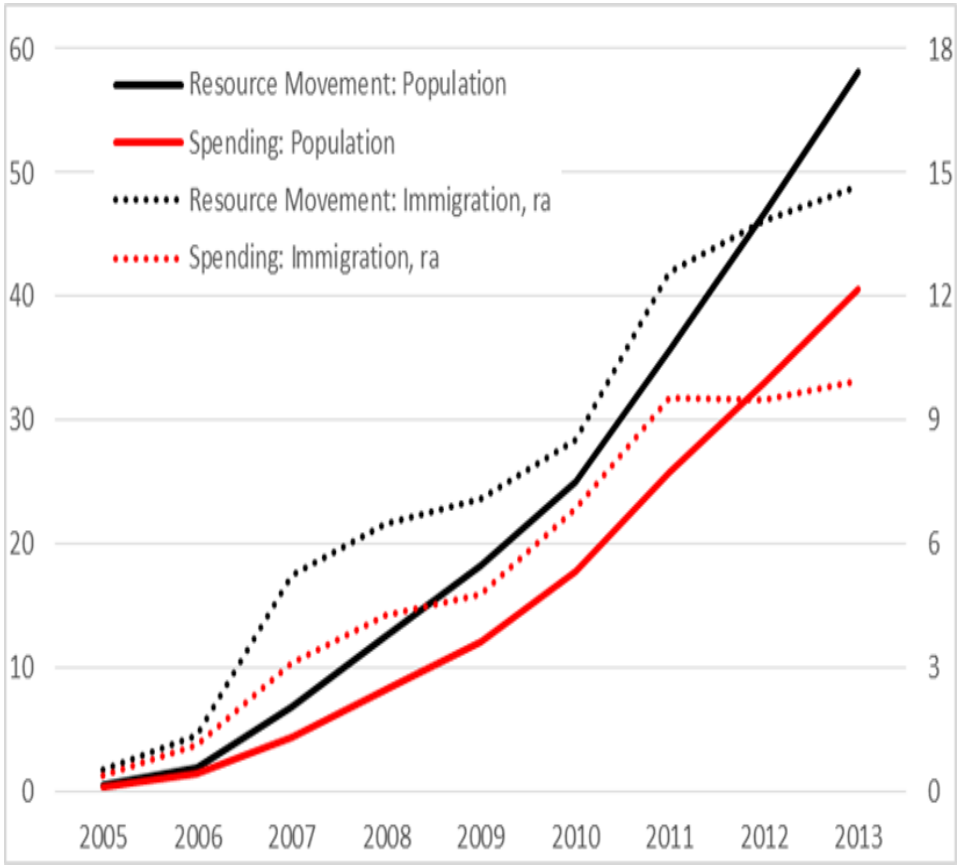
In addition the oil boom led to more immigration from other EU-countries that already had access to the Norwegian labour market

From 2004-2013 the Norwegian economy experienced a resource boom. How has labour migration modified the effects of the boom?



- Total impulse from 2004-2013 is 8% of GDPM (5+3)
- Note that the impulse is increasing over time not a constant shift as share of GDPM
- What are the effects and how has more labour migration affected the results?

Immigration depends on relative GDPs per capita (PPP) and relative unemployment rates



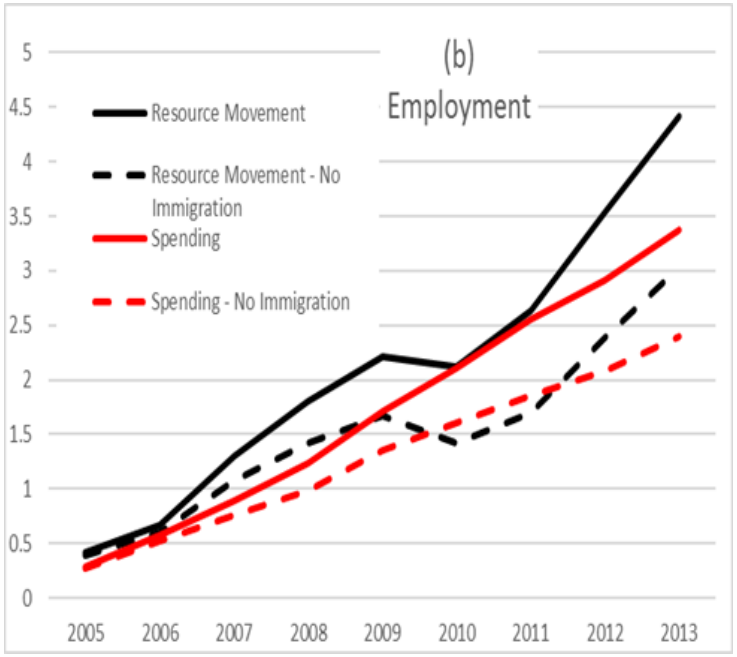
Effects on immigration: right axis; population left axis in 1000 persons

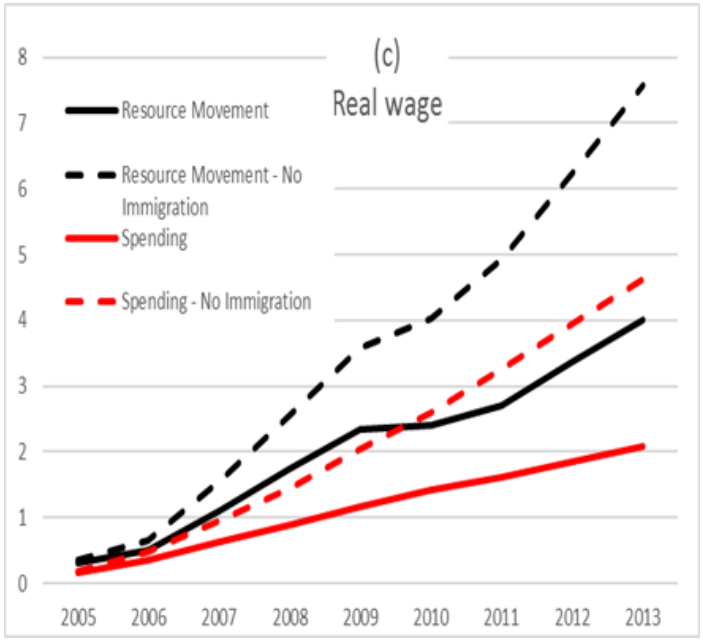
By 2013 population has increased by almost 2 % allowing for endogenous immigration response

Most of these immigrants have entered the labour force

No immigration reponse from Asia &Africa by assumption

- Immigration «flattens» the supply curve and increases the employment effect of the boom while wage effects are reduced.
- GDP is not much affected so productivity is reduced.
- Implication for fiscal policy: demand «leaks» to foreign labour markets, lowers inflationary effects and the need for a monetary policy response





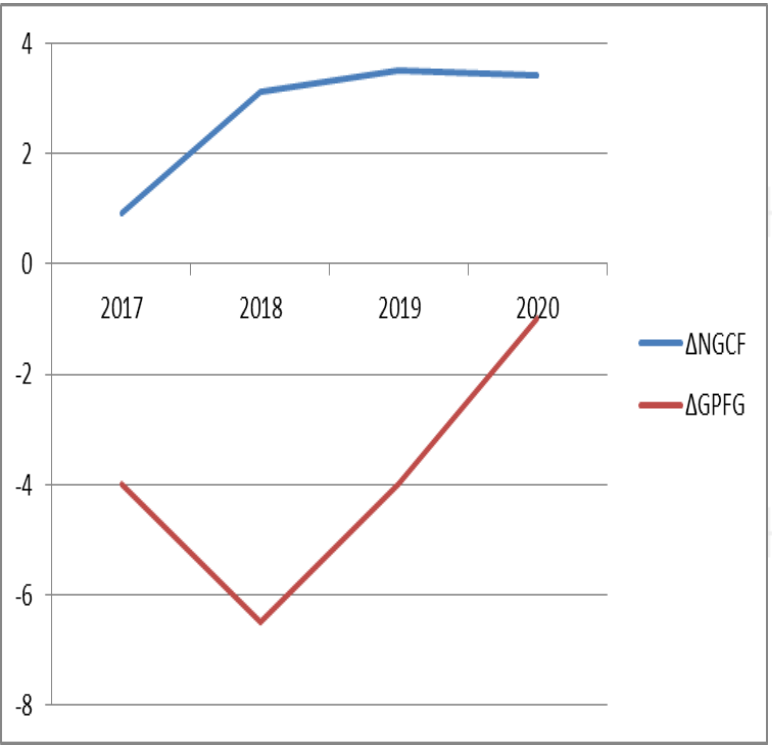
Short vs. long run effects of fiscal policies

- Current policies aim at promoting economic growth and productivity. Productivity growth had declined even before the financial crises of 2008
- During the recent downturn in the Norwegian economy politicians emphasised that fiscal policies did only focus on short term demand management but also the «supply side».
- Tax reform, education policy, R&D investment, investments in infrastructure are elements in the policy package in Norway
- A macromodel should be able to inform us to some extent on the growth potential of these policies
- Integrating these policies within a model is important even if the focus is only short to medium term forecasting: What is the new equilibrium we are moving towards from the cyclical trough we passed a year ago?

Oil price sensitivity and the fiscal policy rule

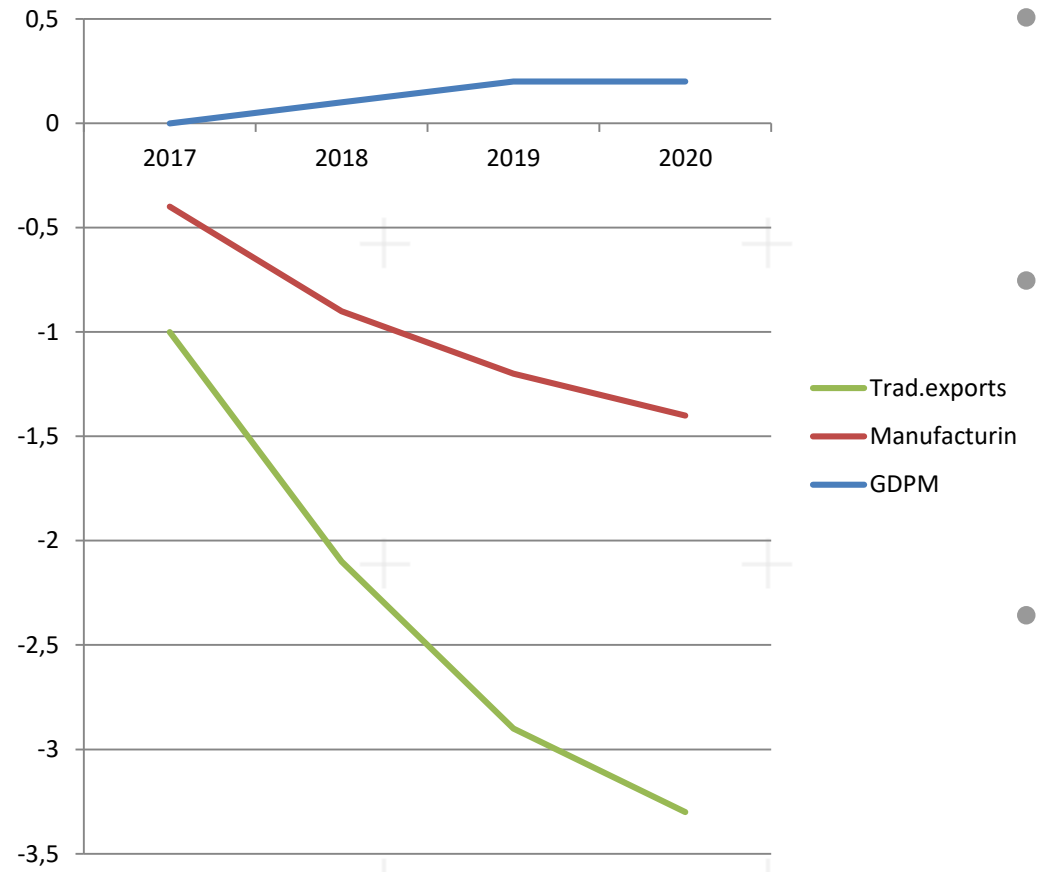
- With less oil & gas left in the ground and a large fund invested abroad (GPFG) fiscal policy becomes more sensitive to the exchange rate and global asset prices than the oil price
- How does a large change in the oil price affect the room for fiscal policy?
- You might say; not very much since the policy rule states that policy makers should smooth transitory changes in GPFG but how to separate transitory from permanent shocks?

Sustained oil price increase by 20 USD per barrel from 2017 to 2020



- Government cash flow increases a lot as share of GDPM (blue). CF is invested in the fund
- The exchange rate appreciates by roughly 3 % due to higher oil prices. GPFG falls (red) as share of GDPM in spite of the positive CF
- How should fiscal policy respond?
  - in this simulation we assume «not at all»
- A large drop in GPFG could also come about due to a fall in asset prices. How should fiscal policy respond?

Effects on output of higher oil prices



- Effects without any investment response in the petroleumsector
- Manufacturing is negatively affected by standard Dutch disease effects
- Consumption increases by 1 % and GDPM is marginally higher