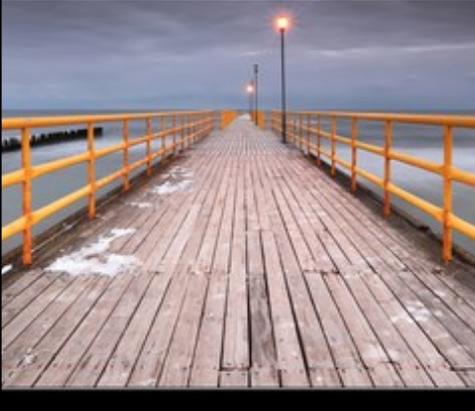




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To explore and to clarify

CPB Suite of models

*Ministry of Finance, Oslo
October 2016*

Albert van der Horst

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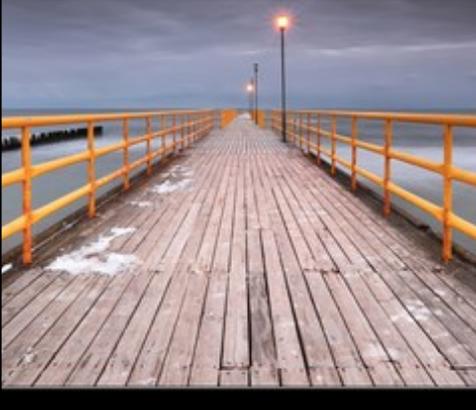
To explore and to clarify

- To explore
 - macroeconomic questions
 - macroeconomic developments => projections
 - impact of policy on Dutch economy
- To clarify
 - understand and explain actual developments
- We use models to explore and to clarify
 - simplify tools
 - improve understanding of model outcomes
 - improve transmittability to new employees

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Three tasks

- Macroeconomic analysis
- Projections
- Policy analysis

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Task 1: Macroeconomic analysis

- Current issues
 - What is the impact of a Brexit on the Dutch economy?
 - What is, and has been, the influence of fiscal policy on GDP?
 - ...
- Structural issues
 - uncertainty
 - interaction financial and real economy
 - impact of policy (fiscal multiplier)

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What is the impact of a Brexit on the Dutch economy

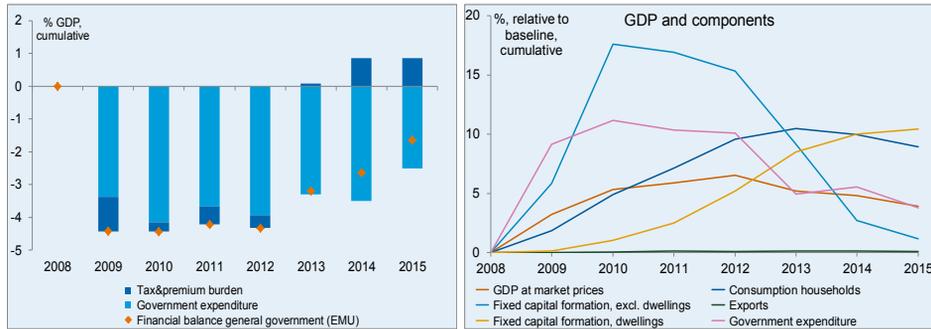
- Short run: -0.4% GDP
 - Uncertainty – empirical analysis with a VAR-model
 - Trade – model analysis with Nigem
- Long run: -1.0% GDP (or maybe less or more)
 - WorldScan: CGE-model
 - > Higher tariffs – small impact
 - > Non-trade barriers – substantial impact
 - > Dynamic gains affects productivity – questionable
- All this information can be combined in Saffier to get a projection for the Dutch economy



What is, and has been, the influence of fiscal policy on GDP?

- Long tradition of analyzing the economic effects of fiscal policy
 - Charting choices – election platforms
 - Coalition agreements – impact on budget and economy
 - Fiscal consolidation
- Suite of models
 - Bookkeeping models (and good thinking) to identify the budgetary shocks, impact on wedge and replacement rate
 - Labor market model, to identify labor supply responses
 - Saffier, to combine everything in macro-economic effects

Budgetary changes and impact on GDP (2008-2015)



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Task 2: Projections

- Requirements
 - Bookkeeping
 - > *We project the National Accounts (not the Dutch economy ...)*
 - Definitions
 - > From $Y=C+I$ to the detailed definition of disposable income
 - Behavioural equations
 - > Both short run and long run
 - Policy instruments
 - > In quite some detail
 - Transparant, reproducable

- Instrument: Saffier + empirical methods

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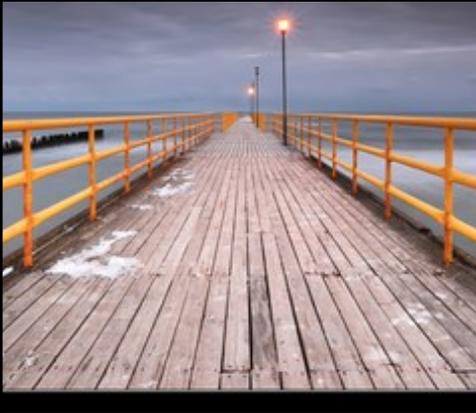
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Task 3: Policy analysis

- Integral part of the projections
 - March/June: projection conditional on 'current policies'
 - June-September: budget and reform proposals by government
 - > Evaluated on its macro-economic effects
 - September: projection including 'new policies'

- Election platforms & coalition agreement



Suite of models

Saffier

Empirical models

The suite



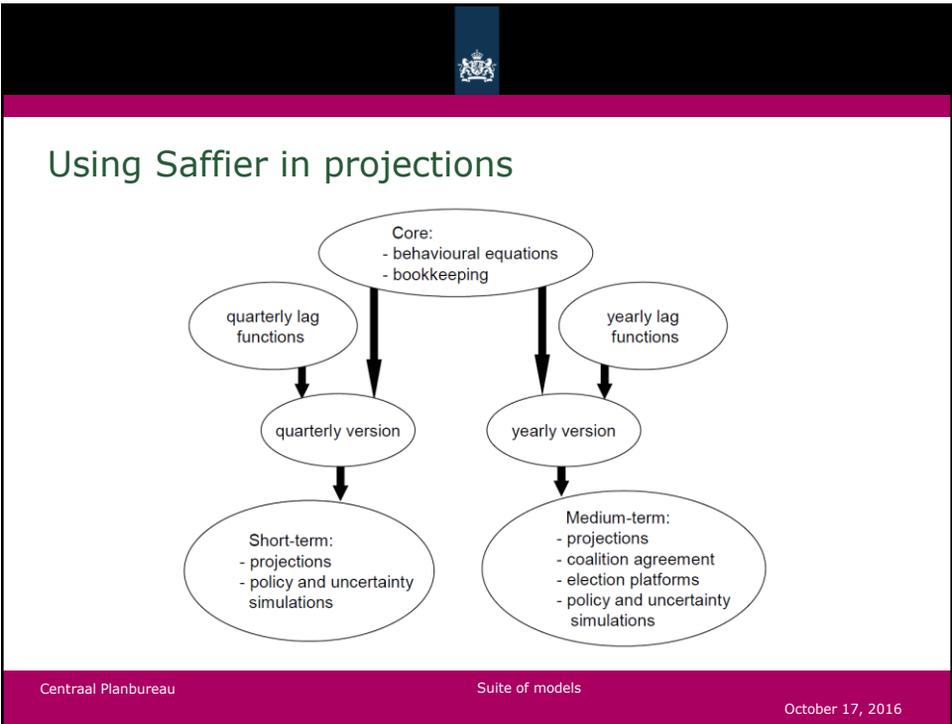
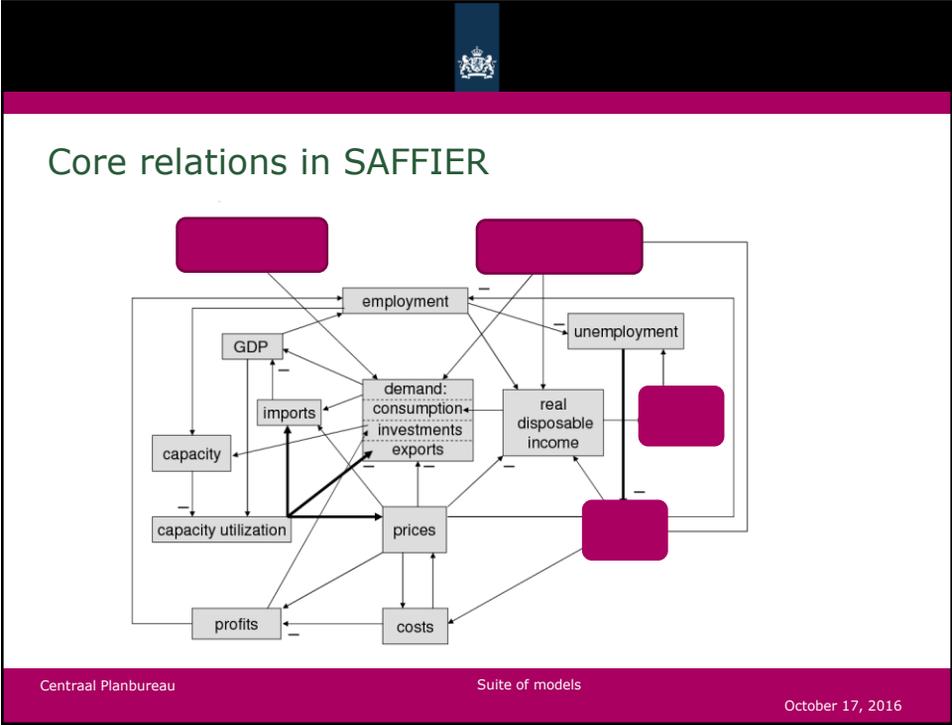
SAFFIER

- **S**hort and medium term **A**nalysis and **F**orecasting using **F**ormal **I**mplementation of **E**conomic **R**easoning
- *one* model for the Dutch economy
- *two* versions (quarterly and yearly)
- *three* applications
 - short term forecasting with quarterly version
 - medium-term forecasting with yearly version (up to 2017)
 - longer term analysis
 - > simulation characteristics of the model
 - > policy analysis
- > 3000 equations
 - but 25 behavioural equations are most relevant



SAFFIER

- Government sector with much detail (for policy analysis)
- Exogenous:
 - international assumptions (trade, prices, interest rates)
 - government policy
 - labour supply
 - specific sectors (health care, gas production)
- Endogenous with possibility to fix
 - taxes , prices health care / social security / income transfers





Strengths and weaknesses

- Strengths
 - Produces the output our customers want
 - Lots of policy detail
 - Both short and medium run
- Weaknesses
 - Complex, not very transparant
 - Doesn't incorporate latest economic thinking
 - No forward looking behaviour
 - Not estimated as a system



Empirical models

- Leading indicator
 - Summary indicator of a large number of leading indicators
 - No point estimate
- Large BVAR with 25 variables
 - GDP
 - Macro
 - Consumer indicators
 - Business indicators
 - Financial
 - Construction
 - International



What do we do with the BVAR?

- Generate forecasts for a wide range of variables
- Decompose the forecasts to back out the contributions of variables
- Condition the forecasts on anticipated paths of specific variables



Discussion

- Role in forecasting process
 - How to combine information from BVAR with SAFFIER?
- Currently used to inform main forecast in SAFFIER
 - Information for expert opinion
 - Inform paths for exogenous variables (world trade)
 - Decide on rounding



Suite of models

Nigem - international

Micsim - labour market

Mimosi - social security

Taxus - tax revenues



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Suite of models

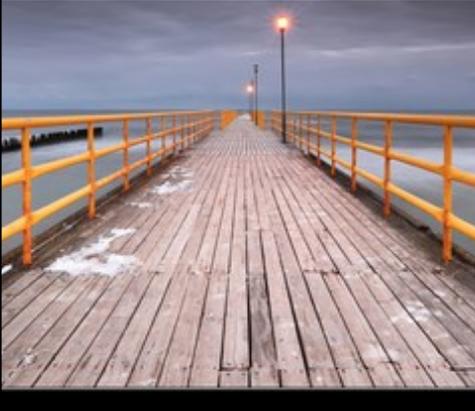


- EMU-model
 - Budgetary implications
- Mimosi
 - Purchasing power
 - Income inequality
- Gamma
 - Sustainability of government budget

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New roads

Revise Saffier

DSGE

Loosened and enriched DSGE

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After many discussions ...*(standing on giants shoulders)*

- CPB-comitee Hellwig (2010)
 - Cutting back on detail could free up resources for
 - > improving forecast quality/accuracy
 - > be spent elsewhere
- Model discussion (2011-12)
 - DSGE and Saffier and VAR
 - > Much in common: linear dynamic models
 - > But different: specification, identification, forward looking behaviour
- CPB-comitee Frijns (2013)
 - CPB should deliver comprehensive view on macromodels

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Revise Saffier

- To clarify
 - transparent
 - less detail
 - revise model sections
- To explore
 - Wealth and consumption
 - Forward looking behavior



DSGE - what have we done?

- We have built and estimated various versions of an Open Economy Smets-Wouters model
- Goal:
 - Include sufficient policy detail to be useful for CPB analysis
 - Include an explanation of unemployment
 - Must be estimated
- Hence
 - Added Gali unemployment
 - Added credit-constrained households



Advantages

- Model near the scientific frontier
 - Can talk to academics
- System estimation
 - The model fits the data by construction
 - Confidence bands for policy analysis
- Economic story for errors
- Better story?
- Lucas critique



Disadvantages

- Development time
 - Especially for estimation
 - > Estimation
 - > Steady state
 - > Data issues (stationarity, current account, etc...)
 - Adding simple new element entails a lot of work
- Size limitation
 - Development time rises exponentially with model size
 - Adding more detail in one place often imposes restrictions somewhere else or interferes with identification
 - Unfeasible to include level of detail required by our customers
- Limited range of stories - ie. fiscal policy story



Current approach: Loosened & Enriched DSGE

Between Saffier & DSGE

- **Compact**
 - Fewer demand and supply categories than Saffier, but > 1
 - Smaller government block
- **Theoretically founded**
 - Behavior of households and firms is derived from first principles
- **Expectations**
 - Forward looking behavior



Current approach: Loosened & Enriched DSGE

- Take DSGE as a starting point
 - For its forward looking behavior
 - Small and transparent
 - Widely use, with many available extensions
- Develop this model in a flexible and enriched way
 - Allow for non-optimal labor market behavior
 - Allow for inconsistencies in behavior
 - › E.g. households may behave differently on the labor market than in their consumption choices



Suite of models – work in progress

- Macro model – moving from Saffier towards DSGE
- Empirical tools – Bayesian VAR applications
- Labour supply – microsimulation model (launched in 2014)
- Labour demand – high on the agenda for coming years