The macroeconomic effects of the euro area fiscal consolidation, 2011-2013: A simulation based approach

Ansgar Rannenberg[1]   Christian Schoder[2]   Jan Stráský[3]

Institute for Monetary and Financial Stability,
Goethe University

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The views expressed here are those of the authors and not necessarily those of the Central Bank of Ireland or the OECD.

[1] Central Bank of Ireland and IMK. Email: ansgar.rannenberg@gmail.com
[2] Wirtschaftsuniversität Wien. Email: christian.schoder@wu.ac.at
[3] OECD. Email: jan.strasky@oecd.org

Introduction

- Over the period of 2011-2013: Member states of the euro area (EA) embarked on a major fiscal consolidation effort that coincided with return to recession.
- Effects uncertain and disputed (Blanchard and Leigh 2013).
- Simulation of EA's fiscal consolidation in two DSGE models used in EA policy-making: NAWM used by the ECB (Coenen et al. 2008) and QUEST III of the European Commission (Ratto et al. 2009).
- No definitive answer, but results from a range of plausible scenarios regarding
    - the expected persistence of fiscal measures (or the horizon of forward-looking households),
    - the presence and severity of credit constraints in the non-financial and household sectors.

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- "Worst case" (FA+higher share of ROT): Multiplier rises to 1.3, government debt-to-GDP ratio declines after 5 or 6 years.

- Consolidation caused between one third/one half (baseline) and 80% of the weak growth performance of the euro area during the 2011-2013 period (measured as decline of GDP relative to pre-crisis trend).

Contribution to literature

- EA fiscal consolidation analysed in Holland and Portes (2012) (NIGEM), European Commission (2012) and in 't Veld (2013) (both versions of QUEST III).
- Unlike Holland and Portes (2012), we use micro-founded models more appropriate for policy analysis (Lucas critique)
- European Commission (2012) limits the zero-lower bound (ZLB) to only one year, too short in our view.
- in 't Veld (2013) allows for longer ZLB, temporary consolidation measures and an elevated share of credit-constrained households. Unlike in 't Veld (2013), we
  - Estimate contribution of the ZLB and credit constraints faced by households and firms to the costs of fiscal consolidation.
  - Use the NAWM in addition to QUEST III, demonstrating robustness of our results.
- Interestingly, multipliers of Holland and Portes (2012) and in 't Veld (2013) close to our scenario with enhanced financial frictions.

Overview

- Overview of the two models
- Simulation design
- Baseline results
- Results with enhanced financial frictions
- Possible contribution of fiscal consolidation to the recent recession
- What would the costs of fiscal consolidation have been if monetary policy were unconstrained?

The models: similarities

- ▶ EA and ROW.
- ▶ Nominal rigidities in wage and price setting, investment adjustment costs, consumption habit formation.
- ▶ International capital flows in the form of safe international bonds.
- ▶ Share of credit constrained households, but no other financial frictions.
- ▶ Monetary policy follows an interest feedback rule.
- ▶ Variety of taxes and expenditure types: consumption tax, labor income tax (employees), social security contributions (employers), capital income tax, government consumption, general transfers.
- ▶ Fiscal rule to stabilize debt-to-GDP ratio in the long run by adjusting a revenue instrument.

The models: differences

- ▶ ROW fully modeled in NAWM, reduced form in QUEST III.
- ▶ QUEST III: Public capital stock enhancing private sector productivity and thus government investment. Automatic stabilizers in the form of transfers negatively related to aggregate employment.
- ▶ Add these features to NAWM as well. Elasticity of private sector output w.r.t. public capital: 0.015%.
- ▶ Response of transfers to employment calibrated such that the response of the primary deficit and output to a government consumption cut implies an empirically plausible semi-elasticity of the primary deficit with respect to GDP.

Simulation design 1: Shocks

- Accumulate to about 4% of EA GDP by 2013.
- Somewhat expenditure biased.
- Assume that transfer cuts are borne largely by liquidity constrained households: 74%. OECD (2012), Rawdanowicz et al. (2013) provide evidence that transfer cuts increase inequality. Broda and Parker (2014) estimate an MPC out of 2008 US stimulus payments on NIPA PCE of 0.74.

Table: Consolidation measures in the EA, 2011-2013 as % of GDP

	2011	2012	2013
Consumption taxes	0.3	0.4	0.2
Labor taxes	0	0.3	0
Corporate taxes	0.1	0	0
Social security contributions	0.2	0	0
Total revenue	0.6	0.7	0.2
Transfers	-1	-0.2	-0.3
Consumption expenditure	-0.2	-0.2	-0.1
Gross fixed capital formation	-0.2	-0.2	0
Total expenditure	-1.4	-0.6	-0.4

Source: European Commission (2012).

Simulation design 2: Temporary or permanent measures?

- In an infinite horizon environment, fully credible permanent expenditure cuts would crowd in the consumption of Ricardian households (Denes et al. 2013).

- Plausible to assume that EA governments cannot commit to permanent expenditure cuts.

- Realistic to assume some household myopia, as in the calibration of household lifetime in the GIMF model (Kumhof et al. 2010, Kumhof and Laxton 2013).

- Simulation: After implementation, consolidation measures are kept in place until quarter 40, then phased out following an AR(1) process with a coefficient of 0.9.
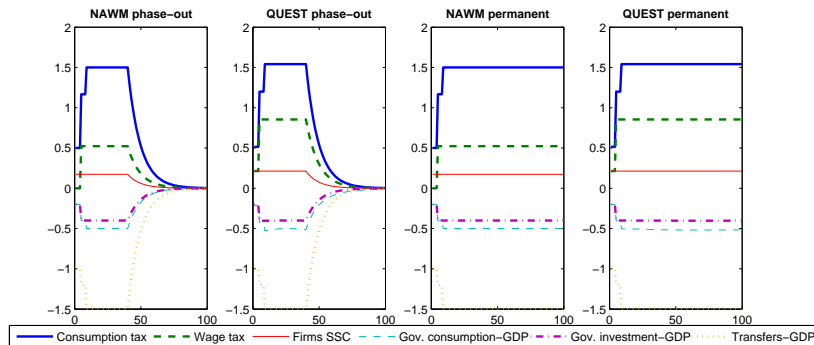
Path of fiscal instruments

Figure: Path of the fiscal instruments: baseline (top) and permanent measures (bottom)

Simulation design 3: Length of the ZLB

- ▶ Baseline: Monetary Policy rule switched off after 6 quarters (i.e. in 2012Q3), switched on again after three years (i.e. 2015Q3).
- ▶ 2011Q1 EONIA at 0.7%, close to effective zero lower bound by 2012Q3. Arguably would have happened even in the absence of fiscal consolidation: Contractionary effect of tightening of credit to households and firms.
- ▶ Al-Eyd and Berkmen (2013) estimate that bank funding pressures increased cost of loans to non-financial firms by about 1 PP in both 2012 and 2013. Simulating these increases as persistent risk premium shocks in the NAWM sufficient to reduce the policy rate by 1 PP for more than 20 quarters, even though the central bank responds only to inflation and GDP growth.

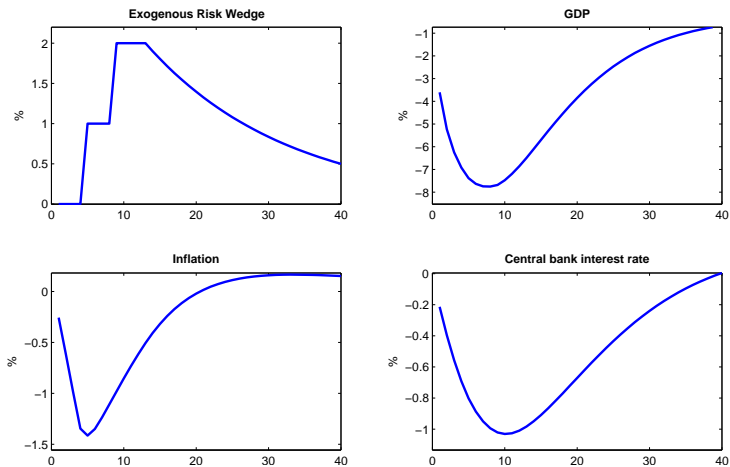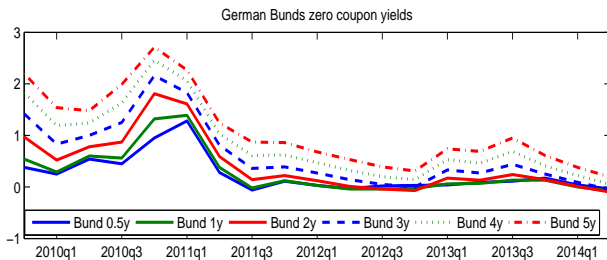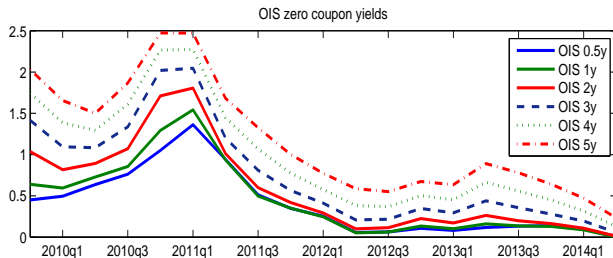# Risk premium shock in the New Area Wide model

Figure: Response of selected variables to a riskiness shock calibrated according to Al-Eyd and Berkmen (2013) estimates, AR coefficient=0.95

Simulation design 3: Length of the ZLB

- In 2012Q3, Bund and OIS yields suggested that financial markets expected the EONIA to be on average close to the ZLB (i.e. 0.25%) for 3 years.
- One year forward yield two years hence implied by two and three year OIS suggests average EONIA in third year of 0.4%.
- OIS-based predictions of the lift-off time from the ZLB maybe downward biased (Lemke and Vladu 2014). Distribution of shocks affecting the EONIA is truncated close to the ZLB. Therefore the "most likely" path of the EONIA is different from the OIS forward curve's prediction.
- Lemke and Vladu (2014): August 2012, estimated most likely time EONIA crosses 50 bp 42 months, while forward curve suggests 30 months (unfortunately no results reported for the 25 bp threshold).
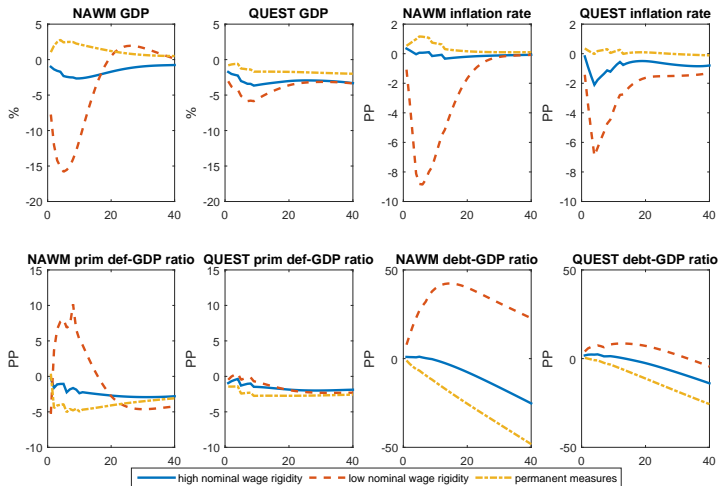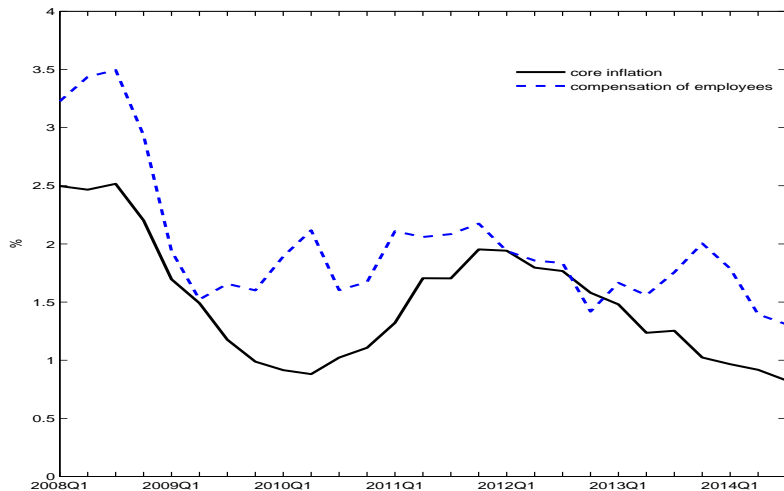
Zero coupon Bund yields and OIS, various maturities

Baseline results

- For original nominal wage rigidity: Big decline in inflation, nominal wage growth and output. Therefore increase Calvo wage parameter from 0.75 to 0.95 in NAWM and similarly in QUEST. Justification:
  - Downward nominal wage rigidity likely increased after the 2007-2009 financial crisis, as inflation and nominal wage growth increased somewhat in 2011 and declined only later.
  - Also micro-evidence from the WDN survey (Fabiani et al. 2015).
- With higher nominal wage rigidity: Both output and inflation decline less (higher nominal rigidity = lower output response to fiscal shocks in line with Eggertsson and Krugman (2012) and Bhattarai et al. (2014).

Baseline results

Core inflation and compensation of employees in the euro area

Financial accelerator

- ▶ Gelain (2010), Queijo von Heideken (2009) and Christiano et al. (2010) show that FA frictions matter in the euro area even in "normal" times.

- ▶ Financial accelerator amplifies the effect of fiscal shocks especially if monetary policy is constrained (Carrillo and Poilly 2013, Freedman et al. 2010).

- ▶ External finance premium:

$$R^K E_t \hat{R}^K_{t+1} - R \hat{R}_t = \xi \hat{\phi}_t \tag{1}$$
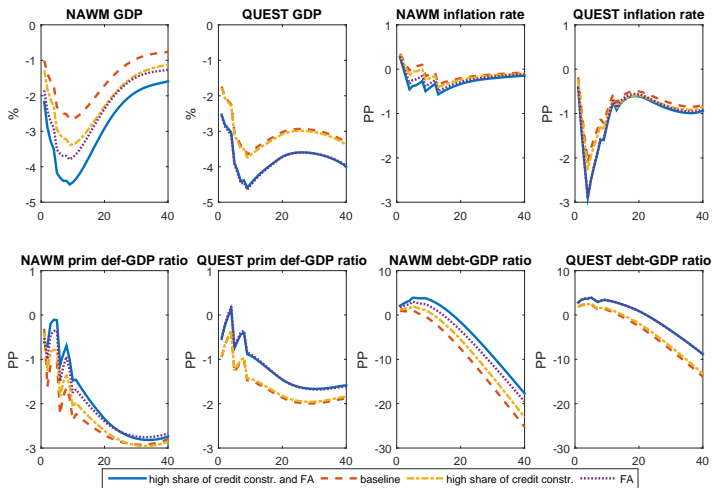
- ▶ For

$$\xi > 0, \tag{2}$$

Lower firm net worth causes higher leverage, higher external financing premium, lower investment spending. Also links non-financial firm net worth and private consumption.

- ▶ Calibration of FA based on estimate of Gelain (2010).

Higher share of credit constrained households

- Share of liquidity constrained households in original models based on pre-crisis estimates, but has likely increased.
- Set share of liquidity constrained households according to 48% (2013 ECB Household Finance and Consumption Survey).

FA, higher share of credit constrained households, and FA + higher share of credit constrained households

Results enhanced financial frictions - GDP + components

NAWM:

- ▶ With FA, cumulative multiplier rises 1.1 (0.7 in baseline). With FA, decline in Tobin's Q lowers firm net worth and increases external financing premium, lowering investment even more. Lower entrepreneurial net worth lowers consumption.
- ▶ Higher credit constrained share: smaller but still substantial amplification. FA + higher credit constrained share: 1.3.

QUEST III, key differences compared to NAWM:

- ▶ Bigger decline in inflation due to smaller nominal wage and price rigidities and employment adjustment costs.
- ▶ Decline of consumption>decline of investment: high capital adjustment costs in QUEST III.
- ▶ Increases in credit constrained household share almost no effect: Combination of real wage increase (price decline $>>$ nominal wage decline) and very strong automatic stabilizers.

Summary of results

Table: Short run costs and benefits of the fiscal consolidation, NAWM/QUEST III

	Cum. GDP loss 2011-2013	Cum. multiplier 2011-2013	Debt-ratio falls in year
Baseline	6/9	0.7/1.0	2/4
Fin. accelerator	10/12	1.1/1.3	4/6
Credit constr. share=0.48	8/9	0.9/1.0	3/4
FA, credit constr. share=0.48	12/11	1.3/1.2	5/6

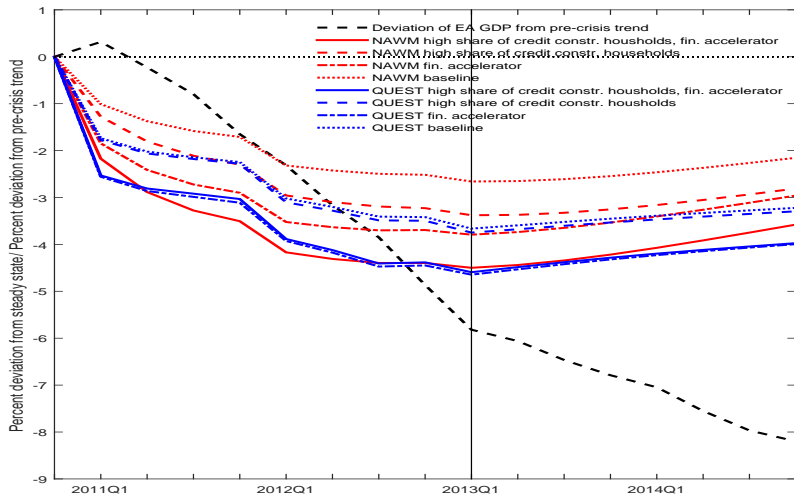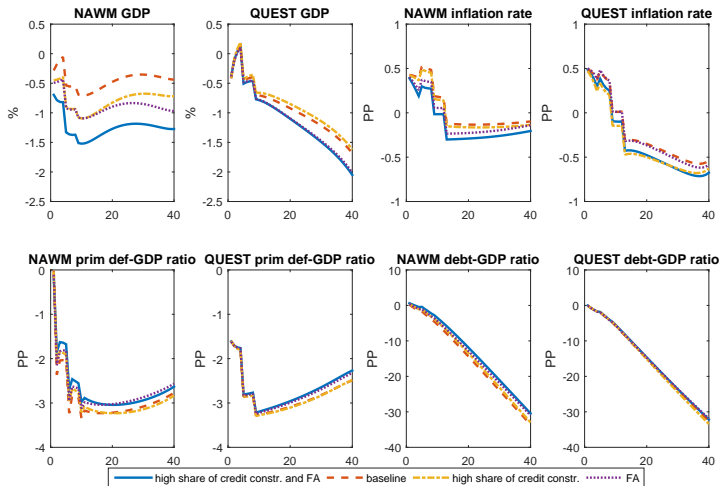# Deviation of euro area GDP from pre-crisis trend and simulated effects of fiscal consolidation

Figure: Average pre-crisis GDP growth rate calculated over 1999-2007 period

Fiscal consolidation in the absence of zero lower bound

high share of credit constr. and FA — baseline — high share of credit constr. ⋯⋯ FA

Fiscal consolidation in the absence of the zero lower bound - summary of results

Table: Short run costs and benefits of the fiscal consolidation in the absence of the zero lower bound, NAWM/QUEST III

	Cum. GDP loss 2011-2013	Cum. multiplier 2011-2013	Debt-ratio falls in year
Baseline	1.4/1.2	0.2/0.1	1/1
Fin. accelerator	2.5/1.4	0.3/0.1	1/1
Credit constr. share=0.48	2.4/1.1	0.3/0.1	1/1
FA, credit constr. share=0.48	3.7/1.4	0.4/0.1	1/1

Conclusion

- Simulated effect of euro area's fiscal consolidation depends on the expected persistence of the measures anticipated by the agents.

- With credibly permanent measures, consolidation might have been expansionary.

- With very persistent but temporary measures: GDP contraction, initial increase in debt-ratio. If a reasonably parameterized financial accelerator is added: Contraction considerably bigger, debt ratio increases for a number of years.

- "Worst" case (FA+higher share of credit constrained households): debt-to-GDP ratio increases for 4 or 5 years, cumulative multiplier over 2011-2013 of about 1.3.

- In the "worst" case scenario, fiscal consolidation causes about 80% the decline of GDP relative to the pre-crisis trend during the recent EA recession.

Why not re-estimate models and thus allow all parameters to change, rather than individual ones?

- ▶ Nominal wage rigidity and the share of ROT households: Post-crisis time series too short for a plain-vanilla estimation.
- ▶ How to incorporate the ZLB (and its expected length!) in the estimation? ZLB has both a quantitative and a qualitative impact on the effect of shocks (e.g. wage or price markup shocks), would affect estimation results.
- ▶ FA: existed even before the crisis, but estimates of Gelain and Kulikov (2011), Queijo von Heideken (2009) and Christiano et al. (2010) suggest that absence or presence of FA has only minor effects on structural parameter estimates
- ▶ Calibrated models are being used for simulation exercises: GIMF model, NAWM in Coenen et al. (2008), EAGLE model.

The sovereign risk channel

- ▶ Countries were under market pressure to consolidate: Fiscal multiplier lower if there is a "sovereign risk channel", i.e. a positive link between the debt-to-GDP ratio and borrowing costs (Corsetti et al. 2013).

- ▶ Empirical evidence inconclusive: Born et al. (2015) estimate an STVAR on a panel of advanced and emerging economies: in times of fiscal stress, fiscal consolidation causes bigger output declines and an increase in the sovereign risk premium.

- ▶ Cottarelli and Jaramillo (2012) investigate determinants of 5-year CDS spreads in 31 advanced economies in 2011.
    - ▶ Primary deficit has a positive, GDP growth a negative and non-linear effect on the spread.
    - ▶ For modest multipliers (1.0), a reduction in government spending increases the spread.

- ▶ Following Erceg and Lindé (2013), assume that interest rate $i_t - i_t^{CB} = 0.2/4 * (PD_t - PD) + 0.008/4 * (Debtratio_t - Debtratio)$. Calibration based on Laubach (2010).

- ▶ With this: Fiscal consolidation becomes expansionary (in QUEST III)

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