Banc Ceannais na hÉireann
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The macroeconomic effects of the Euro Area's fiscal consolidation

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Abstract

This economic letter summarizes research by Rannenberg et al. (2015), who simulate the Euro Area's fiscal consolidation between 2011 and 2013 by employing two DSGE models used by the ECB and the European Commission. The cumulative multiplier over the 2011-2013 period amounts to 0.7 and 1.0 in the baseline, but increases to 1.3 with a reasonably calibrated financial accelerator and a crisis-related increase of the share of credit constrained households. In the latter scenario, fiscal consolidation would be largely responsible for the further decline in GDP relative to its pre-crisis trend during 2011-2013. Postponing the fiscal consolidation to a period of unconstrained monetary policy (until after the economic recovery) would have avoided most of these losses.

1 Introduction

From 2011 to 2013, fiscal policy in the Euro Area (EA) turned progressively more restrictive. According to estimates by the European Commission (2012), spending cuts and tax increases accumulated to about 4% of annual Euro Area GDP between 2011 and 2013. The switch to fiscal austerity during this period has been associated with a return of the EA economy to recession. The role of the fiscal consolidation in driving the Euro Area's disappointing economic performance is uncertain and disputed. Blanchard and Leigh (2013) argue that the growth forecast errors in the IMF's and the European Commission's projections are systematically positively correlated with the size of fiscal consolidation in 2010 and 2011, suggesting that these institutions have consistently underestimated the adverse effects of austerity, and that the fiscal multiplier was in fact substantially larger than one. However, others have challenged this result.[2] This economic letter summarizes

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[2]European Commission (2012a) and Lewis and Pain (2015) argue that the evolution of sovereign bond yields is a more important source of errors than the underestimation of the effects of fiscal consolidation.

some results of recent research from Rannenberg et al. (2015), who assess the impact of fiscal consolidation in the Euro Area employing variants of two Dynamic Stochastic General Equilibrium (DSGE) models used for policy analysis by the ECB (the New Area Wide Model, NAWM) and the European Commission (QUEST III). In a DSGE model, the behavior of firms and households is explicitly derived from the maximization problems of these agents and thus incorporate their expectations about the future, as opposed to more traditional econometric models. According to the Lucas critique, this property makes them more appropriate for policy analysis as these models will take into account the fact that agents may modify their behaviour as a result of policy actions. We show that under plausible scenarios, the output costs of fiscal consolidation were substantial. In our baseline scenario, where we leave the degree of financial frictions in the models unchanged, the cumulative multiplier of the fiscal consolidation over the 2011-2013 period amounts to 0.7 (NAWM) and 1.0 (QUEST III), respectively. The government debt-to-GDP ratio declines below the non-consolidation case after one or three years. However, both models feature only minor credit constraints in the household sector and no such constraints in the firm sector, as they were developed before the world financial crisis. With plausible enhancements of the degree of financial frictions, the multiplier increases to 1.3. Fiscal consolidation would then have increased the government debt-to-GDP ratio for as much as 4 or 5 years relative to the non-consolidation case. In the baseline scenario, fiscal consolidation would be responsible for between one third (NAWM) and one half (QUEST III) of the decline of Euro Area GDP relative to its pre-crisis trend from the beginning of 2011 until the end of the Euro Area's recent recession in 2013, with the share rising to about 80% in the presence of greater financial frictions. Moreover, most of the output costs of fiscal consolidation could

have been avoided if it had been postponed until the zero lower bound constraint on monetary policy was no longer binding. Under such conditions the government debt-to-GDP ratio could have been reduced much more quickly.

2 The models

Our simulations are based on adapted versions of two open economy medium-scale DSGE models of the EA, namely the ECB's New Area Wide Model (NAWM) published in Coenen et al. (2008) and the QUEST III model developed by the European Commission and published in Ratto et al. (2009), with sticky prices, wages and many other common standard features. Both are two region models of the EA and the US and the rest of the world. Both models feature a considerable variety of government revenue and expenditure items and are, therefore, suitable for fiscal policy simulations. Both models are also populated by a fraction of households without access to credit markets whose consumption is therefore closely linked to their current disposable income. Both models feature transfers as well as taxation of wages, profits and consumption, implying that an economic downturn adversely affects government revenues. Furthermore, we modify the models a number ways detailed in Rannenberg et al. (2015) in order to appropriately capture the conditions under which the consolidation took place and the nature of the consolidation package itself.

3 Simulation design

3.1 Magnitude, composition and duration of the fiscal consolidation measures

The components of the consolidation package are summarized in Table 1, which is taken from European Commission (2012b). The table lists estimates of the budgetary effects of

Table 1: Ex-ante deficit effects of consolidation measures implemented in the EA, % 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

Notes: Source: European Commission (2012). The numbers reported indicate by how much the respective measure affects the public deficit as percent of GDP assuming everything else staying the same.

the legislated changes in individual expenditure items and taxes in the respective year, holding GDP and the tax base constant (the so called "ex-ante" effect, as it abstracts from endogenous changes in government expenditure and the tax base). For instance, in 2011, consumption taxes are increased such that holding the level of consumption and GDP constant, revenues would increase by 0.3% of GDP. Following that, in 2012 and 2013, consumption taxes are increased again such that revenues rise by 0.4% and 0.2% respectively. Similarly, transfer are cut by 1.0%, 0.2% and 0.3% in 2011, 2012 and 2013 respectively. Hence, by the end of 2013, the total deviation of expenditures from their path in the absence of fiscal consolidation amounts to 2.4% of GDP (the sum of the "total expenditure" line of the table), while the total deviation of revenue amounts to 1.5% of GDP, implying that by 2013, the total fiscal impulse amounts to 3.9%. The fiscal consolidation is dominated by expenditure changes, which in turn are dominated by transfer cuts (1.5 % of GDP by 2013). Regarding the distribution of the transfer cuts, we assume that transfer cuts are borne largely by credit constrained households,

based on estimates of the marginal propensity to spend out of the US Stimulus payments by Broda and Parker (2014).

We assume that the consolidation measures are kept in place for 10 years, after which they are gradually phased out following an AR(1) process with a coefficient of 0.9. That means, 10% of the measures are rolled back each quarter. We make this assumption because we think it is likely that mounting political pressures will lead to a reversal of at least some of the simulated measures in the future. Furthermore, we want to account for myopia among forward looking households.

3.2 Perceived duration of the zero lower bound

Another key issue is the monetary policy response to the decline in output and inflation caused by the fiscal consolidation. In Rannenberg et al. (2015), we argue that the monetary policy response to the fiscal consolidation was limited. The overnight interbank interest rate (EONIA) had reached a level close to zero by the second half of 2012, and financial market expectations suggest that agents ex-

pected it to remain there over the next three years. Furthermore, we show that the problems in the Euro Area's banking sector, which made lending to non-financial households and firms more expensive, can also motivate a period of the EONIA at the zero lower bound of at least three years. Hence, we switch off the monetary policy rule after 6 quarters (i.e. in 2012Q3) and switch it on again after three years (i.e. 2015Q3).

4   Results

In this section, we first present our main simulation results and then relate them to the results from other estimates of the effects of the Euro Area's fiscal consolidation, empirical estimates of fiscal multipliers and the Euro Area's economic development over the last couple of years.

4.1   Main results

In our baseline scenario, fiscal consolidation lowers GDP by between 2.5% and 3.5%, depending on the model (Figure 1). The fiscal consolidation lowers government demand for goods and services and reduces the disposable income of households via lower transfer payments and higher taxes. The decline in their disposable income lowers the purchases of credit constrained households. Hence, GDP declines. The decline in GDP is further amplified by three mechanisms. First, the drop in employment further reduces the purchasing power of credit constrained households. Second, the real interest rate increases due to lower inflation, as nominal interest rates are stuck at the zero lower bound, which lowers both household consumption and invest-

ment. Finally, the higher real interest rate and and lower current and expected demand also reduce business investment. The cumulative multiplier of the fiscal consolidation amounting to 0.7 and 1.0 over the 2011-2013 period, respectively (Table 2).[3]

We then investigate the impact of two plausible enhancements of the degree of financial frictions in the models on the costs of fiscal consolidation. First, we add a financial accelerator along the lines of Bernanke et al. (1999), which generates a positive relationship between the cost of external finance of non-financial firms and their leverage. It implies that any adverse shock that lowers firm's net worth and thus increases their leverage also increases the cost of borrowing (the so called external finance premium). Hence, future rental income from capital is discounted at a higher rate, depressing investment. [4] Second, we allow for a crisis-related increase of the share of credit constrained households, drawing on evidence from the ECB's Household Finance and Consumption Survey. With both of these enhancements, the trough of GDP is lowered to about 4.5% in both models, while the cumulative multiplier increases to 1.3.

Not surprisingly, in both models, the decline in the deficit is smaller the bigger the output decline caused by fiscal consolidation. However, in all simulations, the decline in tax revenues and the increase in transfer payment caused by the decline in output imply that the primary deficit only gradually approaches the ex-ante deficit effect of the consolidation package, which as discussed above accumulates to 4% of GDP by the end of 2013. As a result of the merely gradual decline in the deficit and the decline in inflation (which increases the real value of the debt stock) as well

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[3]Note that in the NAWM, the decline of investment exceeds the decline of consumption across all scenarios, while the opposite is true in QUEST III. The relatively small decline of investment in QUEST III is partly related to the relatively high degree of capital adjustment costs in the model. Furthermore, the decline in inflation is much bigger in QUEST III, due to smaller price adjustment costs and the presence of employment adjustment costs, which both make inflation more volatile.

[4]The financial accelerator has been parameterized based on Euro Area evidence.

as the direct effect of the decline in output, the government debt-to-GDP ratio increases
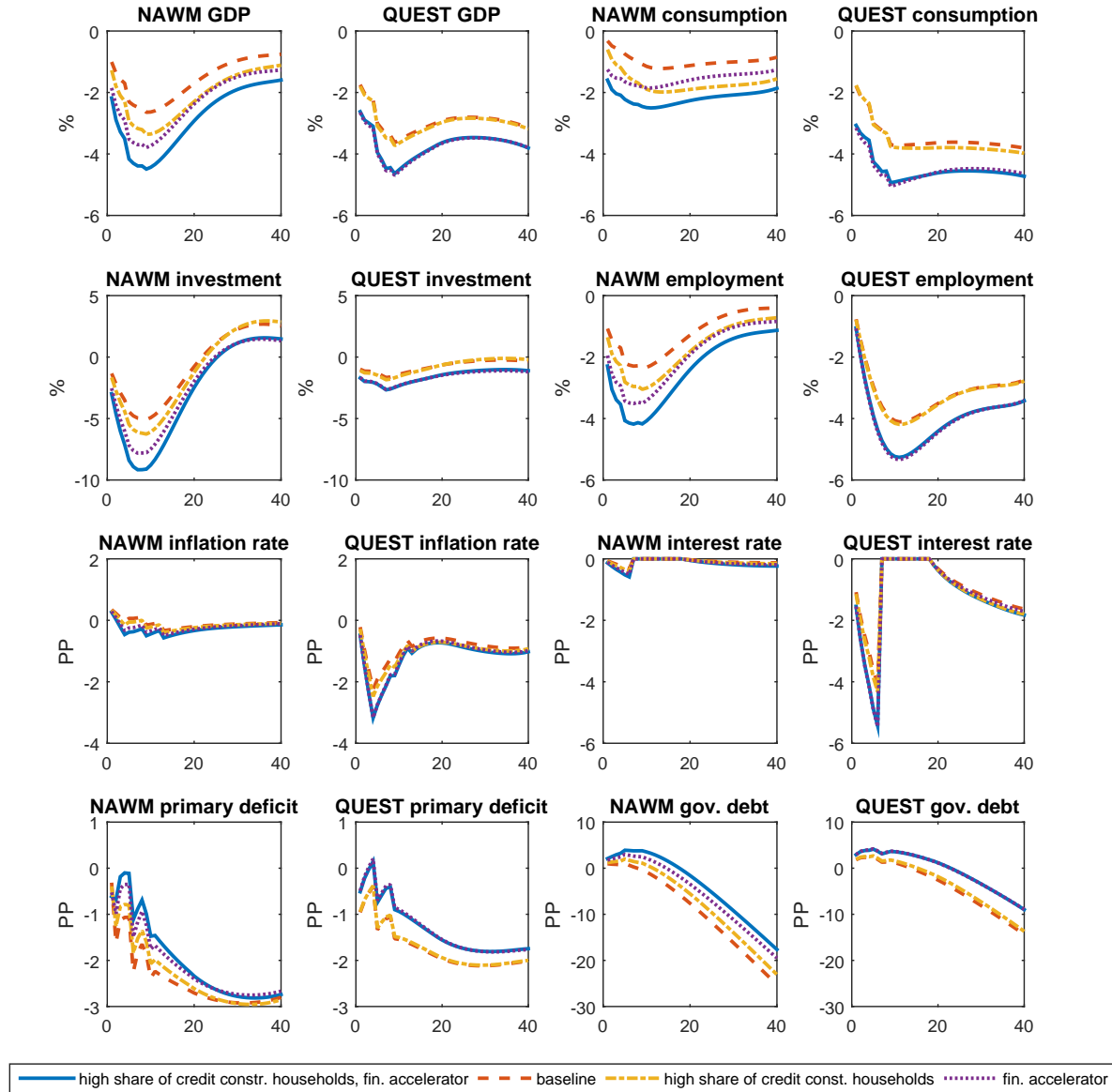
declining below the non-consolidation case.

Figure 1: Responses of selected variables of the EA to the consolidation measures implemented in the EA between 2011 and 2013 for the baseline specification (low share of credit constrained households, no financial accelerator), the baseline with a high share of credit constrained households, the baseline with a financial accelerator, and the baseline with both a high share of credit constrained households and a financial accelerator.

In the NAWM, in the baseline scenario the government debt-to-GDP ratio falls below the non-consolidation case in year two, while suc-

cess on this dimension is only achieved in year three and four with an increased share of credit constrained households or in the presence of a

Table 2: Short run costs and benefits of the fiscal consolidation, NAWM/QUEST III

	Cum. GDP loss 2011-2013	Cum. multiplier 2011-2013	Debt-GDP 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. household share=0.48	8/9	0.9/1.0	3/4
Fin. accelerator, credit constr. household share=0.48	12/12	1.3/1.3	5/6

Table 3: 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-GDP ratio falls in year
Baseline	1.4/1.2	0.2/0.1	1/1
Fin. accelerator	2.5/1.4	0.3/0.2	1/1
Credit constr. household share=0.48	2.4/1.1	0.3/0.1	1/1
Fin. accelerator, credit constr. household share=0.48	3.7/1.4	0.4/0.1	1/1

financial accelerator, respectively. With both of these features in place, the decline takes place only during year five. In the QUEST III model, the decline of the debt-ratios decline below the non-consolidation case takes place somewhat later across all scenarios.

The adverse GDP effects of fiscal consolidation raise the question of whether the fiscal multipliers of individual fiscal instruments associated with the scenarios we consider are reasonable. Table 4 reports the 8 and 20 quarter cumulative multipliers from changes of individual fiscal instruments with an ex-ante effect on the deficit of 1% for the "worst case" scenario considered above, i.e. an increased share of credit constrained households and the presence of a financial accelerator. The table also reports results from a recent meta-regression analysis of fiscal multiplier estimates from Gechert and Rannenberg (2014). The table reports their estimate of the 8 quarter cumulative multiplier during economic downturns. Furthermore, we report results from the contribution of Auerbach and Gorodnichenko (2012), as well as Callegari

et al. (2012), which report results specifically for the Euro Area. It turns out that, with the exception of the government investment multiplier in the QUEST III model, none of the model multipliers are much higher than the reported estimates. Even the investment multiplier in QUEST III gets some empirical support from Auerbach and Gorodnichenko (2012).

4.2 Results from other studies

Other quantitative assessments of the effects of the fiscal consolidation in the EA using structural models have been conducted by Holland and Portes (2012), European Commission (2012b) and in 't Veld (2013). The cumulative multipliers of the total consolidation package found by Holland and Portes (2012) and in 't Veld (2013) are very close to ours. By contrast, European Commission (2012b) finds a fairly low multiplier effect based on a version of QUEST III. However, in their simulation monetary policy is constrained only in 2012, which in our view is too short. Finally, Gechert et al. (2015) apply the fiscal multipliers from the meta-regression anal-

Table 4: Cumulative fiscal multipliers during downturns

	Horizon	
	8 quarters	20 quarters
Government consumption		
Auerbach and Gorodnichenko (2012)		1.5
Callegari et al. (2012) (general expenditure)	2.5	
Gechert and Rannenberg (2014)	1.8	
QUEST III worst case	1.8	1.7
NAWM worst case	2.0	1.8
Government investment		
Auerbach and Gorodnichenko (2012)		3.4
Gechert and Rannenberg (2014)	1.9	
QUEST III worst case	3.9	4.0
NAWM worst case	1.9	1.8
Transfers		
Gechert and Rannenberg (2014)	2.6	
QUEST III worst case	1.0	1.0
NAWM worst case	1.4	1.2
Taxes		
Auerbach and Gorodnichenko (2012)		0.3
Gechert and Rannenberg (2014)	0.4	
Consumption/labor tax multipliers		
QUEST III worst case	0.5/0.2	0.5/0.3
NAWM worst case	1.0/0.3	0.9/0.3

ysis of Gechert and Rannenberg (2014) to the Euro Area's fiscal consolidation effort and find a multiplier of 2.0.

4.3 Fiscal consolidation and the Euro Area recession

We now investigate the degree to which, according to our simulations, the Euro Area's fiscal consolidation has added to the weak growth performance of the Euro Area economy over the 2011-2013 period. Since 2008, the Euro Area economy has moved away from it pre-crisis growth trend. Figure 2 shows the part of that shortfall which took place after 2010Q4, as well as the simulated output effect of the fiscal consolidation in the two models under the various scenarios considered.

According to our estimate, by the end of the recession (black vertical line), Euro Area GDP had increased its distance from its pre-crisis trend by almost 6 percentage points. Under the baseline scenario, fiscal consolidation would explain more than one third (in the NAWM) or one half (in QUEST III) of the deterioration of the output gap during the recession. In the presence of a financial accelerator, this fraction increases to almost two
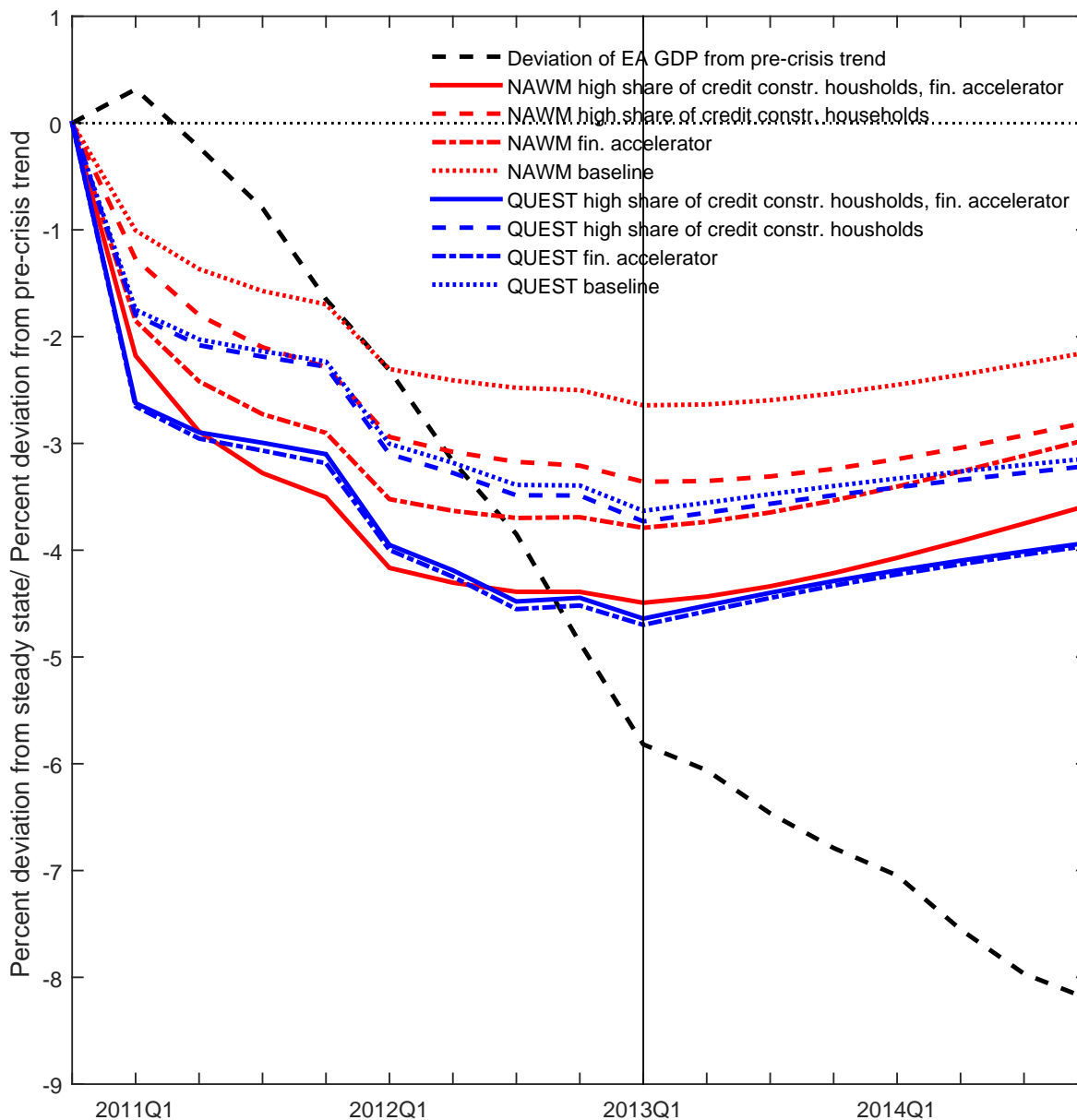
Figure 2: Cumulative deviation from the pre-crisis trend in the Euro Area (black dashed line) since 2010Q4. The assumed pre-crisis trend growth rate equals the average quarterly GDP growth rate over the 1999-2007 period, i.e. 0.6%. The vertical line denotes the end of the last quarter of the EA's recession.

thirds (NAWM) and more than 80% (QUEST III), respectively. With both an increased share of credit constrained households and a financial accelerator, the GDP decline relative to trend reproduced by the NAWM increases to 80% as well. Hence, it seems that if we as-

sume a plausible degree of financial frictions, the Euro Area's fiscal consolidation would be largely responsible for the weak growth performance over the 2011-2013 period.

The potentially high cost of fiscal consolidation raises the question of whether the out-

put loss could have been reduced if the fiscal consolidation had been postponed to a period of robust economic recovery where the central bank would have been no longer constrained by the zero lower bound. As is shown in Table 3, across all scenarios, the simulated GDP loss would only be a fraction of the effect obtained under constrained monetary policy. The reason is that, unlike in our baseline and its extensions, the central bank follows its interest feedback rule and thus lowers both the nominal and the real interest rate in response to the decline in inflation, thereby stabilizing private consumption and investment. By contrast, with constrained monetary policy, the inflation decline causes an increase in the real interest rate.

5   Conclusion

This economic letter summarizes some results of Rannenberg et al. (2015), who attempt to assess the impact of fiscal consolidation in the Euro Area employing variants of two DSGE models used for policy analysis. We show that under plausible assumptions, the output costs of fiscal consolidation were substantial. In our baseline scenario, the cumulative multiplier of the fiscal consolidation over the 2011-2013 period amounts to 0.7 and 1.0, respectively. The government debt-to-GDP ratio declines below the non-consolidation case after

one or three years. However, with plausible enhancements of the degree of financial frictions, the multiplier increases to 1.3. Fiscal consolidation would then have increased the government debt-to-GDP ratio for as much as 4 or 5 years relative to the non-consolidation case. In the baseline scenario, fiscal consolidation would be responsible for between one third (NAWM) and one half (QUEST III) of the decline of the Euro Area GDP relative to the pre-crisis trend since the beginning of 2011 until the end of the EA's recent recession in 2013, with the share rising to about 80% in the presence of enhanced financial frictions. Most of the output costs of fiscal consolidation could have been avoided if it had been postponed until the zero lower bound constraint on monetary policy was no longer binding, and under such conditions the government debt-to-GDP ratio could have been reduced much more quickly. The results of a simulation exercise such as this are subject to caveats. For instance, the models were estimated on pre-crisis data, but the structure of the economy might have changed since then, although we do attempt to account for some of those changes. Also, the results from any simulation exercise are necessarily driven by the assumptions made regarding the simulation design, some of which were mentioned here but which are discussed in more detail in Rannenberg et al. (2015).

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