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Fiscal policy of Germany's grant coalition 2015: A balanced budget at all cost?

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Fiscal policy of Germany's grant coalition 2015: A balanced budget at all cost?

Abstract

According to the Bundesregierung (2014) and the medium-term projections issued by the German finance minister, Germany's federal budget will be balanced from 2015 onwards.

This paper presents a discussion on the efforts undertaken by the German government to balance its budget against the backdrop of related theoretical and empirical results. It evaluates alternative fiscal policy measures in an overlapping generations' structure of the Blanchard (1985) and Yaari (1965) type as suggested in Bierbrauer (2012). A major finding is that after decades of constant deficits such a feat is not achieved easily and comes mainly at the cost of reduced public investments in Germany.

In the model, alternative measures to reduce fiscal deficits have very different effects on key macroeconomic variables. In general, austerity dampens the overall economic activity. However, the magnitude of these effects strongly depends on the chosen consolidation strategy. The German government relied on spending cuts, both in public consumption and investment. Based on the model simulation and the empirical evidence available, the latter is neither the most promising with regard to successful debt reduction in the medium and long term nor the least harmful with regard to the implied effects on the overall economic activity. The results suggest that the German government needs to adjust its strategy by focussing more on reducing public consumption and abandoning consolidation efforts that decrease the level of public investment.

1 Introduction

In response to the global financial and economic crisis, governments in the Euro Area implemented substantial fiscal stimulus packages as well as rescue packages of unprecedented size to stabilize their national financial sectors during the period 2008-2010. As a consequence, public debt in all major member countries of the Euro Area increased tremendously which eventually lead to the Euro Crisis.

Germany issued two fiscal stimulus packages in 2008-2010 which amounted to an overall size of 3% of Germany's gross domestic product. The composition of these packages focused on public investment and tax cuts which reflects the current consensus among economists with regard to the appropriate fiscal measures in times of economic distress. A detailed evaluation of the employed fiscal measures can be found in Roos (2009). The German fiscal stimulus packages were debt-financed which applies to similar measures in all other member states of the Euro Area. Polito and Wickens (2014) evaluate the sustainability of fiscal policy in Europe and find that the fiscal stance of all member states of the Euro Area deteriorated as a consequence of fiscal stimuli in response to the Great Recession.

There is broad agreement that fiscal stimuli prevented the worst scenario and facilitated a slow recovery which allowed most European economies to regain their pre-crisis output levels by the end of 2014. Moreover, it is remarkable that, at least in Germany, decision-makers designed the stimulus packages in compliance with the findings of existing economic research. A conclusion that can be drawn from the careful evaluation of the implemented measures by Roos (2009).

Since then, the question of how to return the levels of public liabilities to a sustainable level has become a priority for European policymakers. Moreover, for the member countries of the Euro Area, high and increasing levels of public debt have been a matter not only of national concern. The Stability and Growth Pact aims to ensure coordinated and sustainable fiscal policies for all member countries which requires them to return the levels of public debt in accordance with the commonly agreed-upon procedures as summarized by the European Commission (2014). It is commonplace that unsustainable levels of public debt, for many reasons, are not desirable. In the course of the Euro Crisis, two issues proofed to be of particular importance for the individual members of the Euro Area and the currency union as a whole.

Firstly, high levels of national public debt cripple the ability of fiscal policy to stabilize the business cycle. As fiscal policy is the only tool left at national level its capability to act is of crucial importance.

Secondly, unsustainable and further increasing levels of public debt may force national fiscal authorities to seek assistance from the European Stability Mechanism. As all members of the Euro Area have to mutually guarantee for measures that stabilize countries in fiscal distress, the overall default risk of the Euro Area increases which might lead to contagion. Moreover, speculations whether a national government decides to exit the Euro Area may arise and induce additional macroeconomic uncertainty. However, a case like this seems to be highly unlikely as there is not much to gain from such a step. For an extensive discussion, see Buiter and Rahbari (2010) and Wyplosz (2013).

In order to ensure the fiscal policy's ability to act as a stabilizing tool, the return of national debt to sustainable levels is crucial. Since the end of 2010, Euro Area governments started to consolidate their budgets, a policy that is confirmed by Paredes et al. (2014) as well as by the calculations of Polito and Wickens (2014).

Fiscal authorities may employ a variety of strategies in order to consolidate. There are two sides of the public budget, spending and revenue side. Public spending is further divided between public consumption and investment. Hence, there are several instruments to decrease the level of public debt, e.g. changes in taxation or spending cuts. Whereby the latter can be further divided into decreases of both, public consumption or public investment.

Empirical evidence, e.g. the findings of Alesina and Perotti (1996) and von Hagen et al. (2001) do not support short run fluctuations in taxation. They find that in developed countries successful consolidations have predominantly been based on spending cuts. A result further specified by Perotti (1996) who summarizes the empirical results by suggesting that decreases in public consumption are the most sustainable strategy because cuts in public investment are less persistent and therefore less effective. With regard to actual behaviour, Corsetti et al. (2009) find that public spending responds to the state of public finances in a systematic way. They find that discretionary increases in public spending are financed by increased taxation and spending cuts in the medium and long run. In accordance with these findings, the IMF (2009) suggests a consolidation strategy that reduces public consumption and increases taxation implicitly suggesting to exclude public investment from necessary spending cuts.

As the original stimulus did closely follow economic advice it seems straightforward to assume that the following consolidation strategy would do as well. However, Paredes et al. (2014) who construct a quarterly fiscal database and provide stylized facts of fiscal policy in the Euro Area, find that the fiscal consolidation efforts relied heavily on decreases in public investment. Suggesting that Euro Area governments follow a strategy that is neither the least harmful nor the most successful one.

This finding is unsettling as the results suggest that such a strategy is unsustainable in the long run. We contribute to the issue by comparing alternative fiscal consolidation strategies in a standard model as to provide a starting point for future work. We apply a new Keynesian model that features finite lifespans modelled as an overlapping generations' structure of the Blanchard (1985) and Yaari (1965) type as suggested for fiscal policy evaluation in Bierbrauer (2012). We compare a tax increases to either a decrease in public investment or public consumption.

Within the model, tax increases and cuts in public consumption are efficient tools to decrease the level of public debt in a sustainable manner. However, tax increases deplete household income and decrease the level of consumption. Public spending cuts have the opposite effect on the household's disposable income and respective consumption demand. With regard to the implied negative effects on the economic activity and driving the debt-to-output ratio down, both measures have a similar impact.

Cutting public investment has the same effect as a negative technology shock in the standard model. Which not only implies the same negative effects on household income but also the strongest dampening effect on the overall economic activity out of all three fiscal consolidation strategies. The latter implies that it is the least effective measure in view of decreasing the debt-to-output ratio, as it requires considerably more severe spending cuts in public investment as compared to decreases in public consumption to achieve the same effect in terms of decreasing the level of public debt.

The major conclusion is that decreasing public investment is the least effective and, in terms of its implied effect on the economic activity and household welfare, most harmful consolidation strategy. Moreover, as the level of public investment complements the production process, decreases in public investment constitute also an unsustainable consolidation strategy as the level of public investment needs to be returned to the steady state level in order to not decrease the production capacity as well as the achievable levels of household consumption and disposable income in the long run.

This Paper is organized as follows: Section 2 summarizes the model. In section 3, we discuss the positive aspects of the alternative fiscal consolidation strategies and section 4 presents the conclusions and possible extensions of the model.

2 The Model

To illustrate the effects of alternative fiscal consolidation strategies, we conduct a series of experiments in a discrete-time new Keynesian closed-economy model. The model features capital accumulation as well as nominal and real frictions of the Calvo (1983) type in the goods and labour markets.

A more detailed discussion of its properties and implications can be found in Bierbrauer (2012).

2.1 Households

Households are introduced in the form of overlapping generations following the discrete-time version of the Blanchard (1985) and Yaari (1965) OLG featuring failures of the Ricardian equivalence. Individuals face a symmetric probability of death $0 < 1 - \gamma < 1$ and share the same preferences. The total population size is normalized to one.

An individual household $h \in [0,1]$ born in period a maximizes his utility over consumption C and leisure $(1 - L)$ according to the certainty equivalent utility function

$$EU_t(h) = \sum_{s=t}^{\infty} (\gamma\beta)^{s-t} \left[lnC_{a+s-t,s}(h) + \frac{\chi_0}{1-\chi} \left(1 - L_{a+s-t,s}(h)\right)^{1-\chi} \right]$$

where $\beta, \chi_0, \chi > 0$ and $\gamma \in [0,1]$. The household's endowment of time in each period is normalized to one. The nominal individual flow budget constraint of a household of age a reads

$$\begin{aligned} \frac{\gamma D_{a,t}(h)}{1+i_t} - (1+\tau^c) P_t C_{a,t}(h) \\ \leq D_{a-1,t-1}(h) + (1-\tau^w) W_{a,t}(h) L_{a,t}(h) + P_t T_{a,t}(h) \\ + \left(1-\tau^k\right) \int_0^1 \Pi_t(i) di + \Pi_t^k \end{aligned}$$

where D denotes the individual holdings of government debt, τ^c, τ^k, τ^w are distortionary tax rates on consumption, capital and labour, T is a lump-sum transfer and i_t the nominal interest rate paid on bond holdings between t and $t+1$. Individual households receive equal shares of profits of intermediate goods producers $\int_0^1 \Pi_t(i) di$ and capital rental firms Π_t^k. Variables without age a index denote per-capita values. The households optimizing behaviour yields the Euler equation consumption

$$(1+\tau^c) P_{t+1} C_{t+1} + \frac{1-\gamma}{\gamma} \frac{1-\gamma\beta}{1+\tau^c} D_t = (1+i_t)\beta(1+\tau^c) P_t C_t$$

Each individual household h faces a downward-sloping demand curve for its individual skill

$$L_t(h) = \left(\frac{W_t(h)}{W_t} \right)^{-\phi} L_t$$

where $\phi > 1$ is the elasticity of substitution between differentiated labour inputs in production, L_t, W_t are the aggregate labour demand and wage rate and $W_t(h)$ is the per-capita wage rate.

We follow Calvo (1983) and assume that in any period of time, a fraction of workers can reset their wages with probability $0 < (1 - \xi_w) < 1$. If a worker is not allowed to reset his wage rate,

it is updated according to the rule $W_{t+j} = \pi^j W_{a,t}(h)$ where π is the inflation target of the monetary authority. The optimal wage choice of an individual household in period t reads

$$w_t(h) = \chi_0 \frac{\phi}{1-\phi} \frac{E_t \sum_{s=t}^{\infty} (\gamma\beta\xi_w)^{s-t} \left(1 - L_s(h)\right)^{-\chi} (1+\tau^c) C_s(h)}{E_t \sum_{s=t}^{\infty} (\gamma\beta\xi_w)^{s-t} (1+\tau^k) w_s} E_t \sum_{s=t}^{\infty} (\gamma\beta\xi_w)^{s-t} \prod_{k=1}^{s-t} \Delta w_{t+k}$$

where $w_t = \frac{W_t}{P_t}$, $\Delta w_t^{-1} = \frac{\pi W_{t-1}}{W_t}$ and $w_t(h) = \frac{W_t(h)}{W_t}$ and the law of motion for the aggregate wage level is $W_t = \xi_w \pi W_{t-1} + (1-\xi_w) W_t(h)$.

2.2 Production Sector

The production sector provides a homogeneous final good Y_t which can be either used for investment or consumption and consists of three sectors: capital rental firms, intermediate goods producers and a representative producer of final goods.

A representative capital rental firm transforms the homogeneous consumption good into a capital good K which is used by intermediate goods' producers as a productive input. The capital rental firm maximizes the discounted value of its real profits

$$\frac{\Pi_t^k}{P_t} = \sum_{s=0}^{\infty} \left(\frac{1}{1+r_t}\right)^s \left[(1-\tau^k) r_{k,t+s} K_{t+s} - I_{t+s} - \frac{\kappa_k}{2} K_{t+s} \left(\frac{I_{t+s}}{K_{t+s}} - \delta \right)^2 \right]$$

where $r_{k,t}$ is the real rental cost for capital, I_t real investment and K_t the capital stock. We assume quadratic capital adjustment cost. The parameter $\kappa_k > 0$ scales the capital adjustment costs, when used in production capital depreciates at rate $\delta > 0$. The law of motion for the capital stock is given by $K_{t+1} = (1-\delta) K_t + I_t$.

A continuum of intermediate goods producers $i \in [0,1]$ combines capital and labour into a variety $y_t(i)$ of the intermediate good. Intermediate producers have no market power at labour and capital markets but some monopolistic power in setting the price for their production. They maximize their profits given a Cobb-Douglas production technology

$$y_t(i) = K_t(i)^{\alpha} L_t(i)^{1-\alpha-\theta_p} K_{p,t}^{\theta_p}$$

where $0 < \alpha + \theta_p < 1$. We allow for government investment in infrastructure $K_{p,t}$. The optimal combination of capital and labor for a given stock of public capital is

$$mc_t = \frac{r_{k,t}}{\alpha \frac{y_t(i)}{K_t(i)}}$$

$$mc_t = \frac{w_t}{\left(1-\alpha-\theta_p\right)\frac{y_t(i)}{L_t(i)}}$$

where w_t is the real aggregate wage rate and mc_t the real marginal cost which is symmetric across intermediate firms. An intermediate producer i can renew its price in any period of time with probability $\left(1-\xi_p\right)$. If an intermediate producer cannot update its pricing calculations, prices adjust according to the rule $P_{t+j}(i) = \pi^s P_t$. The optimal pricing decision in period t is given by

$$P_t(i) = \frac{\theta}{\theta-1}\frac{E_t\sum_{j=0}^{\infty}\psi_{t,j}\xi_p^s\left(\prod_{k=1}^{j} i_{t+k} mc_{t+j} Y_{t+j}\right)}{E_t\prod_{j=0}^{\infty}\psi_{t,j}\xi_p^s Y_{t+j}}$$

and the law of motion for the aggregate price level reads $P_t = \xi_p \pi P_{t-1} + \left(1-\xi_p\right)P_t(i)$. A representative final goods producer transforms intermediate goods into a homogeneous final consumption good

$$Y_t = \left(\int_0^1 y_t(i)^{\frac{\theta-1}{\theta}} di\right)^{\frac{\theta}{\theta-1}}$$

The final goods' producer chooses his inputs to maximize profits. Under perfect competition, the final goods pricing rule is given by

$$P_t = \left(\int_0^1 P_t(i)^{1-\theta} di\right)^{\frac{1}{1-\theta}}$$

2.3 The monetary and fiscal authorities

The monetary authority sets the nominal interest rate i_t, according to the Taylor rule

$$i_t = \frac{1}{\beta} - 1 + \phi_\pi(\pi_t - \pi)$$

where $\pi = 0$ is the inflation target and $\phi_\pi > 1$ the Taylor coefficient on inflation stabilization.

The government demands the final good for the maintenance of a public capital stock and for public consumption. For a given monetary policy, the fiscal authorities decide on the level of taxation and public spending

$$G_t = G_{c,t} + I_{p,t}$$

where $G_{c,t}$ is the level of purely dissipative government consumption of goods and $I_{p,t}$ the level of public investment. The law of motion for public capital is given by $K_{p,t+1} = (1-\delta)K_{p,t} + I_{p,t}$.

Government revenues stem from taxes on consumption τ^c, wages τ^w, capital income τ^k, a lump-sum tax T_t and issuing public debt d_t. The real government flow budget is

$$\frac{d_{t-1}}{1+\pi_t} + G_t = T_t + \tau^w \frac{W_t}{P_t} L_t + \tau^c C_t + \tau^k r_{k,t} K_t + \tau^k \int_0^1 \frac{\Pi_t(i)}{P_t} di + \frac{d_t}{1+r_t}$$

The government responds systematically to the level of public liabilities according to

$$T_t = \tau_t d_{t-4} + \tau^d (d_t - d)$$

with $\tau_t, \tau^d > 0$ for a given target level of the public debt stock $d = 0$. Fiscal policy enters the model as an exogenous change in the level of taxation, public investment or consumption. Fiscal shocks, e.g. a shock to government consumption

$$G_{c,t} = \rho G_{c,t-1} + \varepsilon_t$$

evolve according to a AR(1) process where $0 < \rho < 1$ measures the persistence of the shock.

2.4 Dynamic equilibrium and calibration of the model

The Euler equation, the optimal wage choice of households, the law of motion for the capital stock, the first order conditions from the capital rental sector, the optimal pricing decision for intermediate goods, the optimal combination of capital and labour for a given stock of public capital in the intermediate goods sector, the resource constraint of the economy

$$Y_t = C_t + I_t + G_t$$

coupled with the Fisher equation

$$1 + i_t = (1 + r_t) E_t \left(\frac{P_{t+1}}{P_t} \right)$$

and the government budget constraint characterize the dynamic equilibria of the model. The model is closed by the feedback rules for monetary and fiscal policy. The model has no closed-form solution and is solved numerically by using DYNARE. The applied approach is a first order Taylor approximation around the steady state following the approach of Schmitt-Grohe and Uribe (2004).

The model is calibrated on a quarterly basis. A summary of the parameter values is given in Table 1. Regarding the parameters in the utility function we set the discount factor $\beta = 0.99$ and the Frisch elasticity of labour supply to $\frac{2}{\chi} = 0.5$. For the latter choice, see the discussion in Domeij and Floden (2006). We assume that, in equilibrium, workers spend one third of their time endowment working. The survival probability is set to $\gamma = 0.99$ which is a standard choice in the literature, see e.g. Smets and Wouters (2002).

In the production sector we assume a capital depreciation rate of $\delta = 0.025$ and set $\frac{1}{\kappa} = 0.04$ which is a conventional value for quadratic capital adjustment costs. In the Cobb-Douglas function, the elasticity of output with respect to private and public capital is set to $\alpha = 0.3$ and $\theta_p = 0.1$ respectively. The latter value is in the range of empirical estimates reported in the survey of Romp and de Haan (2007). The model features monopolistic competition in the goods and labour markets. We choose conventional mark-ups of 10%. In the goods' market, the average price duration is set to 4 quarters in accordance with the empirical evidence, see Alvarez et al. (2006). Wage contracts last longer than price spells, we set $\xi_w = 0.83$ which implies one and a half years being the average duration of wage contracts. The assumption that wages are more sticky than prices is common in the literature, see e.g. Christoffel et al. (2009).

For the Taylor rule describing the behaviour of the central bank, we assume a standard value of $\phi_\pi = 1.5$ for the Taylor coefficient. The distortionary tax rates are set according to Andres and Domenech (2006) who estimate these by using European data. The persistence of public spending shocks is set to $\rho = 0.9$. The parameters in the fiscal feedback rule are set to ensure that locally determinate equilibria exist, see Leith and von Thadden (2008) for a throughout discussion.

Table 1: Calibration of the model parameters

β	$\frac{2}{\chi}$	$\frac{2}{\kappa_k}$	δ	α	θ_p	ξ_p	ξ_w	τ^c	τ^w	τ^k	ρ	τ^d	ϕ_π
0.99	0.5	0.04	0.025	0.3	0.1	0.75	0.83	0.1	0.279	0.279	0.9	0.05	1.5

3 Alternative consolidation strategies

To illustrate the impact of alternative fiscal consolidation strategies, we compare three different fiscal shocks: decreases in public consumption, investment and an increase in lump-sum taxation. The experiments illustrate the effects of alternative fiscal consolidation strategies implemented in the wake of the Great Recession to decrease the level of public liabilities. For simplicity all measures are modelled as exogenous AR (1) processes which is the standard experiment in the theoretical literature. The numerical results are given in Fig. 1 where the horizontal axes indicate the time path of variables after the fiscal shocks measured in quarters. All variables are measured in percentage deviations from their steady state values. Solid lines refer to tax increases, dashed lines and dotted lines refer to the alternative decision of decreasing public consumption or public investment respectively.

The standard assumption in theoretical models is that public debt is stabilized by adjustments in lump-sum taxation. If the government decides to decrease the accumulated stock of public liabilities by increasing the tax rate, households suffer from a decrease in disposable income.

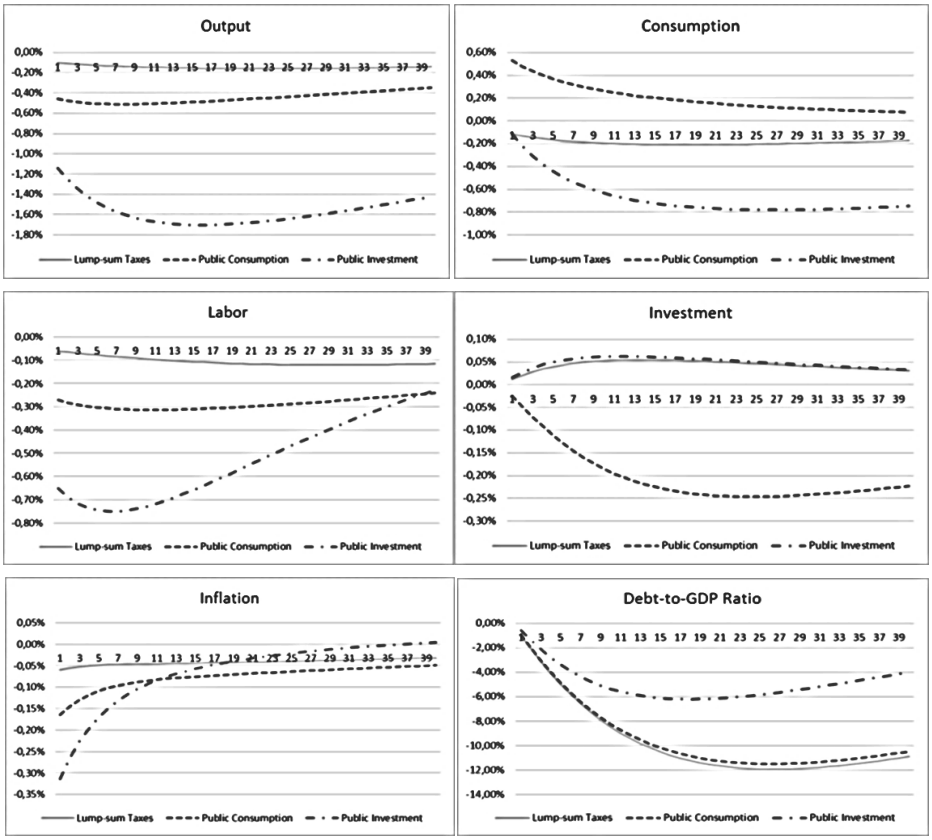

Figure 1: Numerical results

With regard to reductions in the stock of public liabilities, this strategy implies a decreasing tax burden in the long run as the debt service will decrease. Households with finite life expectation do not necessarily benefit from this effect as some of it occurs to future generations. Moreover, as the accumulated stock of public liabilities is perceived as net wealth there is a negative secondary effect. The financial wealth of households is decreased. Reimbursing public liabilities leads to a decline in credit demand which lowers the real interest rates and adds to the negative wealth effects of a decreased stock of public liabilities.

Thus, the household's disposable income and wealth in the foreseeable future is decreased which leads to a dip in consumption demand. As private consumption is the bulk of aggregate demand, output decreases as well. The decrease in aggregate demand translates into decreasing labour demand, wage income and deflationary pressure.

Producers adjust their production and investment plans. The wage adjustment is sluggish which makes labour a more expensive input in production. At the same time, decreasing interest rates make it more attractive to invest in production capital. Producers decrease their demand for labour not only because of the decreased demand for their output but also substitute capital for labour in production.

Overall, the chosen consolidation strategy dampens economic activity. However, this effect is mitigated by public demand for final goods which remains constant. The impact of any consolidation effort on the level of aggregate demand determines prospects for success. In general, public debt is measured as a share of the gross domestic product. In particular, this applies for the Maastricht criteria that suggest an annual deficit of 3% and imposes an upper bound of 60% to the accumulated stock of public debt. Decreasing the nominal amount of debt is not sufficient to meet these criteria. The ratio of debt to output needs to be reduced as well. Thus, the government needs to keep a close eye on the impact that a chosen consolidation strategy might have on the level of economic activity. In this case the impact on the debt to output ratio is positive. Thus, tax increases serve their purpose but have a price in terms of dampening the overall economic activity and inducing utility losses to private households because these suffer from decreased consumption levels and a decrease in financial wealth.

According to the accumulated empirical evidence, the most promising consolidation strategy is curtailing of public spending. Fiscal authorities might consider either to decrease public consumption or investment. In general, decreasing public consumption is considered to be the instrument of choice when it comes to a sustainable reduction of both, the current deficit as well as the level of public liabilities. Moreover, this policy choice is consistent with the proposals of the IMF (2009).

The comparison of a discretionary cut in public consumption with the baseline scenario of a tax increase confirms this view. A decrease in public consumption has a one-to-one effect on aggregate demand. With regard to the behaviour of households the impact is more complex. In case of decreasing public consumption, households face no direct income loss. However, labour income is the major fraction of the household's total wealth. A decrease in aggregate demand and thus labour demand decreases the disposable income. In the long run, the effect is reversed as government demand returns to its initial level and a decreasing stock of public debt lowers the future tax burden by the implied decrease in public debt services. However, such long run increases in disposable income do not entirely fall in the expected lifetime of the current generations. At the same time, the negative wealth effect of decreased public liabilities remains present as in the previous case. Moreover, caused by the decrease in public demand for final goods, the demand for labour is decreased.

The net effect on household income is nevertheless positive and private consumption increases. The increase in private demand is smaller than the decrease in public demand but it mitigates the dampening effect of the fiscal consolidation on the economic activity. The overall effect on output is negative. From the perspective of households, this policy is clearly preferable as it is not related to utility losses caused by lower levels of private consumption.

By direct comparison, decreases in public consumption have a stronger impact on the level of employment and imply a higher deflationary pressure. However, to some extent this is explained by the model setup as an increase in household income leads to two effects: Households will use their increased income to enable the consumption of more consumption goods and leisure. Producers respond in a manner similar to the tax increase in the baseline case and, to some extent, substitute capital for labour in their production process.

With regard to the effect of a consolidation effort by decreasing public consumption on the debt-to-output ratio, we observe effects that are similar to that of a tax increase. But as households are clearly better off, decreases in public consumption constitute the superior strategy.

In Europe fiscal consolidation has been heavily relying on decreases in public investment, see Paredes et al. (2014). If considered in the simple model, decreases in public investment have a devastating effect on the economic activity. A decrease in public investment decreases aggregate demand one-to-one as the spending cut in public consumption. But, in addition the investment cut decreases household demand and impedes the production process as public capital complements private capital in production.

Households face several negative income effects. Their financial wealth is reduced by the decrease in public liabilities as in both alternative strategies. The demand for labour and therefore disposable income decreases as well.

However, public capital augments the production possibilities. Thus, a decrease in public capital has the same effect as a negative productivity shock and therefore decreasing wages in the future. In addition, disposable income is decreased by the sharp decline in demand as both households - because of deteriorating income perspectives - and the government reduces its demand for final goods. Producers take advantage of such an opportunity and, as the real interest rate decreases because of lower public demand for credits, increase their investment to compensate for the decrease in the public capital stock. These effects lead to a much more pronounced decrease in aggregate demand as in the case of tax increases or cuts in public consumption.

Moreover, in order to restore the equilibrium level of public capital, either future tax rates need to go up or the level of public liabilities will increase once again. Any of these measures is counter-productive given the original motivation behind the chosen fiscal measure which was bringing public liabilities back to sustainable levels.

As public debt is measured by the debt-to-output ratio, the government would also have to decrease public investment disproportionately as compared to a cut in public consumption. This is because of the strong negative effects on output which make it much more difficult to achieve a substantial decrease in public debt measured in terms of the gross domestic product.

4 Conclusions

This paper studies the impact of alternative consolidation strategies. It compares decreases in public spending to tax increases which have been deployed to reduce the level of public liabilities in the wake of the Great Recession. The exercise is conducted by using a variant of the standard model extended in Bierbrauer (2012) in view of evaluating fiscal policy. The model features non-Ricardian households. Thus, any reduction in the level of public liabilities has negative effects on the private sector's financial wealth.

The key finding is that, in line with the accumulated empirical evidence, the choice of the consolidation strategy has a huge impact on the prospects of its success and subsequently, the potential impact of fiscal consolidation efforts on the business cycle.

The choice of the consolidation strategy determines its primary effect on household consumption and public demand. Any decrease in public spending decreases aggregate demand one-to-one implying secondary effects on the disposable income of households. Decreased aggregate demand implies decreasing production as well as lower demand for labour which implies a decrease in both, labour income and private consumption. In addition, any decrease in the level of public liabilities reduces the financial wealth of non-Ricardian households. Moreover, any decrease in public spending reduces aggregate demand. As a consequence, we can observe a decrease in labour income and hours worked. The accumulated effect on household income depends on the particular policy chosen by the government.

Public spending is divided in public consumption and investment. As public consumption is assumed to be purely dissipative, a decrease in this component of public spending only affects the level of aggregate demand. Thus, from the perspective of households, the prospect of a decreased level of public liabilities and therefore taxation in the future is the dominating effect. Households are enabled to consume more goods and leisure.

Public investment augments the production possibilities of the production sector. A cut in public investment affects the economy similar to a negative productivity shock. Household income and the production possibilities of the economy are decreased. The government will have to increase the future level of public investment in order to restore the original steady state level of public capital and regain the original level of productivity. As a consequence, household income and consumption demand go down.

Both types of public spending cuts reduce the level of public debt measured as a fraction of output. However, decreases in public investment have a more severe impact on aggregate demand and make it more difficult for the government to achieve a sustainable decrease in the level of public debt. In particular, this is the case as the government cannot decrease the level of public liabilities in a sustainable manner as the government will have to reverse its behaviour in order to restore the steady state level of the production possibilities.

Finally, public investment does have similar effects as a positive productivity shock in standard RBC and new Keynesian models. Generally, public investment increases productivity while cuts in public investment have the opposite effect. The effects of public consolidation by reducing the level of public investment are, in every aspect, unambiguously negative.

However, the impact of spending cuts on household welfare and consumption possibilities is very different. While decreases in public consumption permanently decrease the level of public

debt and improve household income, decreases in public investment have just the opposite effect.

Tax increases are a standard consolidation measure in economic models. Tough, these were not implemented in Germany. Within the model, tax increases directly decrease household income, consumption and dampen the overall economic activity by the implied decrease in aggregate demand.

Tax increases and cuts in public consumption have similar effects with regard to the reduction of the debt-to-output ratio. However, with regard to their impact on disposable income and household consumption they differ. The key difference between decreases in public consumption and increases in taxation is seen in the effect on private consumption. While tax increases have strong negative effects on disposable income, cuts in public consumption lead to income increases in the short and long run. From the perspective of households, decreases in public consumption are to be the preferred measure as it allows for higher levels of consumption which is just the opposite effect as compared to tax increases.

The results from the model make a strong case for decreasing the level of public liabilities by decreasing the level of public consumption. However, in reality there are winners and losers from such an approach. While the major part of the population gains from this approach, the beneficiaries of public spending loose. In particular, as a major share of public consumption is paid on wages, it might proof very difficult to reduce public consumption at short notice. Thus, reducing public liabilities by decreasing public consumption might proof to require substantial efforts by the government in the short, medium and long run.

Such circumstances might explain why the German government as well as other Euro Area governments relied heavily on cuts in public investment in their endeavours to reduce the accumulated stock of public debt. The results the model produced suggest that this strategy implies always high costs in terms of reduced output and consumption. Moreover, decreases in public investment lead to decreasing current debt at the cost of future generations which have to carry the burden of restoring the original level of public capital either by increased tax rates or debt services on increasing levels of future debt.

Another implication of the model is that adversities might be resolved by decreasing public consumption, but instead of using the full amount to decreasing the level of public debt investing a fraction of the freed resources in public capital. The government would therefore decrease the level of public liabilities and stimulate the economic activity at the same time as increases in public investment have effects similar to a positive productivity shock. In any event, stimulating

the economy might create room for manoeuvre to implement other – perhaps more painful - measures.

More recently, the German government seems to have recognized the problem and addresses it by using additional government revenues to strengthen public investment. According to the Federal Ministry of Finance, BMF (2015), additional spending will focus on improving Germany's infrastructure. Moreover, the European Commission has been responding as well to the trend of reduced public investment in other Member States by proposing a European Fund for Strategic Investment.

The findings clearly reiterate the policy advice by the IMF (2009) as well as the empirical results that suggest that decreases in public consumption being the most promising approach to decrease the stock of public debt.

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