The Debt Brake, Transfer Simulation

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Abstract Here, we define the changes necessary for the simulation in which we consider transfers instead of public consumption.

1 Necessary changes in model

1.1 The household sector

We assume that the per-period utility function for all households is given by

$$U_i^t(j) = \zeta_t \left[ (\log (C_i^t(j))) + \nu (\log (L_i^t(j))) \right].$$

(1)

The flow budget constraint of optimizing households in real terms is given by

$$(1 + \tau_t^C)C_i^t(j) + \frac{B_{i+1}^o(j)}{p_t} - T_{i,n}^t \leq (1 - \tau_t^d)W_t \frac{N_i^o(j)}{p_t} + \frac{I_i^o(j)}{p_t} + \frac{B_i^t(j)}{p_t} R_{t-1}^t + TR_t,$$

(2)

where $TR_t$ are transfers. The labor supply schedule stays the same.

The budget constraint for rule-of-thumb households is

$$(1 + \tau_t^C)C_i^r(j) = (1 - \tau_t^d)W_t \frac{N_i^r(j)}{p_t} + TR_t.$$  

(3)

The labor supply schedule changes to

$$N_i^r(j) = \frac{(1 - \chi)}{(1 - \chi) + \nu} - \lambda \frac{v}{1 - \chi + v} \frac{TR_t}{(1 - \tau_t^d)w_t},$$

$$\Leftrightarrow L_i^r(j) = \frac{v}{(1 - \chi) + \nu} \left[ 1 + \frac{TR_t}{(1 - \tau_t^d)w_t} \right],$$

(4)

which implies

$$C_i^r(j) = \frac{(1 - \chi)}{(1 - \chi) + \nu} \cdot \frac{1}{(1 + \tau_t^C)} \cdot \left[ w_t \cdot (1 - \tau_t^d) + TR_t \right].$$

(5)
1.2 Fiscal authorities

Remains unaffected except that we now exchange $G_t$ for $TR_t$.

1.3 Market clearance

In clearing of factor and goods markets, the following conditions are satisfied

\[ Y_t = C_t. \] (6)

The rest remains the same.

1.4 Linearized equilibrium conditions

**Households** The aggregate consumption Euler equation reads:

\[
\hat{C}_t = E_t \hat{C}_{t+1} - \Theta_n E_t \Delta \hat{N}_{t+1} + \xi^C E_t \Delta \hat{\pi}^{C}_{t+1} - E_t \hat{\pi}_t + E_t \hat{\pi}_{t+1} + E_t \hat{\pi}_t \hat{C}_{t+1} - \Theta_T E_t \hat{T}_R_{t+1} + \theta_T E_t \left[ \Delta \hat{w}_{t+1} - \iota^d \Delta \hat{\tau}_{d,t+1} \right],
\] (7)

where

\[
\Theta_n = \frac{\lambda}{(1 - \lambda)}, \quad \xi^C = \frac{\sigma^C}{\sigma^{C + 1}}, \quad \varphi = \frac{N}{1 - N}, \quad \gamma_r = \frac{\upsilon}{1 - \chi + \upsilon}, \quad \gamma_T = \frac{\Theta_T}{\gamma_o}, \quad \Theta_T = \frac{\lambda \cdot \upsilon}{(1 - \lambda)}, \quad \iota^d = \frac{\iota^d}{(1 - \lambda)}, \quad \text{and we used that } \hat{R} = \beta^{-1} \text{ in steady state. The labor supply schedule remains the same.}
\]

**Market clearing** Market clearing implies that

\[ \hat{Y}_t = \hat{C}_t. \] (8)

The other linearized equations as well as shock definitions remain the same.

2 Impulse response analysis

The calibration strategy remains the same. However, in calculating the steady state, we have to conduct the following changes:

- Set $\gamma_C = 1$ and redefine $\gamma_G = \gamma_{TR} = \frac{\lambda \upsilon}{(1 - \lambda)}$ as a fraction of government transfers to households to GDP. For comparability to the analysis in the main text, we set this to $\gamma_G = 0.26$ to generate same impact on fiscal budgets.
- Given $\hat{Y}$ from the calculations in analogy to the Appendix of the main text, we know that $\hat{T}_R = \gamma_{TR} \hat{Y}$
- Calculate $\gamma_r = \frac{\upsilon}{1 - \chi + \upsilon} \frac{(1 - \iota^d) \hat{R}_t}{(1 - \iota^d) \hat{R}_{t+1}}$, where we made use of the fact that, now, $\chi = 0$ must hold.

In the following, we present the IRFs of a consumer preference shock when the government adopts a transfer rule instead of the public consumption rule in the main text. We see that the business cycle effects are very similar except that, now, they are driven by indirect demand resulting from changes in transfers instead of direct demand posted by the government.
Fig. 1 Debt brake (transfer rule) and CPS

Fig. 2 Automatic stabilizer (transfer rule) and CPS
3 Welfare

The welfare analysis is conducted in an analogous way as in the main paper. Table 1 shows the increase/decrease (for “+/-” signs, respectively) of the welfare loss of the rule considered in the first row of the table relative to the debt brake in percent. The row “spending rule” recapture the findings of the main paper. The row “transfer rule” shows the findings of a rule where only transfers to households are used to comply with the idea of the rule under consideration. We concentrate on the case with measurement error.
We see that, in this case, the BB regime and the SGP slightly dominates the DB and the AS regime. This is because, now, (i.) the bias resulting from public consumption in the utility function no longer exists and (ii.) because transfers to households tend to generate lower inflation volatility due to the indirect demand effects via private consumption (through rule-of-thumb households) while public consumption provokes immediate demand-driven inflation volatility. Simulating our model with a full transfer rule (instead of a spending rule).

It has to be borne in mind, however, that the debt brake regimes consider public spending without the autonomously financed social security systems. In Germany, the spending components which can be considered transfers to households in our model (for example, monetary and in kind social benefits and subsidies paid by the federal government) make up only a bit more than 20% of total government spending. Taking this into account and calculating the aggregate welfare loss resulting from a simultaneous change in government consumption and public transfers according to their shares in total public spending, we find that the transfer effects do not overcompensate the findings of a rule only considering public consumption. Therefore, we believe that focusing on government consumption entering households' utility in the model presented below is a justifiable simplification. Results are given in the last row of Table 1 labeled “aggregate rule”.

<table>
<thead>
<tr>
<th></th>
<th>Debt brake</th>
<th>Automatic stabilizer</th>
<th>Balanced budget</th>
<th>Stability and Growth Pact</th>
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</thead>
<tbody>
<tr>
<td>Transfer rule</td>
<td>0.00%</td>
<td>0.00%</td>
<td>-0.28%</td>
<td>-0.64%</td>
</tr>
<tr>
<td>Spending rule</td>
<td>0.00%</td>
<td>-1.53%</td>
<td>2.94%</td>
<td>13.29%</td>
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<tr>
<td>Aggregated rule</td>
<td>0.00%</td>
<td>-1.27%</td>
<td>2.40%</td>
<td>10.96%</td>
</tr>
</tbody>
</table>

Because welfare effects are not altered when taking the transfer component weighted by its share in total spending into account, we believe that only presenting the spending rule in the main paper can considered to be a justifiable simplification. Nevertheless, we are prepared to amend our paper by the implications from including transfers (for example, in section 5) or provide a separate downloadable file describing this exercise.