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Public purchase experiment with adjusted tax rate reaction

Resumé:

We compare a public purchase experiment with the fiscal reaction function to the same experiment the necessary increase in tax rate is introduced exogenously and gradually without fluctuations. The fiscal reaction function makes the tax rate overshoot and undershoot. Without the tax rate fluctuations the labour market response becomes a little less volatile.

The long-run tax change is the same in the two experiments, and the steady state public primary surplus is zero in both experiments. However, the difference in cyclical pattern implies a different cyclical pattern in the primary surplus and a different long-run level of the public net asset.

1. Introduction

In this note we perform an experiment on the government purchase of goods where we use the long-run tax change calculated by the fiscal reaction function, i.e. the experiment *government purchase of goods (mul1)* in 'Fiscal reaction function in ADAM' but we implement the tax change more gradually. Thus, the experiment is fully tax-financed in the long run but the short- and medium-run effects differ from the experiment based on the fiscal reaction function. Besides we get a different long-run impact on the public net asset because the cyclical impact on public finances has differed in the short- and medium run.

2. Public purchase experiment

We use the same baseline that is used for the fiscal reaction function. Public expenditure is increased permanently by 1 percent relative to the baseline corresponding. From the fiscal reaction function experiment we now that this experiment warrant a permanent increase of 1.62 percent in the income tax rate to finance the higher purchase and keep the government sector's net asset constant as GDP share.

We now increase the income tax rates tsysp1 and tsysp2 by 1 percent in the first two years, by additional 0.2 percent in the 3rd and 4th years followed by an annual increase of around 0.1 percent until the steady state change of 1.62 percent is reached, see figure 1. The change in the income tax rate is compared to the change in the public expenditure experiment, called mul1, in 'Fiscal reaction function in ADAM', cf. Figure 2 right-hand panel.

There is a difference in the tax rate reaction and in the labor market response. With the fiscal reaction function, the tax rate increases by up to 1.8 percent where it peaks and after a light undershooting the tax rate attains its steady state increase 1.62 percent, cf. figure 2. This cyclicality of the fiscal reaction function in the first ten to fifteen years contributes to the labor market volatility shown in figure 4. With the exogenously adjusted tax rate, we have lower volatility in the labor market response and e.g. the temporary negative unemployment impact is smaller, see figure 3.

In the long run, we come out with a larger negative impact on public net assets as we have allowed for more temporary negative impact on the public budget by using the adjusted tax rate. There is a tradeoff. We get a less volatile impact on the labor market, cf. figure 4, as we accept a more volatile impact on public finances and in this case also a lower public net asset in the long run. The lower public net asset is reflected in a lower net asset vis-a-vis the foreign sector, while the private net asset seems rather unchanged according to the two panels in figure 7.

The long-run impact on the public, foreign and private net assets is as one should expect, the long-run private net asset is basically controlled by the consumption function that is also a savings function which leaves the foreign net asset to reflect the public net asset. The book-keeping identities imply that the impact on the three net assets (public, private and foreign) sum

to zero, so that when the fiscal reaction function is controlling public finances in the long run it is also controlling the balance of payments and the foreign net asset.

In both scenarios (figure 1 and 2) the tax rate increases to same steady state and the corrected primary surplus is zero in the long run. Also the steady state on the labor market is identical in the two scenarios, but the exogenous and gradual increase in the income tax makes the labor market reaction less volatile compared to the scenario with fiscal reaction function.
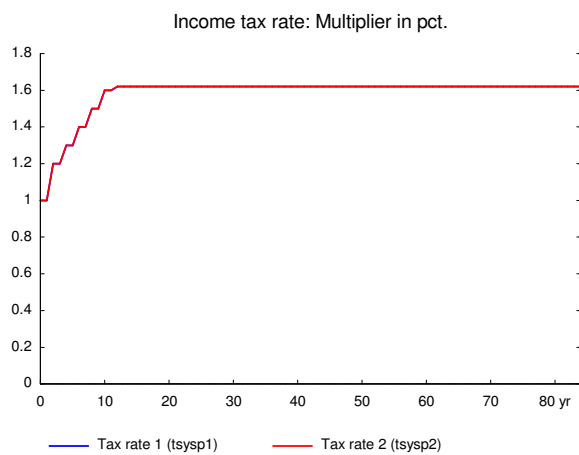
Figure 1: Adjusted reaction in tax rate

Income tax rate: Multiplier in pct.
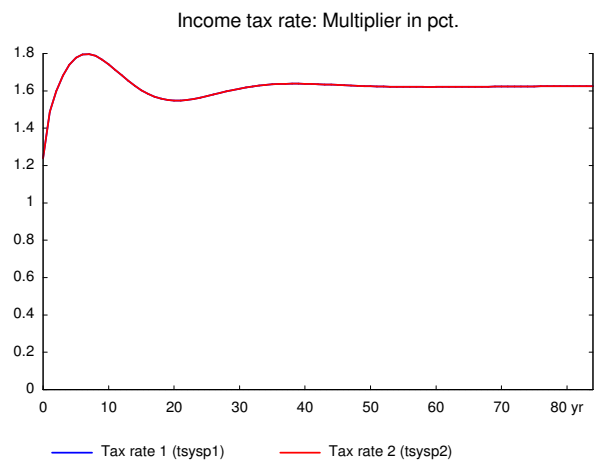
Figure 2: fiscal reaction function

Income tax rate: Multiplier in pct.

Figure 3: Labor market response without fiscal rule

Labor market: Multiplier in 1000 people.
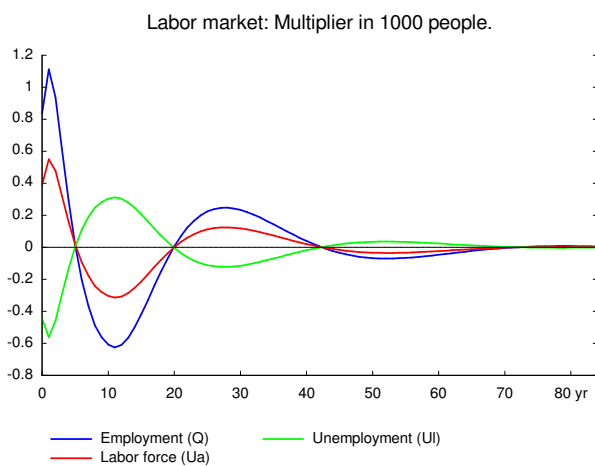
Figure 4: Labor market response with fiscal rule

Labor market: Multiplier in 1000 people.
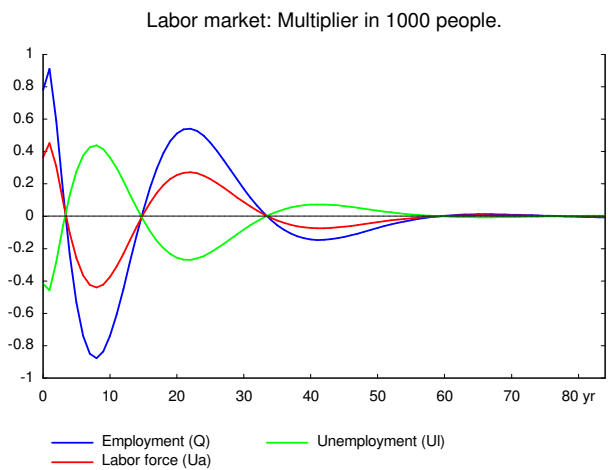
Figure 5: Saving balance without fiscal rule

Saving balance: Percentage share of GDP

Government sector ((Tfn_o/y)
Government sector corrected ((Tfn_o- (Tin_o - Tirn_o))/y)
Foreign sector (Tfn_e/y)
Private sector (Tfn_hc/y)
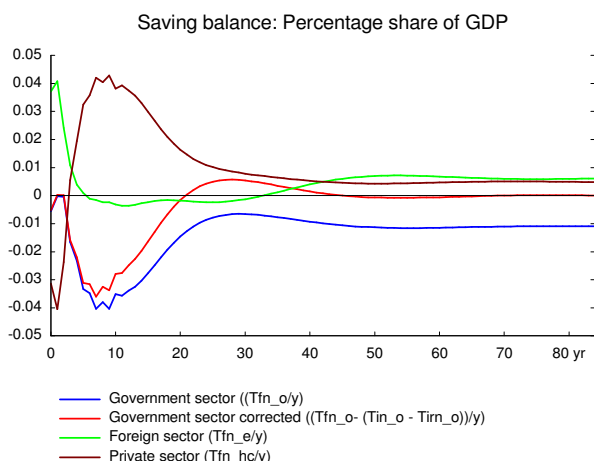
Figure 6: Saving balance with fiscal rule

Saving balance: Percentage share of GDP

Government sector ((Tfn_o/y)
Government sector corrected ((Tfn_o- (Tin_o - Tirn_o))/y)
Foreign sector (Tfn_e/y)
Private sector (Tfn_hc/y)
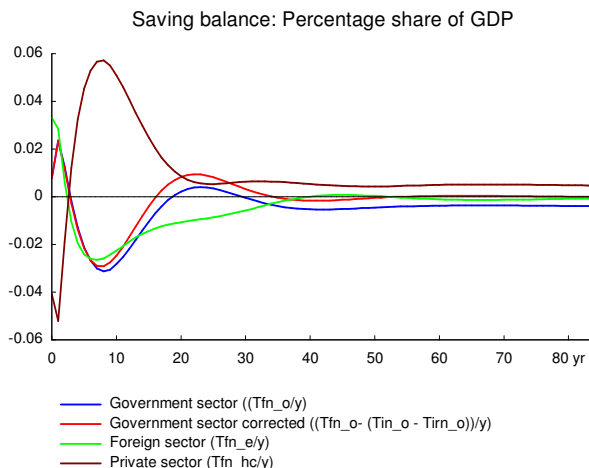
Figure 7: net asset ratio without fiscal rule

Net Asset ratio: Percentage share of GDP

Public sector (wn_o)
Private sector (wn_hc)
Foreign sector (wn_e)
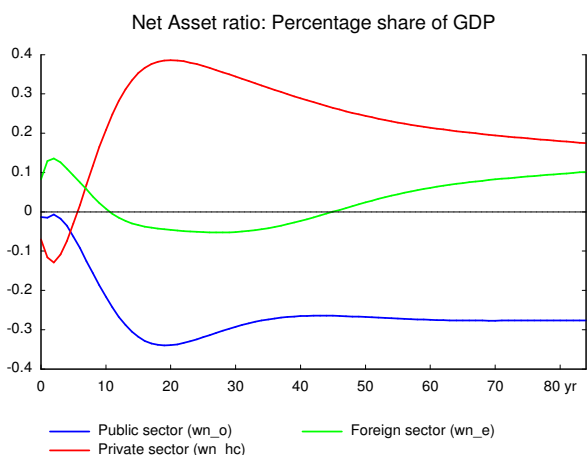
Figure 8: net asset ratio without fiscal rule

Net Asset ratio: Percentage share of GDP

Public sector (wn_o)
Private sector (wn_hc)
Foreign sector (wn_e)
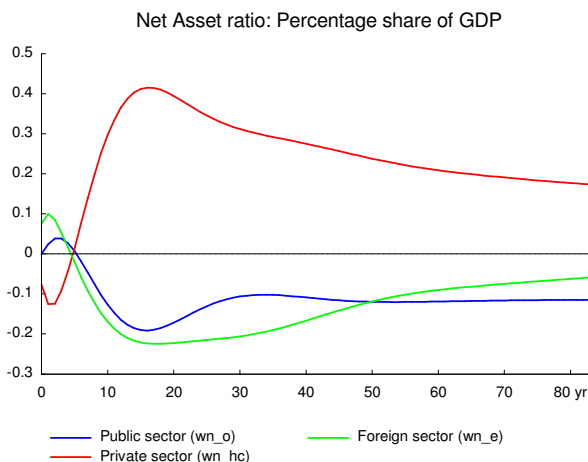
3. Conclusion

It may be worth considering a more gradual reaction in the tax rate than the one implied by the newly developed fiscal reaction function.

A practical approach would be to 1) simulate once with the fiscal reaction function, retrieve the long-run impact on the income tax rate, 2) insert this impact in the tax rate according to a pre-chosen time profile, and 3) run the model one more time with the reaction function switched off and the tax rate exogenous. A more elegant solution would be to make the fiscal reaction function calculate a more gradual tax change.

4. References:

Amenu Temesgen Kitesa and Dan Knudsen (2015), Fiscal reaction function in ADAM, working paper, Denmark Statistics.

Denmark Statistics (2013), ADAM – a model of the Danish economy.