Advanced Macroeconomics: Het. Exam

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1

1.1

In the code, in the "find_ss_HANK" function, the transfers are calculated as the opposite of the dividends. In that regard, we should only need to use one or the other, such that we can reduce the inputs by removing one of them and keeping the other.

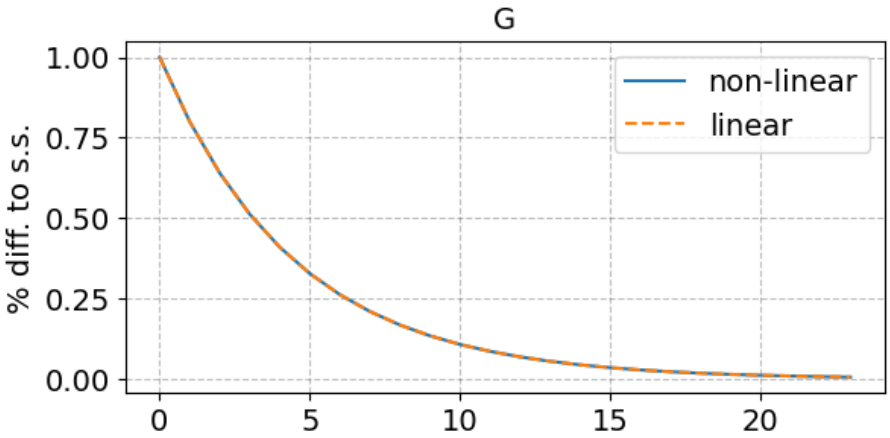
1.2

First of all, if we remove an unknown we must also remove a target such that there are the same amount targets and unknowns. I believe that u could be left out as an unknown, along then with $errors_u$ as a target. The reason for this, is that we have the law of motion for unemployment, u, we also know $par.delta_{ss} (= ss.delta = delta)$ as well as $\lambda^{u,s}$, whereas S is an unknown, once that is pinned down, we should be able to pin down u for a given initial value.

1.3 Linearized IRF and non-linearized IRF

Figure 1 shows the linearized IRF and non-linearized IRF to a shock to G. It is clear that the shock is linear in the size of the shock, as there is no difference between the non-linear and linear shock. This implies that we can capture the dynamics of the system with the linearized IRFs. Wrt. a shock to G, we can continue using linearized shocks which are computationally easier. [1]

Figure 1: linearized IRF and non-linearized IRF



[1] Im under the impression that we are only supposed to look at the shock it self, if this is not the case, then figure 2 shows more responses. Here it is clear that the linear and non-linear approach is not the same.

2

2.1

The fiscal multiplier is the change in total output in the economy wrt. a change in government expenditures. In the model it is calculated to be 1.2 with the standard calibration. From figure 2 we can see that in response to a 1% increase in government spending, private consumption, C_{hh}, initially decreases less than 1% and then slightly overshoots the ss level, but then returns to the ss level. To see if there differences across the different types of households, my idea is to find the difference, by beta, in consumption on the path between a situation with no shock, and with a shock. The results are seen in table 1 and are also shown for 3 values of ω. For the column with standard ω, we see that the changes in (total on path) private consumption is negative, i.e. that consumption is higher when there is no shock to government spending. The effect is largest for the hand-to-mouth consumers, who reduces their consumption the most. Permanent income hypothesis households reduce their consumption the least.

Figure 2: IRF

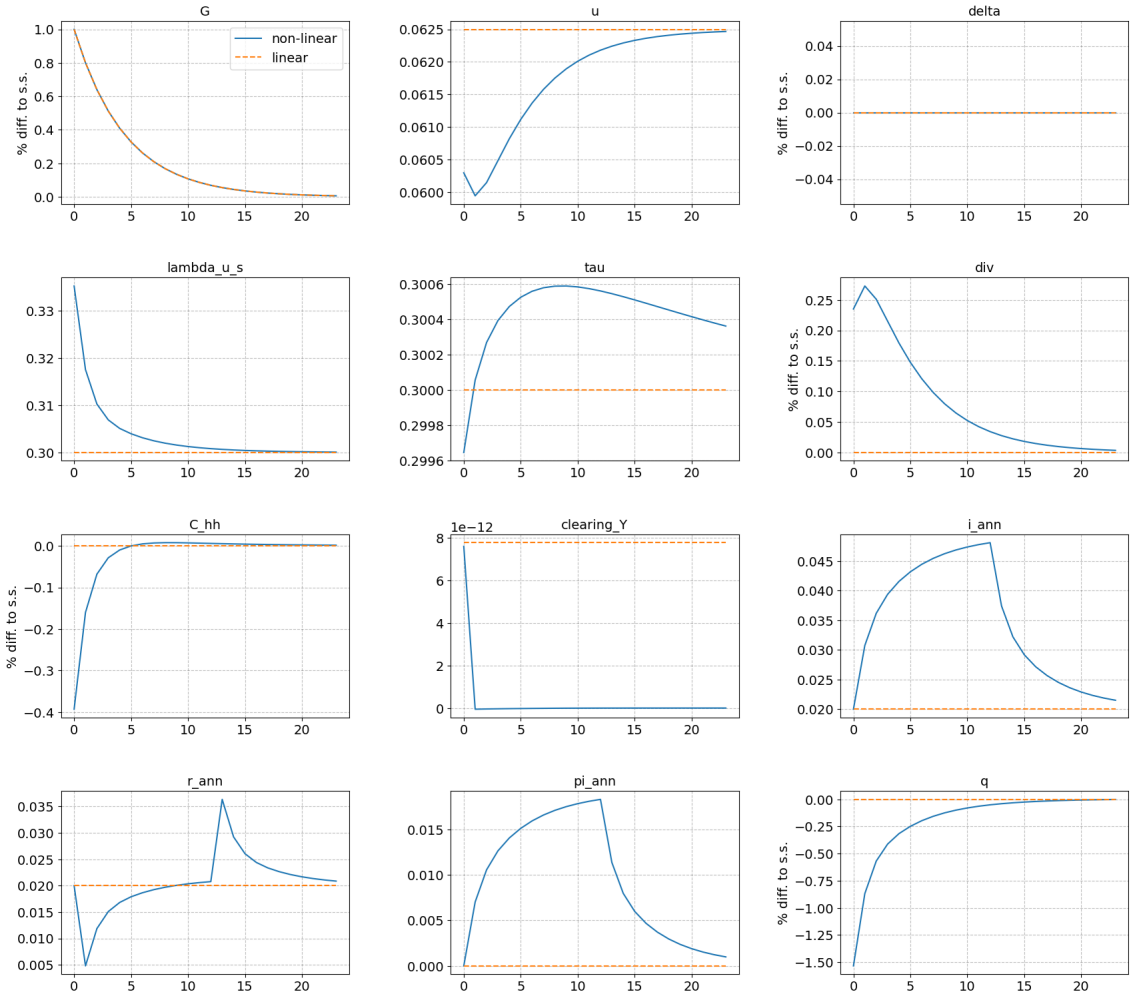


Table 1: Change in consumption and fiscal multiplier

		Omega		
		0.05	0.10	0.20
Beta	**HtM**	-0.00202	-0.00194	-0.00181
	BS	-0.00082	-0.00078	-0.00077
	PIH	-0.00035	-0.00035	-0.00044
	f. mult.	1.271	1.120	1.005

2.2

As seen in table 1, when ω increases, then the reduction in private consumption tends to be smaller i.e. getting closer to 0. The exception is for the permanent income hypothesis households, where for a large ω there is an increase in the drop in private consumption. Additionally, We see that for the various ω's, the fiscal multiplier is dropping.

Figure 3, shows the comparison of the standard model with ω at 0.05 to an alternative model with ω at 0.10 wrt. a 1% shock to government spending. We see that there overall is less crowding out with a higher ω, see also table 1 again, as the as the initial decrease is slightly smaller, however, the return to ss is slower. In other words, there is less crowding out initially, but then relatively more crowding out in the later periods. Also there is no small crowding in effect in the later periods with a higher ω cf. low ω.

With respect to the mechanism underlying these results, then for the PIH households, when ω increases, then taxes increase more with wrt. an increase in debt, which must follow from an increase in government spending. The PIH must realize that their combined life after-tax income is lower, resulting in the larger response in consumption for this type of household. The HtM households just consume their entire income, so when ω increases, I would expect consumption to drop even more with a higher ω, but that is not what is happening here. In the other dimension, that is, for a fixed ω the drop in consumption is as mentioned before larger for HtM and smallest for PIH. This is not surprising, as HtM households simply consume their entire income. Since the government will increase their taxes above ss level, this would mean that there likely is a large decrease in consumption in the initial periods for HtM households, whereas BS households and PIH can smooth consumption over time so the drop is smaller.

2.3

The fiscal multiplier, when HtM is 0.5, is 1.6, which is higher than at the standard calibration. From figure 4, we see that there is relatively more consumption in all periods when compared to the standard calibration.

Figure 3: Comparing IRF's

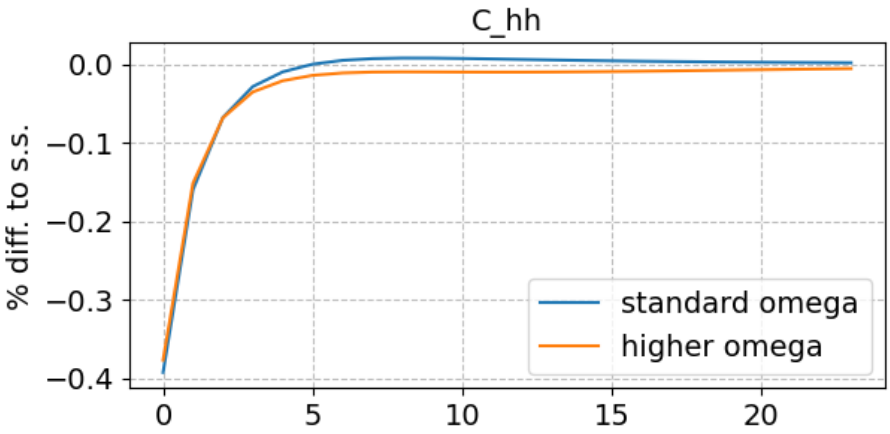
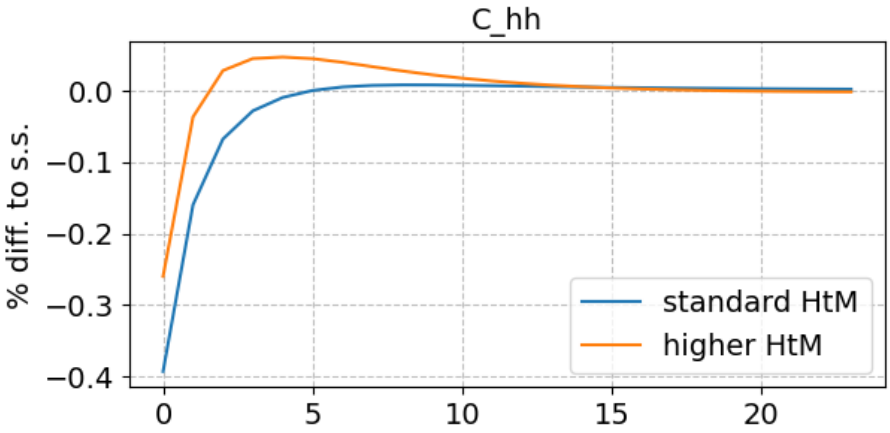


Figure 4: Comparing IRF's when HtM is 0.3 and 0.5



2.4

Figure 5 shows the IRF's for the HANK-SAM model and the RANK model. The IRFs imply that with the RANK model there is initially less crowding out of the private consumption, but more crowding out in the subsequent periods. Overall there appears to be less response to the shock in the RANK model. This is likely because you don't capture the effect from the HtM households who consume their entire income.

Figure 6 shows the response with a standard and increased δ, i.e. increased separation risk.

Figure 5: IRFs for RANK and HANK-SAM

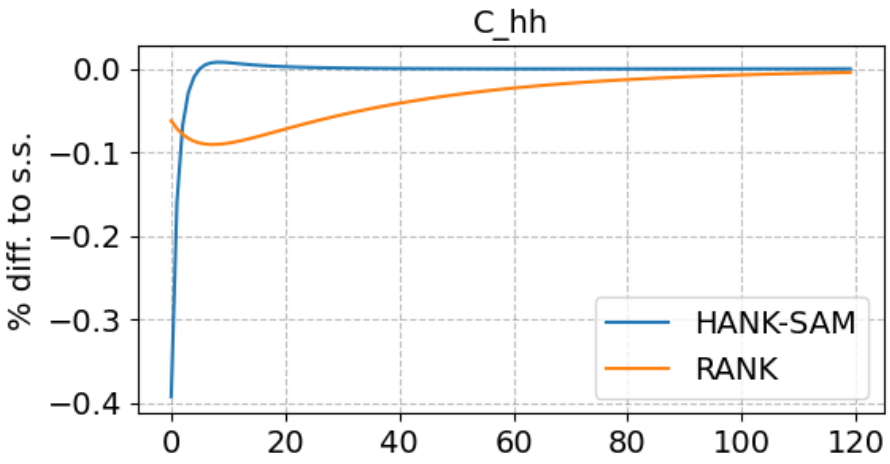
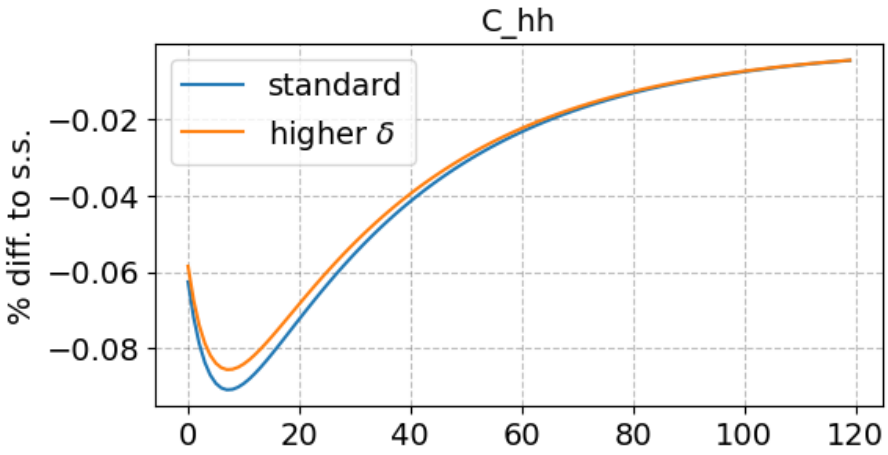


Figure 6: IRFs



3

3.1

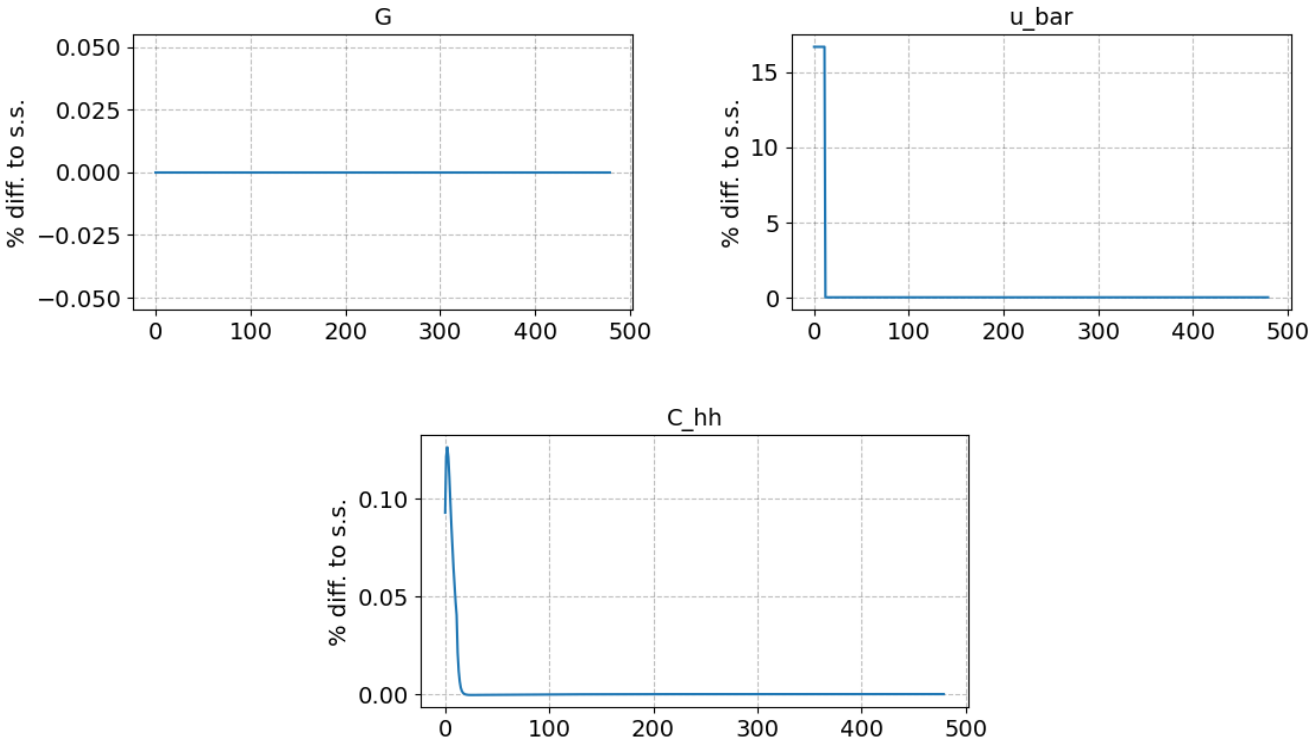
When extending the high unemployment insurance duration from 6 months to 7 months, the fiscal multiplier is close to zero at 0.013. Income is higher in unemployment for all household types[2]. I would therefore expect higher consumption for the unemployed, resulting in higher demand and therefore higher output on the path. However, since the shock is permanent, the tax rate on the path must also be higher, which acts in the other direction reducing household after tax income, therefore the low multiplier seems reasonable.

[2]Well, the high income lasts longer to be precise

3.2

I am now considering u_bar to be a shock instead. I'm making a shock that lasts 12 periods where the high unemployment insurance duration is increased from 6 to 7 months. Figure 7 shows the response of household consumption to a shock to high unemployment insurance duration. We no longer have crowding out of private consumption, but have crowding in. The fiscal multiplier is 1.480, which is higher than the standard multiplier of 1.271 found in question 2 and also higher than what I just found in 3.1.

Figure 7: IRFs



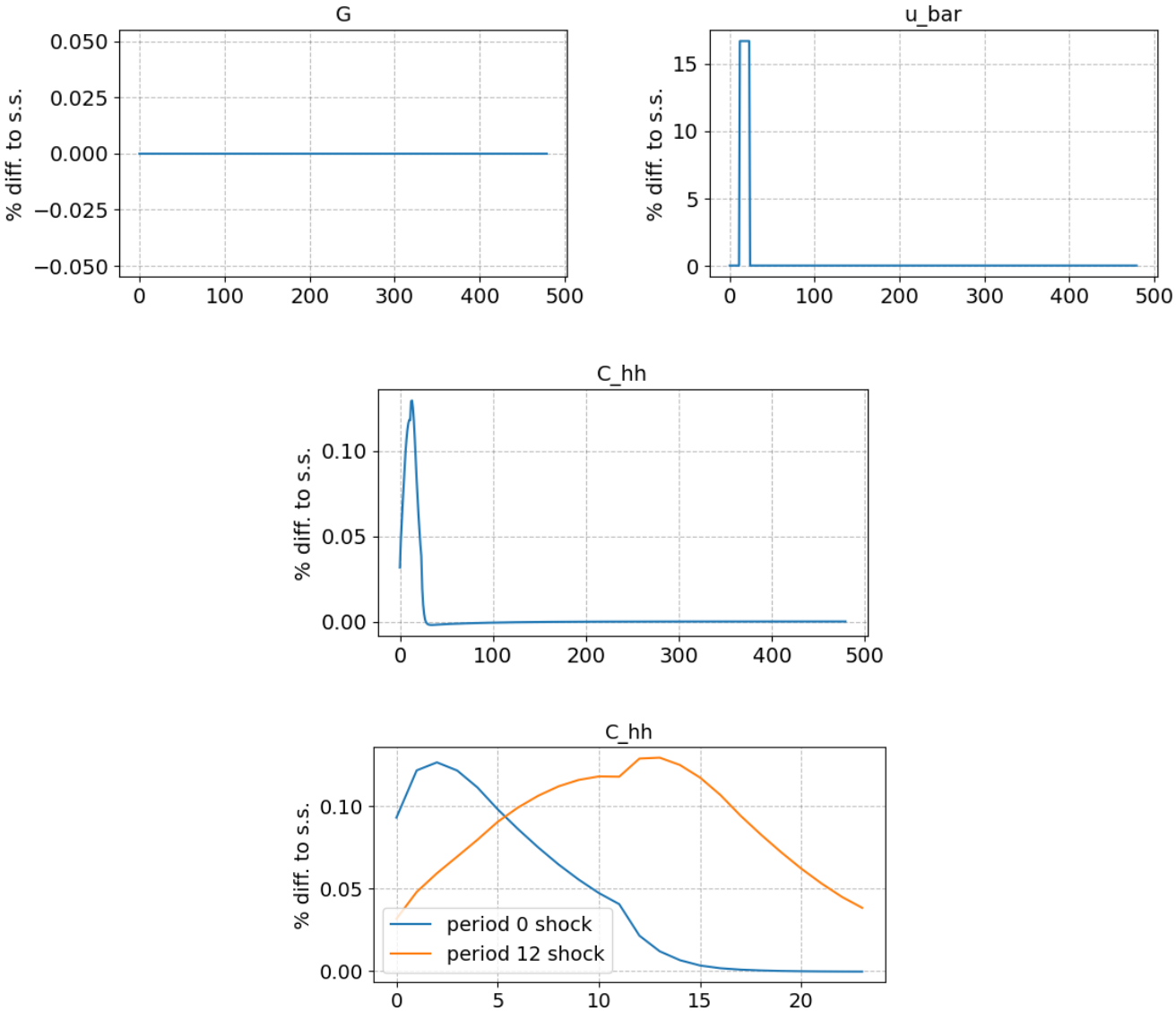
3.3

Next, I consider a shock to high unemployment insurance duration that takes effect after 12 months and lasts for 12 months. From figure 8 we can see that there is still crowding in from private consumption. By comparing the two IRFs when there is a change to the high unemployment insurance duration that takes place in period 0 and period 12, see the lowest plot in 8, it is clear that consumption rises before the announcement. The fiscal multiplier is 5.186, which seems very high, possibly indicating an error. However, the direction seems clear, when a change is announced before it is put into effect, households can anticiapte what happens and adjust their consumption accordingly, as seen in figure 8, this leads to a higher fiscal multiplier. This hump shaped response

is most likely stemming from the non-HtM households, since they are the only households that don't simply consume their entire current period income and therefore act with foresight.

so far we have seen that increasing the high unemployment insurance duration is more effective fiscally than a pure shock to G.

Figure 8: IRFs



3.4

I'm not sure how to implement this in practice, but I think households would have biased beliefs i.e. households solve their value function for the announced high unemployment insurance duration, but then in the simulation the true high unemployment insurance duration is used. One way I

tried implementing this is by using the initial condition from 3.3 and then make a new shock in period 5, but i can't quite get it to work.