HAFiscal project paper outline

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1 Introduction

2 Model

3 Estimation and calibration

4 Fiscal policy simulations

We consider the following fiscal policy experiments

- Payroll tax cut: Employed individuals benefit from a 2 percentage points lower payroll tax cut. The tax cut is unanticipated and usually lasts for 8 quarters. However, there is a 50% chance, that the policy is extended by another 8 quarters if the recession is still ongoing in the 8th quarter of the payroll tax cut.
- Unemployment insurance extension: The duration of the unemployment insurance is doubled from 2 to 4 quarters. Agents, that are unemployed when the policy is implemented thus receive up to 4 quarters of unemployment insurance. The policy is unanticipated and active only for one quarter.
- Stimulus check: Each individual, independent of employment status, receives an unanticipated payment of \$1200 in one quarter. However, the check is only paid out fully to individuals with a permanent yearly income smaller than 100,000 and not at all to those with a income greater than 150,000. Those within the two thressholds receive a share of the full stimulus check amount proportionate to their position within threshholds.[1]

4.1 Impulse responses

[1] For this income group, the check amount is given by $\$1200(1 - \frac{Income - 100{,}000}{50{,}000})$. For example, an individual with a permanent yearly income of 110,000 receives 80% of the stimulus, i.e. \$960.

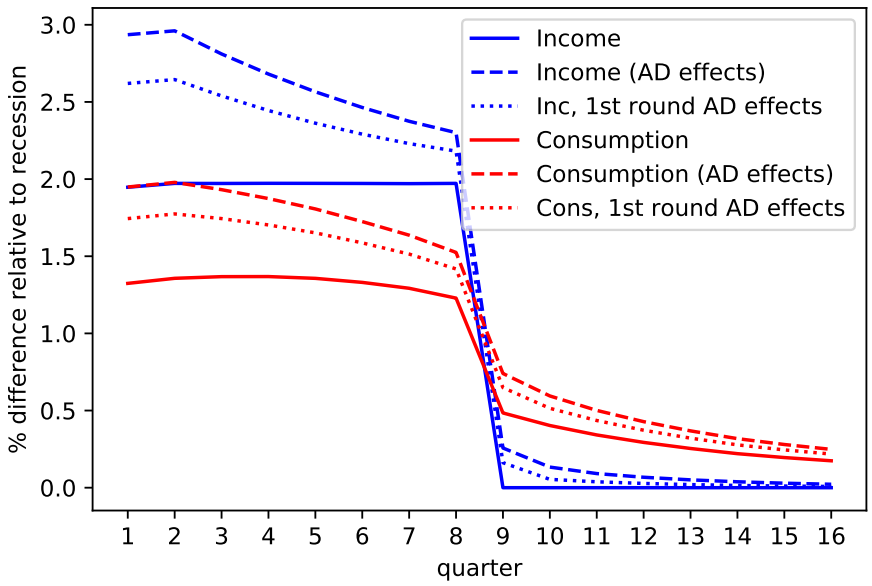

Figure 1: Impulse responses of aggregate income and consumption to a pay roll tax cut during a recesssion lasting eight quarters with and without aggregate demand effects

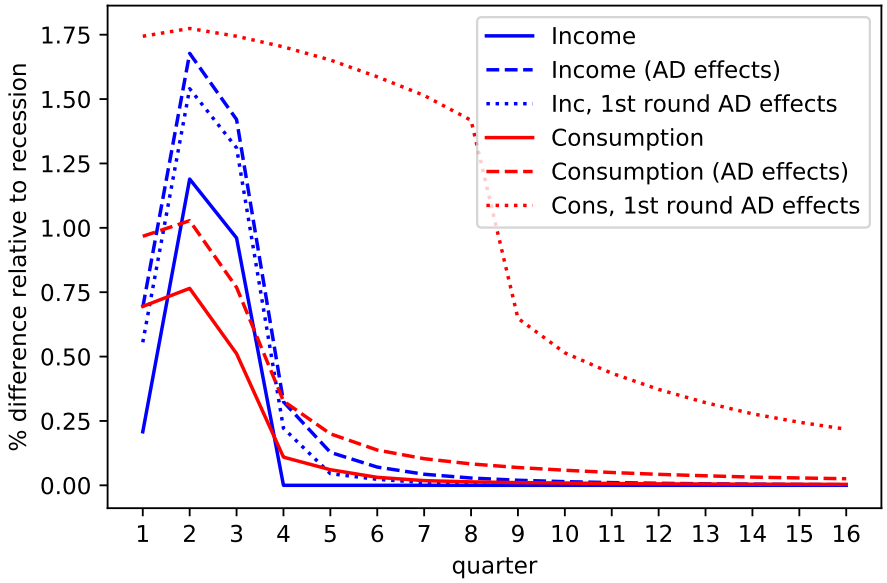

Figure 2: Impulse responses of aggregate income and consumption to a UI extension during a recesssion with and without aggregate demand effects

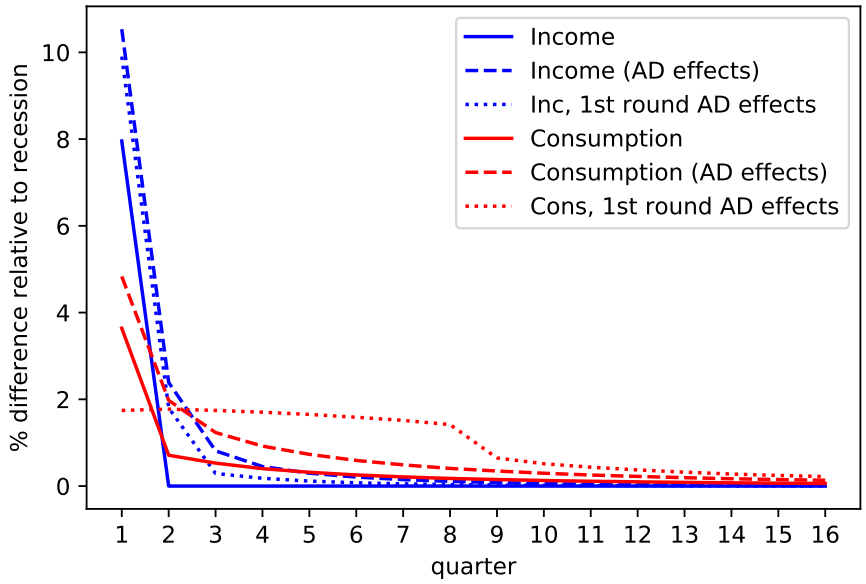

Figure 3: Impulse responses of aggregate income and consumption to a stimulus check during a recesssion with and without aggregate demand effects

4.2 Multipliers

Definitions:

- The *net present value (NPV)* of a variable X at horizon t is given by

$$NPV(t, X) = \sum_{s=0}^{t} \left(\prod_{i=1}^{s} \frac{1}{R_i} \right) X_s \tag{1}$$

- The *cummulative multiplier (CM)* of a policy is given by

$$CM(t) = \frac{NPV(t, \Delta C)}{NPV(T_{max}, \Delta G)} \tag{2}$$

where ΔC is the additional aggregate consumption spending in the policy scenario relative to the baseline and ΔG is the government expenditures caused by the policy.

	Tax Cut	UI extension	Stimulus check
Multiplier (with AD effects)	1.218	1.700	1.674
Multiplier (with only 1st round AD effects)	1.105	1.444	1.396
Share of policy expenditure during recession	43.0%	69.0%	60.7 %

Table 1: Multipliers as well as the share of the policy ocurring during the recession for the three policies considered

	Tax Cut	UI extension	Stimulus check
Recession lasts 2q	1.054	1.573	1.526
Recession lasts 4q	1.161	1.625	1.651
Recession lasts 8q	1.374	1.762	1.803

Table 2: Multipliers (with AD effects) for different recesssion lengths for the three policies considered

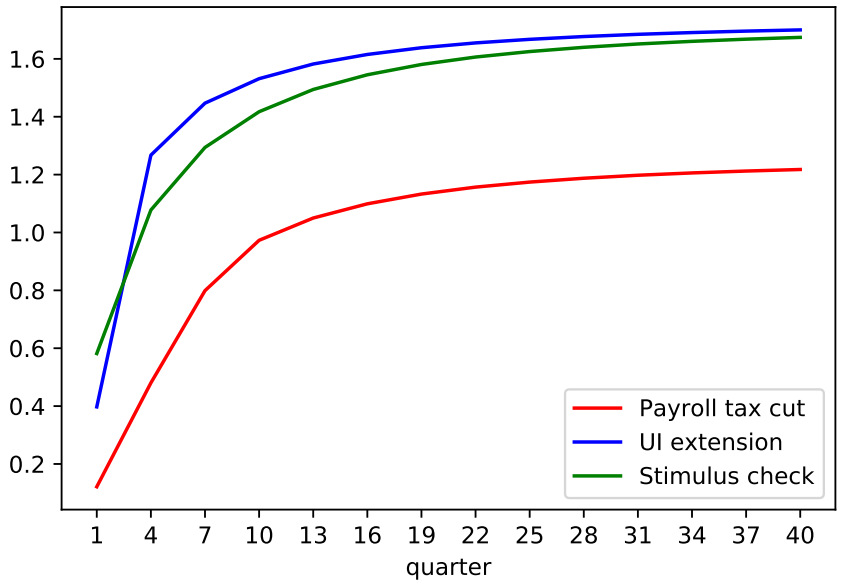

Figure 4: Cummulative Multiplier as a function of the horizon in quarters for the three policies considered. Policies are implemented during a recession with AD effects active

5 Welfare analysis

We want to convert welfare units to consumption units. A proportional increase in every agents' consumption in the baseline by fraction x, in welfare, is equal to:

$$x\frac{1}{N}\sum_{i=1}^{N}\sum_{t=0}^{\infty}D^t c_{it,\text{base}}u'(c_{it,\text{base}}) \tag{3}$$

where c_{it} is consumption (including the splurge) of agent i at time t and D is the social planner's discount rate. N is the number of agents.

The cost of such an increase is

$$x\frac{1}{N}\sum_{i=1}^{N}\sum_{t=0}^{\infty}R^{-t}c_{it,\text{base}} \tag{4}$$

Define

$$\mathcal{W}^c = \frac{1}{N}\sum_{i=1}^{N}\sum_{t=0}^{\infty}D^t c_{it,\text{base}}u'(c_{it,\text{base}}) \tag{5}$$

$$\mathcal{P}^c = \frac{1}{N}\sum_{i=1}^{N}\sum_{t=0}^{\infty}R^{-t}c_{it,\text{base}} \tag{6}$$

Aside - with log utility, $\mathcal{W}^c = \frac{1}{N}\sum_{i=1}^{N}\sum_{t=0}^{\infty}D^t = \frac{1}{1-D}$

We will assume that a government expenditure of size F with welfare benefit $\mathcal{W}$ will be funded by a proportional consumption tax of size $\frac{F}{\mathcal{P}^c}$ resulting in a welfare loss of $\frac{F}{\mathcal{P}^c}\mathcal{W}^c$. The overall welfare benefit will be equivalent to consumption units:

$$\mathcal{C} = \frac{\mathcal{W}}{\mathcal{W}^c} - \frac{F}{\mathcal{P}^c} \tag{7}$$

There is also an 'unseen' cost to the government policy exactly equal to implementing the policy in normal times.

Define welfare of a policy as:

$$\mathcal{W}(\text{policy}, AD, Rec) = \frac{1}{N}\sum_{i=1}^{N}\sum_{t=0}^{\infty}D^t u(c_{it,\text{policy},AD,Rec}) \tag{8}$$

So the consumption equivalent of a policy implemented in recession is:

$$\begin{aligned}\mathcal{C}(\text{policy}, AD, Rec) = &\left(\frac{\mathcal{W}(\text{policy}, AD, Rec) - \mathcal{W}(AD, Rec)}{\mathcal{W}^c} - \frac{PV(\text{policy}, Rec)}{\mathcal{P}^c}\right) \\ &- \left(\frac{\mathcal{W}(\text{policy}) - \mathcal{W}(\text{base})}{\mathcal{W}^c} - \frac{PV(\text{policy})}{\mathcal{P}^c}\right)\end{aligned} \tag{9}$$

Table 3 shows results for this method. Note that the policy expenditures of each policy have been equalized.

6 Conclusion

A Appendix section example

	Check	UI	Tax Cut
$\mathcal{C}(Rec, \text{policy})$	0.208	3.954	0.005
$\mathcal{C}(Rec, AD, \text{policy})$	0.953	5.748	0.113

Table 3: Consumption Equivalent Welfare Gains in Basis Points