ECON 442

Fiscal Stimulus – Some Theory

Winter 2015

Introduction

Suppose there is some slack in the economy relative to an efficient equilibrium.

Why does stimulus work?

It needs to change people's behavior.

How?

- change people's spending directly
- remove constraints on people's spending
- change people's beliefs

We look at a model where people's beliefs determine demand and demand determines output.

Labor Supply

There are $N_t = 1$ households.

They do not value leisure and supply inelastically one unit of labor.

They find work with probability q_H.

Their total wage income is given by

$$w(t)l(t) = w(t)q_H$$

They save and own capital when old.

Labor Demand

Firm employs $l = x + v$ workers.

- v HR people
- x productive workers

HR people find workers according to

$$l = q_F v$$

How effective firms are in finding workers depends on q_F which the firm takes as given.

The representative firm then solves

$$\max_{k,l,x,v} \Big(Ax(t)\Big)^{1-\alpha} k(t)^{\alpha} - w(t)l(t) - r(t)k(t)$$

subject to

$$l(t) = x(t) + v(t)$$
$$l(t) = q_F v(t)$$

Using the constraints, we can substitute and obtain

$$\max_{k,x} \left(A\left(1 - \frac{1}{q_F}\right)\right)^{1-\alpha} k(t)^{\alpha} l(t)^{1-\alpha} - w(t)l(t) - r(t)k(t)$$

FOC:

$$\begin{aligned} (1-\alpha)\frac{y(t)}{l(t)} &= w(t) \\ \alpha\frac{y(t)}{k(t)} &= r(t) \end{aligned}$$

Matching

Firms and households are matched according to the technology

$$l(t) = \sqrt{v(t)}\sqrt{N_t} = \sqrt{v(t)}$$

In equilibrium, we need that q_F is consistent with the aggregate matching technology, or

$$q_F = \frac{l(t)}{v(t)} = \frac{l(t)}{l(t)^2} = \frac{1}{l(t)} = \frac{1}{q_H}.$$

Firms just take q_H as given.

Problem: There is no coordination between firms and households.

Efficiency

What would a social planner do to achieve efficiency?

- need to respect matching technology
- can take into account effects on q_F (coordination)

Maximize output with respect to labour supply:

$$\max_l (Ax(t))^{1-\alpha} k(t)^\alpha$$

subject to

$$x(t) = l(t) + v(t) = l(t) - l(t)^2$$

so that $l(t) = 1/2$.

This serves as a benchmark.

Equilibrium and Animal Spirits

Using an OG structure, we get

$$N_t(c_{t-1}(t) + c_t(t) + s(t+1)) = N_t(w(t)l(t) + r(t)k(t))(\equiv N_t y(t)).$$

Demand is determined by factor incomes which equal output.

Indeterminacy: Demand depends on $l(t) = q_H$ and any value of $q_H \in [0, 1]$ – or $q_F = 1/q_H \in [1, \infty)$ – is an equilibrium.

Whenever $q_H \neq 1/2$ we have an inefficiency.

Interpretation

Beliefs matter.

- Suppose people think it's hard to find a job (q_H low).
- It is easy to find workers (q_F high).
- Hence, in equilibrium, labor demand is low.
- This confirms low labour supply and income is low.

High unemployment is a self-fulfilling prophecy.

Key Issue: Wages are not determined on markets – or through bargaining – that could coordinate firms and households.

Fiscal Stimulus

The initial old just consume the return on capital $r(0)k(0)$.

Fiscal policy:

- deficit in period 0: $\tau_1(0) + \frac{b(0)}{1+r} = 0$
- financed by surplus in period 1: $\tau_2(1) = b(0)$

Household problem for generation 0:

$$\max_{c_1, c_2)} \ln(c_0(0)) + \beta \ln u(c_1(0))$$

subject to

$$c_0(0) + s(1) = w(0)q_H - \tau_1(0)$$

$$c_0(1) = r(1)s(1) - \tau_2(1)$$

Neo-Classical – Ricardian

Household takes into account life-time budget constraint

$$c_0(0) + \frac{c_0(1)}{r(1)} = w(0)q_H$$

Hence: savings adjust 1-1 for the additional debt (crowding out).

Aggregate Demand is given by

$$\begin{aligned} D &= c_{-1}(0) + c_1 + s(1) \\ &= r(0)k(0) + w(0)q_H \end{aligned}$$

Conclusion: Policy needs to **change beliefs** in order to have any impact.

Note that we could have assumed direct spending by gov't as well.

Keynesian – Non-Ricardian

Suppose now that households are constrained in their spending. They face the additional "constraint"

$$c_1 \leq \rho\big(w(0)q_H - \tau_1(0)\big)$$

where $\rho \leq 1/(1+\beta)$. Assume further transfers do not affect savings.

Aggregate demand is given by

$$\begin{aligned}
D &= c_{-1}(0) + c_1 + s(1) \\
&= r(0)k(0) + \rho\left[w(0)q_H - \tau_1(0)\right] + s(1) \\
&= \alpha y(0) + \rho(1-\alpha)y(0) - \rho\tau_2(1) + s(1) \\
&= \frac{s(1) - \rho\tau_1(0)}{(1-\rho)(1-\alpha)} \left(= y_{\text{old}} - \frac{\rho\tau_1(0)}{(1-\rho)(1-\alpha)}\right)
\end{aligned}$$

Conclusion: Policy can determine output (higher q_H) **given beliefs** where $\rho/(1-\rho)(1-\alpha)$ is a (spending) multiplier.