

Discussion on Takahashi and Takayama, "Does Unconventional Fiscal Policy Work at the Zero Bound? Evidence from Value-Added Tax Hikes in Japan"

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This paper

- ▶ Showed empirical evidence against the standard NK model's predictions.
- ▶ **Model's prediction 1:** Anticipated τ^C hike raises current output and inflation.
 - ◊ Households expect higher output and inflation. Stimulative at ELB.
- ▶ **Model's prediction 2:** Delaying the hike strengthens the stimulative effect.
 - ◊ Forward guidance puzzle
- ▶ **Data:** Professional forecasts on inflation and C growth do not rise

This discussion

- ▶ Provides a quick recap of the model's predictions
- ▶ Points out that the Euler equation is as important as the NKPC in generating a counter-factual implication.

On Model's Predictions

NK model's predictions

► Steady-state (SS) effect:

- ◇ C tax encourages labor supply (leisure-consumption substitution)
 - Real wage increases
 - Upward pressure on inflation
- ◇ Maintain zero inflation
 - Monetary policy tighter and C lower

► Transition effect:

- ◇ Future C relatively more expensive (C tax and higher inflation)
 - C higher before the tax hike
 - Intertemporal substitution

Domino effect through expectations

- ▶ C tax anticipated to rise in T^* . Nominal rate fixed.
- ▶ In $T^* - 1$,
 - ◊ Euler implies $C > 0$ Intertemporal substitution
 - ◊ NKPC implies $\pi > 0$ Response to current output
- ▶ In $T^* - 2$,
 - ◊ Euler implies $C > C(+1)$ Lower real rate $R - \pi(+1)$ & higher $C(+1)$
 - ◊ NKPC implies $\pi > \pi(+1)$ Response to current output & expected inflation
- ▶ Forward-looking NKPC and IS are key to obtain large effects.
- ▶ Forward guidance puzzle

On the importance of the Euler equation

The Phillips curve is not the only problem

- ▶ The paper suggested that "modeling the Phillips curve as backward-looking might be more appropriate."
- ▶ Forward-looking Phillips curve does play an important role.
 - ◊ For fixed T^* , inflation keeps increasing and the real rate keeps falling as $t \downarrow 0$.
- ▶ However, the NKPC is not the only source of the problem here.
- ▶ **The Euler part is also problematic.**

What would happen, in the absence of the price/inflation effects?

$$c_t = c_{t+1} - \frac{1}{\sigma}(R - \pi_{t+1} - \Delta\tau_{t+1}^C)$$

- ▶ If inflation is (hypothetically) held fixed (so that $R - \pi = 0$),
 - ◊ Consumption boom (level is high) before the tax hike.
 - ◊ After the hike, it jumps down to the steady state level.
- ▶ I.e. an anticipated tax hike has an immediate positive effect on consumption.
- ▶ As $T^* \rightarrow \infty$, the positive effect has an everlasting effect.
- ▶ Let's understand why.

Consumption function with log utility

- ▶ Household budget constraint:

$$P_t(1 + \tau_t^C)C_t + B_t = P_t(E_t + T_t) + R_{t-1}B_{t-1}$$

- ▶ E_t : real earnings before transfer in t
- ▶ Intertemporal BC from t onward:

$$\sum_{i=0}^{\infty} \frac{P_{t+i}(1 + \tau_{t+i}^C)C_{t+i}}{R_t \cdots R_{t+i-1}} = R_{t-1}B_{t-1} + \sum_{i=0}^{\infty} \frac{P_{t+i}(E_{t+i} + T_{t+i})}{R_t \cdots R_{t+i-1}}$$

- ▶ Consumption function with log utility:

$$C_t = \frac{1}{1 - \beta} \frac{1}{P_t(1 + \tau_t^C)} \left\{ R_{t-1}B_{t-1} + \sum_{i=0}^{\infty} \frac{P_{t+i}(E_{t+i} + T_{t+i})}{R_t \cdots R_{t+i-1}} \right\}.$$

RANK consumption function

- Substitute the government budget constraint

$$R_{t-1}B_{t-1} = \sum_{i=0}^{\infty} \frac{P_{t+i}}{R_t \cdots R_{t+i-1}} (\tau_{t+i}^C C_{t+i} - T_{t+i})$$

and the resource constraint

$$C_t = Y_t = E_t$$

into RHS of the consumption function to get:

$$C_t = \frac{1}{1-\beta} \frac{1}{P_t(1+\tau_t^C)} \sum_{i=0}^{\infty} \frac{P_{t+i}(1+\tau_{t+i}^C) Y_{t+i}}{R_t \cdots R_{t+i-1}}.$$

- Intertemporal Keynesian cross: find $\{C_t, Y_t\}$ with $C_t = Y_t$ for all t .

Wealth and price effects

$$C_t = \frac{1}{1 - \beta} \frac{1}{P_t(1 + \tau_t^C)} \sum_{i=0}^{\infty} \frac{P_{t+i}(1 + \tau_{t+i}^C) Y_{t+i}}{R_t \cdots R_{t+i-1}}.$$

- ▶ **Positive wealth effect:** Households expect larger transfers from tax revenue.
- ▶ **Negative price effect:** After the tax hike, goods are effectively more expensive.

Effect before and after the anticipated tax hike

Without changes in the real interest rates...

- **Before the hike, net effect is positive:**

$$C_t = \frac{1}{1-\beta} \frac{1}{P_t} \sum_{i=0}^{\infty} \frac{P_{t+i} Y_{t+i}}{R_t \cdots R_{t+i-1}} \underbrace{\frac{1 + \tau_{t+i}^C}{1 + \tau_{low}^C}}_{\geq 1 \& > 1 \text{ for all } t \geq T^*}.$$

- **After the hike, net effect is zero:**

$$C_t = \frac{1}{1-\beta} \frac{1}{P_t (1 + \tau_{high}^C)} \sum_{i=0}^{\infty} \frac{P_{t+i} (1 + \tau_{high}^C) Y_{t+i}}{R_t \cdots R_{t+i-1}}.$$

In the RANK model...

- ▶ Holding prices&nominal rates fixed, anticipated C tax hike generates C boom.
- ▶ NKPC merely strengthens the effect through higher inflation&lower real rates.
- ▶ To resolve the puzzle, one may need to generate a negative wealth effect.
- ▶ How? Through redistribution?
 - ◊ HANK model with tax revenue rebated back to *low* MPC households
- ▶ Difficulty: revenue must go somewhere. Just not understood?
 - ◊ Level- k thinking, Belief disagreement
- ▶ Interesting to see people's perception about where the C tax revenue is going.