The Impact of Postponing Announced Unconventional Fiscal Policy on Consumption Expenditure

Xinzhu(Clara) Sun
MA in Computational Social Science, Soicial Science Devision, University of Chicago

Background & Reference

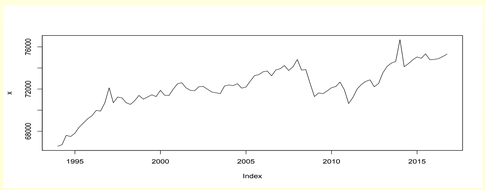
Unconventional fiscal policy (Eggertsson & Woodford, 2006) uses announcements of future increases in consumption taxes to generate inflation expectations and accelerate consumption expenditure (Francesco et al. 2016).

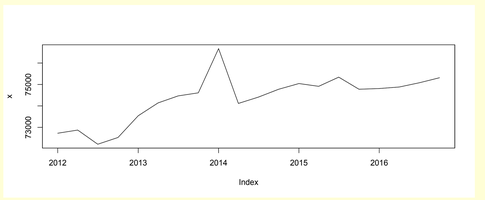
Past researches concluded that unconventional fiscal policy is time consistent. Which means if a future planner were given an opportunity to revise this policy in the future, it would choose no to do so.(Correia et al. 2012; Krugman, 1998; Eggertsson and Woodford, 2003 & 2004)

However, Japan‘s recent value-add -tax (VAT) policy denied the conclusions draw in past researches. In 2009, to win the election, Japanese government promised not to raise the consumption tax for the next four years. In June 2012(Q2), Abe government ate their own words and passed a bill to increase the tax to 8% in April 2014(Q2) and 10% in October 2015. In November 2014(Q4), due to Japan’s economic situation, the government has decided to delay the tax increase to 10% until April 2017. In May 2016(Q2), a second postponement was announced, which pushes the increase to October 2019.

Private Final Consumption Expenditure in Japan

Trillions of Japanese Yen, Seasonally Adjusted





Specific Aims

In my research, I studied the reaction and expectation of consumers when government announces a future sales tax increase but has the option to postpone it. I evaluated both the treatment effect of unconventional fiscal policy and the postponing effect.

Methods

The preference of a representative household over aggregate consumption C_t and leisure L_t is: $E_0\sum_{t=0}^{\infty}\beta^t u(C_t,L_t,\xi_t)$.

As in Correia et al.(2012), the unconventional fiscal policy is characterized as the preference shock ξ_t : $u(C_t,L_t,\xi_t)=u(C_t,L_t)\xi_t$.

In this way, the preference shock does not affect the marginal rate of substitution between consumption and leisure. It does, however, affect the marginal rate of substitution between consumption at time t and time t+1.

I loose the assumption that ξ_t evolves exogenously and model the postponement as a shock on preference shock. The postponement will affect both the size of preference shock and the duration of the policy.

As the previous literature suggests (Correia et al. 2012), there is an equilibrium for $\{C_t, N_t, K_t, P_t, W_t\}$, where N_t is labor supply, K_t is capital stock, P_t is price level, W_t is nominal wage.

When the postponing shock on preference shock wasn’t expected by the household, I use VARX(Vector Auto-regression Model with Exogenous Variables) to calibrate the data:

$$\begin{bmatrix} C_t \\ L_t \\ K_t \\ P_t \\ W_t \end{bmatrix} = \phi_0 + \sum_{i=1}^{p}\phi_i \begin{bmatrix} C_{t-i} \\ L_{t-i} \\ K_{t-i} \\ P_{t-i} \\ W_{t-i} \end{bmatrix} + R\begin{bmatrix} E[\Delta\tau] \\ E[T-t] \end{bmatrix} + a_t$$

where T is the policy exercise date, p is the lag, $\Delta\tau$ is the change of VAT, ϕ_0 is a 5-dimentional constant vector, ϕ_i are 5∗5 real-valued matrices, $\{a_t\}$ is a sequence of serially uncorrelated random vectors with mean zero and positive-definite covariance matrix.

Data Discription

The empirical analysis is conducted using Japanese quarterly time series data from 1994Q1 to 2016Q2. Data sources are Federal Reserve Bank (2016 OECD) and Penn World Table 9.0. The policy announcement/exercise date and the range of tax increase can be found from Ministry of Finance, JAPAN; The House of Representatives, Japan; Ministry of Internal Affairs and Communication; Wikipedia.

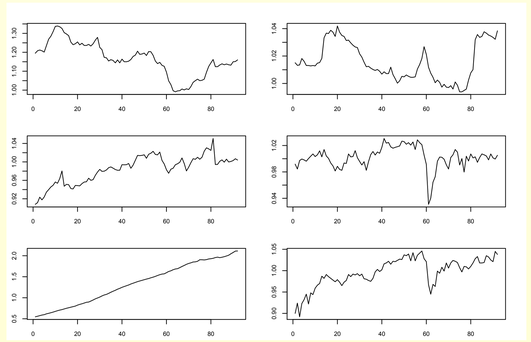
The endogenous variables are conducted using the seasonally adjusted index data (2010 =1) of each time series. Consumption Index of Japan is calculated from Consumption and CPI of Japan; Capital Stock Index of Japan is calculated from Capital Formation, PPI and Capital Stock in 1993 and 2010 of Japan(Penn). Other indexes can be found directly from FRED.

The exogenous variables (Expected VAT Rate Change and Expected Policy Duration) are constructed from Japanese VAT policy sequence since June 2012.

I use the data before the first postponement (1994Q1 − 2014Q4) to train to model and to do the prediction. Then generate the policy treatment effect from the difference of the real value and the prediction. (Note: Instead of Capital Stock, Capital Formation is chosen to fit the model)

Time Series Plots of Consumption, Capital Formation, Capital Stock, CPI, Wage and Labor Supply (1994Q1 to 2016Q4, Japan)

Index 2010=1, Seasonally Adjusted



The order of the plots are: $Kf,\ P,\ C,\ N,\ K,\ W$.

Results

First, set the lag of exogenous variables to be 0 and generate the lags of endogenous variables from the information criteria (AIC, BIC, hq). Then the order of VARX is either 4 or 1.

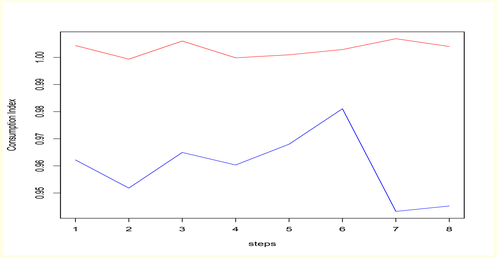
Second, refine the model and perform model checking. A refined VARX(4) model is best fitted.

Next, compute 1-step to 8-step predictions of the endogenous variables at the forecast origin 2014Q4. The prediction of consumption index is generated.

Last, get the policy treatment effect on consumption expenditure from the difference of real consumption and prediction consumption. (see the plot below)

Treatment Effect of Unconventional Fiscal Policy on Consumption (2015Q1 to 2016Q4, Japan)

Trillion of 2010 Yen, Seasonally Adjusted



The red line above is the the real consumption index and the bule line is the predicted consumption index.

Conclusion

To our surprise, the postponing option of unconventional fiscal policy has positive policy treatment effect on consumption. That is to say, when government has the option to postpone an unconventional fiscal policy, she’d better take it.

This fact may raise from the setting that consumers are “short-sighted”. They have no idea of the future actions of the government and when there are two unconventional fiscal policies, they only care about the first come one.

Furture Work/Next Step

When the postponing shock on preference shock was partially expected by the household, I use VARMAX(Vector Auto-regression Moving-average Model with Exogenous Variables) to calibrate the data:

$$\phi(\mathrm{B})\begin{bmatrix} C_t \\ L_t \\ K_t \\ P_t \\ W_t \end{bmatrix} = \phi_0 + R\begin{bmatrix} E[\Delta\tau] \\ E[T-t] \end{bmatrix} + \theta(\mathrm{B})a_t$$

where here $\{a_t\}$ is a sequence of iid random vectors with mean zero and positive-definite covariance matrix, $\phi(\mathrm{B})=I_k-\sum_{i=1}^{p}\phi_i\mathrm{B}^i$ and $\theta(\mathrm{B})=I_k-\sum_{j=1}^{q}\theta_j\mathrm{B}^j$, B is back−shift(lag) operator.

Limitations

1. Limited time duration of data
The quarterly data of Japan (Consumption, Capital Stock, CPI, Wage, Labor supply) is only avaliable from 1994 to 2016 while at this time point, the unconventional policy sequence will last to 2019. The data is not adequate enough but there is no solution except wait.

2. Limited variables
The best way to study the change of structure of consumption expenditure is to study the change of consumer’s preference parameter. However, the Study of Prefernce Parameter Survey data of Japan is only avaliable until 2012. In this case, we cannot find any fluctuation of Janpanese willingness to buy durable goods like household appliance, car and luxury items due to the unconventional policy sequence.

Contact Information

Email: xinzhus@uchicago.edu

R code & Data & Full paper will be posted here:
https://github.com/xinzhusun/The-Impact-of-Postponing-Unconventional-Fiscal-Policy-on-Consumption-Expenditure