ECON 403 midterm 2

Economic policy in response to CoV-19

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1 Overview

1.1 January Canada's economy report

In January 2020, Monetary policy report has published by the Bank of Canada, The Bank of Canada decided to maintain the policy interest rate at 1.75 percent, based on the collected economic data, Canada's economy slowed down at the end of 2019 but is expected to gradually strengthen over the course of 2020. This slowdown comes as the global economy appears to be stabilizing after a period of weakness recent trade developments are positive trade tensions between the US and China have held back Canadian exports and investment, and the other key sources of weakness are consumer spending and housing activity. There is a positive projection on consumer spending in 2020 based on solid wage growth and a healthy job market, and the bank of Canada expects consumer prices to remain close to 2 percent, in line with the target inflation.

1.2 Current economy situation

The January policy report was published before the outbreak of CoV-19 pandemic in Canada;the positive projection on Canada's economy in consumer spending, investment, housing activity excludes the potential impact on the pandemic. The real impact of pandemic was much server than what people expected, especially in the service sector; travel and tourism were almost frozen worldwide. In March, Canada announced to close the Canada-US border for non-necessary traveling, also for those non-Canadian travelers are not permitted to enter the country. Moreover, to slow down the spread of CoV-19, most of the indoor activities were banded, and restaurants were only allowed to make take-out orders, thus a significant shock on both demand and supply side of the Canadian economy, the fear of pandemic and government regulation decrease the aggregate demand of consumer spending, also there is a negative exogenous productivity shock due to the CoV-19, the pressure of cash flow and uneven operating cost making less productive companies out of the market and this resulting in a dramatic increase in the unemployment rate, according to Statistics Canada, the unemployment increased to 7.8 percent in March 2020 from 5.6 percent in Feb 2020 and above market expectation of 7.2 percent. It reached the highest unemployment rate since October 2010, as the pandemic outbreak in Canada.Moreover, the oil dispute between Russia and Saudi Arabia has resulted in a dramatic drop in oil price; the crude oil price was around 68 (USD/bbl) on January 2 to around 28 (USD/bbl) on April 14, approximately 40 percent decrease within three months. Canada, as high energy consumes and produces country, a significant drop in the oil price, adds more pressure on Canada's economy during the pandemic period.

2 Economy predictions and response policy

2.1 No policy response

Without any policy response, I would expect the Canadian economy will become in depression. I think without any government financial aid, many businesses will be closed permanently; the unemployment rate would be much larger than right now; firms and investors will reduce their business scope to make sure they have sufficient cash flow. The output and consumptions will decrease, households face trade-off between get paid from work versus being infected by the CoV-19; based on the report from Statistics Canada the average net saving for all Canadian households was $852 in 2018,and considering the potential inflation under the outbreak of CoV-19 without

response policy, households have quite inelastic demand for work, high fluid labor forces will increase the chance of being infected and that will add more pressure on the Canadian health care system, the infected number will be exponential growth, without any further information on the CoV-19, it is hard to predict how the economy would involve in next year, assume the vaccine of CoV-19 was innovated and workers start to back to work then I would expect the output and consumptions back up slowly but will not back to the previous level due to the deadweight and social welfare lost such as skill deteriorations, lost in the labor forces, rehiring process and etc in the pandemic break.

2.2 Current fiscal and monetary policy response

The government of Canada has launched several policies for supporting the Canadian economy under the CoV-19 pandemic crisis. For workers who are facing the loss of income due to CoV-19 and have met certain conditions are eligible for Canada Emergency Response Benefit(CERB), which will provide a taxable benefit of $2000 every four weeks for up to 16 weeks. In responding to high unemployment caused by CoV-19 and avoiding layoffs and rehiring employees for businesses; Canada Emergency Wage Subsidy was provided for those employers that are hardest hit by the pandemic, the subsidy covers 75% of an employee's wages and up to $847 per week for an employer of all sizes and across all sectors who have suffered a drop in gross revenues at least 15 % in March and 30% in April and May. The fiscal policies will help the economy recover as the virus is controlled, businesses begin to reopen, and people start to return to their normal lives. The speed and timing of the recovery are uncertain. It depends on how the pandemic and the efforts to control it unfold. The consumption will depend on the households's expectations on the CoV-19, and the response of the government also depends on how they think of future taxes. Thus I decided to conduct an RBC model to make a more intuitive prediction on how the economy will evolve over the next year

2.2.1 RBC model with fiscal policy

I was inspired by Eric Sims from the University of Notre Dame. I have replicated his RBC model with fiscal policy and adjusted the value of parameters and shocks to verify my assumptions. This economic recession has a fundamental difference compare to previous economic recessions, Canada has a relatively healthy economy, as we can see from the January monetary policy report, despite there was a drawback like oil prices and trade tensions between US and China, the overall economy projection on the Canada 2020 was positive. Thus, a sudden increase in unemployment and decrease in GDP was primarily caused by CoV-19, which is purely stochastic and it is not an economic factor. A dramatic decrease in both sides of demand and supply was due to the property of high contagious of CoV-19, and households were forced to be quarantined, and many workers were laid off and have the expectations that to back for work after everything back to normal. The government of Canada has implemented several monetary and fiscal policies such as CERB, lowering overnight interest rate, and so on to stable the economy. Government spending has increased by more than 10 percent to support the Canadian household and business. However, there are only two general ways to balance government debts. The first is to cut the future government spending, for example, reduce the spending on public infrastructures, health care or education; the second is based on the concept of Ricardian equivalent, which is saying if an increase in the government spending today, holding other factors as constant, there must be an increase in future taxes in order to satisfy the intertemporal government budget constrain. Thus, the behavior of households may differ from government spending shocks. Since the government budget takes an important role; thus I decided to implement the RBC model with government

spending in the objective function, and in this model, we have three agents, household, firm, and government. The objective functions are defined below.

2.2.2 Household

Household Objective function

$$\max_{C_t, N_t, K_{t+1}, B_{t+1}} E_0 \sum_{t=0}^{\infty} \beta (\ln C_t - \theta \frac{N_t^{1+\eta}}{1+\eta} + h(G_t)$$

subject to

$$C_t + K_{t+1} - (1-\delta)K_t + B_{t+1} - B_t \leq w_t N_t + R_t K_t + \Pi_t - T_t + r_{t-1} B_t$$

where T_t is the lump sum tax and Π is the profit from firms. We have the assumptions that the household is going to maximize the discounted life utility and also assumes that households get some utility from the government eg CERB, wage subsidy...

2.2.3 Firm

The goal of the firm is to maximize its profit and we define the function as below

$$\max_{N_t, K_t} \Pi_t = A_t K_t^{\alpha} N_t^{1-\alpha} - w_t N_t - R_t K_t$$

2.2.4 Government

The government choose spending G_t, It finances spending by issuing new debt at the next period D_{t+1} and the government inherits an existing debt from the previous period. And the budget constraint can be written as

$$G_t + r_{t-1} D_t \leq T_t + D_{t+1} - D_t$$

2.2.5 government spending shocks
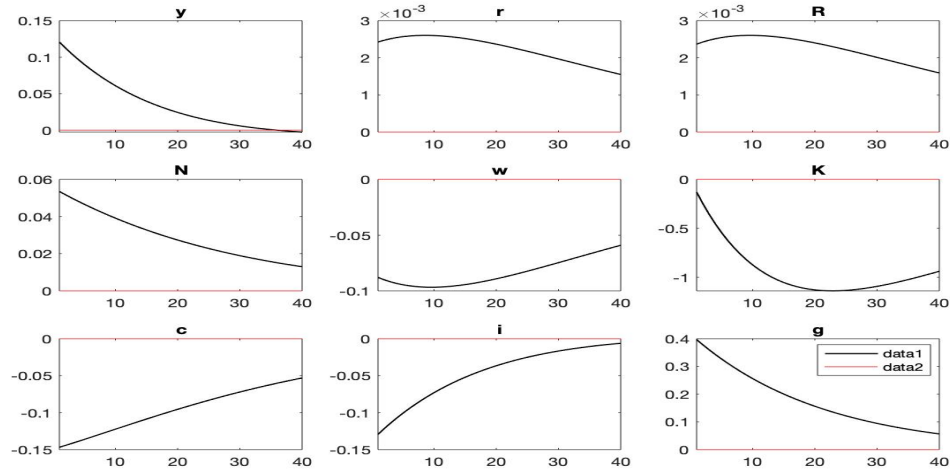
The graph above demonstrates when government increase the spending how the output, real in-

terest rate, investment, consumer spending would deviate from the steady state. I simulated a 10 percent increase in the government spending, as I expected the output increased immediately, but consumptions and investment decreased as government shock hits the economy, the intuitive explanation is that consumers and investors expect to pay back to the government through future increase in taxes, thus they want to consume less and wish to work more as N goes up.

2.2.6 Technology shocks
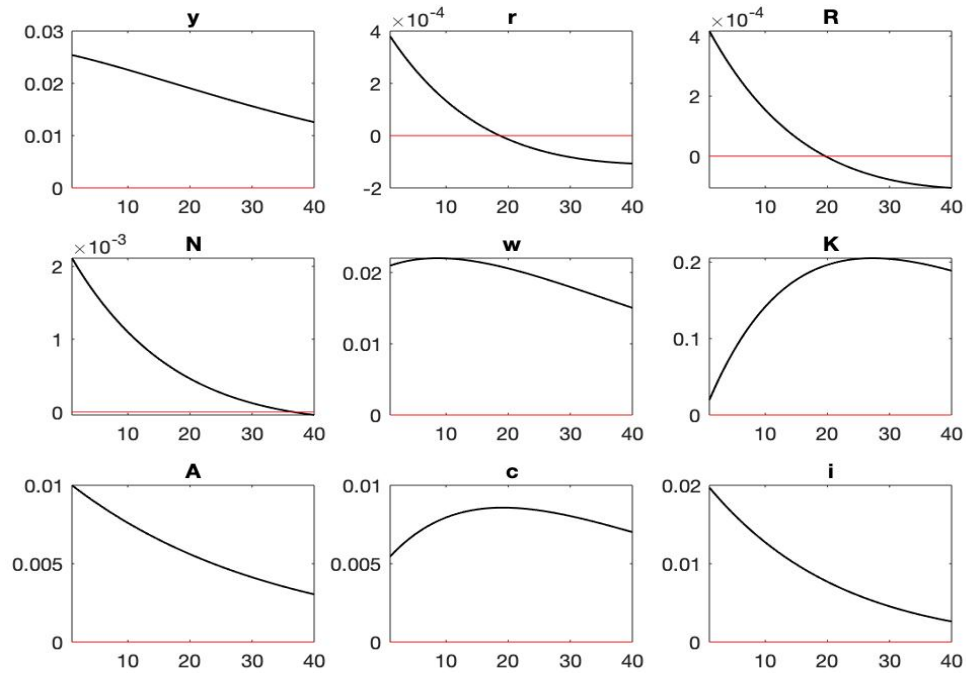
On the bright side of this pandemic crisis, investors are spending money on the research development and technology innovation thus as from the simulation above, the output, consumption and investment will go up immediately, real interest rates jump higher as well but it overshooting below zero after 40 periods

2.2.7 limitations of the model

The model above shows the impact of government spending shocks and technology shocks separately on the output, investment, real interest rate, and household consumptions of the Canadian economy. However, the expectation of household did not play an important role in this model which is not true in reality, the form of expectations decide the future consuming pattern of households and influences how would central bank adjust their monetary policy. For future study, I would consider to add expectation shocks to the model.

3 Final set of policy recommendations

From monetary perspective, I suggest that do not further lower the overnight interest rate, save the power to stimulate the economy in the future period after the pandemic. The reason for that is we are not certain about when the pandemic will be over, if we adjust the interest rate to near 0 we may be stuck in the liquidity trap. However, I would suggest that allow a deferral of mortgage payments for the homeowners, lowering the credit card debt interest rate to prevent increasing in default rate in the debt. From a fiscal policy perspective, the primarily task for the government is to keep the economy running while preventing the infection of CoV-19. I would suggest that encouraging unemployed workers to find a short-term job with facial mask provided or other medical supplies which could reduce the risk of being infected. For part-time and full-time students and for whom were just graduated, government could offer some voluntary positions with some monetary encouragement, it could provide some income for students also those experiences could help them to find a job in the future. Moreover, the government should increase spending on medical innovations and researches, which could increase the productivity and offset some negative effect due to the CoV-19 in the long term . For example, provide subsidies to the manufacturing companies to assist with the production on medical supplies. It not only could increase the supply of the medical equipment, also could provide some job opportunities.

A Reference

[1]https://globalnews.ca/news/6782797/canada-emergency-response-benefit-apply-coronavirus/

[2] https://www.bankofcanada.ca/2020/01/mpr-2020-01-22/

[3] https://www150.statcan.gc.ca/n1/daily-quotidien/190327/dq190327b-eng.html

[4] https://www.bankofcanada.ca/2020/04/mpr-2020-04-15/

[5] https://www3.nd.edu/ esims1/fiscal$_p$olicy$_s$p2015.pdf

[6] https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19

B Dynare code

```
var y r R N w K A c i g;
        varexo eg ea;
        parameters alpha beta theta rhoa d rhog n cov;
        alpha = 0.3578; beta = 0.99; theta=4; cov=0.2; d = 0.025; rhoa = 0.97; rhog = 0.95;
n=1;
        model;
        1/c=beta*(1/c(+1) *(R(+1)+(1-d)));
        1/c=beta*1/c(+1) * (1+r);
        w=(1-alpha)*A*K^(alpha) * N^(-alpha);
        R=alpha*A*K^(alpha-1) * N^(1-alpha);
        N=(1/c *w*1/theta)^(1/n);
        y=A*K^(alpha) * N^(1-alpha);
        y=i+c+g;
        K=i+(1-d)*K(-1);
        log(g)=(1-rhog)*log(cov*y)+rhog*log(g(-1))+eg;
        log(A)= rhoa*log(A(-1))+ea;
        end;
        initval; y=1; c=0.8; K=9; N=0.3; r=0.2; i=0.2; g=1; R=1; w=2; A=1;
        ea=0; eg=0; end;
        steady; resid; check;
        shocks; var eg; stderr 1; var ea; stderr 0.01;
        end;
        stoch_simul(order = 1);
```