How Should the Government Spend Your Taxes?

The government's decision on how to spend tax revenue is described in the UNI-CGE model by the government closure rule. This model exercise explores how the same tax increase affects the economy differently under three government closure options.

CONTENTS

1.   INTRODUCTION

Governments impose taxes for many reasons. The foremost reason is to generate revenues that the government can spend on public goods and services, such as national security, that meet the needs of their society. Governments also raise taxes (or provide subsidies) to influence the decisions of individuals and industries. For example, some governments subsidize nascent industries like solar energy, or impose "sin" taxes to discourage people from buying cigarettes.

The government budget balance is the difference between government tax revenue and government spending. Either a change in tax revenues or a change in spending lead to a change in the government budget balance. Some governments are free to run budget deficits or surpluses as needed when revenues are more or less than their expenditures. Other governments are constrained by parliamentary oversight from borrowing or saving, so they must adjust their spending to maintain a targeted budget balance. And sometimes, revenue from taxes designed to influence individual behavior, such as cigarette taxes, are rebated back to taxpayers in some way. The rebate leaves consumers with the same income as before, so the tax does not add to government revenue. These different ways for the government to handle its tax and spending decisions mean that the same tax can have different effects on an economy, depending on what the government does with its tax revenue.

2. MODEL EXPERIMENT

In this model exercise, we examine how the same change in a tax rate can have different impacts on the economy depending on which of three alternative ways the government spends and saves tax revenue. This exercise uses the USA333 database in the UNI-CGE model.

Your experiment imposes a three-fold increase in the sales tax on US manufactures. The sales tax will increase from 3.4% to 10.1%. You will carry out the same tax experiment under three government closures (GOVCLOS):

GOVCLOS = 1:

The quantities of goods and services purchased by the government are fixed. The government surplus or deficit will adjust if commodity prices change and cause a change in the value of government spending.

GOVCLOS = 2:

The government budget balance is fixed at its initial surplus or deficit. If tax revenues change or commodity prices change, the government will adjust the quantities of all commodities that it purchases by the same proportion.

GOVCLOS = 3:

The government designs the tax so that its revenue is redistributed back to households. The tax influences the composition of the consumer basket, but the tax rebate leaves consumers with the original level of income.

The UNI-CGE model has a single sales price that is paid by all purchasers of MFG. Producers, household consumers, the government, investors and exporters all pay the higher sales tax rate. A caveat for this experiment is that all purchasers of MFG face the same tripling of the initial sales tax rate, but only the household receives a rebate of the taxes through a change in their income tax rate.

3. INSTRUCTIONS

1. Review and follow the instructions in the "How to" Guides in the Course

    a. How to Run the UNI-CGE Model
    b. How to Define, Run and Verify an Experiment
    c. How to Change a Closure
    d. How to Read Results in the either the Excel, .lst or GDX File

2. Carry out the check list (see guide on "How to Run the UNI-CGE Model)

3. Change the sales tax (TQ) on US manufactures

   a. Search for the term "Experiment" in the UNI-CGE model

   b. Unfold the experiment "Change a Sales Tax" by clicking on the arrow on the left of the **"$OnFold"** command. This will open sample experiments that change sales taxes (Figure 1). The first command changes the sales tax (TQ) on all commodities "C". The next command specifies that the tax rate is decreased to 20% of the initial rate, only for the services commodity "C-SER".

   c. Edit one of the commands, or add your own, that changes the sales tax only on the manufacturing commodity, "C-MFG."

   d. Triple the sales tax rate on the manufacturing commodity by multiplying the initial tax by 3.

Figure 1. Experiment to Increase a Sales Tax

```
*EXPERIMENT - Change a Sales Tax
$OnFold
display TQ0;
*  TQ.FX(C)  =  TQ0(C)  +  0.2 ;
*  TQ.FX("C-SER")  =  TQ0("C-SER")  *  1.2 ;
  TQ.FX("C-MFG")  =  TQ0("C-MFG")  *  3 ;
display TQ.L;
$offFold
```

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4. Locate and define the government closure choice

    a. Type `CONTRL+F` and search for the term **Selecting Closure.** Locate the instance where the choices for all three macro closures are defined (Figure 2). What is the default choice of value of the government closure in the UNI-CGE model?

Figure 2. Selecting the Choice of Government Closure

```
Parameter
 SICLOS    savings-investment closure      /1/
 GOVCLOS   government expenditure closure   /2/
 ROWCLOS   foreign exchange market closure  /1/
 ;
```

    b. Define the GOVCLOS closure choice as "1". This closure fixes the quantities of goods and services purchased by the government at their initial levels and allows the budget surplus or deficit (GOVSAV) to adjust to meet changes in revenues or expenditures.

5. After completing the preparatory Checklist, solve the model and verify the experiment. Open the Excel results file, named "UNI-results.xlsx." Look at the Tax worksheet in the results file and verify that the sales tax rate on MFG (TQ_{MFG}) is now triple the initial rate. Verify in the model that your selection of GOVCLOS is what you intended.

6. Report results in Tables 1, 2 and 3.

    a. Hints on where to find results in the UNI-RESULTS.XLSX file: For table 1, use the Quantity worksheet. For table 2, use the Macro worksheet. For table 3, use the Tax Rate worksheet.

b. Hints on where to find results in the UNI-RESULTS.GDX file. For table 1, display parameter RES_QCOM_PC in table view. For table 2, display parameter RES_SCAL_PC. For table 3, search for TY0 (initial household income tax rate) and TY (updated household income tax rate). Multiply the income tax rates by 100.

7. Change the GOVCLOS closure flag to option "2", re-run the model, and report results in Tables 1, 2 and 3.

8. Change the GOVCLOS closure flag to option "3", re-run the model and report results in Tables 1, 2 and 3.

9. Restore the default government closure by changing the GOVCLOS flag to option "2". Run the model to save it.

4. EXPERIMENT RESULTS

Table 1. Percent Change in Quantities of Commodity Consumption and Production				
Commodity	Variable name	GOVCLOS = 1	GOVCLOS = 2	GOVCLOS = 3
AGR Consumption	QQ("AGR")			
MFG Consumption	QQ("MFG")			
SER Consumption	QQ("SER")			
AGR Production	QX("AGR")			
MFG Production	QX("MFG")			
SER Production	QX("SER")			
Household AGR consumption	QHTOT("AGR")			
Household MFG consumption	QHTOT("MFG")			
Household SER consumption	QHTOT("SER")			

Table 2. Percent Change in Macro Variables				
Variable	Variable name	GOVCLOS = 1	GOVCLOS = 2	GOVCLOS = 3
Household income	YHTOT			
Household income tax revenue	HTAX			
Household consumption	EHTOT			
Government tax revenue	YG			
Government budget balance	GOVSAV			
Government expenditure	EG			
Government share of GDP expenditure	GOVSHR			
Investment share of GDP expenditure	INVSHR			

Table 3. Household Income Tax Rate Under 3 Government Closures				
Variable	Base rate	GOVCLOS = 1	GOVCLOS = 2	GOVCLOS = 3
Household Income tax revenue	TY0	TY	TY	TY

5. DISCUSSION QUESTIONS

1. Explain in your own words what the three alternative government closures are and how they affect households' income tax rates.

2. A tax on a commodity discourages purchases of that good and encourages substitution toward things that are not taxed. In this experiment, the government has taxed the consumption of MFG goods. Based on results reported in Table 1, what are the structural changes in production of commodities?

3. Household income is allocated to (1) consumption of goods and services, (2) income taxes and (3) Consider the changes in total household income shown in Table 2 versus the change in household consumption. Can you explain why they are the same or different?

4. When GOVCLOS set to 1, what happens to the government budget balance – is it a growing surplus or deficit? What is the savings-investment closure? Why does the change in the government balance lead to a larger share of investment spending in GDP relative to government and households?

5. In all three closures, why do government revenues from household income taxes and from total tax revenues fall?

6. With GOVCLOS set to 2, what happens to the government budget balance? Why does this result lead to a larger share of government spending in GDP?

7. View the US333 structure table (shown in the DATA module of the course). Examine the commodities that households, government and investors purchase. Are their consumption baskets the same or different? With GOVCLOS set to 2, what do you predict might happen to the structure of production when the share of government spending in the economy increases? Is your prediction supported by the results reported in Table 1?

8. Based on your model results, what concepts would be important to think about if your government asks you for advice on a new consumer tax on gasoline?