



Pandemic Spending: What Happened When We Stayed Home During Covid

During the Covid pandemic many people isolated at home. This caused a sharp drop in demand for services and a shift toward demand for goods. In this exercise you will explore a change in consumer preferences and the sensitivity of results to alternative parameters for the LES demand system.

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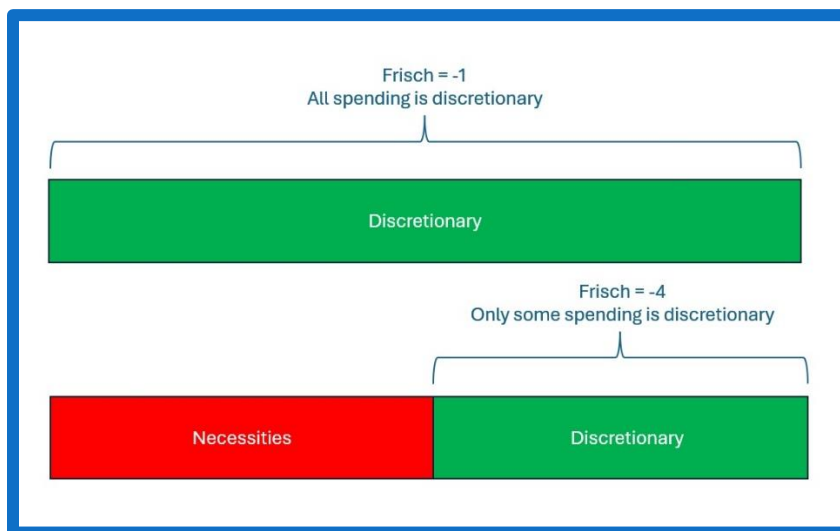
1. INTRODUCTION

During the Covid pandemic, many people chose to, or were required to, stay home and isolate. Demand for services like restaurant meals, gym sessions and movies at the theater dropped precipitously. Instead, people at home purchased goods to use for things like home improvements, supplying home offices and adopting crafts.

A change in consumer demand patterns leads to changes in the kinds of goods and services an economy produces, imports and exports. In turn, the macro economy changes when structural changes occur in the composition of consumer demand, production, and trade.

In a CGE model, consumer preferences are described by a utility function. The UNI-CGE model uses the Stone-Geary utility function/LES demand system to describe consumer behavior. The LES divides consumer demand into a necessity component and discretionary spending (Figure 1). Defining the Frisch parameter with a value between -1 and larger absolute values, such as -4, determines the shares of necessary and discretionary spending in the consumer basket.

Figure 1. LES demand system and the Frisch parameter



A Frisch value of -1 defines all spending as discretionary. A Frisch value larger than one describes households for whom some share of spending is for necessities.

In this exercise, you will learn how to change consumer preferences by changing marginal budget shares (parameter beta in the UNI-CGE model) in the consumer basket. First, you will examine the impacts when all spending is discretionary, none is for necessities. Then you will explore the sensitivity of results when the Frisch parameter describes households spending on both necessities and discretionary items.

This experiment uses the US333 database and the UNI-CGE model.

2. MODEL EXPERIMENT

In this model experiment, you will redefine the value of the beta parameter for services. A beta parameter is called a “marginal” budget share because it is the weighted share of a commodity in the discretionary part of the consumer basket. Weights are the income elasticities of demand.

Your experiment will reduce the marginal budget share for services by 25 percent. This shock describes households’ choice to reduce the share of services in their discretionary spending. Consequently, the marginal budget shares of AGR and MFG in consumer baskets will increase.

You will run the same preference-change experiment using a Frisch parameter value of -1 (no necessity spending) and -4 (relatively large necessity spending). Your analysis of results will focus on quantities consumed by households (QHTOT), produced by activities (QX), exported (QE) and imported (QM). After running the experiment with both Frisch parameter values, you will compare results to determine their sensitivity to assumptions about the share of necessities in the consumer basket.

This exercise uses the USA333 database in the UNI-CGE model, with default closures and elasticity parameter values.

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 an Elasticity
 - d. How to Read Results in the Excel File
 - e. How to Read Results in the Listing File
 - f. How to Read Results in the GDX File

2. Define the experiment
 - a. Search for the term “Experiment” in the UNI-CGE model

 - b. Unfold the experiment “Consumer Taste Shift” by clicking on the arrow on the left of the “\$OnFold” command. This will open a sample experiment that changes a beta value and recalculates the remaining beta values.

3. Reduce the beta value for services by 25%
 - a. Search for the set “newcom.” This set defines which commodity’s budget share will be changed. In this example, shown in green text, the set is defined to include SER.

```
newcom(c)  commodities with change in consumer expenditure share  
  
          /c-SER/
```

- b. Reduce the services budget share (beta) by 25% from the base value of beta (betab).

$$\text{Beta}(\text{newcom}, \text{h}) = .75 * \text{betab}(\text{newcom}, \text{h}) ;$$

Because betas are budget shares in the discretionary part of the consumer basket, the sum of beta parameters for all commodities must equal one. When you reduce the beta parameter for services by 25%, the model code recalculates the beta values for AGR and MFG so that the sum of beta parameters is again equal to one.

- 4. Change the Frisch parameter to -1.
 - a. Review the LES parameter values by opening the SAM-USA333.xlsx data file. LES parameters are reported on the LES worksheet. The default values are shown in Figure 2.

Figure 2. Default values for LES parameters in the US333 SAM

Frisch parameter	
	PRIV
Frisch0	-2
LESELAS	
	PRIV
c-AGR	0.5
c-MFG	1.5
c-SER	1.5

- b. Change the Frisch parameter value to -1.
- c. *Save the data file.*

5. Complete the checklist before running the model, then run the model.
6. Verify your experiment. In the .lst file, open the search utility by hitting **CNTRL + F**. Searching from the bottom of the file, find the term “set newcom”, the set of commodities for which demand has changed. This set should include only services (c-SER).
7. Verify your experiment. In the search utility, search from the bottom of the .lst file for the term “pc_beta”, the percent change in the beta parameter. Check that the value of pc_beta for services is -25%. (Beta values for the other commodities will also change due to rebalancing of the betas so they sum to one.)
8. Verify your experiment. In the search, search from the bottom for the term “Frisch0.” Its value should be -1
9. Report experiment results for budget shares, with Frisch = -1, in Table 1.
 - a. Search from the bottom of the .lst file for the term “Budshr_b”.
These are the base budget shares in the model. Report them in Table 1.
 - b. Search for the term “Budshr_L”. These are the updated budget shares with Frisch = 1. Report them in Table 1.
10. Report experiment results for quantities, with Frisch = -1, in Table 2
 - a. Option 1 – View Results in Excel:
Quantity results are reported in UNI-Results.XLSX file on the “Quantity” worksheet.
 - b. Option 2 – View Result in GDX:
In the UNI-RESULTS.GDX file, search for parameter RES_QCOM_PC.
11. Follow the directions from step 4 to step 8 to redefine the Frisch parameter value to -4, run the model, and verify your experiment.

12. Report model results for Frisch = -4 in tables 1 and 2.
13. **IMPORTANT** – restore the default Frisch value of -2 and save the data file. It is a good practice to restore all default values after completing an experiment so that you do not inadvertently run other experiments with altered elasticity values.

4. RESULTS

Table 1. Commodity budget shares in household spending with different Frisch parameters

---- BUDGET SHARES in TOTAL SPENDING ----			
	Base Frisch = -2	Frisch = -1	Frisch = -4
Commodity	(Budshr_B)	(Budshr_L)	Burdshr_L)
AGR	.01		
MFG	20.5		
SER	78.8		

Table 2. Percent changes in quantities with different Frisch parameters

	----- Frisch = -1 -----				----- Frisch = -4 -----			
	Household demand (QHTOT)	Production (QX)	Imports (QM)	Exports (QE)	Household demand (QHTOT)	Production (QX)	Imports (QM)	Exports (QE)
AGR								
MFG								
SER								

5. DISCUSSION QUESTIONS

1. What is the Frisch parameter? Explain how the share of necessity spending changes with changes in the Frisch parameter value.
2. What are budget shares? How do they compare to beta, the marginal budget share?
3. Why are quantity changes from a consumer taste shock smaller as the Frisch parameter gets larger in absolute terms?
4. Referring to Tables 1 and 2, how would you characterize the differences in budget shares and quantity results in the two experiments – large or small? Important or not?
5. Review the structure table or SAM and think about the size of the service sector in the economy and the share of services in the consumer basket. Why might the size of the shrinking sector matter when explaining the magnitude of effects on the other sectors of the economy?
6. What is meant by the “structure” of an economy? Why does the change in preferences change economic structure?
7. What is a homothetic utility function? Does either set of parameters you explored describe a homothetic function?
8. *A challenge activity:* The LES demand system collapses to a Cobb-Douglas utility function when the Frisch parameter is -1 and income elasticity parameters are 1. Change the parameters of the LES function so it becomes a Cobb-Douglas utility function. Run the model and compare your results with those reported in Tables 1 and 2. What do you think are the advantages and disadvantages of using a Cobb-Douglas utility function versus an LES demand system in your CGE analysis?