

Influence of Indirect Tax Change on Japanese Economy in JIDEA dynamic model

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1. Introduction

A consumption tax was established in 1989 at 3 percent, and was pulled up to 5 percent in 1997. Japan is now serious in fiscal deficit, and government have issued a large national loan. To make up for deficit revenue and a large national loan, there is arguments about pulling up a consumption tax rate. There is demand side factor and supply side factor about the effect of a consumption tax to domestic price. In demand side, there is inhibitory action to consumption. How much an enterprise shift a consumption tax to consumers depend on demand side effect. In supply side, a consumption tax change a system of production cost and lead to a rise in domestic price.

This paper aims to estimate influence of indirect tax change on Japanese economy in JIDEA dynamic model.

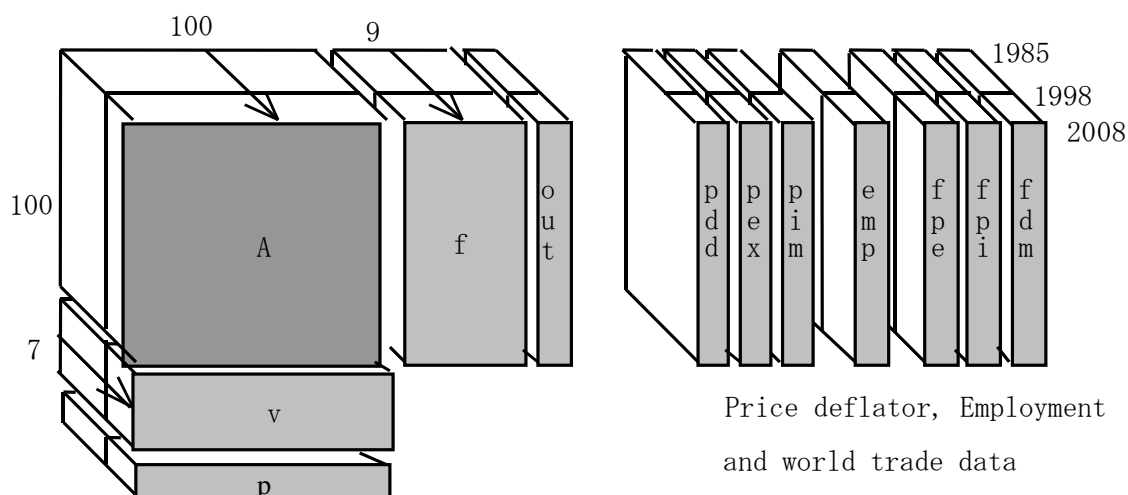
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2. Methodology

a. Structure of the model: Jidea5

The model of Jidea5² (Japan Interindustry Dynamic Econometric Analysis, version 5) is an INFORUM type model based on the Japanese Input-Output table. The I-O table components such as household consumption, private investment, export, import, wages, profit, depreciation, etc. are changed into functions by each sector and

JIDEA5: General Concept of the Model



I-O table (100×100)

put into the model. The parameters of these functions are estimated by OLS based on the data of Japanese Input-Output table 1985-1999. For the export function, the foreign demand data is supplied by BTM³(Bilateral Trade Model) and for import share function, the import price data supplied by the same source.

The final demand side components are added to compose demand total which produces output employing intermediate coefficient. Our intermediate coefficient is estimated for future simulation by the past time-series intermediate coefficient. The value added components are same as final demand side but value added total is estimated in nominal and divided by real output so as to produce unit prices.

The model is demand driving type but supply and demand is balanced by prices of each sector, accordingly it has the character of general equilibrium model and also it reflects inter-industry induced effect to simulate total

² The Jidea model has been developed by ITI and members of Chuo University since 1993. The current model was revised to 1995 constant price in 2003 as JIDEA version 5.

³ Constructed and maintained by INFORUM

industrial activities.

JIDEA5 has 100*100 matrices for 1985 to 1999 and it contains also employment data by sector for 1985 to 1998. The model also contains macro variables from new SNA data of Japan 1985 to 2000. With the Japanese I-O table, the capital matrix is also published by every 5 years, so the model uses it as a bridge matrix to convert private investment data by selling industry to purchasing industry or vice versa.

The main concept of model explained by equivalent is as follows;

Final demand side (Real side):

$$Q = AQ + F - M(p,..)Q$$

Q : Output vector in real term

A : Intermediate coefficient in real term

F : Final demand vector contains also import in real term

M(p,..) : Import share function explained by domestic demand and relative price

Value added side (Nominal side)

$$p = AD * p + AM * p_m + v$$

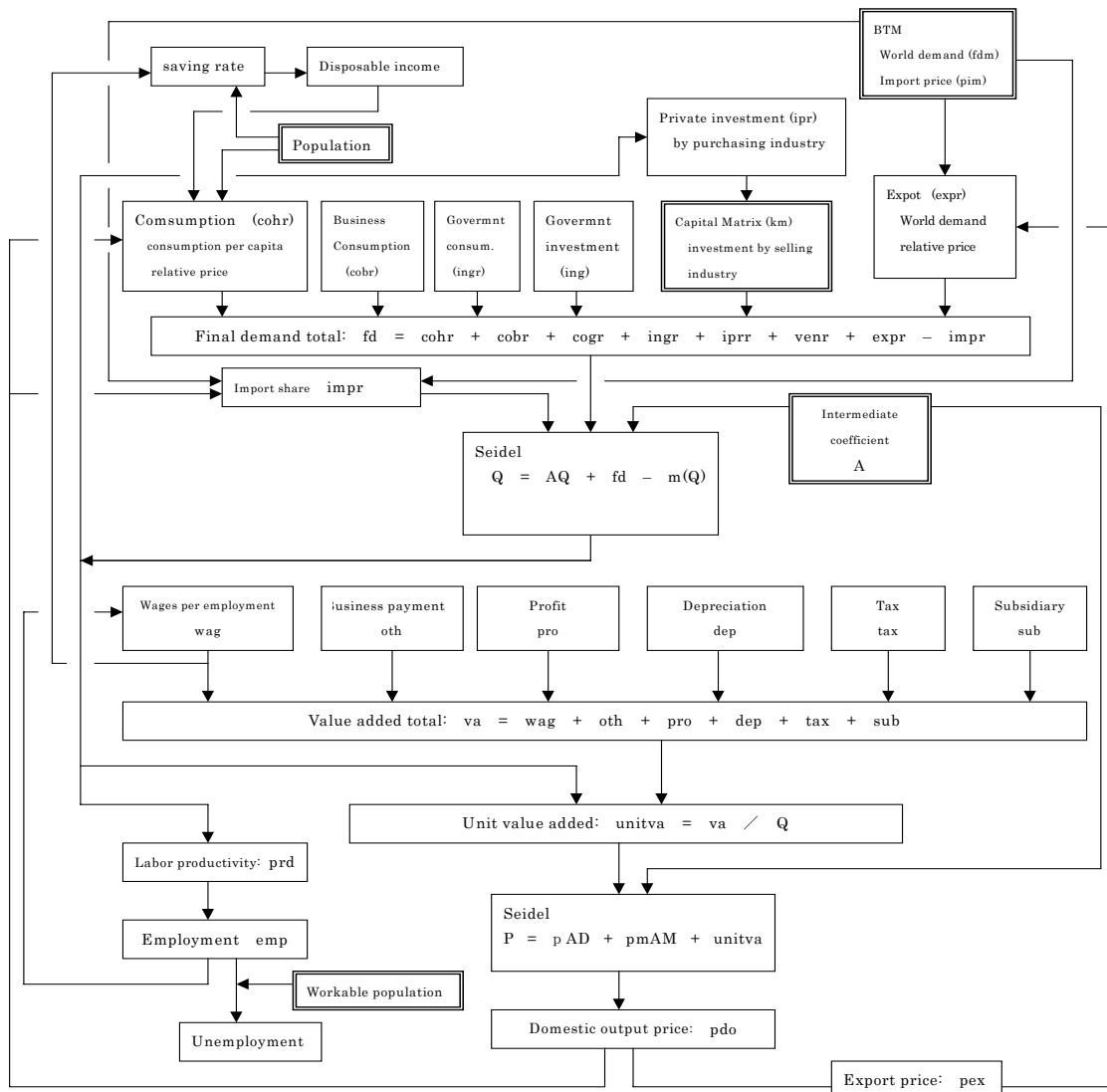
p : Output price vector

AD : $AD = A - AM$ (Domestic intermediate coefficient)

p_m : Import price vector

AM : $AM = A * Imps$ (Imps is a matrix whose diagonal elements are import shares)

The data flow of JIDEA5



The equations of each component of final demand side and value added side are basically as follows;

- The household consumption function by sector is explained by relative price (consumption price by sector/household consumption total) and disposable income per capita. The share of sectoral household consumption to total consumption will be decided by sectoral consumption function. The budget constraint works on total consumption.
- The private investment function by purchasing industry by sector is explained mainly by lagged output or lagged GDP.
- The export function by sector is explained by foreign demand and relative price (export price/import price by sector).
- The import function by sector is explained by domestic demand and relative price (import price/domestic

output price by sector).

- The wage function is explained by productivity and wage index of aggregated tradable sector.
- The depreciation function is explained by the accumulated value of purchasing sectors' investment.
- The profit function is explained by labor productivity and/or GDP in nominal term.
- The labor productivity function is explained by the difference of output from the past peak of output. Some sectors of the productivity function do not work well, accordingly, some sectors of productivity were fixed as exogenous.

b. Method of Simulation

I have simulated four cases about indirect tax as follows.

Case1 : Consumption Tax Abolition

Case2 : Consumption Tax at 6 percent

Case3 : Consumption Tax at 8 percent

Case4 : Consumption Tax at 10 percent

First , I defined domestic demand(dd) by Industry as follows.

$$dd=cob+coh+cog+ing+ipr+ven-exp-adj+imp$$

where cob is consumption of business , coh is consumption of household , cog is consumption of government , ing is public domestic capital formation , ipr is private domestic capital formation , ven is changes in inventories , exp is export , adj is term of adjustment , imp is import. Then , I estimated consumption tax(dtax) by Industry as follows.

$$dtax=(0.05/1.05)*dd$$

In case1 , I subtracted dtax from indirect tax by Industry , then simulated in JIDEA dynamic model. In case2 , I added one-fifth of dtax to indirect tax by Industry , then simulated in JIDEA dynamic model. In case3 , I added three-fifths of dtax to indirect tax by Industry , then simulated in JIDEA dynamic model. In case4 , I added dtax to indirect tax by Industry , then simulated in JIDEA dynamic model.

3. Summary: Influence of Indirect Tax Change on Japanese Economy

In this chapter, we will see how abolition of indirect tax and 1% , 3% and 5% rise in indirect tax rate affect domestic output price by sectors in the year of 2000, and make clear empirically what sector's domestic output price is affected seriously by indirect tax change.

Table 1 shows the simulation result about indirect tax in 2000. Following table 1 , domestic output price in **wearing and other textile products , steel bar and sheet , house rent** is affected seriously by indirect tax change. For example , in **case1** domestic output price in **wearing and other textile products , steel bar and sheet , house rent** decrease **-9.71 , -9.34 , -8.95 percent** respectively as compared with base line.

Table 2 show the effect of indirect tax change on GDP components by expenditure category. **Gross domestic product** decrease **-5.30 percent** in **case1** and increase **1.06 , 3.18 , 3.25 percent** in **case2 , case3 , case4** as compared with base line.

Table 3 show the effect of indirect tax change on principal price index. For example , GDP Deflator decrease **-5.31percent** in **case1** and increase **1.06 , 3.18 , 5.30 percent** in **case2 , case3 , case4** as compared with base line .

Table 1. Influence of Indirect Tax Change on Domestic Output Price by Industry

	Case1	Case2	Case3	Case4
Wearing and other textile products	-9.71	1.95	6.04	10.28
Steel bar and sheet	-9.34	1.94	5.91	10.03
House rent	-8.95	1.80	5.37	8.92
Hotel	-8.80	1.76	5.30	8.84
Restaurant	-7.97	1.60	4.82	8.06
Food products	-7.84	1.62	4.94	8.35
Civil engineering public	-7.60	1.52	4.57	7.64
Civil engineering private	-7.36	1.48	4.46	7.46
Beverages & tobacco	-7.10	1.41	4.30	7.23
Dwelling construction	-6.92	1.39	4.18	6.98

percent

Table 2. Influence of Indirect Tax Change on GDP Components by Expenditure Category

	Case1	Case2	Case3	Case4
				percent
Gross Domestic Product	-5.30	1.06	3.18	3.25
Total Consumption	-2.26	0.45	1.36	-0.35
Total Investment	-5.55	1.12	3.36	7.38
Exports	-1.17	0.24	0.73	3.07
Imports	-0.01	0.00	0.00	-9.08

Table 3. Influence of Indirect Tax Change on Principal Price Index

	Case1	Case2	Case3	Case4
Household Consumption Deflator	-5.61	1.12	3.37	5.61
Import Price Index	-0.01	0.00	0.00	0.01
Export Price Index	-1.17	0.24	0.73	1.23
GDP Deflator	-5.31	1.06	3.18	5.30
Consumer Price Index	-7.08	1.42	4.25	7.08

percent