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Price/Wage Determination under the Generalized Leontief Cost Function for Multi-Country/Multi-Sector System

小坂弘行

総合政策学部名誉教授

hkosaka@sfc.keio.ac.jp

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Hiroyuki Kosaka
Faculty of Policy Management, Keio University
Endo 5322,Fujisawa,Kanagawa,252-8520,Japan
TEL: 0477-47-5111
E-mail: hkosaka@sfc.keio.ac.jp

Abstract
This paper argues determination of price/wage rate by sectors under generalized Leontief cost function within profit maximization for multi-country/multi-sector system by three agents; a) the first determines factor demands under the cost function; b) the second decides sector price given the optimized cost function via profit maximization of monopoly firm; c) the third decides sector wage rate in internal labor market under profit maximization where profit of the third agent differs slightly from that of the second. The price model is tested against the world input output table 2005 of JETRO Institute of Developing Economies.

Keywords: multi-country/multi-sector system, Isard inter-regional IO model, generalized Leontief cost function

1. Introduction

Multi-country/muti-sector table 2005, published by JETRO Institute of Developing Economies(JETRO IDE 2005), April of 2013, covers seven main countries/region for seven plus twenty-five sectors in the world economy; the table is expected to analyze the current issues of the world economy.[1] The first pioneering model in the use of multi-country/multi-sector table (MCMS table in abbreviation) was made by W.Leontief and F. Duchin(1983); their model was direct extension of Isard's multi-region/multi-sector IO model in dollar term. Their model can be called Isard's MCMS system. For modeling MCMS system, the MCMS table of JETRO IDE 2005 intends to be converted into two directions. On account of the importance of financial sector having impact on the world economy, in addition to real sector, the table of dollar term should be converted into that of local currency in order to endogenize behavior of monetary authority and foreign exchange rate. Secondly, converted local currency table furthermore should be converted into that of real term for micro-based modeling in MCMS system.[2]

For this purpose, so-called cost function is needed to be taken explicitly in elucidating intermediate demands. Most promising cost function for single-country/multi-sector economy, i.e. generalized Leontief cost function(SCMS GL cost function in short), was proposed by M.A.Fuss(1977). This paper will generalize the SCMS GL cost function to that of MCMS system in local currency: the cost function could be called MCMS GL cost function. Then, the cost function of Isard's MCMS system will be shown to be a special case of MCMS GL cost function. It is also possible to extend Isard's MCMS cost function to more general case of allowing relative price in bilateral trade; the cost function will be applied to JETRO IDE 2005 empirically. At the same time, the MCMS GL cost function is devoted to endogenize price and wage rate in MCMS system.

Eventually, the basic features of the present paper has three folds; first, to elucidate MCMS GL cost function; secondly, to endogenize price and wage rate using the cost function; thirdly, to test the price model in the use of JETRO IDE 2005. Yet, study in the full use of MCMS system is postponed to future research.

2. MCMS Table in Local Currencies

[1] Groningen University, Netherland, has similar project World Input-Output Database(WIOD).

[2] Factor input for household utility and production function should be real term in local currency.

W.Leontief and F. Duchin(1983) have analyzed world defense spending in the use of dollar term MCMS table of 1970. This paper aims to formulate micro-based econometric model of producer's behavior for MCMS system in the use of MCMS table like JETRO IDE 2005. Yet, in contrast to W.Leontief and F. Duchin(1983), who used dollar term MCMS table, we convert it into that of local currency in real term in order to introduce market of foreign exchange and issuing right of local currency by central bank. The Table 1 below is a layout of JETRO IDE 2005.

Table 1: Layout of JETRO IDE 2005 in Nominal Dollar Term

In the table, one describes equilibrium of goods/services in h-th country's local currency by horizontal flow of goods/services; on the other hand, one describes cost function in k-th currency by vertical flow. So that, we provide two kinds of tables. Hence, the published MCMS table in nominal dollar term is to be converted into intermediate and final demands in horizontal side, and into factor inputs in vertical side, both converted by the use of foreign exchange rates; in the next, two converted tables are furthermore converted into those of real term deflated by sector prices.[3] By the use of the tables of real and of local currency we will build model.[4]

Accordingly, we are supposed to have seven or twenty-five world commodity markets of product differentiation with seven different prices; seven differentiated products are supplied in local currencies, but are also exposed in dollar terms. In other words, each differentiated market is oligopolistic in seven suppliers.

3. Model

3.1 MCMS GL Cost Function and Factor Demands

M.A.Fuss(1977) has posed the SCMS GL cost function which has Leontief cost function as a special case: the function is quadratic form of root of factor prices for SCMS economy:

[3] For detail of converting process, see T.Yano and H.Kosaka (2008). Sector prices of local currency in JETRO IDE 2005 are all set to unity.

[4] Formulation of behavioral equations is made by local currency in real term.; e.g. factor inputs for production function are in local currency and in real term; cost function derived from production function is also evaluated in local currency.

$$C(X,p,t)=\sum_i\sum_j h_{ij}(X,t)\sqrt{p_i}\sqrt{p_j} \qquad (3.01)$$

p : vector of factor prices X : production h_{ij} : symmetric and concave function

MCMS system is assumed to have unique production plant of j-th sector in k-th country.[5] Let the notation be:

p_i^r : the i-th sector price of r-th country in r-th local currency

$p_i^{rk}=p_i^r\left(e^k/e^r\right)$: the i-th sector price of r-th country in k-th currency

The sector price above is generalized by incorporating export subsidy, import tax and traffic cost:

$$p_i^{rk}=\left(1-s_i\right)p_i^r\left(e^k/e^r\right)\left(1+\tau^k\right)T^{rk}$$ [6]

s_i: rate of export subsidy τ_i^k : rate of import tax by import country for i-th product

T^{rk} : traffic cost from r to k countries in k-th currency

Hence, the GL cost function for MCMS system (MCMS GL cost function in short) is exposed for the j-th sector in k-th country:

$$C_j^k=\sum_{r1}^{R}\sum_{r2}^{R}\sum_{i1}^{N+2}\sum_{i2}^{N+2}h_{i1,i2,j}^{r1,r2,k}(X,t)\sqrt{p_{i1}^{r1,k}}\sqrt{p_{i2}^{r2,k}} \qquad (3.02)$$

where cost is expressed in k-th currency; number 1~N stand for material inputs, N+1 for labor and N+2 for capital inputs; there is no off-diagonal elements

[5] In reality the j-th industry may have multiple plants in k-th country. Actually, the Japanese nine regions/multi-sector IO system has a plant in each region.

[6] It is possible to have multiple supply and consumer sites as: $p_i^{r_v k_w}=p_i^r\left(e^k/e^r\right)T^{r_v k_w}$

for N+1 and N+2. Now S.Nakamura(1990) has specified function h_{ij} for SCMS economy:

$$C(X,p)=[\sum_{i} b_{ii} p_i X^{b_{yi}} \exp(b_{ti}t)+\sum_{j\neq i} b_{ij}\sqrt{p_i}\sqrt{p_j}X^{b_y} \exp(b_t t)] \qquad (3.03)$$

where the first term is diagonal and the second off-diagonal elements. The corresponding factor demand in share form is:

$$x_i / X = b_{ii} X^{b_{yi}} e^{b_{ti}t} + \sum_{j\neq i} b_{ij}\sqrt{p_j / p_i}\, X^{b_y} e^{b_t t} \qquad (3.04)$$

Now MCMS GL cost function of (3.03) is:[7]

$$C_j^k = \sum_{r=1}^{R}\sum_{i=1}^{N+2} b_{ij}^{rk} p_i^{rk} \left(X_j^k\right)^{bx_{ij}^{rk}} \exp\left(bt_{ij}^{rk} t\right) \qquad (3.05)$$

$$+\sum_{r1=1}^{R}\sum_{r2=1}^{R}\sum_{i1\neq i2}^{N+2}\sum_{i2\neq i1}^{N+2} b_{i1,i2,j}^{r1,r2,k}\sqrt{p_{i1}^{r1,k}}\sqrt{p_{i2}^{r2,k}}\left(X_j^k\right)^{bx_j^k} \exp\left(bt_j^k t\right)$$

where the upper part stands for diagonal and the lower for off-diagonal elements. Therefore, the factor demands of MCMS in share form is:

$$x_{ij}^{rk} / X_j^k = b_{ij}^{rk}\left(X_j^k\right)^{bx_{ij}^{rk}} \exp\left(bt_{ij}^{rk} t\right) + \sum_{r2\neq r}^{R}\sum_{i2\neq i}^{N} b_{i,i2,j}^{r,r2,k}\sqrt{p_{i2}^{r2,k} / p_i^{rk}}\left(X_j^k\right)^{bx_j^k} \exp\left(bt_j^k t\right) \qquad (3.06)$$

[7] For fixed k-th country/j-th industry, sum r2-th region and i2-th industry instead i and stead j in quadratic form respectively in (3.03).

Now we consider Isard's MCMS cost function. Input coefficient is easily calculated:

$$a_{ij}^{rk} = x_{ij}^{rk} \big/ X_j^k \qquad (3.07)$$

x_{ij}^{rk} : the i-th material input of j-th production in k-th country in r currency

X_j^k : real production of j-th sector in k-th country in k-th currency

a_{ij}^{rk} : input coefficient (unit : r-th currency/k-th currency)

$$L_j^k = \beta_j^k X_j^k \qquad \text{k-th currency} \qquad (3.08)$$

$$K_j^k = \kappa_j^k X_j^k \qquad (3.09)$$

As a result, cost function of Isard's MCMS is the following:

$$C_j^k = \sum_{r=1}^{R}\sum_{i=1}^{N} p_i^{rk} x_{ij}^{rk} + w_j^k L_j^k + r^k K_j^k = \sum_{r=1}^{R}\sum_{i=1}^{N} a_{ij}^{rk} p_i^{rk} X_j^k + \beta_j^k w_j^k X_j^k + \kappa_j^k r^k X_j^k \qquad (3.10)$$

Note that terms of technical progress and of off-diagonal elements both lack; cost function of Isard's MCMS is a special case of (3.05). [8]

Now we revive off-diagonal elements, for Isard's MCMS cost function, to express effect of relative prices in bilateral trade; the cost function is altered in reference to (3.05).

[8] For confirmation we derive factor demands via Shephard's Lemma:
$\partial C_j^k \big/ \partial p_j^{rk} = x_{ij}^{rk} = a_{ij}^{rk} X_j^k$, $\partial C_j^k \big/ \partial w_j^k = L_j^k = \beta_j^k X_j^k$, $\partial C_j^k \big/ \partial r^k = K_j^k = \kappa_j^k X_j^k$

$$C_j^k = \sum_{r=1}^{R}\sum_{i=1}^{N} b_{ij}^{rk} p_i^{rk} X_j^k + \beta_j^k w_j^k X_j^k + \kappa_j^k r^k X_j^k$$

$$+ \sum_{r1=1}^{R}\sum_{r2=1}^{R}\sum_{i1\neq i2}^{N+2}\sum_{i2\neq i1}^{N+2} b_{i1,i2,j}^{r1,r2,k} \sqrt{p_{i1}^{r1,k}}\sqrt{p_{i2}^{r2,k}}\left(X_j^k\right) \qquad (3.11)$$

The corresponding factor demand in share form is:

$$x_{ij}^{rk} / X_j^k = b_{ij}^{rk} + \sum_{r2\neq r}^{R}\sum_{i2\neq i}^{N} b_{i,i2\,j}^{r,r2,k} \sqrt{p_{i2}^{r2,k} / p_i^{rk}} \qquad (3.12)$$

Furthermore, in considering bilateral trade of r-th export to k-th import, relative price of i-th product alone is taken into accounts; the trade model (3.12) is simplified to:

$$x_{ij}^{rk} / X_j^k = b_{ij}^{rk} + \sum_{r2\neq r}^{R} b_{i,i,j}^{r,r2,k} \sqrt{p_i^{r2,k} / p_i^{rk}} \qquad (3.13)$$

For example, the Japanese production of car industry needs to have input of steel; domestic input is expressed in b_{ij}^{rk} and inputs of steel by competing countries are expressed in the second terms. Noting that zero-data in MCMS table is ignored in (3.13). Econometric estimation for (3.13) is easy; on the other hand, calibration without the second terms is also calculated easily.

3.2 Price Determination under the Generalized Leontief Cost Function

If one has a cost function, one could endogenize price and wage rate via profit maximization. For illustration we discuss price determination in a simple case of the cost function (3.10). Sector prices are all assumed to be unity in local currency at 2005. Calibrating a_{ij}^{hk} by using JETRO IDE 2005 will gives us the marginal cost:

$$MC_j^k = \sum_{r=1}^{R}\sum_{i=1}^{N} a_{ij}^{hk} p_i^{rk} + \beta_j^k w_j^k + \kappa_j^k r^k \quad \text{in k-th local currency} \tag{3.14}$$

We propose two alternative price determination schemes.

a) Scheme 1

Left hand side logarithmic demand function $\partial X_j^{k(D)} / \partial p_j^k = -\beta_j^k X_j^{k(D)}$ [9] and demand effect on supply $\partial X_j^{k(S)} / \partial X_j^{k(D)} = \delta_j^k$ are assumed. Then we have profit maximization by agent of price determination:

$$\frac{\partial \pi_j^{k(p)}}{\partial p_j^k} = X_j^{k(D)} + p_j^k \frac{\partial X_j^{k(D)}}{\partial p_j^k} - MC_j^k \frac{\partial X_j^{k(S)}}{\partial X_j^{k(D)}} \frac{\partial X_j^{k(D)}}{\partial p_j^k}$$

$$= X_j^{k(D)} - \beta_j^k X_j^{k(D)} p_j^k + \beta_j^k \delta_j^k X_j^{k(D)} MC_j^k = 0 \tag{3.15}$$

Equation (3.15) will lead to the price determination.

$$p_j^k = 1/\beta_j^k + \delta_j^k MC_j^k \tag{3.16}$$

Condition $\beta_j^k > 1$ is required for positive p_j^k. Equation (3.16) indicates increase of marginal cost gives rise to price increase. Two parameters are involved in (3.16); if one parameter is known, the other is calibrated.

b) Scheme 2

Left hand side logarithm demand function $\partial X_j^{k(D)} / \partial p_j^k = -\beta_j^k X_j^{k(D)}$ and different demand effect on supply $\partial X_j^{k(S)} / \partial X_j^{k(D)} = \delta_j^k p_j^k$ are assumed. In the same way price determination is obtained.

$$p_j^k = \frac{1}{\beta_j^k \left(1 - \delta_j^k MC_j^k\right)} \tag{3.17}$$

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9 This may be a perceived demand curve of T.Negishi's sense(see T.Negishi(1961)). Economically no significant results are obtained for the following demand system; both side logarithmic demand function, linear demand system, Cobb-Douglas and CES demand systems.

Again, increase of marginal cost has the same effect on price.

As is remarked, JETRO IDE 2005 has both seven and twenty-five sectors; we select simple case of seven sectors for illustration. Analysis of using twenty-five sectors is postponed for future research. And, we focus only on manufacturing sector of Japan, US and China; notwithstanding, the number of factors of the cost function is accounted to $7 \times 7+1=50$; data of capital stock are ignored due to non-availability. Table 2 shows labor share, profit share, rate of value added against total output, which are all calculated from JETRO IDE 2005; China shows lowest labor share and US highest; US shows highest profit share and Japan lowest; rate of value added is calculated from both figures. And, marginal costs for the three are in the next row; figures show quite similar numerical values. Utilizing value of MC, calibration of β_j^k given $\delta_j^k = 0.5$ via $p_j^k = 1/\beta_j^k + \delta_j^k MC_j^k$ and $p_j^k = 1/\beta_j^k\left(1-\delta_j^k MC_j^k\right)$ are in the last two rows.

Table 2: Manufacturing Sector of Japan/US/China

3.3 Wage Rate Determination under the Generalized Leontief Cost Function

In the second, we proceed to wage rate determination. Labor market is said to have two kinds, i.e. external and internal labor markets. P.Doeringer and M.Piore(1971) is said to have first advocated internal market. In this paper also wage rate is a product of internal labor market; it is decided inside of the firm. Wage is, for workers, cost of living; it is decided under the influence of constant level of wage rate, of slide to the consumer price and thirdly of connection to profit maximization. Among the three, the first two factors are evaluated in the quadratic losses in the optimization for seeking the objective.

$$-\frac{1}{2}c_j^{k2}(w_j^k - c_j^{k2}p_c^k - c_j^{k1})^2 \qquad (3.18)$$

c_j^{k1} : constant level of wage rate $\quad p_c^k$: consumer price

Consumer pice index is defined below:

$$p_c^k = \sum_{l=1}^{N} \theta_l^{k,cp} p_l^k \qquad (3.19)$$

$\overline{cp}_l^{k,H}$: household expenditure of l-th goods at base year

$$\theta_l^{k,cp} = \frac{\overline{cp}_l^{k,H}}{\overline{cp}^{k,HT}} \qquad \overline{cp}^{k,HT} = \sum_{l=1}^{N} \overline{cp}_l^{k,H}$$

Therefore, profit maximization by the agent of determining wage is the following:

$$\max_{w_j^k} \tilde{\pi}_j^{k(w)} = \max_{w_j^k} \left\{ -\frac{1}{2} c_j^{k3} (w_j^k - c_j^{k2} p_c^k - c_j^{k1})^2 + \frac{1}{X_j^{k*}} \left(p_j^k X_j^{k(D)} - C_j^k \right) \right\} \tag{3.20}$$

where balancing two terms forces to denominate profit by normal level of production X_j^{k*}. Now, solve profit maximization with conjectural variation of agent of wage determination against agent of price determination $\partial p_j^k / \partial w_j^k = \lambda_j^k$; and, left hand side logarithmic demand curve $\partial X_j^{k(D)} / \partial p_j^k = -\beta_j^k X_j^{k(D)}$ plus $\partial X_j^{k*} / \partial w_j^k = 0$ are also assumed.

$$\frac{\partial \tilde{\pi}_j^{k(w)}}{\partial w_j^k} = -c_j^{k3} \left(w_j^k - c_j^{k2} p_c^k - c_j^{k1} \right) - \frac{1}{X_j^{k*}} \frac{\partial C_j^k}{\partial w_j^k} = 0 \tag{3.21}$$

$$= -c_j^{k3} \left(w_j^k - c_j^{k2} p_c^k - c_j^{k1} \right) + \frac{1}{X_j^{k*}} \frac{\partial p_j^k}{\partial w_j^k} \left(X_j^{k(D)} + p_j^k \frac{\partial X_j^{k(D)}}{\partial p_j^k} \right) - \frac{1}{X_j^{k*}} \frac{\partial C_j^k}{\partial w_j^k}$$

$$= -c_j^{k3} \left(w_j^k - c_j^{k2} p_c^k - c_j^{k1} \right) + \frac{\lambda_j^k}{X_j^{k*}} \left(X_j^{k(D)} - \beta_j^k p_j^k X_j^{k(D)} \right) - \frac{1}{X_j^{k*}} L_j^k$$

So that, wage rate is determined:

$$w_j^k = c_j^{k1} + c_j^{k2} p_c^k + \frac{\lambda_j^k X_j^k}{c_j^{k3} X_j^{k*}} \left(1 - \beta_j^k p_j^k \right) - \frac{1}{c_j^{k3}} \frac{1}{\left(X_j^{k*} / L_j^k \right)} \tag{3.22}$$

Under the assumption of $X_j^{k*} = X_j^k$, wage determination is modified to:

$$w_j^k = \left(c_j^{k1} + \frac{\lambda_j^k}{c_j^{k3}} \right) + c_j^{k2} p_c^k - \frac{\beta_j^k \lambda_j^k}{c_j^{k3}} p_j^k - \frac{1}{c_j^{k3}} \frac{1}{\left(X_j^k / L_j^k \right)} \qquad (3.23)$$

Wage rate is interpreted as dependent on; constant level of wage rate, consumer price, current price and labor productivity. Then, increase of constant leve of wage rate, consumer price and labor productivity all increase wage rate. As sector wage rate is determined within internal labor market, unemployment of external labor market has no effect on wage rate.

4. Concluding Remarks

We explain producer's behavior in MCMS system; demand side modeling coupled with that of supply side will accomplish the full MCMS system. And we believe the arguments above will be a first step for econometric modeling and even for CGE under the national currency-based MCMS table.

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Table 1: Layout of JETRO IDE 2005 in Nominal Dollar Term

		Intermediate Demand (A)							Final Demand (FD*)							Export to R.O.W.	Statistical Discrepancy	Total Outputs
		BRZ	CHN	IND	JPN	EU25	RUS	USA	BRZ	CHN	IND	JPN	EU25	RUS	USA			
Intermediate Input (A)	BRZ	XV^{BB}	XV^{BC}	XV^{BG}	XV^{BJ}	XV^{BO}	XV^{BR}	XV^{BU}	FD^{BB}	FD^{BC}	FD^{BG}	FD^{BJ}	FD^{BO}	FD^{BR}	FD^{BU}	EX^{BW}	SD^{B}	X^{B}
	CHN	XV^{CB}	XV^{CC}	XV^{CG}	XV^{CJ}	XV^{CO}	XV^{CR}	XV^{CU}	FD^{CB}	FD^{CC}	FD^{CG}	FD^{CJ}	FD^{CO}	FD^{CR}	FD^{CU}	EX^{CW}	SD^{C}	X^{C}
	IND	XV^{GB}	XV^{GC}	XV^{GG}	XV^{GJ}	XV^{GO}	XV^{GR}	XV^{GU}	FD^{GB}	FD^{GC}	FD^{GG}	FD^{GJ}	FD^{GO}	FD^{GR}	FD^{GU}	EX^{GW}	SD^{G}	X^{G}
	JPN	XV^{JB}	XV^{JC}	XV^{JG}	XV^{JJ}	XV^{JO}	XV^{JR}	XV^{JU}	FD^{JB}	FD^{JC}	FD^{JG}	FD^{JJ}	FD^{JO}	FD^{JR}	FD^{JU}	EX^{JW}	SD^{J}	X^{J}
	EUR	XV^{OB}	XV^{OC}	XV^{OG}	XV^{OJ}	XV^{OO}	XV^{OR}	XV^{OU}	FD^{OB}	FD^{OC}	FD^{OG}	FD^{OJ}	FD^{OO}	FD^{OR}	FD^{OU}	EX^{OW}	SD^{O}	X^{O}
	RUS	XV^{RB}	XV^{RC}	XV^{RG}	XV^{RJ}	XV^{RO}	XV^{RR}	XV^{R+-U}	FD^{RB}	FD^{RC}	FD^{RG}	FD^{RJ}	FD^{RO}	FD^{RR}	FD^{RU}	EX^{RW}	SD^{R}	X^{R}
	USA	XV^{UB}	XV^{UC}	XV^{UG}	XV^{UJ}	XV^{UO}	XV^{UR}	XV^{UU}	FD^{UB}	FD^{UC}	FD^{UG}	FD^{UJ}	FD^{UO}	FD^{UR}	FD^{UU}	EX^{UW}	SD^{U}	X^{U}
Freight and Insurance cost		FRE^{B}	FRE^{C}	FRE^{G}	FRE^{J}	FRE^{O}	FRE^{R}	FRE^{U}	FR^{B}	FR^{C}	FR^{G}	FR^{J}	FR^{O}	FR^{R}	FR^{R}			
Import from the R.O.W. (FOB)		IM^{WB}	IM^{WC}	IM^{WG}	IM^{WJ}	IM^{WO}	IM^{WR}	IM^{WU}	IM^{WB}	IM^{WC}	IM^{WG}	IM^{WJ}	IM^{WO}	IM^{WR}	IM^{WU}			
Duties and Import Commodity Taxes		$DUTY^{B}$	$DUTY^{C}$	$DUTY^{G}$	$DUTY^{J}$	$DUTY^{O}$	$DUTY^{R}$	$DUTY^{U}$	$DUTY^{B}$	$DUTY^{C}$	$DUTY^{G}$	$DUTY^{J}$	$DUTY^{O}$	$DUTY^{R}$	$DUTY^{U}$			
Statistical discrepancy		QX^{B}	QX^{C}	QX^{G}	QX^{J}	QX^{O}	QX^{R}	QX^{U}	QX^{B}	QX^{C}	QX^{G}	QX^{J}	QX^{O}	QX^{R}	QX^{U}			
Value-added(VA*)		VA^{B}	VA^{C}	VA^{G}	VA^{J}	VA^{O}	VA^{R}	VA^{U}										
Total Inputs		X^{B}	X^{C}	X^{G}	X^{J}	X^{O}	X^{R}	X^{U}										

***FD** is composed of 4 categories;
1. Private Consumption (**CP**),
2. Government Consumption (**CG**),
3. Investment Demand (**I**),
4. Inventory (**IV**).

***VA** is composed of 4 categories;
1. Wages (**W**),
2. Operating Surplus (**YC**),
3. Depreciation of Fixed Capital (**DEP**),
4. Indirect Tax less Subsidy (**TAX**)

Source: cited from http://www.ide.go.jp/Japanese/Publish/Books/Tokei/material.html

Table 2: Manufacturing Sector of Japan/US/China

	JAPAN	USA	CHINA
Labor Share	0.173584	0.203386	0.072390
Profit Share	0.045736	0.119319	0.077368
Rate of Value Added	0.219320	0.322705	0.149758
MC	0.7944032	0.7876572	0.7545211
β_j^k (3.16)	1.658929	1.649698	1.605808
β_j^k (3.17)	1.658929	1.649698	1.605808