CHAPTER 5

CGE SIMULATION RESULTS

This chapter is aimed to combine the theoretical structure of the Computable General Equilibrium (CGE) model specified in Chapter 3 and the model data base described in Chapter 4 in order to quantify the economic impacts of FDI productivity spillover on the overall economy as well as the sectoral production. The computation of FDI productivity spillover effects based on the CGE framework would be done by using the program called GEMPACK (General Equilibrium Model PACKage). There are three sections in this chapter; the first is assigned for the determination of simulation experiments performed in this study, the second is about the assessment of productivity effects in the model and the third is accounted for the CGE simulation results of the experiments.

5.1 The Determination of Simulation Experiments

In this study, the research on FDI productivity spillover effects is conducted in the CGE framework, thereby implementing the computer-based simulation of various scenarios in order to evaluate the impacts of FDI productivity spillover on Thai economy. The CGE model is implemented in order to capture the effects of FDI productivity spillover at macro as well as sectoral level. The model disaggregates domestic production into nine sectors by production activities, namely Metal and metal products, Rubber and plastic products, Components, Engines, Electrical machineries, Agricultural and mining, Other manufacturing, Services and Motor vehicle. According to the model closure of the CGE model in Chapter 3, the model in linear equation system comprises of 501 equations with 571 variables where all variables are classified into 501 endogenous and 70 exogenous variables.

Due to the significant role of FDI in the automotive sector, the automotive sector is more likely to achieve the productivity advantages transferred from MNCs via FDI technology spillovers and becomes more productive with the increased level of productivity. Consequently, the automotive sector is considered to be the ‘source’

sector transferring the productivity advantages received from FDI spillovers to the other sectors or the 'destination' sectors via the backward linkage channel. Unfortunately, this study does not introduce endogenous total factor productivity (TFP) growth caused by FDI inflows to the CGE model but assumes to be exogenous variable in the model. The key FDI productivity spillover variable, here in this study, is attributed to the Hick-Neutral general total factor productivity of the Motor vehicle sector (a_{mot}) caused by FDI productivity spillovers. This exogenous variable will be used as a shock variable in performing the computer-based simulations throughout this chapter. Instead of estimating the FDI productivity spillover variable by using econometric technique, one assumes its value to be equal to 5%.

From the eleventh group of equations in the theoretical structure of the CGE model, the Nested Structure of Productivity Spillovers, how well the productivity advantages occurred in the Motor vehicle sector 'mot' can be transferred to the destination sector 'd' (where d is an index for the destination sector in the set DES) depends on the value of Spillover Coefficient. The Spillover Coefficient is determined using the Embodiment Index ($E_{d,mot}$) and the Capture Parameter (θ_d).

The Embodiment Index represents the transferring channel of productivity advantages from the Motor vehicle sector 'mot' to the destination sector 'd' in which the most effective channel for the dissemination of productivity advantages is the backward linkages between the source and destination sectors. The Capture Parameter is defined as the bilateral product of Absorptive Capacity Index (AC_d) and Structural Similarity Index ($SS_{d,mot}$) in measuring the efficiency with which the productivity advantages in the Motor vehicle sector 'mot' be captured by the destination sector 'd'. These two are additional parameters introduced in the parameter file since the spillover hypothesis suggests that the destination sectors' abilities to harness the productivity advantages from the source sector depend on their absorptive capacity and also the similarity of production structure between the source and destinations. It should be noted that the value of Spillover Coefficient depends more strongly on the value of θ_d than on $E_{d,mot}$ alone. Thus, the whilst backward linkage channel is considered as the prime vehicle for the transmission of productivity advantages while

AC_d and $SS_{d,mot}$ (hence, θ_d) are critical for the effective transmission of productivity advantages from the source to destination sectors. This is due to the fact that even $E_{d,mot}$ has lower value, the magnification of $E_{d,mot}$ by θ_d can lead to the higher rate of destination sectors' capture abilities of the productivity advantages.

Due to the lack of data for AC_d and $SS_{d,mot}$ directly applied to this study, the values of these two parameters are set arbitrarily such that $0 \le AC_d \le 1$ and $0 \le SS_{d,mot} \le 1$. By assuming that the manufacturing sector is more similar to the Motor vehicle sector 'mot' in terms of both AC_d and $SS_{d,mot}$ than to the agricultural and services sectors; therefore the higher values are assigned for these two coefficients in case of the manufacturing sector as compared to the agricultural and services sectors. Moreover, this study assumes that all manufacturing sectors have the same and highest potential to absorb the productivity advantages from the Motor vehicle sector and also the same production structure reflected by the equal values of AC_d and $SS_{d,mot}$ for all manufacturing sectors. Therefore, the values of AC_d and $SS_{d,mot}$ for the destination sectors applied in this study are shown in Table 5.1.

Table 5.1

Absorptive Capacity Index and Structure Similarity Index

Destination Sector	**Absorptive Capacity Index** $\left(AC_d\ ;\ d \in DES\right)$	**Structural Similarity Index** $\left(SS_{d,mot}\ ;\ d \in DES\right)$
met	1.0	0.8
rub	1.0	0.8
com	1.0	0.8
eng	1.0	0.8
ele	1.0	0.8
agm	0.5	0.1
oma	1.0	0.8
ser	0.5	0.1

This section aims to describe the setting of simulation experiments related to the effects of FDI productivity spillover from the Motor vehicle sector 'mot' to the destination sector 'd'. The main purpose of the simulation experiments is to evaluate the economic impacts of FDI productivity spillover under different scenarios disaggregated by different assumptions about the destination sectors' capture abilities of the productivity advantages or different settings of AC_d and $SS_{d,mot}$. Table 5.2 shows the summary of simulation experiments performed in this study.

Table 5.2
List of the Simulation Experiments on FDI Productivity Spillovers

Experiment	**Description**	**Spillover Coefficient**
1	A 5% increase in TFP of the Motor vehicle sector and there are no effects of absorptive capacity and structural similarity of the destination sectors	The values of $\gamma_d\left(E_{d,mot},\theta_d\right)$ are shown in Table 5.3
2	A 5% increase in TFP of the Motor vehicle sector and there are effects of absorptive capacity and structural similarity of the destination sectors	The values of $\gamma_d\left(E_{d,mot},\theta_d\right)$ are shown in Table 5.4

The first experiment is assigned to be the base case such that there are no effects of the destination sectors' absorptive capacity and the congruence of production structure between the source and destination sectors; therefore the values of AC_d and $SS_{d,mot}$ applied in this case are equal to zero. As a result, the Spillover Coefficient in the base case is solely determined by the Embodiment Index as shown in Table 5.3. The second experiment is designed for investigating the role of destination sectors' capture abilities of the productivity advantages spilled over from the Motor vehicle sector. Hence, the values of AC_d and $SS_{d,mot}$ are set according to Table 5.1, and then the values of Spillover Coefficient are shown in Table 5.4.

Table 5.3

The Spillover Coefficient Used in Experiment 1

Destination Sector	**Embodiment Index** $\left(E_{d,mot}\right)$	**Capture Parameter** $\left(\theta_d = AC_d . SS_{d,mot}\right)$	**Spillover Coefficient** $\gamma_d\left(E_{d,mot},\theta_d\right) = \left(E_{d,mot}\right)^{1-\theta_d}$
met	0.0238	0	0.0238
rub	0.0206	0	0.0206
com	0.0314	0	0.0314
eng	0.0018	0	0.0018
ele	0.0496	0	0.0496
agm	0.0002	0	0.0002
oma	0.0089	0	0.0089
ser	0.0670	0	0.0670

Table 5.4

The Spillover Coefficient Used in Experiment 2

Destination Sector	**Embodiment Index** $\left(E_{d,mot}\right)$	**Capture Parameter** $\left(\theta_d = AC_d . SS_{d,mot}\right)$	**Spillover Coefficient** $\gamma_d\left(E_{d,mot},\theta_d\right) = \left(E_{d,mot}\right)^{1-\theta_d}$
met	0.0238	0.80	0.4735
rub	0.0206	0.80	0.4600
com	0.0314	0.80	0.5005
eng	0.0018	0.80	0.2840
ele	0.0496	0.80	0.5483
agm	0.0002	0.05	0.0004
oma	0.0089	0.80	0.3893
ser	0.0670	0.05	0.0767

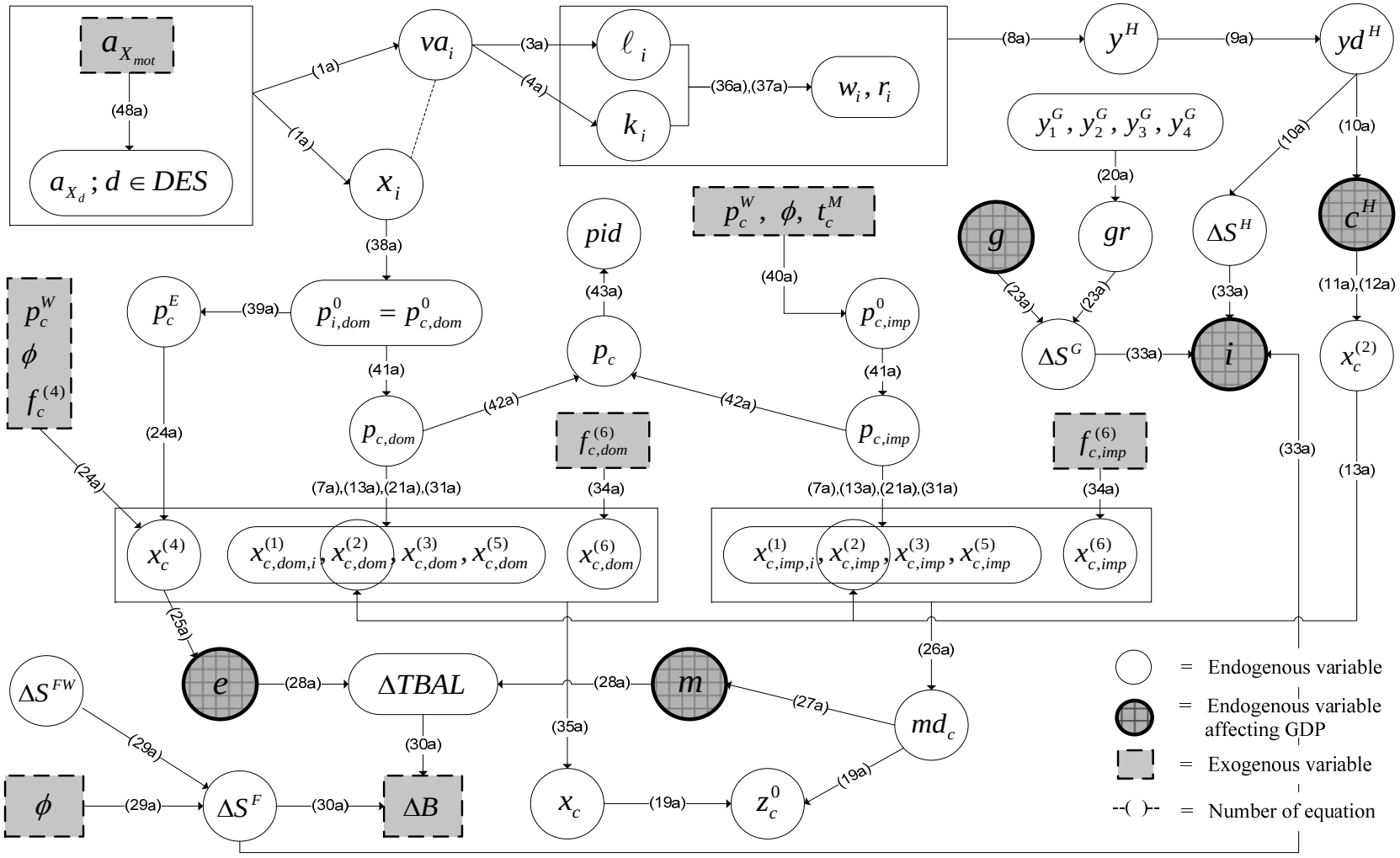
5.2 The Assessment of Productivity Effects in the Model

After deriving the theoretical structure of the CGE model, it is capable to bring the model to be used for assessing the impacts of exogenous variables on the endogenous variables. This study is attempted to evaluate the economic impacts of FDI productivity spillover on Thai economy by looking at the overall and sectoral effects. For this reason, the Hick-Neutral Technical Progress parameter representing the exogenous increase of productivity of the Motor vehicle sector caused by FDI productivity spillovers will be used as a shock variable in the CGE simulations. The assessment of FDI productivity spillover effects on the model variables is based on the theoretical structure of the CGE model together with the model data base including behavioral elasticities and miscellaneous share coefficients.

The exogenous increase of TFP of the Motor vehicle sector 'mot' ($a_{X_{mot}}$) will cause the change in TFP of the destination sector 'd' (a_{X_d}) using the transmission mechanism of productivity spillovers in equation (48a). It has been noticed that the efficiency with which the productivity advantages in the Motor vehicle sector be transferred to the destination sector 'd' depends on the value of Spillover Coefficient (γ_d) assigned for the destination sector 'd'. Hence, the assessment of FDI productivity spillover effects will be concerned with the effects of the change in TFP of domestic production sectors. Figure 5.1 shows the flow chart of relationship among the model variables in response to the change of TFP of the production sector.

The change of TFP of the production sector 'i' (a_{X_i}) will yield results on composite primary factor demand of the production sector (va_i) and output produced by the production sector (x_i) using equation (1a). The increased level of TFP allows the production sector to demand less composite primary factor in producing the given level of output. The change of composite primary factor demand results in the change of demand for labor (ℓ_i) and capital (k_i) of the production sector as per equation (3a) and (4a), respectively. The change in labor and capital demand is due to the change of composite primary factor demand together with the substitution elasticity between labor and capital (σ_i^{LK}) and also the primary factor prices.

Figure 5.1: Flow Chart Showing Relationship among the Model Variables



The change of outputs produced by the production sectors will cause the reallocation of primary factors among the production sectors such that labor and capital will move from one sector to the other sectors by biding up the rates of return, that is wage rate (w_i) and rental rate (r_i). By assuming full utilization and fixed supplies of primary factors shown by equation (36a) and (37a), wage rate of labor and rental rate of capital paid by the production sector will be changed as per equation (3a) and (4a). As a result of assuming perfect mobility of primary factors, labor and capital will move across the production sectors until wage rates and rental rates in all production sectors are equal. This can be shown by the equilibrium condition of wage rate and rental rate in equation (5a) and (6a), respectively.

The change of demand for labor and capital of all production sectors and primary factor prices will directly affect total income of a household (y^H) as per equation (8a) since household is the one having the ownership of primary factors used in the production. Without the change in personal income tax rate ($t^{(2)}$) imposed on total household income, disposable income of a household (yd^H) will be equally changed to the change of total household income as per equation (9a). The change of household disposable income will cause total consumption expenditure and savings of a household (c^H and ΔS^H) to change using equation (10a). The change of nominal household consumption affects household demand for composite commodity ($x_c^{(2)}$) as per equation (11a) and (12a). For equation (11a), the change of total household consumption expenditure will yield results on household consumption expenditure on each type of commodity using the share of household consumption expenditure on that commodity (S_c^C). In this study, household consumption is set in the form of Linear Expenditure System (LES) in which household demand for any type of commodity is determined as a linear function of commodity prices and income. Consequently, equation (12a) indicates that how much the change of nominal household consumption and commodity prices affects household consumption on each composite commodity depends on the value of expenditure elasticity of that commodity (ε_c) and price elasticities (η_{ck}) including own and cross price elasticities (the change in its price and the change in any other commodities' prices).

When output produced by the production sector and all input prices including intermediate input prices (or commodities' prices), primary factor prices (wage rate and rental rate) and indirect taxes (c_i^{ITAX}) were changed, producer price of domestic commodity ($p_{c,dom}^0$) will be changed according to the zero profit condition of the production in equation (38a) given there is no change in corporate income tax rate imposed on the production sector. The change of producer price of domestic commodity will cause purchaser price of domestic commodity ($p_{c,dom}$) and export price of commodity (p_c^E) to change using the price relationship in equation (41a) and the zero profit condition of exports in equation (39a), respectively.

The change of purchaser price of domestic commodity will generally affect demand for domestic commodity of the production sectors, household, government and investor ($x_{c,dom,i}^{(1)}$, $x_{c,dom}^{(2)}$, $x_{c,dom}^{(3)}$ and $x_{c,dom}^{(5)}$) as per equation (7a), (13a), (21a) and (31a), respectively. Equation (7a), (13a), (21a) and (31a) indicate that the change in demand for domestic and imported commodity of users is due to the change in price of domestic and imported commodity (both absolute and relative terms) and also the value of substitution elasticity between domestic and imported commodity (σ_c). The change of export price will cause foreign demand for Thai's exports of domestic commodity ($x_c^{(4)}$) to change as per equation (24a) in which the strength of this change is determined by the value of foreign elasticity of demand for exported commodity (γ_c). According to the change of all users' demand for domestic commodity, the market clearing condition of domestic commodity in equation (35a) indicates that total demand for each domestic commodity must equal with total supply of that commodity or the output produced of that commodity.

The change of purchaser price of domestic commodity while purchaser price of imported commodity ($p_{c,imp}$) remains unchanged will cause relative price of domestic and imported commodity to change. The change in relative price of domestic and imported commodity will cause demand for imported commodity of the production sectors, household, government and investor ($x_{c,imp,i}^{(1)}$, $x_{c,imp}^{(2)}$, $x_{c,imp}^{(3)}$ and $x_{c,imp}^{(5)}$) to change as per equation (7a), (13a), (21a) and (31a), respectively. Purchaser price of

imported commodity is unchanged since there are no change in world commodity price (p_c^W), exchange rate (ϕ), import tariff rate (t_c^M) and indirect tax rate (t_c^0) imposed on total value of commodity using the price relationships in equation (40a) and (41a). Based on the equilibrium condition of imported commodity in equation (26a), the change of demand for imported commodity of all users will cause total demand for imported commodity (md_c) to change using the share of imported commodity used by each group of users. Total import value (m) will be changed due to the change of total demand for all imported commodities as per equation (27a) in which the change in total import value is determined by the share of import value of each imported commodity to total import value (U_c^M).

The change of foreign demand for Thai's exports of all commodities will cause total export value (e) to change as per equation (25a) using the share of export value of each commodity to total export value of all commodities ($S_c^{(4)}$). Due to the change of total export and total import values, trade balance ($\Delta TBAL$) will be changed as per equation (28a). As shown by equation (30a), when assuming that there is no change in balance of payments (ΔB) in order to make balance of the model, the surplus (or deficit) in trade balance would be equally compensated by the value of net capital outflows (or inflows) (ΔS^F).

Total government revenue comes from four different sources of income which are import tariffs, personal income taxes imposed on total household income, corporate income taxes imposed on total revenue of all production sectors and indirect taxes imposed on total value of all commodities (y_1^G, y_2^G, y_3^G and y_4^G). Each source of government revenue will be affected by the change of endogenous variables since all policy variables which are import tariff rate (t_c^M), personal income tax rate ($t^{(2)}$), corporate income rate ($t_i^{(1)}$) and indirect tax rate (t_c^0) remain unchanged. The change of total import value leads to the change in government import tariff revenue passing through equation (14a). Personal income tax revenue of the government will be changed according to the change of total household income from being primary inputs supplied in the production sectors as per equation (15a). The change of current production (outputs produced by the production sectors and their producer prices)

causing the change in total revenue of the production sectors will cause corporate income tax revenue of the government to change as per equation (16a). The change of quantities demanded for domestic and imported commodity and the change of producer prices of domestic and imported commodity will cause total value of commodity (z_c^0) to change as per equation (19a). The change of total value of all domestic and imported commodities will cause indirect tax revenue of the government to change passing through equation (17a) and (18a). The change of government revenue from four different sources enables total government revenue (gr) to change as per equation (20a) using the share of government revenue from each source to total government revenue ($A_j^{(3)}; j = 1,2,3,4$). The change of government consumption expenditure on domestic and imported commodities will cause the change in total government expenditure (g) as per equation (22a) using the share of government expenditure on each commodity (S_{cs}^G). The change of total government revenue and expenditure will yield results on the government balance in equation (23a) such that government savings (ΔS^G) will be changed.

As the aggregate level of investment is fixed, the change of demand for domestic and imported commodities used as inputs in capital formation process will cause total investment expenditure (i) to change as per equation (32a) using the share of investment expenditure on each commodity (S_{cs}^I). Total investment expenditure is assumed to be the sum of domestic savings which are household and government savings and the value of net capital flows shown in equation (33a).

The change of household and government consumption expenditure, investment expenditure, total export values and total import values will cause nominal gross domestic product (gdp) in expenditure side to change as per equation (44a). The change of purchaser price of domestic and imported commodity will cause composite price (p_c) to change as per equation (42a). Thus, average price index (pid) will be changed by the weighted average of all composite prices as per equation (43a). By considering effects of the price change, the change of price index will yield results on real gross domestic product ($rgdp$), real wage for labor (rw) and real return on capital (rr) as per equation (45a), (46a) and (47a), respectively.

5.3 The Empirical Results

As previously discussed, the impacts of FDI productivity spillover or the effects of productivity increase of the Motor vehicle sector on the overall economy and the sectoral production are evaluated by applying the two simulation experiments with the descriptions summarized in Table 5.2. The values of shock variable or productivity increase of the Motor vehicle sector caused by FDI productivity spillovers assigned for the two experiments are the same at 5%. These two simulation experiments are different in terms of having different determinations of the Spillover Coefficient. The first experiment is assigned to be the base case in evaluating the effects of productivity spillover while the second experiment is designed not only to evaluate the effects of FDI productivity spillover but also to investigate the role of destination sectors' specific factors in absorbing the productivity advantages transferred from the Motor vehicle sector or the source sector. Hence, the values of Spillover Coefficient for all destination sectors applied in experiment 2 are greater than those to be applied in experiment 1. This is referred to the case when the production sectors gain greater benefits from FDI productivity spillovers under experiment 2 as compared to experiment 1.

The model is solved by using GEMPACK simulation program in which the solutions of endogenous variables refer to the percentage change (%) in response to the specified shock on exogenous variables relative to the initial values. This section provides the CGE simulation results of the two experiments and also the discussion of the simulation results. The simulation results of the two experiments will be explained by classifying the macroeconomic effects and the sectoral effects in the consequence. The simulation results of the two experiments are shown in Table 5.5.

5.3.1 Macroeconomic Results

This subsection shows the macroeconomic effects of FDI productivity spillover simulated by the two experiments. The macroeconomic results stand for the effects on aggregate level of the model variables, thus leading to the change in macroeconomic variables in representing the overall effects of FDI productivity spillover.

The macroeconomic results include effects on return to primary factors, effects on average price index, effects on the household sector, effects on the government sector, effects on the investment sector, effects on exports, effects on imports and effects on the trade balance and GDP.

– **Effects on Return to Primary Factors**

The increase of productivity of domestic production sectors causes the primary factor prices to increase in both experiments. Wage rates of labor in experiment 1 and experiment 2 will be increased by 0.231% and 1.218%, respectively. Rental rates of capital in experiment 1 and experiment 2 will be increased by 0.220% and 1.111%, respectively. It is noted that all production sectors face the same primary factor prices as the model does not disaggregate the primary factors (labor and capital) by the production sectors. Thus, the change of domestic production (expansion and reduction of the outputs produced by the production sectors) will induce labor and capital to move across the sectors of production by biding up the rates of return until wage rates and rental rates in all production sectors are equal.

The reason behind the change of primary factor prices is due to the fact that the increased level of productivity of the production sectors will cause an expansion or even reduction in the production of domestic commodities, thus leading to the change in labor and capital demand of the production sectors. The change of primary factor demand of the production sectors when assuming fixed supplies, full utilization and perfect mobility of labor and capital will bring about the change in wage rate of labor and rental rate of capital. More details about the production and primary factor utilization will be specified in the sectoral effects.

– **Effects on Average Price Index**

When the outputs produced by the production sectors were changed due to the increased level of productivity, the prices of domestic commodities will be changed (more details about the change of commodity prices are in the sectoral effects). As the prices of domestic commodities change while the prices of imported commodities remain unchanged, the composite prices of domestic and imported commodities defined as the weighted average of domestic and import prices will be changed

following the direction of changing domestic prices. For the average price index of all commodities, it is defined as the weighted average of all composite prices using the value share of each commodity in gross value of all commodities. The productivity increase of domestic production causing the change in outputs produced and their prices will yield different results on the average price index in the two experiments. Consequently, the average price index in experiment 1 decreases by 0.015% while the average price index in experiment 2 increases by 0.152%.

In experiment 1, even though the increased productivity of domestic production causes the composite prices of most commodities (except Electrical machineries, Services and Motor vehicle) to increase, the average price index is lowered by 0.015%. Hence, the declining average price index is due to the decrease in composite prices of Electrical machineries (0.008%), Services (0.073%) and Motor vehicle (0.452%) sharing 52.17% in gross value of all commodities. The declining average price index yields results on real rates of return to primary factors such that 0.246% increase in real wage of labor and 0.235% increase in real rental rate of capital.

In experiment 2, as opposed to experiment 1, the effects of productivity increase on the composite prices of most commodities (except Agricultural and mining and Services) are positive in terms of generating decreasing composite prices of most commodities. Though the composite prices of most commodities decrease, the average price index increases. Thus, the average price index increases following the increase in composite prices of Agricultural and mining (0.564%) and Services (0.525%) sharing 43.98% in gross value of all commodities. As the average price index increases, it generates negative effects on real return for primary factors such that real wage of labor and real return on capital will be less increased by 1.066% and 0.960%, respectively, as compared to their nominal terms.

It is suggested that the average price index will be changed according to the direction of changing composite/domestic price of Services given there is no change in import price of Services. This is due to the fact that total value of Services shares the most portions (36.21%) in gross value of all commodities.

Nonetheless, the change of domestic commodity prices will cause the general change of demand for domestic and imported commodities of all users, i.e. producers, household, government, exporter (demand only domestic commodities) and investor.

The change of domestic commodity prices will directly affect demand for domestic commodities of the users. Since the prices of imported commodities remain unchanged, then the users' demand for imported commodities will be affected by the change in relative prices of domestic and imported commodities.

– **Effects on the Household Sector**

In both experiments, the rising wage of labor and return on capital and the increasing of labor and capital demand of the sector of Services will cause total income of a household to increase since 60.31% of total household income comes from being labor and capital inputs supplied in the production of Services. As a result, total household income in experiment 1 and experiment 2 will be increased by 0.223% and 1.147%, respectively. Even though total household income increases in both experiments, the effects of the change in commodity prices on nominal household consumption are different in the two experiments.

In experiment 1, the change of commodity prices gives 0.006% reduction in total household consumption expenditure causing the household savings to increase by 0.685%. Even though the composite/domestic prices of most commodities (except Electrical machineries, Services and Motor vehicle) increase, total household consumption expenditure decreases. As a result, the declining nominal household consumption is due to the decrease of household consumption expenditure on Services since a household consumes Services mostly accounted for 55.95% of total household consumption expenditure. Explicitly, 0.073% decrease in composite price of Services and 0.043% increase in household consumption on Services cause household consumption expenditure on Services to decrease by 0.031%. Although nominal household consumption decreases, its decreased level is very little at 0.006%. The explanation is that the household consumption expenditure on most types of commodities increases in response to their increased prices.

In experiment 2, according to the increase of total household income and the decrease of composite prices of most commodities (except Agricultural and mining and Services), total household consumption expenditure increases very little by 0.087% causing the household savings to increase by 3.285%. In this case, nominal household consumption increases on account of increasing household consumption

expenditure on Agricultural and mining and Services at 0.248% and 0.220%, respectively, sharing 59.75% of total household consumption expenditure. Although the household consumption on most types of commodities increases in response to their lower prices, nominal household consumption does not increase much. This is because the decrease of composite prices of most commodities is greater than the increase of household consumption on these types of commodities, thus causing the reduction in household consumption expenditure on most types of commodities.

It is noted that total household consumption expenditure will be changed according to the change in composite/domestic price of Services, thus leading to the change in household consumption expenditure on Services in the same direction. The reason is that the household consumption expenditure on Services shares the most portions in total household consumption expenditure at 55.95%.

– **Effects on the Government Sector**

The increased productivity of the production sectors induces total government revenue in both experiments to increase such that total government revenue in experiment 1 and experiment 2 will be increased by 0.240% and 1.033%, respectively. The increase of total government revenue in both experiments is due to the increase in all sources of government revenue. It is noticed that since all policy variables which are import tariff rate, personal income tax rate, corporate income tax rate and indirect tax rate remain unchanged, then the change in government revenue from different sources will be dependent upon the change of endogenous variables.

Government import tariff revenue in experiment 1 and experiment 2 will be increased by 0.261% and 0.700%, respectively, due to the increase of total import value in both experiments. *Government personal income tax revenue* in experiment 1 and experiment 2 will be increased by 0.223% and 1.147%, respectively, following the increase of total household income from being labor and capital inputs supplied in the production sectors in both experiments. When the outputs produced by the production sectors and their producer prices were changed, total revenue of the production sectors will be changed causing the change in corporate income tax revenue of the government. Hence, *government corporate income tax revenue* in experiment 1 and experiment 2 will be increased by 0.235% and 1.242%, respectively.

Note that indirect tax revenue sharing the most portions (46.42%) in total government revenue is the government receipt by imposing taxes on total value of domestic and imported commodities. Therefore, the increase of total value of all commodities in both experiments will cause *government indirect tax revenue* in experiment 1 and experiment 2 to increase by 0.235% and 1.088%, respectively.

To be more extended, *in experiment 1*, total value of Motor vehicle increases at the greatest extent by 0.897% due to the highest increased production of Motor vehicle at 1.577% together with the highest increase of total demand for imported Motor vehicle at 0.911%. *In experiment 2*, total value of Agricultural and mining and Services sharply increases by 1.049% and 1.573%, respectively. The increase of total value of Agricultural and mining and Services is influenced by the increase of their output production together with the increase of their domestic prices since 70.20% and 96.26% of total value of Agricultural and mining and Services, respectively, originate from the values of their domestic commodities.

As the commodity prices change, total government consumption expenditure in experiment 1 and experiment 2 will be sharply increased by 3.063% and 8.786%, respectively, as a result of increasing government consumption on all types of commodities. It should be noted that the government consumption on any type of commodities is not dependent on the change of commodity prices. The reason is that the model does not assume fixed aggregate level of government consumption on any type of commodities, therefore the change in government consumption will not be affected by only the change of commodity prices. The government savings were deteriorated by 6.72% in experiment 1 and 18.08% in experiment 2 as a result of increasing total government consumption expenditure.

– **Effects on the Investment Sector**

Based on the theoretical structure of the CGE model, the aggregate level of investment is fixed during the period of study. Hence, the change of commodity prices will cause nominal investment to change. The change of commodity prices will yield different results on nominal investment in the two experiments such that total investment expenditure in experiment 1 will be lowered by 0.069% while total investment expenditure in experiment 2 will be increased by 0.224%.

In experiment 1, the investment demand for most domestic commodities (except Electrical machineries, Services and Motor vehicle) decreases as a result of their increased prices while the investment demand for most imported commodities of these types increases due to the higher relative prices of domestic and imported commodities of these types. Although the investment expenditure on most domestic and imported commodities increases, nominal investment decreases. Therefore, total investment expenditure declines following the reduction of investment expenditure on domestic Services (0.076%) and imported Electrical machineries (0.003%) sharing 48.72% and 11.38% of total investment expenditure, respectively.

In experiment 2, the investment expenditure on most domestic and imported commodities (except Agricultural and mining and Services) decreases as a result of the decrease of their domestic prices and the lower of investment demand for imported commodities of these types (as the relative prices of domestic and imported commodities decrease). Since 48.72% of total investment expenditure accounts for the investment expenditure on domestic Services, therefore nominal investment increases following the increase of investment expenditure on domestic Services (0.545%).

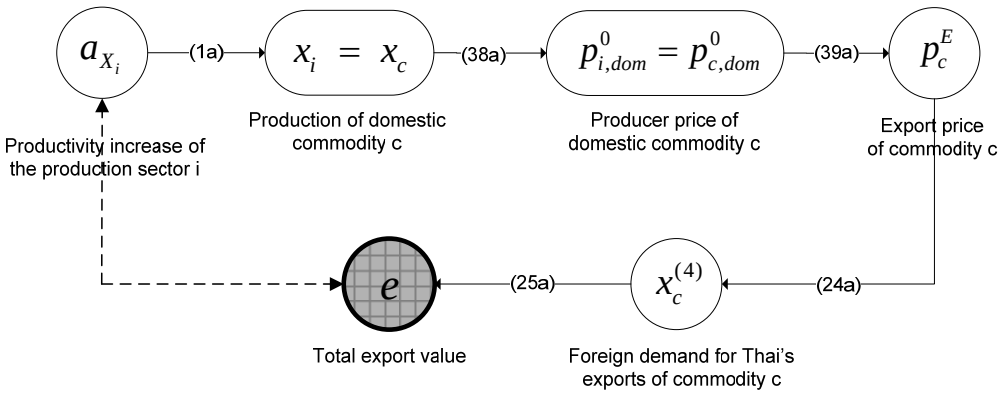
Noting that nominal investment will be changed according to the change in composite/domestic price of Service since investment expenditure on domestic Services accounts for the most portions (48.72%) in nominal investment.

– **Effects on Exports**

Apart from Figure 5.1 with the same notations, Figure 5.2 shows the relationship between the productivity increase of the production sectors and total export value. The increased productivity of domestic production will affect total export value through the change in prices of domestically sold commodities. The increase of productivity of the production sectors will cause the change in output production of domestic commodities, thus causing the change in producer prices of domestic commodities. According to the zero profit condition of exports, the export prices of domestically sold commodities will be equal to the producer prices of domestic commodities. Foreign demand for Thai's exports will be changed as the export prices of commodities change or as domestic prices of commodities change, thus leading to the change in total export value.

Figure 5.2

Effects of Productivity Increase on Exports



From the simulation results of the two experiments, the productivity increase of domestic production yields different results on total export value in the two experiments such that total export value in experiment 1 decreases at 0.018% while total export value in experiment 2 increases at 0.772%.

In experiment 1, the reduction of total export value is caused by the decrease of export values of most commodities (Metal and metal products, Rubber and plastic products, Components, Engines, Agricultural and mining, Other manufacturing and Services) sharing 66.20% in total export value. The reason is that the increase of domestic prices of these commodities enables Thai's exports of these commodities to loss competitiveness as compared to the foreign's, thus leading to the decrease in foreign demand for these types of commodities. For the exports of Services, even though domestic price of Services is lowered by 0.076%, the export value of Services decreases by 0.075%. This is due to the slight increase of foreign demand for the exports of Services at 0.001%. For the exports of Electrical machineries and Motor vehicle, since their domestic prices are lowered, then the foreign demand for Thai's exports of these two commodities will be increased by 3.436% and 0.067%, respectively. In other words, Thai's exports of Electrical machineries and Motor vehicle become more competitive in the foreign market

In experiment 2, the increase of total export value is due to the increase of export values of most commodities (except Agricultural and mining) sharing 98.61% of total export value. The export demand for most commodities (except Agricultural

and mining and Services) increases as a result of the decrease of their domestic prices. For the exports of Agricultural and mining and Services, due to the increase of their domestic prices, the foreign demand for Thai's exports of Agricultural and mining and Services will be lowered by 4.015% and 0.006%, respectively. Hence, the export value of Agricultural and mining will be lowered by 3.212%. The slight decrease of export demand for Services (0.006%) given the higher domestic price of Services will cause the export value of Services to increase by 0.540%.

Noting that for the exports of tradable commodities (all types of commodities except Services which is nontradable one), the effects of changing domestic prices are always less than the effects of changing foreign demand for Thai's exports of tradable commodities. This can be explained by the fact that the values of foreign elasticity of demand for Thai's exports of tradable commodities are assumed to be high at -5.00. Thus, the little change of domestic prices of tradable commodities may cause the foreign demand for Thai's exports of tradable commodities to be more varied. The value of foreign elasticity of demand for Thai's exports of Services is assumed to be very small at -0.01. This is due to the fact that Services is nontradable goods in the foreign market such that the changing domestic price of Services will not affect the foreign demand for Services much. Therefore, the change of export price of domestic Services is always greater than the change of foreign demand for Thai's exports of Services. In other words, the export value of Services will be changed following the change of domestic price of Service.

– **Effects on Imports**

The effects of productivity increase of domestic production will cause total import value in experiment 1 and experiment 2 to increase by 0.133% and 0.676%, respectively. It is suggested that the increase of total import value can be caused by not only the increase of domestic prices but also the expansion of outputs produced by the production sectors. The change of domestic prices will affect total import value in such a way that when the prices of domestic commodities increase, the relative prices of domestic and imported commodities will be increased causing the demand for imported commodities of all users to increase. Thus, the increase of total demand for imported commodities will cause total import value to increase.

In experiment 1, as the prices of domestic Metal and metal products, Rubber and plastic products, Components, Engines, Agricultural and mining and Other manufacturing increase, total demand for imported commodities of these types will be increased. Among commodities within this group, total demand for imported Engines is highly increased by 0.822%. This is due to the increase in domestic price of Engines at 0.042% and also the fact that 80.15% of imported Engines is used as the intermediate inputs in the output production especially in the production of Motor vehicle (50.18%) and the production of Engines itself (21.16%). As a result, the expansion of outputs produced by the sectors of Motor vehicle and Engines at 1.577% and 0.053%, respectively, will cause their intermediate input demand for imported Engines to increase at 1.579% and 0.065%, respectively, thus leading to the increase in total demand for imported Engines. Although the prices of domestic Electrical machineries and Motor vehicle decrease, total demand for imported Electrical machineries and Motor vehicle increases at 0.097% and 0.911%, respectively. This is due to the fact that 74.59% of imported Electrical machineries and 68.80% of imported Motor vehicle are accounted for the intermediate uses in the production of themselves. Consequently, the increased production of Electrical machineries and Motor vehicle at 0.108% and 1.577%, respectively, will enable the intermediate input demand for imported Electrical machineries and Motor vehicle to increase at 0.106% and 1.539%, respectively. Total demand for imported Services is slightly increased by 0.029% since 92.62% of total import of Services is used for household consumption. Even though the price of domestic Services is lowered by 0.076%, the household demand for imported Services is slightly increased by 0.008% causing the lower of household consumption expenditure on imported Services.

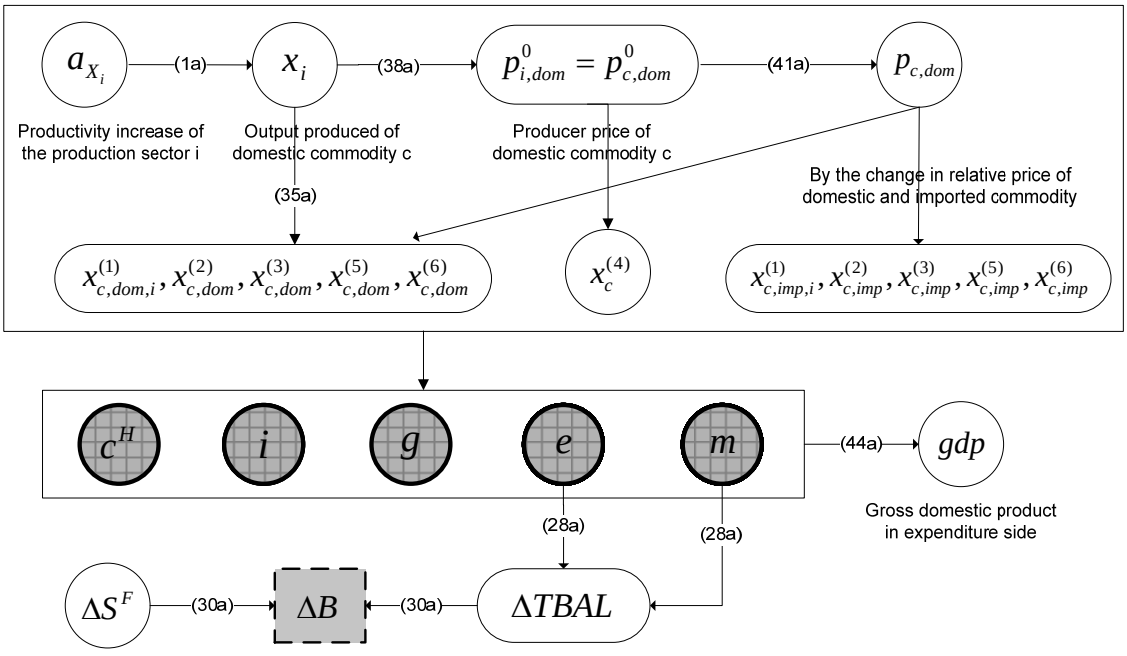
In experiment 2, the increase of total import value is caused by the expansion in domestic production of all commodities together with the increase of domestic prices of Agricultural and mining and Services. For most types of commodities (Metal and metal products, Rubber and plastic products, Components, Engines, Electrical machineries, Other manufacturing and Motor vehicle), total demand for imported commodities of these types increase even if their domestic prices are lowered. This is because most of imported commodities of these types are used as intermediate inputs in the current production; therefore the increased production of all production sectors

in this experiment will yield the increase in intermediate input demand for imported commodities of these types. For the imports of Agricultural and mining, total demand for imported Agricultural and mining is highly increased by 1.263% as a result of increasing domestic price of Agricultural and mining and the fact that 85.02% of imported Agricultural and mining is used as the intermediate inputs in the production of Components. Hence, when the output produced by the sector of Components sharply increases at 1.144%, the intermediate input demand for imported Agricultural and mining of the sector of Components will be increased at 1.278%.

– **Effects on the Balance of Trade and GDP**

Figure 5.3

Effects of Productivity Increase on the Aggregate Variables



Apart from Figure 5.1, Figure 5.3 shows the effects of productivity increase of domestic production sector on the aggregate variables in the model which are nominal household consumption (c^H), government expenditure (g), nominal investment (i), total export value (e) and total import value (m). The change of these aggregate variables will affect the balance of trade ($\Delta TBAL$) and nominal gross domestic

product (gdp) representing the overall effects of productivity spillover. The increased productivity of the production sectors will yield results on the outputs produced by the production sectors causing the change in prices of domestic commodities ($p_{c,dom}$). The change of domestic commodity prices will directly affect demand for domestic commodities of all users which are producers, household, government, exporter, investor and change in inventories ($x_{c,dom,i}^{(1)}, x_{c,dom}^{(2)}, x_{c,dom}^{(3)}, x_{c}^{(4)}, x_{c,dom}^{(5)}, x_{c,dom}^{(6)}$). Noting that by the market clearing condition of domestic commodities in equation (35a), total demand for each domestic commodity must equal with total supply of that commodity or the output produced of that commodity. As the prices of domestic commodities change while the prices of imported commodities remain unchanged, demand for imported commodities of all users ($x_{c,imp,i}^{(1)}, x_{c,imp}^{(2)}, x_{c,imp}^{(3)}, x_{c,imp}^{(5)}, x_{c,imp}^{(6)}$) will be affected by the change in relative prices of domestic and imported commodities. The change of users' demand for domestic and imported commodities and the change of domestic commodity prices will cause the change in nominal aggregate variables which are total household consumption expenditure, total government expenditure, total investment expenditure, total export and total import values. The change of total export and total import values will affect the balance of trade. The model assumes that there is no change in the balance of payments; therefore the deficit (or surplus) in trade balance will be equally compensated by the value of net capital inflows (or outflows). Finally, the change of all aggregate variables in expenditure side (c^H, i, g, e and m) will cause nominal gross domestic product to change.

For the effects on the balance of trade, the trade balance in the base period by the year of 2000 is surplus at 181,609 million baht; therefore the change of total export and total import values will cause the change in trade surplus. *In experiment 1*, the decrease of total export value and the increase of total import value will cause the surplus in trade balance to decrease by 4,419 million baht or 2.434% and then causes the value of net capital inflows to increase by the same amount at 2.434%. Therefore, the increase of productivity in this experiment will decay the balance of trade. *In experiment 2*, as a result of increasing total export and total import values, the surplus in trade balance will be increased by 5,626 million baht or 3.098%. Hence, the value of net capital inflows will be decreased by the same amount at 3.098%,

in other words, there are net capital outflows. Due to the fact that the increase of total export value is greater than the increase of total import value, the productivity increase in this experiment will favor the balance of trade.

For the overall effects of productivity spillover, the change of total household consumption expenditure, total government expenditure, total investment expenditure, total export and total import values will cause nominal gross domestic product (GDP) in expenditure side to increase in both experiments. *In experiment 1,* although there is reduction in nominal household consumption (0.006%), nominal investment (0.069%) and total export values (0.018%) and the increase of total import values (0.133%), the effects that the productivity increase has on nominal GDP are positive at 0.227%. Thus, the percentage increase of nominal GDP is caused by the percentage increase of total government expenditure (3.063%). Nevertheless, real GDP will be increased by 0.242% as a result of declining average price index at 0.015%. *In experiment 2*, the increase of nominal household consumption (0.087%), total government expenditure (8.876%), nominal investment (0.224%), total export values (0.772%) and total import values (0.676%) will together cause nominal GDP to increase by 1.138%. As the average price index increases at 0.152%, real GDP will be less increased by 0.986% as compared to its nominal terms.

It is noticed that the government expenditure is sharply increased in both experiments since the base period value of total government expenditure is small as compared to other final users' demand. Since total government expenditure shares only 10.93% in nominal GDP, then the nominal increase of total government expenditure (Baht) will not cause nominal GDP (Baht) to increase much.

5.3.2 Sector-Specific Results

This section is concerned with the implications of productivity increase at industry level or the output production. It is noticed that a change in policy shock will have very small impact on the aggregate production level in a given period due to supply limitation of primary inputs. However, the policy change will affect the structural adjustment of production in each industry, i.e. the reallocation of factors among industries (Cintakulchai, 1997).

– **Effects on Industry's Productivity**

In both simulation experiments, the exogenous productivity increase of the Motor vehicle sector (source sector) caused by FDI productivity spillovers at 5% will be transferred to the destination sectors through the values of Spillover Coefficient, thus enabling total factor productivity of all destination sectors to increase but having different magnitudes of the productivity effects. Since these two experiments are different in determining the Spillover Coefficient, therefore the simulation results from the two experiments will be different according to the assumption of the Spillover Coefficient applied in each experiment.

The simulation experiment 1 is determined to be the base case in analyzing the effects FDI productivity spillover. Therefore, there are no effects of the destination sectors' capture abilities of the productivity advantages transferred from the Motor vehicle sector, i.e. the absorptive capacity of the destination sectors and the similarity of production structure between the source and destination sectors. *The simulation experiment 2* is assigned for evaluating the impacts of FDI productivity spillover under the assumption about the destination sectors' specific factors in absorbing the productivity advantages transferred from the source sector. As a result, the spillover effects of productivity advantages transferred from the Motor vehicle sector to the destination sectors will depend on the two additional parameters representing the absorptive capacity of the destination sectors and the congruence of production structure between the source and destination sectors

In experiment 1, the values of Spillover Coefficient (see Table 5.3) are solely determined by the values of Embodiment Index representing the transferring channel of productivity advantages via the backward linkages between the Motor vehicle sector and any other destination sectors who supply domestic intermediate inputs in the production of Motor vehicle. Therefore, if the sector of Motor vehicle uses domestic intermediate inputs from which sector mostly, that sector will gain the highest benefit of the productivity spillover effects. The empirical results show that the most benefited sectors are Services and Electrical machineries having 0.335% and 0.248% increase in productivity, respectively, since these two sectors supply 51.66% of all domestic intermediate inputs in the production of Motor vehicle.

The sectors of Agricultural and mining and Engines are the least benefited sectors having 0.001% and 0.010% increase in productivity, respectively. This is due to the fact that these two sectors share only 0.93% of all domestic intermediate inputs supplied in producing the output of the Motor vehicle sector.

In experiment 2, the values of Spillover Coefficient (see Table 5.4) are calculated based on the values of Embodiment Index and Capture Parameter defined as the joint product of Absorptive Capacity Index and Structural Similarity Index. It has been noticed that the values of Spillover Coefficient depend more strongly on the values of Capture Parameter than on the values of Embodiment Index alone (Das and Powell, 2000). Therefore, the different effects of productivity spillover on the destination sectors are due to the different settings of Absorptive Capacity Index and Structural Similarity Index applied to the destination sectors.

It is assumed that the manufacturing sectors are more similar to the Motor vehicle sector in terms of both the absorptive capacity and the similarity of production structure than to the agricultural and services sectors. The results show that the most benefited sectors in receiving the productivity advantages from the Motor vehicle sector are Electrical machineries and Component having 2.742% and 2.503% increase in productivity, respectively. This is due to the fact that these two share 35.90% of all domestic intermediate inputs in the production of Motor vehicle. The least benefited sectors are Agricultural and mining and Services having 0.002% and 0.383% increase in productivity, respectively. Note that even though 29.69% of all domestic intermediate inputs supplied in the production of Motor vehicle comes from the sector of Services, the productivity increase in the Services sector is very small. The reason is that the Services sector is assumed to be far different from the Motor vehicle sector in both the absorptive capacity and the similarity of production structure, thus causing the small value of Spillover Coefficient.

– **Effects on Industry's Output**

When the productivity of current production changes, the output produced by the production sector and the composite primary factor demand of the production sector will be changed. Generally, the increased productivity causes the output production to increase in both experiments.

In experiment 1, as a result of the productivity increase in all production sectors, the production of Metal and metal product, Components, Engines, Electrical machineries, Services and Motor vehicle is enhanced. For the sectors of Motor vehicle, Electrical machineries, Components and Metal and metal products having the high increase in productivity, the productivity increase causes an expansion in the output production of these sectors while it causes a reduction in the demand for composite primary factor of these sectors. In other words, these production sectors will demand less composite primary input given the increased level of the output produced. The productivity increase in the production of Services and Engines will cause the outputs produced of Services and Engines to increase given the uses of higher composite primary factor. This is because the sectors of Services and Engines have the most and the least share of primary factor usages to total primary factor demand, respectively, in which 65.06% of labor and 57.94% of capital are used in producing the output of Services while 0.0013% of labor and 0.0013% of capital are utilized in the production of Engines.

The most benefited sector in receiving the productive efficiency is the sector of Motor vehicle due to the highest increase of productivity. Explicitly, 5% increase of productivity of the Motor vehicle sector causes the output production of Motor vehicle to increase at the greatest extent by 1.577% and also causes the lower composite primary factor demand at 3.423%. The output production of the sectors of Services and Electrical machineries, which are the most benefited sectors in receiving the productivity advantages from the Motor vehicle sector, will be increased by 0.427% and 0.108%, respectively. For the other sectors, which are Components, Engines and Metal and metal product, their outputs produced increase at 0.103%, 0.053% and 0.012%, respectively. It is noticed that which sector has the more increase of productivity, the better increase of production.

The production of the remaining sectors which are Rubber and plastic products, Agricultural and mining and Other manufacturing, is contracted due to the primary factor supply limitation or fixed supplies of labor and capital assumed in the model. The slight increase of productivity of the sectors of Rubber and plastic products, Agricultural and mining and Other manufacturing at 0.103%, 0.001% and 0.045%, respectively, causes the outputs produced by these sectors to decrease and cause their

composite primary factor demand to be lowered as well. The output production of Rubber and plastic products, Agricultural and mining and Other manufacturing is lowered by 0.026%, 0.021 and 0.091%, respectively. Therefore, it is noticed that the less increase of productivity leads to the less increase of output produced.

In experiment 2, as a result of increasing productivity, the output production of all production sectors increases. The productivity increase of most production sectors including Metal and metal products, Rubber and plastic products, Components, Engines, Electrical machineries, Other manufacturing and Motor vehicle will cause an expansion in the output production of these sectors while it cause a reduction in the composite primary factor demand of these sectors. Only for the sector of Agricultural and mining and Services that the productivity increase causes the production of domestic Agricultural and mining and Services to increase and also causes their composite primary factor demand to increase.

As a result, the production of Metal and metal products, Motor vehicle, Electrical machineries and Component will be increased by 1.539%, 1.384%, 1.204% and 1.144%, respectively, due to the high increase of productivity of these sectors. Therefore, the most benefited sector in receiving the productive efficiency is the sector of Metal and metal products. For the production of Rubber and plastic products, Engines and Other manufacturing, their outputs produced will be increased by 0.676%, 0.502% and 0.378%, respectively. For the production of Agricultural and mining and Services, which are the least benefited sectors in receiving the productivity advantages from the Motor vehicle sector, their outputs produced will be increased by 0.155% and 1.087%, respectively, and their composite primary factor demand will be increased by 0.153% and 0.703%, respectively.

– **Effects on Primary Factor Demand**

The change of domestic production, i.e. expansion or reduction of the outputs produced by the production sectors, requires re-utilization of labor and capital among the production sectors. By assuming that labor and capital are mobile factors, their supplies are fixed and they are fully utilized following the full employment condition, the change of domestic production will cause labor and capital to move across the production sectors by biding up the rates of return.

In both simulation experiments, as previously discussed, the productivity increase of domestic production will generally cause the outputs produced by the production sectors to increase given the uses of lower composite primary factor, thus causing the lower of demand for labor and capital of the production sectors. According to the full employment condition and perfect mobility assumption of labor and capital, the lower of composite primary factor demand of most production sectors in the two experiments will induce labor and capital to move from these sectors toward the other sectors having the higher of primary factor demand. *In experiment 1*, as most production sectors demand less the primary factors, there will be an increase in primary factor demand of the sectors of Services and Engines. Demand for labor and capital of the sector of Service will be increased by 0.083% and 0.097%, respectively. Demand for labor and capital of the sector of Engines will be increased by 0.037% and 0.047%, respectively. *In experiment 2*, when all manufacturing sectors demand less primary factors, labor and capital will move toward the sector of Agricultural and mining and Services. Demand for labor and capital of the sector of Agricultural and mining will be increased by 0.114% and 0.167%, respectively. Demand for labor and capital of the sector of Services will be increased by 0.622% and 0.749%, respectively. Therefore, in both experiments, the greatest extent of labor and capital usages can be found in the production of Services.

As the output production of Services increases, labor and capital will move from other production sectors having lower demand for primary factors toward the sector of Services reflected by the increased employment of labor and stock of capital. Furthermore, the reallocation of labor and capital among the production sectors towards the sector of Services will cause wage rate of labor and rental rate of capital to increase. Wage rates of labor in experiment 1 and experiment 2 will be increased by 0.231% and 1.218%, respectively. Rental rates of capital in experiment 1 and experiment 2 will be increased by 0.220% and 1.111%, respectively. Note that even though the primary factor demand of most production sectors decreases, wage rate and rental rate increase. This is due to the fact that the sector of Services has the highest share of labor and capital usages which are equal to 65.06% and 57.94%, respectively. Therefore, the inflow of labor and capital to the sector of Services enables wage rate and rental rate to increase in both experiments.

The increase of primary factor prices in the two experiments can be explained in another way using the equilibrium condition of perfectly competitive market (both commodity and factor markets) such that wage rate of labor and rental rate of capital will be equal to the value of marginal product of labor and capital, respectively. In perfectly competitive market, the value of marginal product of primary factor (VMP_L, VMP_K) is defined the product of market price (P) and marginal product of that primary factor (MP_L, MP_K). As the productivity increases, the marginal product of labor and capital will be increased causing the value of marginal product of labor and capital to increase. Thus, wage rate and rental rate will be increased following the increased value of marginal product of labor and capital, respectively.

– **Effects on Commodity Price**

The upward pressure on wage rate and rental rate as well as the higher of other costs (or indirect taxes) will impose additional costs on the production sectors. Together with the change of outputs produced by the production sectors, the producer prices of domestic commodities or the basic prices of domestically produced outputs will be changed according to the zero profit condition of production. Nevertheless, the change of domestic commodity prices will be affected not only by the change of outputs produced together with the change of all factor prices and taxes but also by the interaction between supply of commodities (the output production of domestic commodities) and demand for domestic commodities.

In experiment 1, as a result of the highest increased production of Motor vehicle, Services and Electrical machineries, the producer prices of domestic Motor vehicle, Services and Electrical machineries will be lowered by 0.687%, 0.076% and 0.013%, respectively. It is noticed that the more increase of production of domestic commodity brings the more decrease of its producer price. The producer prices of domestic Agricultural and mining, Other manufacturing and Rubber and plastic products increase at 0.149%, 0.082% and 0.051%, respectively, as a result of their decreasing output production. For the remaining commodities which are Engines, Metal and metal products and Components, even if their domestic production increases, their producer prices increase at 0.042%, 0.034% and 0.019%, respectively. The reason is that the increase in total demand for domestic commodities of these

types is greater than the increase of total supply of domestic commodities of these types or the outputs produced by the sector of Engines, Metal and metal products and Components since the change in commodity prices is dependent on the change of output produced as well as the change of users' demand.

For experiment 2, as a result of the expansion in the output production of Metal and metal products, Motor vehicle, Electrical machineries and Component, Rubber and plastic product, Engines and Other manufacturing, their producer prices will be lowered by 0.430%, 0.550%, 0.233% and 0.346%, 0.123%, 0.011% and 0.034%, respectively. The producer price of domestic Motor vehicle decreases at the greatest extent by 0.550% while that of Agricultural and mining sharply increases by 0.803%. Although domestic production of Agricultural and mining and Services increases, their producer prices increase at 0.803% and 0.545%, respectively.

The change of producer prices of domestic commodities will cause the purchaser prices of domestic commodities of these types to change equally since indirect tax rate remains unchanged. As the purchaser prices of domestic commodities change, the relative prices of domestic and imported commodities will be changed according to the changing purchaser prices of domestic commodities since the purchaser prices of imported commodities remain unchanged. The change of commodity prices (in both absolute and relative terms) will cause the change in demand for domestic and imported commodities of all users, i.e. producers, household, government, exporter and investor. Therefore, the change of commodity prices will yield results on nominal household and government consumption, nominal investment, total export and total import values, thus leading to the change in nominal gross domestic as discussed in the macroeconomic results.

5.3.3 Discussion

As the Motor vehicle sector gains the productivity advantages from the operation of multinational corporations (MNCs) in the automotive industry, there will be an increase of its productivity level through FDI productivity spillovers from MNC affiliates to domestic firms in the automotive industry. In this study, instead of estimating the key productivity spillover variable by the econometric approach, it is

assumed that the increased productivity of the Motor vehicle sector caused by FDI spillovers is equal to 5%. Thus, this study is aimed to analyze the impacts of FDI productivity spillover or the effects of productivity increase of the Motor vehicle sector on the overall economy as well as the sectoral production. The productivity increase of the Motor vehicle sector is more likely to be transferred to other related sectors or the destination sectors since the productivity spillover effects tend to be cross-industry rather that sector-specific. The Motor vehicle sector is the synthetic industry of any other industries through the potential linkages; therefore the increase of productivity of the Motor vehicle sector may yield results on the destination sectors' productivity level. The other sectors or the destination sectors are disaggregated according to the supply chains via the backward linkage channel of the Motor vehicle sector, here they are Metal and metal products, Rubber and plastic products, Components, Engines, Electrical machineries, Agricultural and mining, Other manufacturing and Services.

The exogenous productivity increase of the Motor vehicle sector at 5% will cause the change in productivity of the destination sectors through the value of Spillover Coefficient. How well the productivity advantages of the Motor vehicle sector can be transferred to the destination sectors is dependent on the value of Spillover Coefficient assigned for the destination sectors. At this time, the two simulation experiments are introduced in order to classify the analysis of FDI productivity spillover effects into the base case (experiment 1) and the special case (experiment 2). These two simulation experiments are different due to the different assumptions about the destination sectors' capture capabilities of the productivity advantages, thus causing the different Spillover Coefficients.

According to the different settings of the Spillover Coefficient in the two simulation experiments as previously discussed, the values of Spillover Coefficient applied for experiment 2 are greater than those to be applied for experiment 1. Consequently, the exogenous productivity increase of the Motor vehicle sector (at 5% assigned in both experiments) will yield more increase of productivity of the destination sectors under experiment 2 as compared to experiment 1. In other words, the destination sectors gain more advantages from the increased level of productivity under experiment 2 as compared to experiment 1.

In experiment 1, the most benefited sector in receiving the productivity advantages from the Motor vehicle sector is the sector of Services who supplies most of domestic intermediate inputs in the production of Motor vehicle. *In experiment 2*, with considering the role of Absorptive Capacity of the destination sectors and Structural Similarity between the source and destination sectors, the most benefited sector in receiving the productivity advantages from the Motor vehicle sector will be changed from the sector of Services in experiment 1 to the sector of Electrical machineries. This is due to the fact that Electrical machineries is the manufacturing sector which is assumed to be more similar to the Motor vehicle sector in terms of absorptive capacity and production structure as compared to the sectors of Services and Agricultural and mining. It can be concluded that, for experiment 1, the more supply of domestic intermediate inputs to the production of Motor vehicle leads to the more productivity increase of the destination sectors, while the conclusion for experiment 2 is that the manufacturing sectors have more increase of productivity than the sectors of Agricultural and mining and Services.

The higher productivity increase of the destination sectors in experiment 2 as compared to experiment 1 will cause the higher output production of the destination sectors and also causes the more decrease of composite primary factor demand of all production sectors. For the change of domestic commodity prices, the prices of domestic commodities will be affected by the change of output production and also the change of users' demand depending on which effect is greater.

In experiment 1, there exist the expansion and reduction of output production. Due to the resource constraint or fixed supplies of labor and capital assumed in the model, the outputs produced by the sectors of Rubber and plastic products, Agricultural and mining and Other manufacturing decline. This is supported by the fact that the productivity increase of these production sectors is lower than that of the other sectors in this experiment. As a result of changing output production, the prices of domestic Electrical machineries, Services and Motor vehicle decline while domestic prices of most types of commodities increase. This is due to the fact that the output production in experiment 1 is not much increased as compared to the change of users' demand, or even decline in some production sectors. *In experiment 2*, since the output production of all production sectors sharply increases, then domestic prices of

most commodities (except Agricultural and mining and Services) decline. There exist higher domestic prices of Agricultural and mining and Services. This is due to the fact the output production of Agricultural and mining and Services is less increased as compared to the output production of the other sectors and also the fact that the effects of changing users' demand for these two commodities are greater than the effects of changing output production of these two sectors. In both experiments, it is found that domestic price of Motor vehicle is greatly declined while domestic price of Agricultural and mining is highly increased.

The change of domestic production in both experiments yields results on primary factor demand of the production sectors in the same direction. With the increased level of productivity, the output production will be expanded causing the lower demand for primary factors. The primary factor demand of most production sectors is lowered except for the sector of Services. When most production sectors demand less primary factors in producing the output, under the assumption of perfect mobility and full employment of labor and capital, there exist the inflow of labor and capital to the sector of Services. This is due to the fact that the sector of Services accounts for the largest portions in total primary factor usages.

When comparing results between the two experiments, the higher increase of productivity of domestic production in experiment 2 as compared to experiment 1 will cause the production sectors in experiment 2 to demand lower primary factors as compared to experiment 1, thus causing the higher inflow of labor and capital to the sector of Services. The more increase of labor and capital demand of the sector of Services yields the more increase of wage rate of labor and rental rate of capital even though most production sectors have lower demand for labor and capital. Hence, the primary factor prices paid by the production sectors in experiment 2 are higher than those in experiment 1. It can be concluded that the more increase of productivity of the production sectors in experiment 2 as compared to experiment 1 will cause the higher primary factor prices paid by the production sectors. Therefore, the productivity increase of domestic production in both experiments will yield positive impacts on the rates of return paid to the primary factors reflected by the increase of wage rate and rental rate. The higher primary factor prices and primary factor demand of the sector of Services will cause total household income to increase in both experiments.

The change of outputs produced by the production sectors causing the change in domestic commodity prices will generally affect the users' demand for domestic and imported commodities. For the household sector, even though total household income increases in both experiments, there exist different effects of changing commodity prices on nominal household consumption such that total household consumption expenditure decreases in experiment 1 while that increases in experiment 2. This is due to the different effects of changing domestic price of Services in the two experiments. Since household consumes Services mostly, then the lower (higher) domestic price of Services will cause the lower (higher) household consumption expenditure on Service, thus leading to the decrease (increase) of total household consumption expenditure or nominal household consumption.

For the investment sector, like the change of total household consumption expenditure, total investment expenditure decreases in experiment 1 while that increases in experiment 2. The reason for these different effects is due to the fact that total investment expenditure is mainly derived from the investment expenditure on domestic Services. Therefore, the lower (higher) domestic price of Services causes the lower (higher) in investment expenditure on Service, thus leading to the decrease (increase) of total investment expenditure. It can be concluded that different effects of total household consumption expenditure and total investment expenditure between the two simulation experiments are due to the different results of changing domestic price of Services.

In both experiments, there exist the same direction of the change in total government revenue and expenditure. The increase of total import value, total income of household, total revenue of the production sectors (the increased output production) and total value of commodity will cause total government revenue to increase in both experiments. Total government revenue will be more increased under experiment 2 as compared to experiment 1 since the increase of all endogenous variables affecting total government revenue under experiment 2 is higher. For the government consumption expenditure, since the aggregate level of government consumption is not assumed to be fixed during the period of study, then government consumptions on all types of commodities increase (not undertaking the change of commodity prices), thus leading to the increase of total government expenditure.

For the effects of productivity increase on exports and imports, there exist different effects of productivity increase on total export value while there exist the same direction of the change in total import value. By looking at the different effects on total export value, in experiment 1, since the prices of most domestic commodities increase, the Thai's exports of these commodities will loss competiveness as compared to foreign's, thus leading to the declining foreign demand for Thai's exports of these commodities and then the declining of total export value. In experiment 2, as opposed to experiment 1, the increase of productivity causes the lower domestic prices of most commodities except Agricultural and mining and Services. Hence, the declining prices of most of domestic commodities will cause the foreign demand for these commodities to increase, thus leading to the increase of total export value.

All users' demand for imported commodities will be affected by the change of relative prices of domestic and imported commodities since there are no change in prices of imported commodities and also import tariff rate imposed on imported commodities. Due to the fact that most of imported commodities (except for imported Services) are commodities intended for intermediate uses of the production sectors, therefore even if there are declining prices of domestic commodities, total demand for imported commodities increase. The increased output production of the production sectors together with the lowered domestic prices in both experiments will cause total demand for imported commodities to increase, thus leading to the increase of total import value in both experiments. Since the output production in experiment 2 is highly increased as compared to experiment 1 together with the lower prices of most domestic commodities, total import value of all commodities in experiment 2 will be more increased as compared to experiment 1.

The effects of productivity increase of domestic production will yield results on nominal gross domestic product through the change of output production and domestic commodity prices. There exist positive effects of FDI productivity spillover on the overall economy in both experiments reflected by the increase of nominal GDP. When comparing the two experiments, the effects of FDI productivity spillover on the overall economy undertaking the role of destination sectors' specific factors in absorbing the productivity advantages transferred from the Motor vehicle sector are more positive as compared to the base case overlooking them.

Table 5.5

The CGE Simulation Results

Variable	Description	Experiment 1	Experiment 2
$a_{X_{met}}$	Total factor productivity of sector ‘met’	0.119%	2.367%
$a_{X_{rub}}$	Total factor productivity of sector ‘rub’	0.103%	2.300%
$a_{X_{com}}$	Total factor productivity of sector ‘com’	0.157%	2.503%
$a_{X_{eng}}$	Total factor productivity of sector ‘eng’	0.009%	1.420%
$a_{X_{ele}}$	Total factor productivity of sector ‘ele’	0.248%	2.742%
$a_{X_{agm}}$	Total factor productivity of sector ‘agm’	0.001%	0.002%
$a_{X_{oma}}$	Total factor productivity of sector ‘oma’	0.045%	1.946%
$a_{X_{ser}}$	Total factor productivity of sector ‘ser’	0.335%	0.383%
va_{met}	Composite primary factor demand of sector ‘met’	-0.107%	-0.828%
va_{rub}	Composite primary factor demand of sector ‘rub’	-0.129%	-1.624%
va_{com}	Composite primary factor demand of sector ‘com’	-0.054%	-1.359%
va_{eng}	Composite primary factor demand of sector ‘eng’	0.044%	-0.919%
va_{ele}	Composite primary factor demand of sector ‘ele’	-0.140%	-1.538%
va_{agm}	Composite primary factor demand of sector ‘agm’	-0.023%	0.153%
va_{oma}	Composite primary factor demand of sector ‘oma’	-0.135%	-1.568%
va_{ser}	Composite primary factor demand of sector ‘ser’	0.092%	0.703%
va_{mot}	Composite primary factor demand of sector ‘mot’	-3.423%	-3.616%
ℓ_{met}	Labor demand of sector ‘met’	-0.114%	-0.897%
ℓ_{rub}	Labor demand of sector ‘rub’	-0.131%	-1.643%
ℓ_{com}	Labor demand of sector ‘com’	-0.059%	-1.404%
ℓ_{eng}	Labor demand of sector ‘eng’	0.037%	-0.983%
ℓ_{ele}	Labor demand of sector ‘ele’	-0.146%	-1.599%
ℓ_{agm}	Labor demand of sector ‘agm’	-0.027%	0.114%

Variable	Description	Experiment 1	Experiment 2
ℓ_{oma}	Labor demand of sector ‘oma’	-0.137%	-1.586%
ℓ_{ser}	Labor demand of sector ‘ser’	0.083%	0.622%
ℓ_{mot}	Labor demand of sector ‘mot’	-3.423%	-3.616%
k_{met}	Capital demand of sector ‘met’	-0.104%	-0.799%
k_{rub}	Capital demand of sector ‘rub’	-0.128%	-1.615%
k_{com}	Capital demand of sector ‘com’	-0.052%	-1.339%
k_{eng}	Capital demand of sector ‘eng’	0.047%	-0.886%
k_{ele}	Capital demand of sector ‘ele’	-0.137%	-1.513%
k_{agm}	Capital demand of sector ‘agm’	-0.021%	0.167%
k_{oma}	Capital demand of sector ‘oma’	-0.135%	-1.560%
k_{ser}	Capital demand of sector ‘ser’	0.097%	0.749%
k_{mot}	Capital demand of sector ‘mot’	-3.423%	-3.616%
w	Wage rate for labor	0.231%	1.218%
r	Rental rate for capital	0.220%	1.111%
x_{met}	Output produced by sector ‘met’	0.012%	1.539%
x_{rub}	Output produced by sector ‘rub’	-0.026%	0.676%
x_{com}	Output produced by sector ‘com’	0.103%	1.144%
x_{eng}	Output produced by sector ‘eng’	0.053%	0.502%
x_{ele}	Output produced by sector ‘ele’	0.108%	1.204%
x_{agm}	Output produced by sector ‘agm’	-0.021%	0.155%
x_{oma}	Output produced by sector ‘oma’	-0.091%	0.378%
x_{ser}	Output produced by sector ‘ser’	0.427%	1.087%
x_{mot}	Output produced by sector ‘mot’	1.577%	1.384%
$p_{met,dom}$	Purchaser price of domestic commodity ‘met’	0.034%	-0.430%
$p_{rub,dom}$	Purchaser price of domestic commodity ‘rub’	0.051%	-0.123%
$p_{com,dom}$	Purchaser price of domestic commodity ‘com’	0.019%	-0.346%

Variable	Description	Experiment 1	Experiment 2
$p_{eng,dom}$	Purchaser price of domestic commodity ‘eng’	0.042%	-0.011%
$p_{ele,dom}$	Purchaser price of domestic commodity ‘ele’	-0.013%	-0.233%
$p_{agm,dom}$	Purchaser price of domestic commodity ‘agm’	0.149%	0.803%
$p_{oma,dom}$	Purchaser price of domestic commodity ‘oma’	0.082%	-0.034%
$p_{ser,dom}$	Purchaser price of domestic commodity ‘ser’	-0.076%	0.545%
$p_{mot,dom}$	Purchaser price of domestic commodity ‘mot’	-0.687%	-0.550%
p_{met}	Composite price of commodity ‘met’	0.015%	-0.193%
p_{rub}	Composite price of commodity ‘rub’	0.038%	-0.092%
p_{com}	Composite price of commodity ‘com’	0.015%	-0.267%
p_{eng}	Composite price of commodity ‘eng’	0.019%	-0.005%
p_{ele}	Composite price of commodity ‘ele’	-0.008%	-0.136%
p_{agm}	Composite price of commodity ‘agm’	0.105%	0.564%
p_{oma}	Composite price of commodity ‘oma’	0.063%	-0.026%
p_{ser}	Composite price of commodity ‘ser’	-0.073%	0.525%
p_{mot}	Composite price of commodity ‘mot’	-0.452%	-0.362%
pid	Average price index	-0.015%	0.152%
$x^{(2)}_{met,dom}$	Household demand for domestic commodity ‘met’	-0.013%	0.168%
$x^{(2)}_{rub,dom}$	Household demand for domestic commodity ‘rub’	-0.022%	0.053%
$x^{(2)}_{com,dom}$	Household demand for domestic commodity ‘com’	-0.010%	0.176%
$x^{(2)}_{eng,dom}$	Household demand for domestic commodity ‘eng’	-0.035%	0.009%
$x^{(2)}_{ele,dom}$	Household demand for domestic commodity ‘ele’	0.014%	0.245%
$x^{(2)}_{agm,dom}$	Household demand for domestic commodity ‘agm’	-0.067%	-0.360%
$x^{(2)}_{oma,dom}$	Household demand for domestic commodity ‘oma’	-0.040%	0.016%
$x^{(2)}_{ser,dom}$	Household demand for domestic commodity ‘ser’	0.047%	-0.333%
$x^{(2)}_{mot,dom}$	Household demand for domestic commodity ‘mot’	0.405%	0.324%
$x^{(2)}_{met,imp}$	Household demand for imported commodity ‘met’	0.014%	-0.176%

Variable	Description	Experiment 1	Experiment 2
$x^{(2)}_{rub,imp}$	Household demand for imported commodity ‘rub’	0.029%	-0.070%
$x^{(2)}_{com,imp}$	Household demand for imported commodity ‘com’	0.011%	-0.206%
$x^{(2)}_{eng,imp}$	Household demand for imported commodity ‘eng’	0.015%	-0.004%
$x^{(2)}_{ele,imp}$	Household demand for imported commodity ‘ele’	-0.002%	-0.035%
$x^{(2)}_{agm,imp}$	Household demand for imported commodity ‘agm’	0.082%	0.443%
$x^{(2)}_{oma,imp}$	Household demand for imported commodity ‘oma’	0.026%	-0.011%
$x^{(2)}_{ser,imp}$	Household demand for imported commodity ‘ser’	0.008%	-0.061%
$x^{(2)}_{mot,imp}$	Household demand for imported commodity ‘mot’	-0.420%	-0.336%
$x^{(2)}_{met}$	Household demand for commodity ‘met’	-0.011%	0.136%
$x^{(2)}_{rub}$	Household demand for commodity ‘rub’	-0.018%	0.042%
$x^{(2)}_{com}$	Household demand for commodity ‘com’	-0.006%	0.107%
$x^{(2)}_{eng}$	Household demand for commodity ‘eng’	-0.006%	0.002%
$x^{(2)}_{ele}$	Household demand for commodity ‘ele’	0.002%	0.038%
$x^{(2)}_{agm}$	Household demand for commodity ‘agm’	-0.059%	-0.316%
$x^{(2)}_{oma}$	Household demand for commodity ‘oma’	-0.028%	0.011%
$x^{(2)}_{ser}$	Household demand for commodity ‘ser’	0.043%	-0.305%
$x^{(2)}_{mot}$	Household demand for commodity ‘mot’	0.183%	0.146%
c^{H}	Total consumption expenditure of a household	-0.006%	0.087%
$x^{(3)}_{met,dom}$	Government demand for domestic commodity ‘met’	3.127%	8.303%
$x^{(3)}_{rub,dom}$	Government demand for domestic commodity ‘rub’	3.127%	8.303%
$x^{(3)}_{com,dom}$	Government demand for domestic commodity ‘com’	3.127%	8.303%
$x^{(3)}_{eng,dom}$	Government demand for domestic commodity ‘eng’	3.102%	8.309%
$x^{(3)}_{ele,dom}$	Government demand for domestic commodity ‘ele’	3.127%	8.310%
$x^{(3)}_{agm,dom}$	Government demand for domestic commodity ‘agm’	3.127%	8.303%
$x^{(3)}_{oma,dom}$	Government demand for domestic commodity ‘oma’	3.126%	8.303%
$x^{(3)}_{ser,dom}$	Government demand for domestic commodity ‘ser’	3.127%	8.303%

Variable	Description	Experiment 1	Experiment 2
$x_{mot,dom}^{(3)}$	Government demand for domestic commodity ‘mot’	3.127%	8.303%
$x_{met,imp}^{(3)}$	Government demand for imported commodity ‘met’	3.154%	7.959%
$x_{rub,imp}^{(3)}$	Government demand for imported commodity ‘rub’	3.178%	8.180%
$x_{com,imp}^{(3)}$	Government demand for imported commodity ‘com’	3.148%	7.922%
$x_{eng,imp}^{(3)}$	Government demand for imported commodity ‘eng’	3.152%	8.296%
$x_{ele,imp}^{(3)}$	Government demand for imported commodity ‘ele’	3.111%	8.030%
$x_{agm,imp}^{(3)}$	Government demand for imported commodity ‘agm’	3.276%	9.106%
$x_{oma,imp}^{(3)}$	Government demand for imported commodity ‘oma’	3.192%	8.276%
$x_{ser,imp}^{(3)}$	Government demand for imported commodity ‘ser’	3.089%	8.575%
$x_{mot,imp}^{(3)}$	Government demand for imported commodity ‘mot’	2.302%	7.643%
g	Total consumption expenditure of the government	3.063%	8.786%
$x_{met}^{(4)}$	Export demand for commodity ‘met’	-0.170%	2.150%
$x_{rub}^{(4)}$	Export demand for commodity ‘rub’	-0.257%	0.614%
$x_{com}^{(4)}$	Export demand for commodity ‘com’	-0.096%	1.732%
$x_{eng}^{(4)}$	Export demand for commodity ‘eng’	-0.209%	0.055%
$x_{ele}^{(4)}$	Export demand for commodity ‘ele’	0.067%	1.163%
$x_{agm}^{(4)}$	Export demand for commodity ‘agm’	-0.746%	-4.015%
$x_{oma}^{(4)}$	Export demand for commodity ‘oma’	-0.410%	0.167%
$x_{ser}^{(4)}$	Export demand for commodity ‘ser’	0.001%	-0.006%
$x_{mot}^{(4)}$	Export demand for commodity ‘mot’	3.436%	2.750%
e	Total export values	-0.018%	0.772%
$x_{met,dom}^{(5)}$	Investment demand for domestic commodity ‘met’	-0.020%	0.252%
$x_{rub,dom}^{(5)}$	Investment demand for domestic commodity ‘rub’	-0.013%	0.031%
$x_{com,dom}^{(5)}$	Investment demand for domestic commodity ‘com’	-0.017%	0.299%
$x_{eng,dom}^{(5)}$	Investment demand for domestic commodity ‘eng’	-0.032%	0.009%
$x_{ele,dom}^{(5)}$	Investment demand for domestic commodity ‘ele’	0.013%	0.228%

Variable	Description	Experiment 1	Experiment 2
$x^{(5)}_{agm,dom}$	Investment demand for domestic commodity ‘agm’	-0.021%	-0.114%
$x^{(5)}_{oma,dom}$	Investment demand for domestic commodity ‘oma’	-0.047%	0.019%
$x^{(5)}_{ser,dom}$	Investment demand for domestic commodity ‘ser’	0.000%	0.000%
$x^{(5)}_{mot,dom}$	Investment demand for domestic commodity ‘mot’	0.135%	0.108%
$x^{(5)}_{met,imp}$	Investment demand for imported commodity ‘met’	0.007%	-0.092%
$x^{(5)}_{rub,imp}$	Investment demand for imported commodity ‘rub’	0.038%	-0.091%
$x^{(5)}_{com,imp}$	Investment demand for imported commodity ‘com’	0.005%	-0.082%
$x^{(5)}_{eng,imp}$	Investment demand for imported commodity ‘eng’	0.018%	-0.005%
$x^{(5)}_{ele,imp}$	Investment demand for imported commodity ‘ele’	-0.003%	-0.051%
$x^{(5)}_{agm,imp}$	Investment demand for imported commodity ‘agm’	0.128%	0.689%
$x^{(5)}_{oma,imp}$	Investment demand for imported commodity ‘oma’	0.018%	-0.008%
$x^{(5)}_{ser,imp}$	Investment demand for imported commodity ‘ser’	-0.038%	0.273%
$x^{(5)}_{mot,imp}$	Investment demand for imported commodity ‘mot’	-0.690%	-0.552%
i	Total investment expenditure	-0.069%	0.224%
md_{met}	Total demand for imported commodity ‘met’	0.179%	0.853%
md_{rub}	Total demand for imported commodity ‘rub’	0.245%	0.810%
md_{com}	Total demand for imported commodity ‘com’	0.119%	0.571%
md_{eng}	Total demand for imported commodity ‘eng’	0.822%	0.854%
md_{ele}	Total demand for imported commodity ‘ele’	0.097%	0.898%
md_{agm}	Total demand for imported commodity ‘agm’	0.128%	1.263%
md_{oma}	Total demand for imported commodity ‘oma’	0.040%	0.210%
md_{ser}	Total demand for imported commodity ‘ser’	0.029%	0.044%
md_{mot}	Total demand for imported commodity ‘mot’	0.911%	0.881%
m	Total import value	0.133%	0.676%
z^{0}_{met}	Total value of commodity ‘met’	0.120%	0.968%
z^{0}_{rub}	Total value of commodity ‘rub’	0.081%	0.618%

Variable	Description	Experiment 1	Experiment 2
z_{com}^{0}	Total value of commodity 'com'	0.121%	0.746%
z_{eng}^{0}	Total value of commodity 'eng'	0.490%	0.688%
z_{ele}^{0}	Total value of commodity 'ele'	0.096%	0.941%
z_{agm}^{0}	Total value of commodity 'agm'	0.128%	1.049%
z_{oma}^{0}	Total value of commodity 'oma'	0.003%	0.313%
z_{ser}^{0}	Total value of commodity 'ser'	0.339%	1.573%
z_{mot}^{0}	Total value of commodity 'mot'	0.897%	0.850%
$\Delta TBAL$	Trade balance (% change)	-2.434%	3.098
ΔS^{F}	Net capital flows (% change)	2.434%	-3.098
y^{H}	Total income of a household	0.223%	1.147%
yd^{H}	Disposable income of a household	0.223%	1.147%
ΔS^{H}	Household savings (% change)	0.685%	3.285%
y_{1}^{G}	Import tariff revenue of the government	0.261%	0.700%
y_{2}^{G}	Personal income tax revenue of the government	0.223%	1.147%
y_{3}^{G}	Corporate income tax revenue of the government	0.235%	1.242%
y_{4}^{G}	Indirect tax revenue of the government	0.235%	1.088%
gr	Total government revenue	0.240%	1.033%
ΔS^{G}	Government savings (% change)	6.719%	18.082%
gdp	Gross domestic product	0.227%	1.138%
pid	Average price index	-0.015%	0.152%
$rgdp$	Real gross domestic product	0.242%	0.986%
rw	Real wage rate for labor	0.246%	1.066%
rr	Real rental rate for capital	0.235%	0.960%