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A STUDY ON INTERNAL LABOR MOVEMENT AND POLICY MULTIPLIER IN THAILAND

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Abstract

The main objective of this paper is trying to measure the effectiveness of selected supply side and demand side policies on Thai economy by using Computable General Equilibrium (CGE) model. We found that there is a special characteristic of the unskilled labor movement among agricultural sector and other sectors in Thailand and this characteristic can represented by Harris-Todaro expected wage equation. Therefore, we developed the CGE model incorporating Harris-Todaro expected wage equilibrium for the labor market. The simulation result shows that, for selected supply side policy, the reduction of switching cost, increasing labor productivity (which are selected supply side policy), increasing in government spending and export promotion (which are selected demand side policy) can contribute positive impacts to Thai economy. Interestingly, we found that if both the reduction of switching cost and the increasing labor productivity are implemented together, they will generate even more positive impacts to Thai economy than separately implemented. This finding suggests policy maker should implement both the reduction of switching cost and the increasing labor productivity together in order to gain more benefit to Thai economy. These two policies are supply side policy and related to labor market, thus improving labor market is a great choice for Thailand. Lastly, we found that all policies have the similar non-linear characteristic.

Keywords: Supply-Side and Demand-Side Policies, Computable General Equilibrium, Harris-Todaro Equation, Non-Linear Characteristic

1. Introduction

Thailand has been gradually transforming its structure from the agricultural-based nation to the export-driven economy since the implementation of its first National Economic and Social Development Plan in 1950s. This transformation greatly influenced the expansion of national GDP. This caused the demand of labor in the agriculture declined while demand for manufacturing and service sectors increased. In addition, it also created a very unique characteristic of the Thailand's labor market, allowing the seasonal migration between the agricultural sector and non-agricultural sectors. This seasonal pattern is studied by Sussangkarn (1987), Sussangkarn and Chalamwong (1994), and Ashakul (1996). Continuing this migration behavior in 1980s and 1990s, the seasonal migration of labor still exists as shown in Figure 1, illustrating the mirroring pattern of employments in agricultural and non-agricultural sectors. Especially, the growing season in Thailand starts in July and ends in December,

therefore the employment in agricultural sector follows the same pattern. Every year, the agricultural employment cycle reaches its first highest point when farmers start to grow their crops in July and August, and this cycle forms the next peak during the harvest season from November to December. Therefore, the employment in agricultural sector oscillates with the pattern based on this fact and it also causes the mirroring cycle of employment in non-agricultural sectors due to labors migrating between agricultural and non-agricultural sectors.

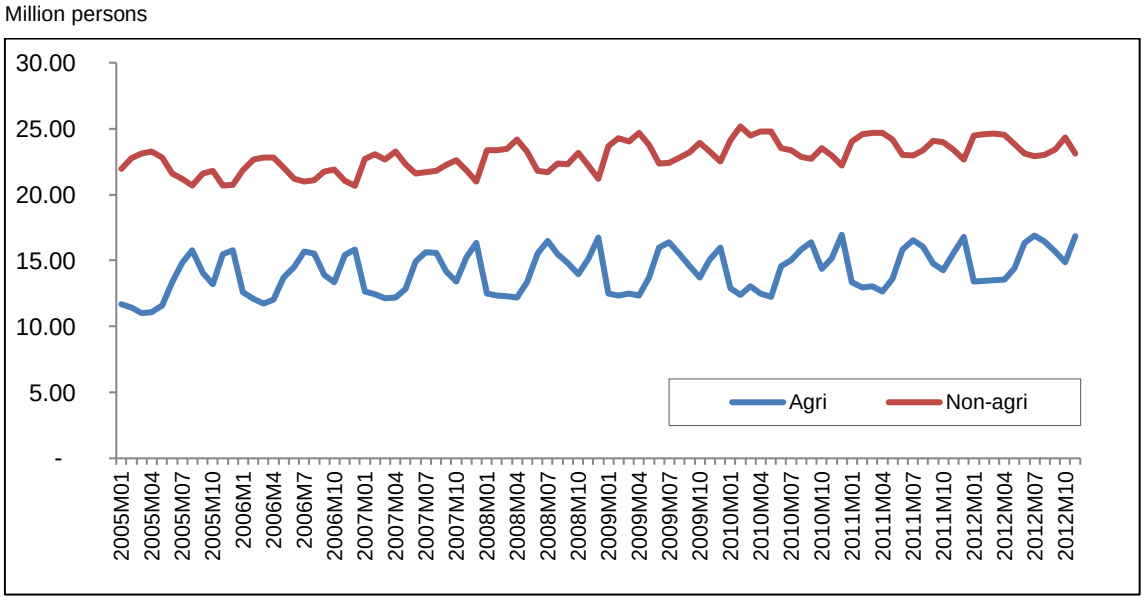

Figure 1. Seasonal employment in agricultural and non-agricultural sectors in Thailand during 2005 – 2012.
Source: The Labor Force Survey, Ministry of Labor, Thailand

In addition to this mirroring cyclical pattern, there also exists the evidence of relationship between the expected sectoral wage, the sectoral employment and the switching cost in Thai labor market. This relationship follows the concept of Harris and Todaro (1970), explaining the internal migration pattern based on the expected wages among sectors. As mathematically indicated in Eq. 1, the worker would earn the wage of $wage_{agri}$ if she works in the farm, and this earning is adjusted by the probability to get this job ($prob(employment_{agri})$), forming the value of expected wage if she works in the agricultural sector ($prob(employment_{agri}) \cdot wage_{agri}$). On the other hand, this worker would earn the income from working in other sectors (the non-agricultural sectors or *nagri*) but it has to be adjusted by the probability to get a job in those sectors. Following Harris-Todaro's concept, the behavior of internal migration between agricultural and non-agricultural sectors can be mathematically represented by the expected wage equilibrium as shown in Eq. 1.

$$prob(employment_{agri}) \cdot wage_{agri} = \sum_{nagri}(prob(employment_{nagri}) \cdot wage_{nagri}) - switching\ cost \quad (1)$$

where $prob\,(employment_{agri}) = \frac{employment_{agri}}{total\ labor\ supply}$,

and $prob\,(employment_{nagri}) = \frac{employment_{nagri}}{total\ labor\ supply}$

When placing the historical data of sectoral employment, sectoral wage, and total labor supply of Thailand into Eq. 1, there exists a residual term representing the switching cost that incurs when the worker migrates from the agricultural sector to others. As shown in Figure 2, after deflating this series of switching cost (the series of nominal values of switching cost is deflated by using the series of Consumer Price Index (CPI) with the base year of 2005), its

value shows the seasonal pattern and the consistent range of oscillation. Therefore, based on these evidences, it is found that the internal migration of labors in Thailand follows the Harris-Todaro's concept of expected wage equilibrium.

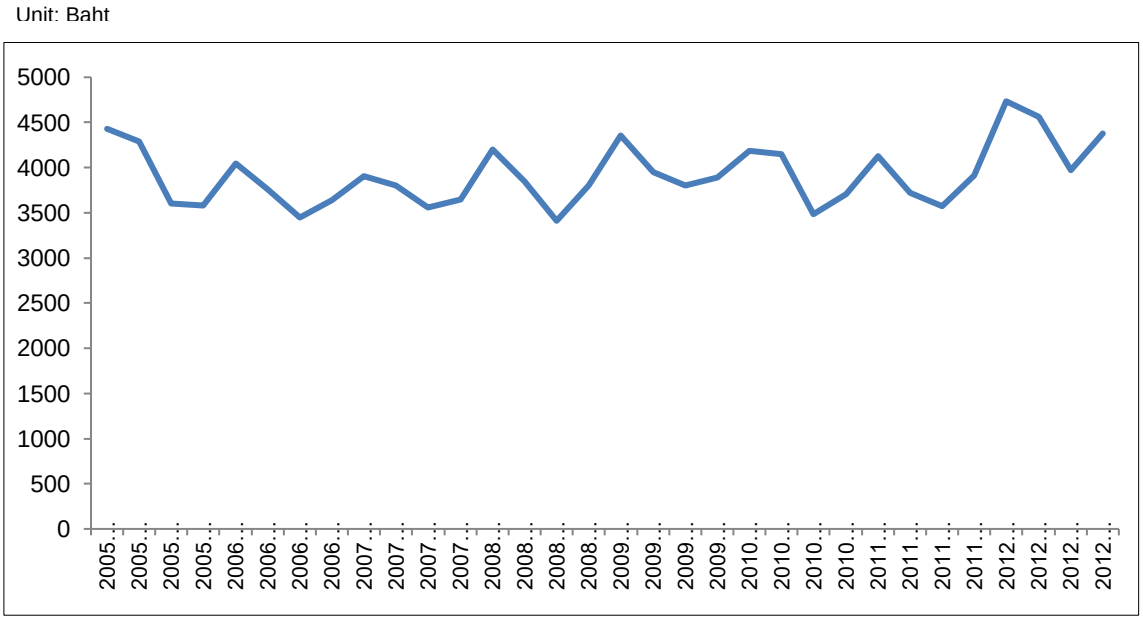

Figure 2. The time series of the deflated switching cost during 2005 - 2012
Source: Authors' calculation based on the date obtained from the Labor Force Survey, Ministry of Labor, Thailand.

From these findings of the consistent pattern of internal migration which conforms to the concept of Harris-Todaro's expected wage, this paper is aimed at developing the CGE model for Thailand which incorporates the expected wage equilibrium equation in order to explore the effects of supply side and demand side policies. This paper is organized as follows. The second section introduces the review of literatures related to the economic impact of migration, CGE models studying labor migration, and impacts of policies. The third part describes the CGE model's main structure and its special features developed for this study. The last part concludes main findings of this research and also suggests key issues for future studies.

2. Literature Review

The most common aspects of the labor market study are the analysis of the inter-relationship between macroeconomic conditions and the labor movement. Thailand Development Research Institute (TDRI) (2004) used a computable general equilibrium (CGE) model to find the impact of immigrants from neighboring countries on the wages in Thailand. They used the data in year 1995 and found that if there are 700,000 unauthorized migrants, the wages of native unskilled labors would decrease by 3.5 percent comparing to no immigrants. Kulkolkarn (2007) used a geographic approach to study the impact of immigration on unemployment rates and native wages. She found that if there is a 1 percent increase in immigration in 2001, natives' unemployment rate will increase about 0.5 percent in a province in Thailand in 2005. In addition, she claimed that unskilled labors are most affected by the immigration. However, she did not find the effect of immigration on wages.

In contrast with Borjas (1994), he did not find the negative impact of migrants on employment in the United States and European but he found a small negative impact on minimum native wages. This is because unskilled migrants may fill jobs not wanted by domestic labors (Yarbrough and Yarbrough, 2006). The difference result between Thailand and Western countries is the number of unskilled labors employed in tradable sectors. In Thailand, tradable

sectors, especially agriculture and fisheries, mainly employ unskilled labors. Since tradable sectors are highly competitive in the world market, firms are unable to raise price to respond higher wages but instead firms tend to hire the migrants, which are abundant, from neighboring countries to maintain the minimum wages. Therefore, between Thailand and Western cases is different in both qualitative and quantitative (Kulkolkarn, 2007).

Kulkolkarn and Potipiti (2009) analyzed the impact of immigration on labor markets in a receiving country. They claimed that immigrants are substitute or complement to native labors in the job markets depending on the number of immigrants. When there are small numbers of immigrants, they will harm native labors by depressing wages in the unskilled labor segment. This leads to the movement of native labors to other sectors. These sectors may require native language which is a barrier to enter for immigrants. However, if there is further immigration, immigrants will become complement to native labors through the efficiency gain from the division of labor between native and immigrants. This is because labor markets eventually become completely segmented. Nevertheless, too many immigrants will harm native labors because they start to enter and compete for jobs.

Gonzalez and Ortega (2011) found that the unskilled migration inflows did not affect the wages or employment rates of unskilled labors in the receiving regions. The increase in the unskilled labor force was absorbed mostly through increases in total employment which did not originate from increases in output but was instead driven by changes in skill intensities at the industry level. The receiving regions that received a large inflow of unskilled migrants would adapt to use more unskilled labors or increase the intensity of unskilled labor uses. They concluded that the industries those respond for this absorption were retail, construction, hotels and restaurants and domestic services. All these industries produce non-traded goods.

There were variety of model uses in order to explore the economic impact of labor movement. In this paper, we explore the economy-wide perspective on the interaction between labor movement and macroeconomic factors by using a single country CGE model. This is because, firstly, the CGE model is a standard and widely used tool to examine the impacts of shocks on economy in industry or country levels. Secondly, the CGE model can capture the inter-relationships between agents, industries, and activities.

Since the introduction of Harris-Todaro (HT)'s concept of expected wage equilibrium in 1970, a large number of literatures have been conducted to deepen and broaden its details and implications. The main contributors are Khan (1980) who developed the generalized HT (GHT); and Bhagwati and Srinivasan (1973; 1974; 1977) who incorporated the HT equilibrium with analyses of fixed urban wages and wage subsidies. In addition, the HT concept has been connected with various issues, such as the export of rural or urban commodities (Khan and Lin, 1982), the educated unemployed (Chaudhuri and Khan, 1984), the distorted capital market (Khan and Naqvi, 1983), and the introduction of informal sectors (Fields, 1975; Stiglitz, 1982).

On the contrary to the development of HT concept, there are still a limited number of CGE models that incorporate the HT equilibrium, like the works of Stifel and Thorbecke (2003) who constructed the CGE model to explore the impact of reducing tariffs on the stylized African economy and Khan (2005) who developed a similar CGE model for Pakistan. Razacka *et al.* (2009) developed a CGE model for India by incorporating Harris-Todaro economic characteristics of labor migration. Harris-Todaro migration equilibrium condition states that the wages in the agricultural sector equal to the manufacturing wage times the probability of getting employed in the manufacturing sector. In equilibrium, rural wage must equal the expected wage in the urban sector. They used the model to analyze the effects of agricultural production subsidy policies. Their findings showed that agricultural production subsidy increases agricultural production, reduces unemployment, raises the wage rate in the agriculture sector, increases the consumption among the rural and urban households, and increases the rental rate for capital in agricultural sector.

For the selected literatures those using CGE model to explore the inter-relationship between macroeconomic conditions and the labor movement are as follow. Iregui (2003) used a multiregional CGE model to investigate the worldwide efficiency gains from the elimination of global restrictions on labor movement. He found that the elimination of global restrictions on the labor migration generates worldwide efficiency gains ranging from 15 percent to 67 percent of

world GDP. However, when only skilled labor migrates, worldwide efficiency gains are smaller because skilled labor represents a small fraction of the labor force. Similarly, Nana *et al.* (2009) reported that high skill targeted immigration did not appear to significantly increase the overall benefits to economy. They argued that when an economy grows labor is required at all levels.

Moreover, Park (2007) and Chen and Groenewold (2011) simulated various policies shocks and claimed that only a reduction in inter-regional labor migration restrictions able to reduces income disparity, increases aggregate output, improves income and welfare at the same time, while all other policies considered face a trade-off in at least one dimension. However, Xu and Li (2008) reported that inter-regional labor migration has little effect on the regional income disparity, mainly, due to the effect of capital-chasing-labor. In other word, the capital will move accompany with labor migration.

In addition, Sudtasan and Suriya (2014) forecasted the impact of skilled labor movement in ASEAN Economic Community (AEC) on Thai economy. They simulated the impact of skilled labor movements in eight occupations that are allowed by the AEC agreement. The inward skilled labor movements in all eight occupations will yield a positive impact to the Thai economy. Weyerbrock (1995) supported that immigration is economically benefit in the long-run, while there would have the adjustment problems in the short- and medium-run. However, he suggested that such problems can be reduced significantly, if government responds to massive labor immigration with small wage cuts. In addition, Fougere *et al.* (2004) calculated an expected future immigration flows would contribute to reduce a negative impact of ageing on real per capita GDP by roughly 30 percent.

For the studies of the inter-relationship between macroeconomic conditions and demand-side policy by using CGE model are as follow. Akapaiboon (2010), Carneiro and Arbache (2003) and Raihan (2010) investigated the effect of trade liberalization, representing by removing tariff. The simulation results showed that trade liberalization has a positive effect on economic welfare in Thailand, Brazil and Bangladesh. Akapaiboon (2010) suggested that the manufacturing sector's output expands after trade liberalization, while the output of the agricultural sector declines because there was a movement of labor out of agricultural sectors into the expanding manufacturing and service sectors after trade reform. At the micro level, household income is found to increase mainly due to an increase in unskilled and skilled wages. Moreover, Carneiro and Arbache (2003) explored the impacts of export promotion and productivity shocks on the economy. For, the export promotion policy shock, they imposed a 20 percent increase in export leading to domestic inflation rates fall by 0.26 percent and real GDP rises by 0.53 percent. For the productivity shock, they imposed a 10 percent rise in the shift parameter of the production function leading to greater efficiency contributes to lower prices by dropping the inflation rate by 7.7 percent. Real GDP increases by nearly 10 percent.

CGE model allows researcher to simulate numerous economic shocks or policy choices such as migrant restriction and trade liberalization in order to measure these impacts on economy. This paper is trying to measure the effectiveness of selected supply side and demand side policies on Thai economy by using CGE model. Moreover, there is still a gap of the research examining the internal migration with CGE model, coupled with Harris-Todaro expect equilibrium, particularly in the case of Thailand. Hence, this paper aims at filling this research gap by applying this research methodology to the actual data of Thai economy. In this paper we will use the labor productivity and switching cost as supply side shocks and government spending and export promotion as demand side shocks in order to measure the macroeconomic impacts.

3. Methodology

The CGE model structure follows the static CGE model developed by Decaluwe *et al.* (2012), which enables adjustment of price and quantity of most goods and input factors. In this study, the full mathematical details of this model are available upon request and the main assumptions of the CGE model include:

- Producers have the main purpose to maximize profit and production behavior under the constant-return-to-scale condition.

- Consumers aim at maximizing utility under budget constraints, and deciding about consuming a combination of domestic and imported goods.
- All markets of goods and services are in equilibrium and prices are equilibrating variables.
- There is non-linear behavior in the frictional substitution mechanism between domestic and export products and the similar frictional mechanism of substitution between domestic and imported goods.
- Institutions in the model include five groups of households, the government, the aggregate representative of corporations, and the rest of the world.
- The Social Accounting Matrix (SAM) of Thailand in 2010 is the main source of data, including 40 production activities, 49 commodities, the aggregate household, the government, and the rest of the world.
- There is one type of labor and also one type of capital.

In addition to standard features of CGE model stated above, this study incorporates a special characteristic of the developed model. As mentioned in the introduction part, there exists the consistent pattern of internal migration in Thailand, and this seasonal behavior empirically follows the concept of Harris-Todaro's expected wage equilibrium. Hence, this study incorporates the equation governing the sectoral employment and sectoral wage in the model. Specifically the labor market mechanism is modified by introducing the expected wage equilibrium. Based on the name assigned to variables and parameters in the standard CGE model introduced by Decaluwe *et al.* (2012), its mathematical representative is shown in Eq. 2.

$$\frac{LD_{agri}}{LS} \cdot WTI_{agri} = \sum_{nagri} \frac{LD_{nagri}}{LS} \cdot WTI_{nagri} - \frac{SWCOST}{PIXCON} \quad (2)$$

$$LS = \sum_{nagri} LD_{nagri} + LD_{agri} \quad (3)$$

The LD_{agri} is the demand for labor in the agricultural sector and LD_{nagri} is the demand for labor for each sector in the set of *nagri* which is comprised of non-agricultural activities. Also in this model, *LS* represents the total labor supply and *WTI* is the sectoral wage, while *SWCOST* identifies the switching cost's value and *PIXCON* corresponds to the value of Consumer Price Index (CPI). Following the empirical finding as shown on Figure 2, the value of *SWCOST* is fixed, representing the stability of the deflated switching cost. The inclusion of this equation governs the simultaneous adjustments of sectoral wages and sectoral employment in the model to follow the actual behavior of labor movement as discussed in the first section. The wage in agricultural sector, WTI_{agri}, is assigned to be endogenous, due to its flexibility. In addition to the expected wage equation, Eq. 3 is included in the model to equate the total demand and total supply of labor.

Because the internal migration is the unique characteristics of Thai labor market, the simulation in this study mainly concentrates on the improving Thailand's production capability through the reduction of switching cost, which would allow more flexibility in sectoral migration and subsequently enhance the aggregate production of the country. The simulation result of this lowering switching cost is compared with the result of simulating the increasing labor productivity, which is the most common recommendation towards the improvement of the production capability. The result of simulation and comparison is shown in the following section.

4. Results

There are three sets of simulations performed. The first set shows nation-wide impacts (selected macroeconomic indicators) of altering values of supply side policies, which are switching cost and labor productivity. The second set shows nation-wide impacts of altering values of demand side policies which are government spending and export promotion. The last set of simulation demonstrates the nation-wide impacts caused by altering values of both switching cost and labor productivity in order to show the multiplier effect.

Table 1 shows the results from six simulations of altering the switching costs in both positive and negative directions with the steps of 10%, 5%, 2.5%, -2.5%, -5%, and -10%. Because the lowered switching cost contributes to the less friction and more mobility in labor migration, this change leads to the economy-wide positive responses. According to equation 2 and 3, lowered switching cost by 10%, labor supply increases by 11.46% which results to wage of both agricultural and non-agricultural decline by 8.53%, demand of agricultural sector increases by 4.04% while demand of non-agricultural sectors increase by 12.60% in average. This suggests that labors prefer to move to higher pay sectors. In contrast, higher switching cost by 10%, labor supply decreases by 9.35% which results to wage of both agricultural and non-agricultural increase by 8.45%, demand of agricultural sector decreases by 3.38% while demand of non-agricultural sectors decrease by 10.14% in average.

From Table 1, the key macro indicators indicate the expansion of the economy induced by the extension of supply side capability, where the consumer price index (CPI) declines but the real GDP, private income, private consumption and government income increase. On the other hand, the simulation result specifies that the rising value of switching cost will cause the contraction of supply side capability, leading to the higher inflation and the decrease in the real GDP, private income, private consumption and government income. Interestingly, the non-linear characteristic of this CGE model shows the non-linear responses of the economy to the variation of switching cost. The adjustment of selected macroeconomic variables on Table 1 does not change in the same proportion of percentage as those of switching cost. In addition, the magnitudes of positive responses are greater than those of negative ones. It indicates non-linear characteristic response to the shock.

Table 1. Simulation results from altering values of switching cost (selected macroeconomic indicators)

	Private Consumption		Real GDP		CPI		Govt Income		Private Income	
	Value**	% change	Value**	% change	Value	% change	Value**	% change	Value**	% change
Base-case	5,810.61	0.00	9,128.53	0.00	1.000	0.00	1,964.33	0.00	9,441.26	0.00
Switching cost + 10.0%	5,803.27	-0.13	9,113.30	-0.17	1.019	1.94	1,946.93	-0.89	9,429.34	-0.13
Switching cost + 5.0 %	5,806.62	-0.07	9,120.36	-0.09	1.010	0.99	1,955.33	-0.46	9,434.77	-0.07
Switching cost + 2.5%	5,808.53	-0.04	9,124.30	-0.05	1.005	0.50	1,959.75	-0.23	9,437.88	-0.04
Switching cost - 2.5%	5,812.87	0.04	9,133.06	0.05	0.995	-0.51	1,969.09	0.24	9,444.93	0.04
Switching cost - 5.0 %	5,815.32	0.08	9,137.92	0.10	0.990	-1.03	1,974.02	0.49	9,448.92	0.08
Switching cost - 10.0%	5,820.84	0.18	9,148.68	0.22	0.979	-2.10	1,984.47	1.03	9,457.89	0.18

Notes: ** the value is in the unit of thousand millions baht

Table 2 shows the simulation results obtained from altering the labor productivity with the steps of -10%, -5%, -2.5%, 2.5%, 5%, and 10%. The increasing labor productivity leads to the same positive economy-wide impacts as in the case of the reduction of switching cost.

Higher labor productivity by 10%, resulting to wage of both agricultural and non-agricultural increase by 1.47%, demand of agricultural sector decreases by 5.78% while demand of non-agricultural sectors increase by 1.21% in average. This suggests that change in wage in agricultural sector is more sensitive than non-agricultural sectors. In contrast, lower labor productivity by 10%, resulting to wage of both agricultural and non-agricultural decrease by 1.55%, demand of agricultural sector increases by 6.98% while demand of non-agricultural sectors decrease by 1.27% in average.

With the higher labor productivity, the supply-side capability is increased with the lowered cost of production and it subsequently influences the expansion of the economy where the real GDP, private income, private consumption, and government income increase with the decreased CPI. On the contrary, the decreasing labor productivity will cause the lowered production capability which will result in higher inflation and the decrease of the real GDP, private income, private consumption, and government income.

Interestingly, both simulation results of altering switching cost and labor productivity show the similar responses of the economy. Especially, the magnitudes of response of selected

macroeconomic variables are almost identical. For example, the effects of 2.5% increase in labor productivity are mostly at the same magnitude of effects from 2.5% reduction in the switching cost. Also, this similarity occurs to the case of 2.5% reduction in labor productivity and 2.5% increase in switching cost. This indicates increase in labor productivity and reduction of switching cost can be substituted to each other.

Table 2. Simulation results from altering values of labor productivity (selected macroeconomic indicators)

	Private Consumption		Real GDP		CPI		Govt Income		Private Income	
	Value**	% change	Value**	% change	Value	% change	Value**	% change	Value**	% change
Base-case	5,810.61	0.00	9,128.53	0.00	1.000	0.00	1,964.33	0.00	9,441.26	0.00
Labor productivity - 10.0%	5,802.61	-0.14	9,111.87	-0.18	1.022	2.15	1,945.14	-0.98	9,428.26	-0.14
Labor productivity - 5.0%	5,806.42	-0.07	9,119.96	-0.09	1.010	1.04	1,954.87	-0.48	9,434.46	-0.07
Labor productivity - 2.5%	5,808.48	-0.04	9,124.20	-0.05	1.005	0.51	1,959.64	-0.24	9,437.79	-0.04
Labor productivity + 2.5%	5,812.81	0.04	9,132.95	0.05	0.995	-0.50	1,968.97	0.24	9,444.84	0.04
Labor productivity + 5.0%	5,815.08	0.08	9,137.44	0.10	0.990	-0.98	1,973.54	0.47	9,448.52	0.08
Labor productivity + 10.0%	5,819.77	0.16	9,146.62	0.20	0.981	-1.91	1,982.51	0.93	9,456.15	0.16

Notes: ** the value is in the unit of thousand millions baht.

Table 3 shows the simulation results obtained from altering the government spending with the same adjustment as conducted in the case of labor productivity. With the higher government spending, demand is increased leading to the expansion of the economy where the real GDP, private income, private consumption, and government income increase with the increased CPI. On the contrary, the decreasing government spending will cause the lowered demand leading to lower inflation and the decrease in the real GDP, private income, private consumption, and government income.

Table 3. Simulation results from altering values of government spending (selected macroeconomic indicators)

	Private Consumption		Real GDP		CPI		Govt Income		Private Income	
	Value**	% change	Value**	% change	Value	% change	Value**	% change	Value**	% change
Base-case	5,810.61	0.000	9,128.53	0.000	1.000	0.000	1,964.33	0.000	9,441.26	0.000
Government spending - 10.0%	5,749.29	-1.055	9,031.01	-1.068	0.996	-0.389	1,942.65	-1.104	9,341.62	-1.055
Government spending - 5.0%	5,779.94	-0.528	9,079.75	-0.534	0.998	-0.193	1,953.50	-0.552	9,391.42	-0.528
Government spending - 2.5%	5,795.27	-0.264	9,104.13	-0.267	0.999	-0.096	1,958.92	-0.276	9,416.34	-0.264
Government spending + 2.5%	5,825.95	0.264	9,152.93	0.267	1.001	0.095	1,969.75	0.276	9,466.19	0.264
Government spending + 5.0%	5,841.30	0.528	9,177.34	0.535	1.002	0.189	1,975.16	0.551	9,491.12	0.528
Government spending + 10.0%	5,872.01	1.057	9,226.19	1.070	1.004	0.375	1,985.97	1.102	9,541.02	1.057

Notes: ** the value is in the unit of thousand millions baht.

Table 4 shows the simulation results obtained from altering the export with the same adjustment as conducted in the case of labor productivity. The increasing export leads to the same positive economy-wide impacts as in the case of increased government spending. With the higher export, demand is increased leading to the expansion of the economy where the real GDP, private income, private consumption, and government income increase with the increased CPI. On the contrary, the decreasing export will cause the lowered demand leading to lower inflation and the decrease of the real GDP, private income, private consumption, and government income.

Table 4. Simulation results from altering values of export (selected macroeconomic indicators)

	Private Consumption		Real GDP		CPI		Govt Income		Private Income	
	Value**	% change	Value**	% change	Value	% change	Value**	% change	Value**	% change
Base-case	5,810.61	0.00	9,128.53	0.00	1.000	0.00	1,964.33	0.00	9,441.26	0.00
Export - 10.0%	5,362.42	-7.71	8,414.90	-7.82	0.976	-2.44	1,810.91	-7.81	8,713.02	-7.71
Export - 5.0%	5,587.25	-3.84	8,772.85	-3.90	0.988	-1.19	1,887.91	-3.89	9,078.34	-3.84
Export - 2.5%	5,699.11	-1.92	8,950.97	-1.95	0.994	-0.59	1,926.19	-1.94	9,260.09	-1.92
Export + 2.5%	5,921.75	1.91	9,305.54	1.94	1.006	0.58	2,002.34	1.93	9,621.85	1.91
Export + 5.0%	6,032.55	3.82	9,482.02	3.87	1.011	1.14	2,040.21	3.86	9,801.87	3.82
Export + 10.0%	6,253.13	7.62	9,833.42	7.72	1.022	2.24	2,115.56	7.70	10,160.28	7.62

Notes: ** the value is in the unit of thousand millions baht.

Interestingly, if we implement both lowering switching cost and improving the labor productivity together, they will generate more positive effects to the economy than separately implement each one. Table 5 shows the effect of this combination into the model. Then, we obtained the net effect (combination policies – base-case) on private consumption, real GDP, CPI, government income, and private consumption for each altering value of switching cost and labor productivity. We only simulate the positive shock because we want to see the economic response of the combined policy if they are implemented.

Table 5. Simulation results from altering values of switching cost and labor productivity and their combination effect (selected macroeconomic indicators)

	Private Consumption	Real GDP	CPI	Govt Income	Private Income
	Value**	Value**	Value	Value**	Value**
Base-case	5,810.61	9,128.53	1.000	1,964.33	9,441.26
Switching cost - 2.5% and labor productivity + 2.5%	5,815.20	9,137.67	0.990	1,973.78	9,448.72
Net effect	4.589	9.147	-0.010	9.441	7.457
Switching cost - 5.0% and labor productivity + 5.0%	5,820.28	9,147.59	0.980	1,983.44	9,456.97
Net effect	9.671	19.067	-0.020	19.107	15.714
Switching cost - 10.0% and labor productivity + 10.0%	5,831.89	9,169.71	0.960	2,003.49	9,475.84
Net effect	21.281	41.187	-0.040	39.160	34.578

Notes: ** the value is in the unit of thousand millions baht.

Table 6 shows the effect of the reduction of switching cost and increase in labor productivity individually on private consumption, real GDP, CPI, government income, and private consumption. Then we sum both value of the reduction of switching cost and increase in labor productivity in order to compare them to the combination one (Table 5).

Table 6. Magnitudes of impacts caused by altering values of switching cost and labor productivity and their effect (selected macroeconomic indicators)

	Private Consumption	Real GDP	CPI	Govt Income	Private Income
	Value**	Value**	Value	Value**	Value**
Net effect of switching cost - 2.5%	2.261	4.534	-0.005	4.753	3.675
Net effect of labor productivity + 2.5%	2.204	4.420	-0.005	4.635	3.581
Sum	4.466	8.954	-0.010	9.388	7.256
Net effect of switching cost - 5.0%	4.713	9.392	-0.010	9.686	7.659
Net effect of labor productivity + 5.0%	4.471	8.915	-0.010	9.209	7.265
Sum	9.185	18.306	-0.020	18.895	14.924
Net effect of switching cost - 10.0%	10.234	20.156	-0.021	20.138	16.629
Net effect of labor productivity + 10.0%	9.166	18.089	-0.019	18.176	14.893
Sum	19.400	38.245	-0.040	38.314	31.522

Notes: ** the value is in the unit of thousand millions baht.

Table 7 shows the additional effect (or multiplier effect) of the combination policy (combination policy – sum of switching cost and labor productivity). For the combination of lowering switching cost -2.5% and improving labor productivity +2.5%, real GDP will gain more 193 million baht or 2.161% than implement both switching cost -2.5% and labor productivity +2.5% separately. In addition, GDP will gain more 14.596% in the case of lowering switching cost -10.0% and improving labor productivity +10.0%. Interestingly, the more magnitude of both policies implements, the more multiplier effect, especially on real GDP.

Table 7. Comparison of magnitudes of impacts caused by altering values of switching cost and labor productivity and their additional effect (selected macroeconomic indicators)

	Private Consumption	Real GDP	CPI	Govt Income	Private Income
	Value**	Value**	Value	Value**	Value**
Switching cost - 2.5% and labor productivity + 2.5%	0.124	0.193	0.000	0.053	0.201
Surplus	2.769%	2.161%	-0.251%	0.565%	2.769%
Switching cost - 5.0% and labor productivity + 5.0%	0.486	0.760	0.000	0.212	0.790
Surplus	10.871%	8.531%	-1.012%	2.300%	10.871%
Switching cost - 10.0% and labor productivity + 10.0%	1.881	2.942	0.000	0.846	3.055
Surplus	18.375%	14.596%	-1.821%	4.200%	18.375%

Notes: ** the value is in the unit of thousand millions baht

The comparison of similarity from changes in labor productivity and the switching cost is concluded on Table 1 and 2. The magnitudes of macroeconomic responses are almost identical to the same percentage of changes of either labor productivity or switching cost. Also, as previously mentioned, the simulation results indicate the asymmetric responses of the economy to the same magnitudes of shocks imposing in the different direction. The results from Table 1 to Table 4 exhibit that the positive responses have the greater magnitude than those of negative ones excepting the export promotion case. This evidence implies the caution and policy recommendation towards the important to implement. From Table 5 to Table 7 exhibit the finding of multiplier effect.

Based on all findings generated by this research, there are two main policy implications that can be developed, which are:

(1) The empirical analysis shows that there exists the season migration supporting the production capability of both agricultural and non-agricultural sectors. Although this evidence indicates the flexibility of the labor market correcting the problem of underemployment in rural areas, it may also impede the progress of applying new machines and production technology to both farm and non-farm activities. With the rising proportion of skilled labor, this internal migration may decline in the future. But the clear understanding of the positive and negative impacts of this internal migration is incomplete. Hence, more studies are required to clarify and suggest the proper preparation.

(2) The results from simulation show that the supply side policies should introduce schemes leading to the reduction of switching cost and the increasing labor productivity. As projected by the CGE model, both policy options would lead to the increment of aggregate supply which results in the increasing aggregate output, rising aggregate income, and lowered price index. Especially, if we implement both the reduction of switching and the increasing labor productivity together, they will generate the multiplier effect and the more magnitude of both values will generate the stronger of multiplier effect. However, there is also interesting to find the multiplier effect on the demand side as well, this leave the room for the future work.

5. Conclusions

This paper delivers three main contributions. First, it shows the empirical evidence that there exists the systematic pattern of internal migration in Thailand's labor market, which conforms to Harris-Todaro's theory of expected wage equilibrium. Also, the empirical analysis shows that there exists the consistent range of switching cost, which is the cost incurs when labors move

from agricultural sector to non-agricultural sectors. Secondly, it incorporates the Harris-Todaro's equation into the standard static CGE model. Thirdly, it shows the multiplier effect when using both the reduction of switching and the increasing labor productivity which are supply side policy and related to labor market. The result obtained from the simulations exhibits that Thai economy responds to the reduction of switching cost at the same rate as to the increasing labor productivity. Interestingly, the simulation result also indicates the asymmetric response of the economy to the changes of switching cost and those of labor productivity, where the positive response is greater than that of negative one. Based on these key findings, the government programs supporting the reduction of switching cost and increasing labor productivity are the top-priority tasks and should implement both of them in order to sustain the growth. The future improvement of this research should include the extension of details of labor market and household classification. Also the future analyses should cover impacts on income distribution and sectoral production.

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