



# Macroeconomic Impacts of Migrant Workers: Analyses with a CGE Model\*

Chalongphob Sussangkarn\*\*

## INTRODUCTION

This paper analyzes the macroeconomic impacts of migrant workers in Thailand using a Computable General Equilibrium (CGE) model of the Thai economy. In early 1995, it was estimated that there were about 750,000 undocumented migrant workers in Thailand; most are from Thailand's neighboring countries, particularly Myanmar. This represents about 2.2 percent of the total Thai labor force, which is certainly a sizable figure. Over the past few years, the issue of migrant workers has become an important policy issue. This is partly because of the size of the migrant workforce, but also because of differing views on the need for such workers and the impact of employing these workers on the economy. Employers normally point to labor shortages for some types of work and in some areas of the country, while workers are concerned that the migrant workers are competing directly with Thai workers and are driving down Thai real wages. To clarify these issues, a CGE model based on 1995 data was built incorporating migrant workers. The model was used to simulate the impacts of migrant workers. Basically, the presence of migrant workers expand the labor resource base of the economy. This allows for larger total output. Naturally, some groups gain from the presence of these workers, while others lose. In particular, low educated Thais lose out from having these workers in the economy. Nevertheless, given the larger output potential from the presence of the migrant workers, it should be possible to manage the situation so that all groups gain. This can be achieved through taxes and transfers to more evenly share the rent available from having migrant workers in the economy.

## STRUCTURE OF THE MODEL

The CGE is based on a Social Accounting Matrix (SAM) of the economy.<sup>1</sup> For this model, data based on 1995 was used. Data generated by the TDRI Economic Demographic CGE for 1995 was used as a starting point.<sup>2</sup> The data was then aggregated to form a simpler SAM with just 4 sectors of production, and data on migrant labor was utilized to add migrant labor into the SAM. A brief description of the SAM and the model follows.

### Production and Factors of Production

There are 4 sectors of production;

1. Agriculture
2. Low Skill Industries
3. Medium Skill Industries
4. Services

There are also 4 factors of production;

1. Capital/Land
2. Thai workers with Primary Education or Less (Tha.Leprim)
3. Thai workers with more than Primary Education (Tha.Gtprim)
4. Foreign workers (FOR)

In this analysis, only the low skilled foreign workers (mostly from Thailand's neighboring countries) are considered, as the problem with this group is the key policy focus at the present time. The high skilled foreign workers are not considered a problem, except in certain professions, and they help to ease the shortage of skilled technical workers in Thailand, and also come as part of foreign direct investment projects.

Each sector of productions uses intermediate inputs and the factors of production to produce output. Foreign workers are assumed to be limited in employment to the Agriculture, Low skill industry and the Services sectors. This is close to the actual situation. The structure of employment in 1995 is given in [Table 1](#). In total, there are about 33.48 million workers employed. About 56 percent are employed in Agriculture. Of the total employment, about 20 percent, or 6.94 million are those with more than primary education. The rest consists of Thai workers with primary education or less (25.8 million) and 0.74 million foreign workers.<sup>3</sup> For Thai workers with more than primary education, 23.6 percent are employed in agriculture, with 76.4 percent employed in non-agriculture. For Thai workers with primary education or less, 65.5 percent are in agriculture and 34.5 percent are in non-agriculture. And for foreign workers, 75.6 percent are in agriculture, and 24.4 percent are in non-agriculture.<sup>4</sup> The share of foreign workers in total employment is about 2.2 percent, which is certainly very significant. For employment in agriculture, the foreign share comes to about 3 percent, and about 3.8 percent for the Low skill industry.

Production is modeled as shown in [Diagram 1](#). Each sector of production uses intermediate inputs, factors of production and pay indirect taxes. Intermediate inputs in each sector of production was treated as in a Leontief type model, so that the input-output table had fixed coefficients in quantities, i.e., the quantity of commodity  $j$  needed to produce one unit of commodity  $i$  was assumed fixed. The intermediate inputs were also combined with value added in fixed proportions. Value added (net of indirect taxes) is a composite, composed of the factors of production.

Factors of production are substitutable, and are modeled as a 3-stage constant elasticity of substitution (CES) production functions. This allows different elasticities of substitution for different combinations of factors of production. As shown in [Diagram 1](#), in the first stage capital is substitutable with the composite labor input. The composite labor input is in turn a combination of the skilled and unskilled labor inputs. Skilled labor is the Thai workers with greater than primary education (Tha.Gtprim), while unskilled labor is a combination of Thai workers with primary education or less (Tha.Leprim) and foreign workers. Basically, skilled and unskilled labor are less easily substituted for each other compared to the substitution between Thai labor with primary education or less and foreign unskilled workers.

Factors of production are assumed to be mobile across sectors of production. This is fully the case for Capital, Thai workers with primary education or less, and Thai workers with more than primary education. For foreign workers, as already indicated, they do not work in the medium skill industry, but are fully mobile across the other sectors. Wages and rental on capital are determined endogenously in the model. It is assumed, however, that for Thai workers of each type, there is a constant gap between the wages in agriculture and non-agriculture activities. For foreign workers, they are assumed to work at the same wage in all sectors in which they can work.

## Commodities

The 4 sectors of productions produce 4 domestic commodities. The economy also import commodities. The usual treatment, allowing for substitution possibilities between domestic and imported commodities, is to combine domestic commodities and imported commodities of the same sector into a composite commodity via a CES production function. These composites are then used in production, consumption and investment.

Because of the combinations of imports with domestic commodities into composites, the shares of import in the composite will depend on the relative prices of the imported and the domestic commodities. If domestic price rises, then a given unit of composite will tend to contain more imports. The elasticity of substitution will govern the degree to which the import shares respond to a change in the price. If the elasticity of

substitution is very high then any slight change in relative prices will bring about large changes in relative shares.

## Final Demand

There are 5 types of final demand. Consumption by households, consumption by the government, consumption by tourists, export and finally investment. Each export was assumed to have a constant elasticity of demand depending on the relative price between the domestic price and the world price (expressed in foreign currency through a fixed exchange rate) as well as a trend factor. Tourists consume commodities in fixed quantity shares, but the total tourist demand is also like an export demand function.

Government consumption is assumed to be a fixed proportion of government revenue. Similarly, household consumes a fixed proportion of its income. Household consumption function is modeled as a linear expenditure system. Investment is taken as exogenous in quantity in the model. Thus, the current account (investment-saving gap) is endogenous.

## Taxes

The SAM and model has indirect taxes (including import taxes and some minor export taxes) and direct taxes on household income and operating surplus. Indirect taxes put wedges between producer prices and consumer prices. The import taxes put wedges between c.i.f prices of imports and the consumer prices. The export taxes make domestic prices lower than export prices. Income tax is collected from households and is assumed to be an exogenous proportion of household income. Corporation tax is collected from private corporations and is also assumed to be an exogenous proportion of corporation's income.

## Incomes

There are four main economic institutions in the model; households, private corporations, the public sector, and the rest of the world. Households and private corporations derive incomes from claims on the factors of production (labor and capital) and various transfers. The public sector derives incomes from taxes, transfers, and also from claims on private corporations (part of the private corporations are actually state enterprises). The rest of the world account derives and pays income related to foreign trade and investment.

In the model, households are further separated out into 3 different types. The first two types are the Thai households. The first type consists of the richest 40 percent of the Thai households, while the second type consists of the poorest 60 percent of the Thai households. Having these two Thai household types allows the model to look at income distribution impacts. The third household type consists of the foreign workers. For foreign workers, it is assumed that half of the income they earn in Thailand are remitted abroad, while the other half is used for consumption in Thailand.

## Quantities, Prices and Values of SAM Accounts

Most of the quantities, prices and values for each of the SAM accounts are endogenous. For the current exercise, the quantities of the factors of production are exogenous. Thus, the quantity of capital, Thai workers with more than primary education, Thai workers with primary education or less, and foreign workers are exogenous. In the analyses, the impact of changes in these variables on the economy can be assessed, e.g., what would happen if all foreign labor were removed from the economy.

## Macroeconomic Closure and Determination of Equilibrium

Given the SAM and the model specifications, the search for a new equilibrium after some changes in the exogenous variables involves finding a vector of relative prices that will lead to all markets clearing; product markets, factor markets and the foreign exchange market. In fact, as the SAM is a balanced square matrix, which represents the flows of commodities and incomes in the economy with demand equal to

supply for all accounts, the new equilibrium automatically leads to a new SAM for the economy.

The solution process for the model will depend on what type of macroeconomic closure is assumed. In the current specification, investment is exogenous and the current account (saving-investment gap) endogenous. The determination of equilibrium works as follows. Given a vector of relative prices (the exchange rate is fixed and can be taken as the numeraire), and the exogenous demands (total investment), the commodity and factor demands would be determined. This will determine the level of incomes, and also the current account deficit on the trade side. The incomes determine the savings. However, there may not be an equilibrium in the foreign exchange market. Thus, the current account deficit generated on the trade side may not be equal to the difference between the fixed level of investment and the saving generated from the incomes. Thus, the vector of prices is not an equilibrium, and a new vector of prices has to be tried. The equilibrium price vector will clear all the product markets, and also generate precisely the same current account gap from the trade side as from the saving investment side. The equilibrium price vector will generate a balanced SAM as the new solution.

## SIMULATIONS

Simulations were carried out to study the impact of foreign labor on the economy. The results to some extent depend on how easily foreign labor can substitute for Thai workers with primary education or less, and also on the substitutability between low skilled labor and medium skilled labor. In general, low skilled foreign labor can easily substitute for low skilled Thai workers in the production process. Thus, the elasticity of substitution between these types of workers will be high. On the other hand, low skilled labor (primary education or less) cannot easily substitute for medium skilled labor (more than primary education). This is attested to by the fact that most modern sector firms do not hire many workers with primary education or less. Thus, the elasticity of substitution between low skilled workers and medium skilled workers tends to be low, i.e., they are complementary in the production process. In this exercise, it was assumed that the elasticity of substitution between foreign labor and Thai workers with primary education or less is 3.0, while the elasticity of substitution between low skilled workers and medium skilled workers was set at 0.2. Generally, different values for these elasticities will lead to different solutions. But through simulations with various elasticity values, it was found that given high elasticity of substitutions between Thai workers with primary education and foreign workers, and low elasticity of substitution between low and medium skilled workers, for a fairly large range of elasticity values, the directions of the results to be presented below remain robust.

### Removal of Foreign Labor

The first simulation involves the removal of all foreign labor from the system. The situation with and without foreign labor can be compared to assess the impact of having foreign labor to the economy. [Table 2](#) shows the impact of the removal as compared to the Base situation (1995 SAM). The column labeled BASE gives the base situation. The second column labeled NOFOR denotes the case with the removal of the foreign labor. (In fact, the supply of foreign labor is reduced by 99.9 percent as with the CES specification of substitution between foreign labor and Thai workers with primary education or less, it is not possible to reduce the supply of foreign labor to zero). Other columns refer to other simulations to be described later.

The main results of the removal of foreign labor are as follows.

1) Real GDP falls. This is because the presence of foreign labor means additional human resource for the economy, and will therefore lead to greater production possibilities. Overall real GDP falls by about 0.48 percent compared to the base case. The fall in real GDP is most heavy for agriculture and low skill industry as these sectors have the most significant presence of foreign labor ([Table 1](#) above). Agriculture real GDP falls by 1.02 percent and low skill industry's real GDP falls by 0.82 percent. For medium industry and services, the fall in real GDP are 0.33 percent and 0.2 percent respectively. It should be noted that these fall in real GDP refer to the lowering of the production level per year rather in the potential growth rate.

2) Looking at wages (last part of [Table 2](#)), it can be seen that will the removal of foreign labor, real wages for Thai workers with primary education or less rises by about 3.5 percent while that for workers with more than primary education falls by about 3.8 percent. The result is intuitive. Foreign workers are good substitutes for low educated Thai workers, so a reduction in their supply will lead to increased real wages for the low educated workers. For better educated workers who are complimentary with low educated workers, the reduction in supply of the low educated workers leads to a downward pressure of their demand, and hence their real wages fall. Thus, looking the opposite fashion, the presence of foreign workers in the Thai economy leads to lower real wages for low educated workers, while higher real wages for the better educated workers. This is quite consistent with recent historical changes in real wages by education level as documented in Chalongphob and Yongyuth (1994).

3) Reallocation of factors toward the agriculture sector takes place with the removal of foreign labor. This is because more foreign workers work in the agriculture sector, and the reallocation of both labor and capital toward the agriculture sector is to compensate for the reduced supply of foreign workers. The real rental price of total capital (which is mobile across sectors) does not change very much.

4) Export falls slightly. The reduced supply of labor leads to upward pressures on domestic prices, and this leads to a 0.64 percent fall in exports. However, as economic activity is less with the removal of the foreign labor, imports also falls, and there is actually an improvement in the trade and current account deficits.

5) With the removal for foreign labor, income distribution improves. Total real household (Thai) income increases just slightly (0.05 percent), but real income of the poorest 60 percent household increases by 0.4 percent while real income of the richest 40 percent household declines by about 0.3 percent.

These results are actually quite intuitive. Foreign workers increase the labor resource for the economy and allow higher output levels and higher exports. At the same time, as they compete fairly directly with low educated Thai workers, the presence of foreign workers leads to downward pressures on Thai unskilled wages, and adversely affect income distribution. These results simply highlight the conflict between growth and distributional objectives. However, given that real GDP increases as a result of the foreign labor, it should be possible to redistribute the additional income to the economy made possible by the foreign labor so that poorer groups also benefit from the presence of the foreign workers. This can be done partly through taxes and transfers, which is analyzed in the other simulations.

### **Tax on Foreign Labor**

One way to redistribute the benefits of higher output made possible by foreign labor to the poorer households is to tax foreign labor (or charge a levy on labor import), and use the revenue for the benefit of the less educated workers. In most countries who import labor, some tax or levy is charged on labor import. The revenue can then be used to increase skills of domestic workers or in projects that benefit the poor directly. In this exercise, simulations are carried out imposing a tax of about 20 percent on foreign workers. For simplicity, the proceeds of the tax are transferred directly to the poorest 60 percent household. In actual practice, proceeds from taxes on foreign labor can be used for skill training and such like. The simulations here simply indicate the potential benefits of the taxes, assuming that the revenues are used effectively for the benefit of the poorer households.

The amount of benefit that taxes on foreign labor can generate will depend on the elasticity of supply of foreign labor, as this will govern who is likely to bear the tax burden, and also the amount of tax revenue that can be generated. Three cases are considered.

The first case is when the supply of foreign labor is very elastic. In this case, the tax burden cannot be easily passed on to the foreign workers in the form a lower after tax wage. The tax burden will therefore be absorbed in terms of a higher effective wage paid by the employers of the foreign workers. This case is given by the column labeled LOCAL in [Table 2](#). The other extreme is when the foreign labor supply is completely inelastic. This means that the foreign workers will absorb almost all the tax that is imposed. Thus, the net wage paid by the employer does not change from the level paid before the tax is imposed,

but the tax is passed on fully to the foreign workers who end up getting less wage equivalent to the amount of the tax. This case is presented as the last column of [Table 2](#), and labeled PASSFOR. The third case is the intermediate case, where the tax burden is shared about equally between the foreign workers and the employer. This case is labeled HALF in [Table 2](#).

The results of the tax and transfer simulations are as follows.

- 1) In all three cases, real GDP is still slightly less than in the base case, but significantly higher than in the case with no foreign labor. If the tax can be passed on completely to the foreign workers (PASSFOR), real GDP is almost the same as in the base case with no tax. These results are not surprising, as in all three cases the economy still has access to foreign labor to utilize in the production process. When the tax can be fully passed on to the foreign workers, the supply of foreign workers remain the same as in the base situation. When foreign labor supply elasticity becomes higher, the tax leads to a decrease in supply, but still a sizable number of foreign workers remain in the economy.
- 2) In terms of the impact on real wages, if foreign labor supply is totally inelastic, then the situation almost does not change from the base situation. There will still be the same number of foreign workers to compete with local workers as in the base case, and real wages hardly changes. When foreign labor supply becomes more elastic, the tax reduces the supply of foreign workers to the economy, and the relative price impacts of having foreign workers are in the same directions as the first case when foreign workers are removed from the economy. Thus, workers with primary education tends to benefit from the imposition of the tax, and workers with more than primary education lose. The impacts are, however, much less than in the case where all foreign workers are removed.
- 3) The impacts on the redistribution of employment and capital toward the agriculture sector are similar to no foreign worker case, but the magnitude of the impact is much less. These impacts basically stem from the change in the supply of foreign labor. In the case when the foreign labor supply is completely inelastic, there is almost no impact as compared to the base case. The impacts on exports and imports are also similar to the no foreign worker case, and the magnitudes also vary with the impacts on foreign labor supply.
- 4) For all three cases, total real household income increases as a result of the imposition of the tax compared to both the base case and the no foreign labor case. The increase is greatest for the case with completely inelastic foreign labor supply. The key point here is that with the tax and transfer, total real household income can be greater than without any foreign labor in the country. As for the relative impacts on the richest 40 percent household and the poorest 60 percent household, the poorer household obviously benefits from having the tax (as the revenue is transferred to it), while the richer household also benefits in the case where some shifting of the tax burden to the foreign workers can take place. Compared to the no foreign labor case, however, the poorest 60 percent household is still worse off in all three tax cases. This means that the tax and transfer scheme *by itself* probably cannot make the poorer household better off than the situation where there are no foreign labor at all. However, given that total real household income increases compared to the no foreign labor case, other tax and expenditure instruments that will help to transfer real household income from the richer household to the poorer household can be used in combination with the tax on foreign labor to improve the real income of the poorer household compared to the situation with no foreign labor at all, while ensuring that the real income of the richer household is also at least as much as in the no foreign labor case.

The case with foreign labor but no tax on foreign labor (i.e., the base case), total real household income is less than in the no foreign labor case. Thus, normal tax and expenditure instruments (apart from the tax on foreign labor) will not be able to make the poorer household better off than in the no foreign labor case, while keeping real income of the richer household at least equal to the no foreign labor case. Thus, tax on foreign labor seems to be an important policy measure in order that the rent (or benefit) from having the foreign labor in the country can be managed to benefit both groups of households.

## CONCLUSIONS

This paper carried out a simple macroeconomic analysis of the foreign labor issue using a CGE model. The benefit in terms of higher production made possible by foreign labor was shown. However, the presence of foreign labor also leads to adverse impact on the less educated local workers, and on income distribution. In order to manage the situation so that the presence of foreign labor will also benefit the local households, analyses of the impacts of imposing taxes on foreign labor and transferring the proceeds to the poorer households were carried out. It was shown that this allows the possibility, in combination with other tax and expenditure schemes, to make sure that the presence of foreign labor can benefit both the poorer household and the richer household when compared to the case with no foreign labor at all.

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