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Can Country Continuously Compete on Cheap Labor Cost? A System Dynamics Approach to FDI Policy Analysis

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Abstract

This paper studies the interaction of FDI, wages and employment of workers under different policies in countries that use cheap labor cost strategies such as Thailand. The interactions are analyzed by using system dynamics modeling. The model simulation shows that FDI drives salaries up when the demand for workers reaches the limit of the working population. A higher salary, in turn, causes low labor cost seeking FDI to withdraw their investment. Government policies aimed to sustain cheap labor cost seeking FDI are examined. Policies to subsidize foreign operation such as providing tax breaks and reducing the time to set up a new firm can stimulate FDI in the short term but in the long term the foreign firms still withdraw their investments due to high salaries. An increase in the working population or a reduction in firm hiring process time, on the other hand, does not affect the volume of FDI. Thus, the country cannot rely on a low labor cost strategy on the long term.

INTRODUCTION

The goal of foreign investment falls into one of these categories, market seeker or resource seeker. Market seeking FDI aims to expand the market size and penetrate into rich countries while resource seeking FDI intends to acquire cheap and limited resources, including labor. Low cost labor can be acquired mainly from developing countries. Therefore, governments of developing countries can use this competitive advantage to attract foreign investment. However, some countries such as Mexico faced the problem of foreign enterprises withdrawing their investments after a period of time whereas China and India are still enjoying high FDI flow due to their low labor cost. The focus of this paper is to find out if countries can attract FDI by using low labor cost strategy in the long term.

To consider this issue, we analyze the situation in which foreign firms pull out their investment. Low labor cost seeking FDI withdraws their investment if the labor cost is higher than other developing countries if all other factors remain the same. Extensive studies have shown that rising labor cost come with the inflow of FDI (Bandick, 2004;Conyon, Girma, Thompson, & Wright, 2002;Heyman, Sjöholm, & Tingvall, 2007;Lipsey & Sjöholm, 2004;Martins, 2004;Samii & Teekasap, 2009). Based on classical macroeconomics theory, the system should reach the equilibrium level where the demand of low cost labor from FDI is equal to the supply of low labor cost. However, the real situation does not show an equilibrium pattern but it displays an inverted U-shape with the withdrawal of foreign investment in the long run which is the pattern of a system with significant delay (Sterman, 2000). It is obvious that using a static approach as a snapshot of when the demand and supply is balanced is not applicable in this situation. This situation requires a methodology that can incorporate a dynamic perspective of the problem with a significant time delay taken into consideration. System dynamics is a methodology that combines a dynamics perspective with the time delay concept (Sterman, 2000). System dynamics is used extensively in research that focuses on the dynamics of market systems with significant delays such as the oil market (Samii & Teekasap, 2010), growth of a city (Forrester, 1969), industrial cluster growth (Teekasap, 2009), and also policy analysis (Saeed, 1982).

In this study, a system dynamics model is developed to examine the situation when low labor cost seeking FDI enters into a developing country and drives up the salary of workers in that country until it is too high for the low labor cost seeking FDI causing FDI to leave the country. The model shows that the workers' salary starts to rise significantly when the demand of workers almost reaches the limited number of workers available in that country. When workers become the limited resource, foreign firms and local firms will increase their offering salary to attract workers. Four policies that stimulate low labor cost seeking FDI considered are subsidies for foreign operations, incentives to increase the working population, enhancement of workers' mobility, and encouragement of new firm establishment. None of these policies can achieve its goal of keeping low labor cost seeking FDI in the long run. Thus, the cheap labor cost strategy cannot be utilized forever.

This paper is organized as follows. The existing literature on FDI and wages and employment of host countries are reviewed. Next, the review of the papers on the systematic approach of FDI is considered. Then, we explain the model and the simulation methodology. The last part is the result of the simulation, policy analysis and the conclusion.

FOREIGN FIRMS AND THE WAGES OF EMPLOYEE

It is obvious that foreign firms pay higher wages than the domestic firms (Bandick, 2004;Conyon et al., 2002;Heyman et al., 2007;Lipsey & Sjöholm, 2004;Martins, 2004). For example, in the UK a foreign acquisition leads to higher wages while a domestic acquisition reduces wages (Conyon et al., 2002). The interesting issue is which factors create a wage premium. Zhao (2001) suggests that in China the skill of workers is an important factor since only skilled workers will earn more from working in foreign firms while unskilled workers can gain more benefits if they work with a State-owned enterprise. Lipsey and Sjöholm (2004) also include the education level and the plant characteristics in their study and indicate that the wage premium is still significant after controlling the education level and plant characteristics. Martins (2004) focuses on the individual level analysis by using a propensity score matching method and finds that the wage premium is not significant, which is in line with the results from

Heyman et al. (2007) in that the wage premium between foreign firms and local firms is only two percent when using the propensity score matching method. In conclusion, individual workers do not have a wage premium from working with foreign companies but the foreign firms pay more, in general, because the firms hire high quality workers. In summary, foreign firms pay higher salaries in order to acquire high quality workers. If we consider workers in local firms as a total labor pool, foreign firms will pay higher wages to hire highly qualified workers from local firms to work for them.

Another issue is whether local firms and foreign firms have the same wage growth rate. Bandick (2004) indicates that the wage growth is not different between local firms and foreign firms. This result contradicts the results from Heyman et al. (2007) which indicate that the wage growth will be lower after foreign acquisition. On the other hand, Görg, Strobl, & Walsh (2007) claim that the wage growth in foreign firms is higher because foreign firms invest more in on-the-job training. Without the on-the-job training, the wage growth of employees in both foreign firms and local firms is the same. Another perspective, which is used in the model, is to consider the wage growth through the lens of game theory. Local firms and foreign firms are two players who offer the wages to the workers pool. Workers have the right to choose to work in local firms or foreign firms based on the offer. Local firms and foreign firms will pay higher salaries if they need workers. The firms need workers to fill the vacancies. Therefore, the wage growth is driven by the vacancies in that firm type.

FDI AND THE WAGES AND EMPLOYMENT

The effect of FDI on employment is mixed. However, in general, FDI creates more jobs in the host country. Williams (1999) presents the case of FDI in the UK. Williams (1999) observes that foreign firms from Asia Pacific and North America create more new jobs than European firms. Besides, Greenfield investment also provides more jobs than other entry modes, while 40% of samples using Mergers and Acquisitions do not change the number of employment. McDonald, Tüselmann, & Heise (2002) indicate that the FDI from Germany in North-West England mainly creates jobs for Germans while only a small number of new jobs are created for local people. For the macro level, local jobs are

reduced because local firms cannot compete with German firms and in turn close down. Fu and Balasubramanyam (2005) suggests that export-oriented FDI in China creates more jobs and encourages worker transfer from the agricultural sector to the non-agricultural sector. Girma and Görg (2007), using the data from UK firms, present that both skilled and unskilled workers have wage increases from the US acquirers but not for the EU acquirers. However, FDI increases employment if the host countries are developing countries because of the technology spillover from foreign firms to local firms with no competition effect (Meyer & Sinani, 2009).

The level of wages in the host country also affects the flow of FDI. From the FDI flow data of the US to and from the UK, France, Germany, Canada and Japan, rising wages and falling productivity stimulate FDI outflows and discourage FDI inflows (Cushman, 1987).

Therefore, based on the above mentioned studies, it is generally concluded that FDI encourages an increase in employment and provides higher salaries. However, a higher salary reduces the FDI attractiveness of the country.

SYSTEM MODELING ON FDI

The use of system modeling approach to analyze FDI has been explored in the international business arena for many years. The main propose of such research is to find an optimum solution that provides the maximum benefits to firms.

Buckley and Casson (1996) created an economic model to justify the foreign market entry strategy i.e. licensing, international joint venture, and mergers and acquisition based on the market size, speed of technological change, interest rate, cultural distance, protection of independence, patent protection, economies of scope, and technological uncertainty. Buckley and Casson (1998) created another model based on Buckley and Casson (1996) to analyze the foreign market entry strategy between exporting, licensing, subcontracting, franchising, joint venturing, acquisition, and greenfield investments to find the lowest cost strategy based on location costs, internationalization factors, financial variables, cultural factors, market structure, adaptation cost, and cost of doing business abroad.

Later, Buckley and Hashai (2004) developed a model to identify in which type of country the firm should invest in order to have the lowest cost by dividing the firm's operation into research and development, production, and marketing and the categorize the location into a large developed country, a small developed country, and a developing country. However, all the above mentioned models looked at saturated systems and did not take into account the dynamic dimension and the feedback impact.

Nocke and Yeaple (2007) also studied the FDI entry mode, namely mergers and acquisitions and Greenfield investments, through an equilibrium model by considering the firm heterogeneity. The results indicate that firms in industries with mobility capability prefer Greenfield investments while the firms with non-mobile capability are likely to invest through mergers and acquisitions. Raff, Ryan, and Stähler (2009) shifted the focus to the comparison between mergers and acquisitions and joint ventures and considered Greenfield investments as a threat for local firms if they did not accept an M&A or joint venture offer. This paper also used the equilibrium model to assist the MNEs' decision on an entry mode.

Even though the system approach to FDI has been extensively studied, most of them used the equilibrium approach and aimed to obtain optimal solutions. However, the real situation does not show an equilibrium pattern because of the significant delay (Sterman, 2000). In other words, it is hard for firms to identify the equilibrium level and to pinpoint if they are at the equilibrium level. The firms can only know when they have already passed the equilibrium point and the environment becomes opposite to what it was before. Therefore, this paper adopts the dynamics perspective with a time delay approach which is more appropriate to attack this problem.

FDI AND EMPLOYMENT IN LOW LABOR COST COUNTRY MODEL

The FDI and employment in low labor cost country model consists of four modules namely the Firms Module, the Job Vacancy Module, the Worker Module, and the Salary Module as shown in Figure 1. Firms are categorized into three types which area foreign firm, a local firm that operates in related industries with the foreign investment called "Local FDI-related firm," and a local firm in other industries. Because the country attracts FDI by using low labor cost strategy, the salary of people in each

firm type affects the number of firms. The salary is assumed to increase only when the current level of salary cannot attract enough workers to fill the job vacancy. The job vacancy is calculated by the difference between the number of positions and the number of workers in each firm type. The number of job vacancies and the salary gap between each firm type will control the number of people who is hired by each firm type.

--- Figure 1 goes about here ---

The Firm module consists of three types of firm and the factors that affect their growth as shown in Figure 2. A foreign firm's growth is based on the salary, which is modeled in the Salary module. The salary does not affect local firm's growth rate. However, the local FDI-related firm's growth rate is assumed to be affected by the growth of a foreign firm in order to support the operation of the foreign firms.

$F_{i,t}$ is the number of firm in firm type i at time t where i equals 1, 2, and 3 which represents a foreign firm, a local FDI-related firm, and a firm in other industries respectively. $\Delta F_{i,t}$ is the change of the number of firms in firm type i at time t. SF_t is the effect of salary on foreign firm growth rate which will be explained in detail in the Salary module. GR is the growth ratio of firms in other industries, which is constant.

$$F_{i,t} = F_{i,t-1} + \Delta F_{i,t-1} \quad (1)$$

$$\Delta F_{1,t} = F_{1,t} \times SF_t \quad (2)$$

$$\Delta F_{2,t} = F_{2,t} \times f(\Delta F_{1,t}/F_{1,t}) \quad (3)$$

$$\Delta F_{3,t} = F_{3,t} \times GR \quad (4)$$

--- Figure 2 goes about here ---

The Salary module presents the salary of each firm type as shown in Figure 3. The salary change is assumed to be affected solely by the vacancy ratio in each firm type because each firm type will adjust their salary to attract potential workers to fill the vacancy. The salary gap between each firm type will affect the number of workers who are hired. The worker's movement between firm types is explained in the Worker module. For a foreign firm to set up a firm in the country, the salary level in a foreign firm will be compared with the average global salary and the growth rate of foreign firm as shown in the Firm module.

Given $S_{i,t}$ is the salary of workers in firm type i at time t where i equals 1, 2, and 3 which represents a foreign firm, a local FDI-related firm, and firms in other industries consecutively. $\Delta S_{i,t}$ is the change in salary for firm type i at time t. $VR_{i,t}$ is the vacancy ratio of firm type i at time t which is modeled in the job vacancy module. SG is the average global salary which is assumed to be constant. $SR_{ij,t}$ is the salary ratio between firm type i and firm type j at time t. $SH_{i,t}$ is the effect of salary on the number of people that is hired by firm type i at time t.

$$S_{i,t} = S_{i,t-1} + \Delta S_{i,t-1}$$

$$\Delta S_{i,t} = S_{i,t} \times f(VR_{i,t})$$

$$SR_{ij,t} = (S_{j,t} - S_{i,t})/S_{i,t}$$

$$SH_{i,t} = f(SR_{ij,t})$$

$$SF_t = f(S_{1,t}/SG)$$

--- Figure 3 goes about here ---

Figure 4 shows the detail of the Job vacancy module, which illustrates the calculation of the job vacancy in each firm type. The number of jobs in each firm type comes from the number of firms in each firm type times the average number of jobs per firm. The vacancy is the difference between the jobs and the number of workers in each firm type. The number of workers in each firm type is explained in the Worker module.

$J_{i,t}$ is the number of jobs in firm type i at time t. JF is the number of jobs per firm and assumed to be constant because the change of number of jobs per firm is small and insignificant during the period of the simulation. $W_{i,t}$ is the number of workers in firm type i at time t. $V_{i,t}$ is the vacancy in firm type i at time t.

$$J_{i,t} = F_{i,t} \times JF$$

$$V_{i,t} = J_{i,t} - W_{i,t}$$

$$VR_{i,t} = V_{i,t}/J_{i,t}$$

--- Figure 4 goes about here ---

The last module is the Worker module that consists of the number of workers in each firm type and unemployed people as shown in Figure 5. The model adopts the neo-classical assumption of labor homogeneity and labor mobility between industries and sectors of economy. Therefore, workers can move freely between industries that related to FDI and other industries. The workers' movement is based on the vacancy in the target firm type and the salary gap. For the industries that related to FDI, foreign firms offer a salary premium over the local firm to attract qualified workers (Bandick, 2004;Conyon et al., 2002;Heyman et al., 2007;Lipsey & Sjöholm, 2004;Martins, 2004). Therefore, the model is designed for foreign firm to get workers from the local firms in the related industries. New generations of the population are assumed to start as unemployed and being hired later. For simplicity, unemployed people are hired by the firms in other industries and then will move to other firm types afterwards. The model is simulated for 12 years, thus the number of working population is assumed to be constant.

$W_{i,t}$ is the number of workers in firm type i at time t. $W_{i-j,t}$ is the hiring rate from firm type i to firm type j at time t. U_t is the number of unemployed people at time t. UH_t is the rate that unemployed people are hired at time t. PG is the population growth rate which is assumed to be constant during the simulation period. T_H is the average time used for hiring workers from other firm type and T_U is the average time used for hiring unemployed people.

$$W_{j,t} = W_{j,t-1} + \sum_i W_{i \to j,t-1}$$

$U_t = U_{t-1} + PG - UH_t$

$W_{i-j,t} = MIN(V_j, W_i \times SH_j)/T_H$

$UH_t = MIN(U_t, V_3)/T_U$

--- Figure 5 goes about here ---

SIMULATION METHOD

The model is simulated using feedback control theory and computational mathematical simulation. First, an initial value is assigned to each stock variable based on historical data. Next, the correlation between each variable is assigned based on the correlation of historical data. Then, the model is simulated for the value in the next time period based on the initial value and the correlation. Because the model was created as a close-loop model, the value of all variables is linked together and changed every time step.

MODEL VALIDATION

Thailand is used as the actual case for model validation because Thailand has high skill workers with low labor cost which can attract FDI from developed countries (Nstda, 2007). The number of employment, unemployment, average wages and amount of inward foreign direct investment during 2000 and 2008 were acquired from Thomson Datastream®. The number of local and foreign firms was collected from the Department of Business Development, Ministry of Commerce. The growth of foreign firms is assumed to be the same as the growth rate of inward foreign direct investment. The foreign firm's wage premium is assumed to be 20% according to general firm-level wage premium analysis (Heyman et al., 2007).

Based on the data, the initial values for each stock variable are shown in Table 1. The simulation results, when compared with the historical data from 2000 to 2008, show the same pattern. Besides, the correlation between simulation results and the empirical data is significantly high which is shown in Table 2. Thus, we can conclude that the model is able to illustrate the actual change of each variable over time and is appropriate for use in scenario studies as shown in the following section.

--- Table 1 goes about here ---

--- Table 2 goes about here ---

SIMULATION RESULTS

The model was simulated from 2008 to 2012 in order to see the forecasted pattern of the FDI and the host country welfare measured by the salary of local workers and the unemployment rate. The results show that due to a significant growth in position offerings and a limited number of workers, companies in each firm type raise their salaries to attract workers. When the salary is over the limit of what foreign firms would pay, the foreign enterprises withdraw their investment which leads to an increase in unemployment as shown in Figure 6 and Figure 7. Therefore, the country cannot continuously rely on a cheap labor strategy in the long run. This situation is similar to the Prisoner's Dilemma where each player has an incentive to defect although it leads to an inferior outcome (Dixit & Nalebuff, 1991).

--- Figure 6 goes about here ---

--- Figure 7 goes about here ---

POLICY ANALYSIS

The previous section shows that a country is unable to compete based on low labor cost in the long run. However, if a government persists on relying on low labor cost by providing different policies to attract FDI, what is the outcome of those policies? In this section, different policies are simulated to study the effect of each policy on the forecasted FDI pattern. Each simulated policy is initiated in 2008 and effective until 2012.

Foreign firms withdraw their investment because the operating costs in other countries are cheaper. Thus, if a government subsidizes the operation costs of foreign firm for example by providing tax breaks, this should prevent the flow of FDI from leaving. In the model, this policy is implemented to subsidize the workers' salaries in foreign firms by 10%. The result in Figure 8 shows that a cost subsidy policy can stimulate more FDI after the policy is implemented for 2 years. However, the foreign firms would still withdraw their investment in the long run because even a subsidized operating cost is still higher than in other countries. Therefore, the cost subsidy policy fails to reach its goal in the long run.

--- Figure 8 goes about here ---

The salary increases because the number of workers is not enough to fill all the vacancy position. Therefore, if a government eases the immigration policy and allows workers from other countries to work, this could solve the problem. In 2008, the working population in Thailand was almost 40 million people. For simulation purposes we assume that the immigration policy can attract 4 million immigrants (10% of working population) to work in the country every year.

The result in Figure 9 shows that even though the government allows immigrants to work in the industry, there is no change in the pattern of the FDI. The reason is that workers need at least 2.5 years to move from unemployment to employment in foreign firms. When foreign firms hire immigrants, the salary is already above their limit. Therefore, the immigration policy has no effect on the FDI.

--- Figure 9 goes about here ---

According to the immigration policy analysis having more workers does not make a difference in FDI amount because of the long worker mobility duration. Then if the government can reduce the hiring period for example by providing databases of workers and jobs announcement, it would be able to make the workers mobile faster and reduce an increase in salary. We assume that the government's hiring assisting policy can reduce the hiring period from 1 year to 0.5 year.

Figure 10 shows the result of the hiring policy on FDI. Surprisingly, there is no difference in the pattern of FDI with and without the hiring policy. This is because during the first two years (2008 – 2009) there is no worker movement from local FDI-related firm to foreign firms. The salary of local FDI-related firm is higher than the salary of foreign firm until mid 2009. When the salary of foreign firms is higher than the salary of foreign FDI-related firm, the salary of foreign firm is already higher than an average salary in other countries. Therefore, the hiring assistant policy also fails to hold up the withdrawal of foreign investment.

--- Figure 10 goes about here ---

The results from the previous policies show that it is hard to prevent foreign firms to leave the country. But what would happen if the government focuses on supporting the establishment of new foreign firms, instead of reducing the withdrawal rate? One way to stimulate the establishment of new enterprises is to reduce the time to establish a firm. The simulation shows the effect of reducing firm establishment time from 2 years to 1.5 years.

Figure 11 shows the effect of reducing time to establish the firm on FDI. The policy results in an increase in FDI during the first period. However, an increase in the number of foreign firms pushes the salary up and leads to a faster drop in FDI in the long run. Thus, the firm establishment policy also fails to prevent FDI withdrawal.

--- Figure 11 goes about here ---

CONCLUSION AND POLICY IMPLICATION

This research focuses on the interaction of FDI, wages and employment of workers in countries that use cheap labor cost strategy to attract FDI such as Thailand. We study whether the country can use a cheap labor cost strategy in the long term by using system dynamics modeling. The study shows that the demand of workers increases with the inflow of FDI. When the demand of workers almost equals the number of the working population in the country, foreign firms and local firms will raise the salary for their workers in order to attract workers from other firm types. The salary of workers in foreign firms will increase until it is not attractive for low labor cost seeking FDI. Then, foreign companies start to withdraw their investment to the country that has lower labor cost. Therefore, a low labor cost strategy cannot be used to attract FDI in the long run.

This study extends the scope to examine if the government insists to use cheap labor cost strategy to attract FDI by providing public policies. The first policy simulated is subsidies for foreign operations such as p tax breaks. The simulation shows that the policy can prolong the FDI for a short period but then foreign firms still withdraw their investment due to a high labor cost. The next policy considered is one that increases the working population by supporting immigration. This policy creates no change in the value of FDI because it takes a significant time for immigrants to be hired by the firms. The next policy considered was the reduction of the time the firms take to hire workers by providing a workers and jobs database. This policy also failed to achieve its goal because of the salary competition between local and foreign firms. The last policy considered was one that focuses on encouraging the establishment of new

firms, instead of aiming to keep the existing firms, by reducing the time to establish them. This policy immediately increases the volume of FDI. However, foreign firms still withdraw their investment in the long run with a faster rate because an increase in FDI creates higher demand for the workers which makes the salary jump even higher. Therefore, these four policies fail to sustain the low labor cost seeking FDI in the long run.

From the results, attracting FDI using low labor cost strategies should be used with caution. Governments should use a low labor cost strategy in order to gain knowledge, technology, or skill from foreign firms instead of relying solely on low labor cost seeking FDI. There is an argument that low labor cost seeking FDI leads to higher economic growth and a better standard of living, which in turn attracts market-seeking FDI. However, market-seeking FDI is not considered in this paper and it supports our finding that a cheap labor cost strategy does not last long.

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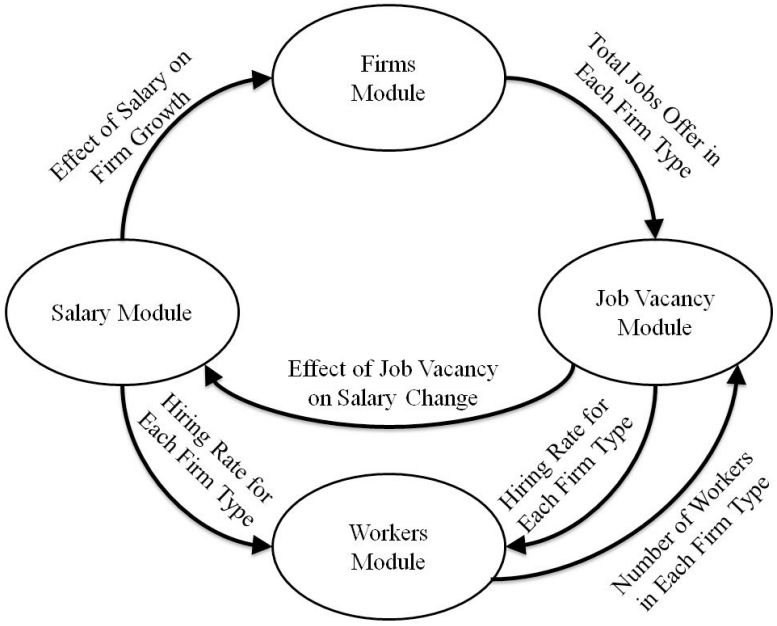


Figure 1 Relationship between four modules

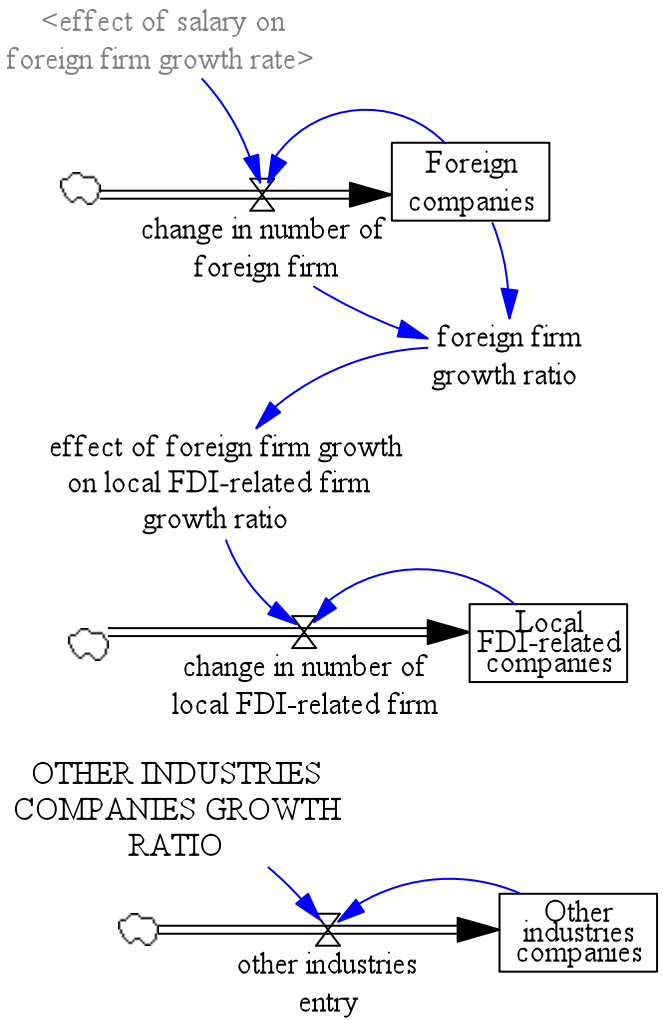


Figure 2 Detail of the Firm Module

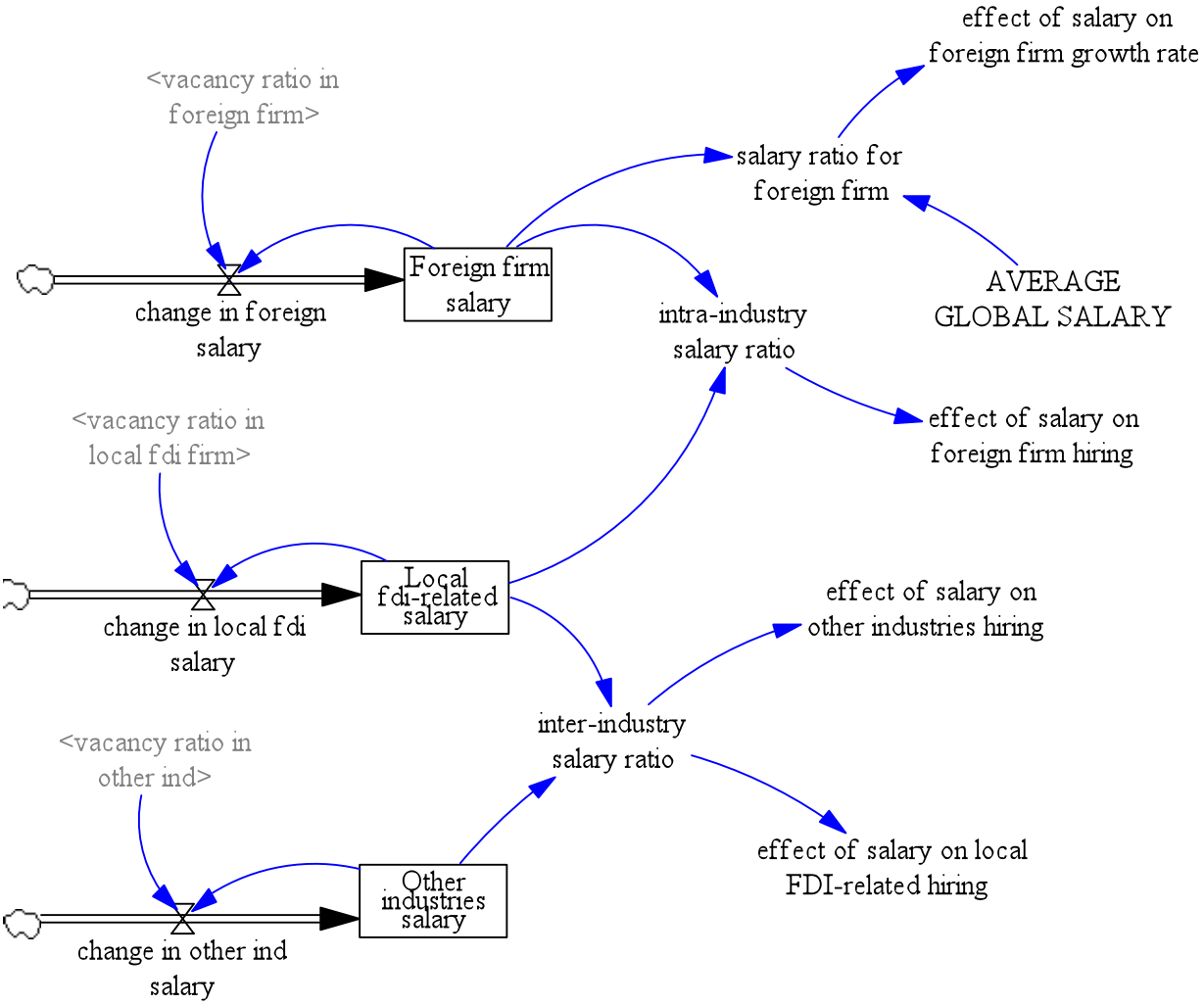


Figure 3 Detail of the Salary Module

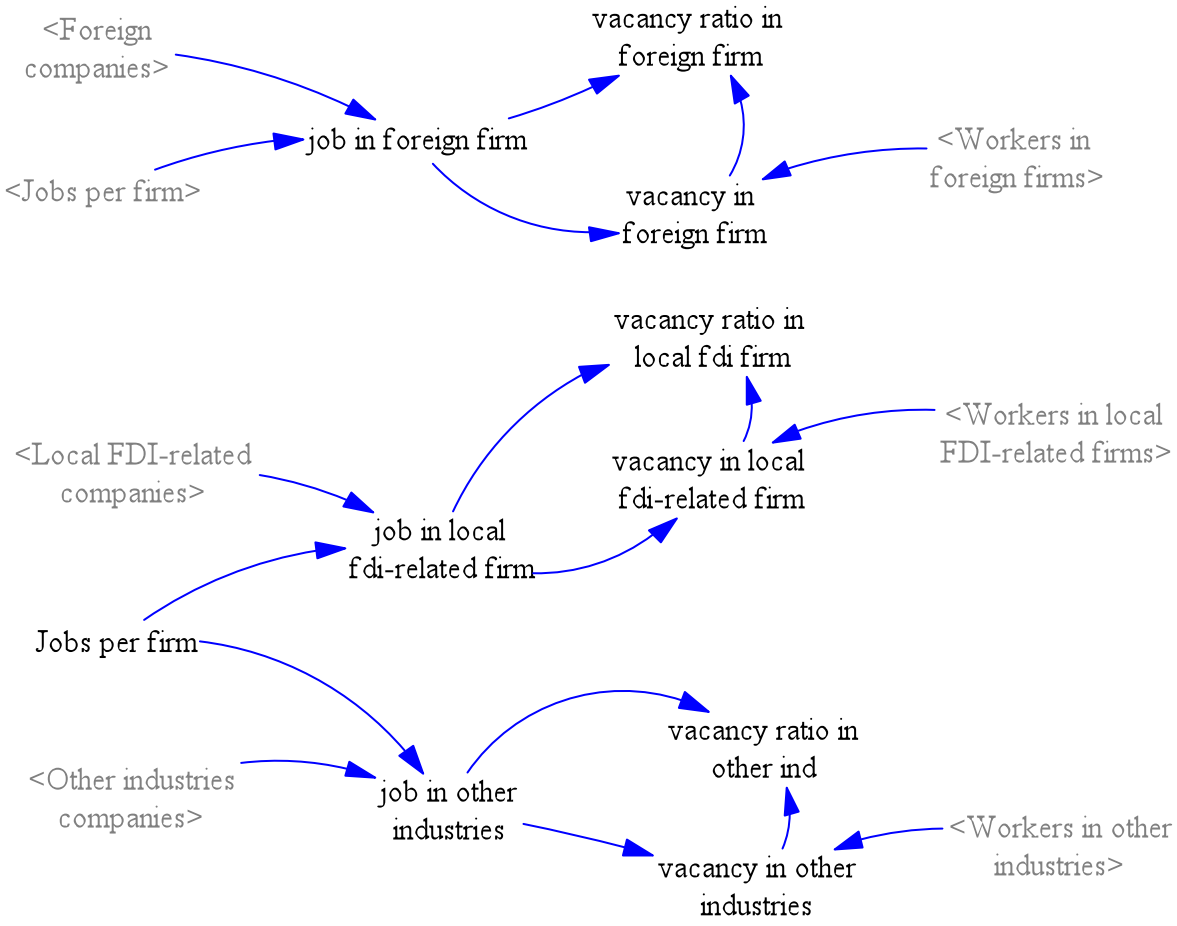


Figure 4 Detail of the Job Vacancy Module

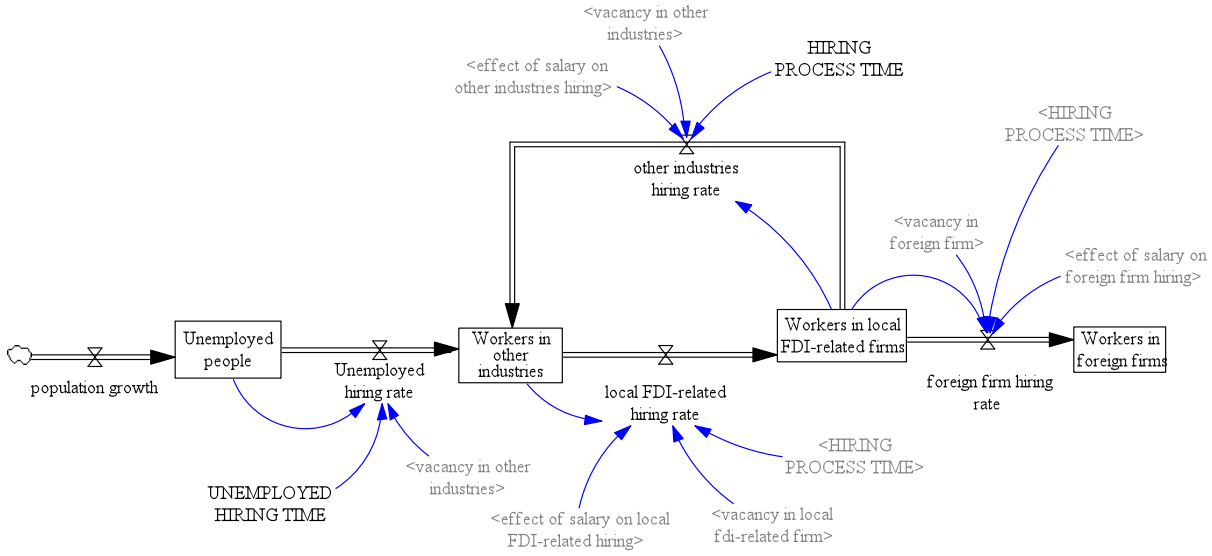


Figure 5 Detail of the Worker Module

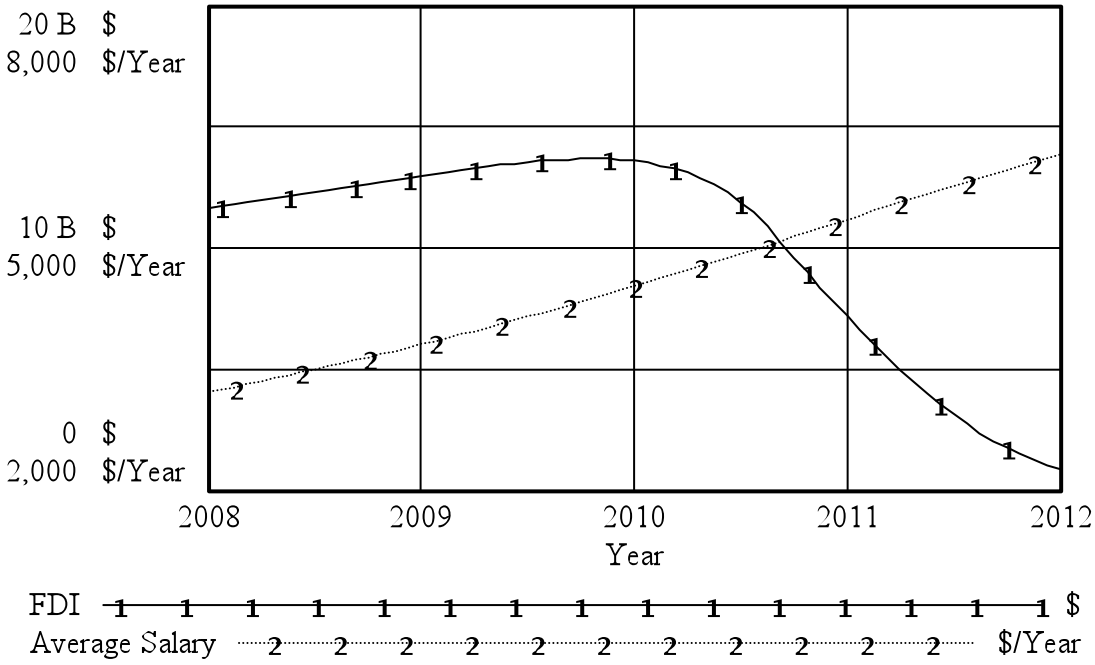


Figure 6 Simulation of FDI and Average Salary from 2008 to 2012

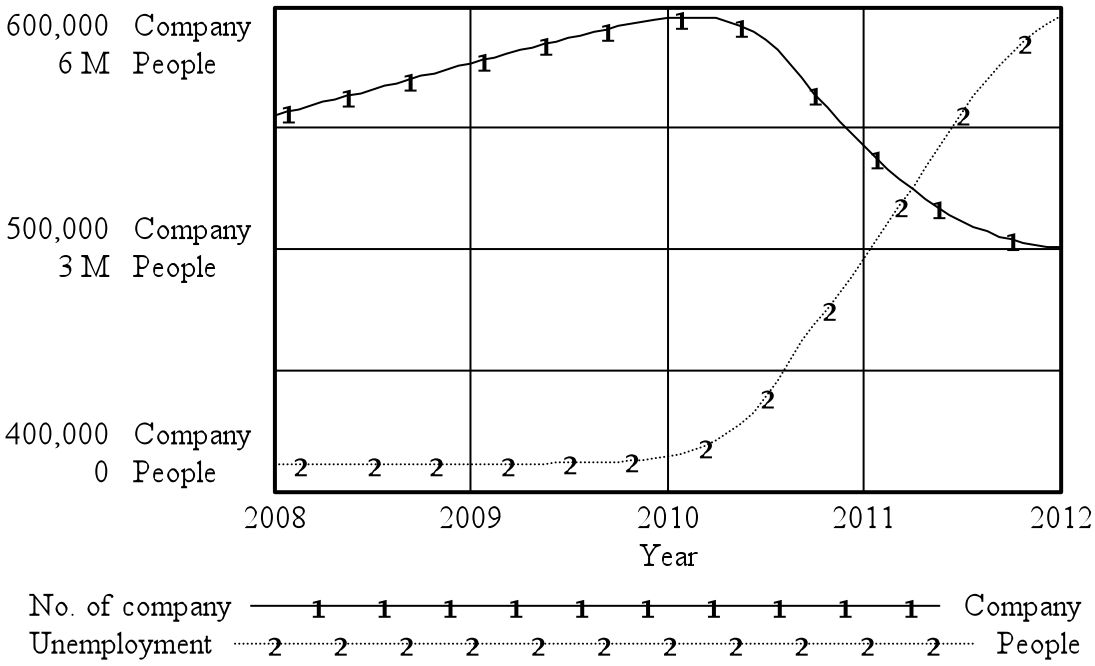


Figure 7 Simulation of Number of company and Unemployment

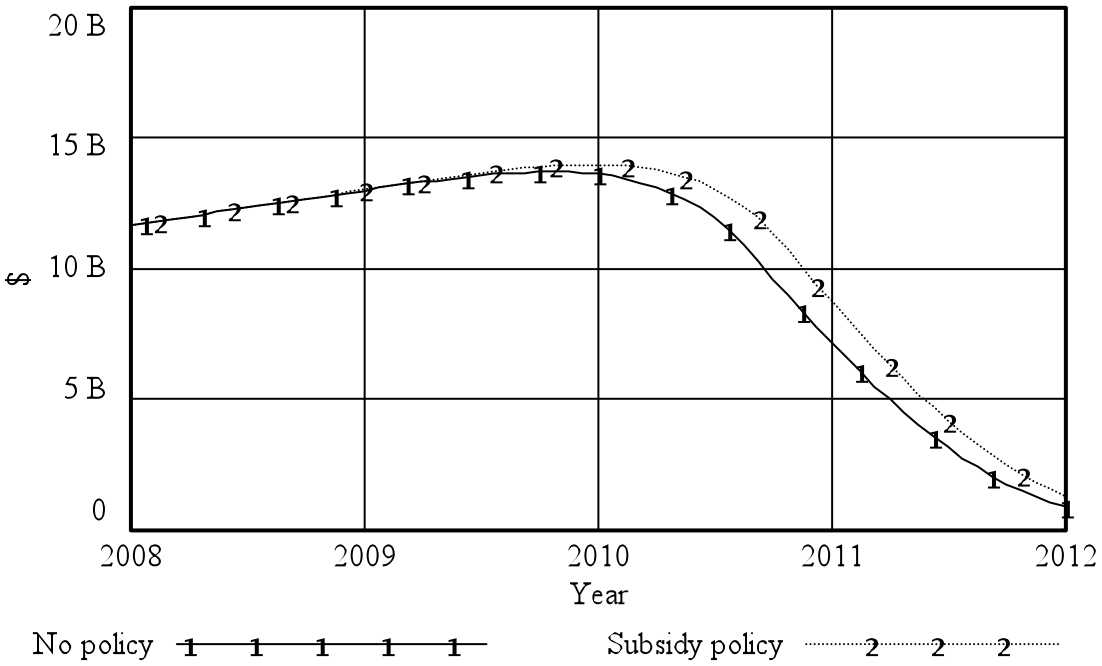


Figure 8 Simulation of FDI under Operation Cost Subsidy Policy

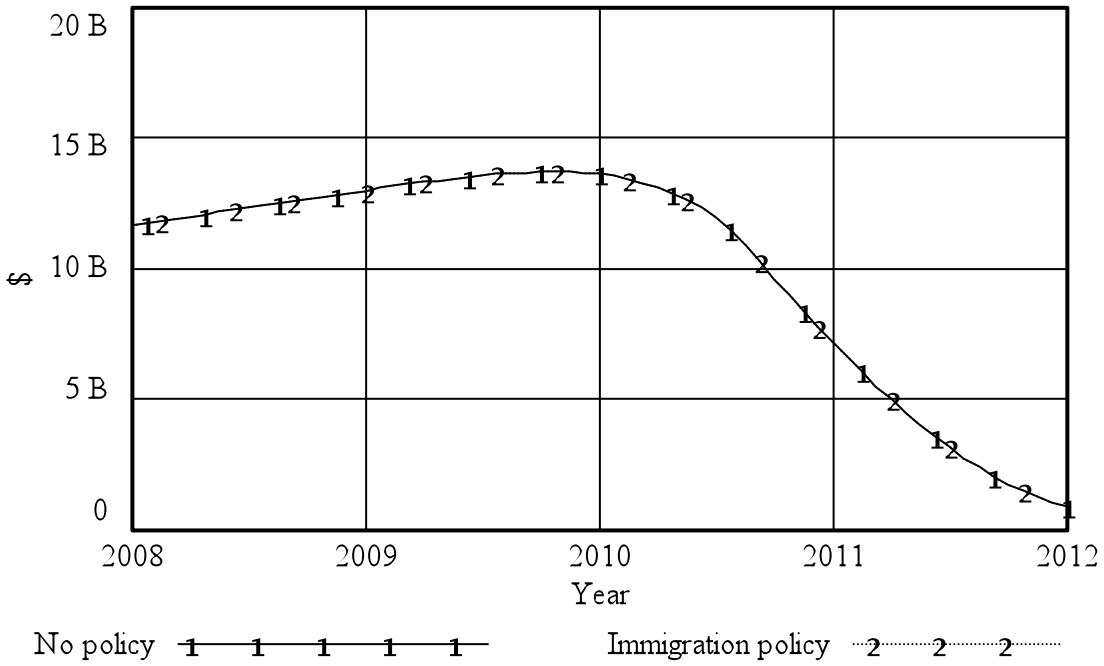


Figure 9 Simulation of FDI under Immigration Policy

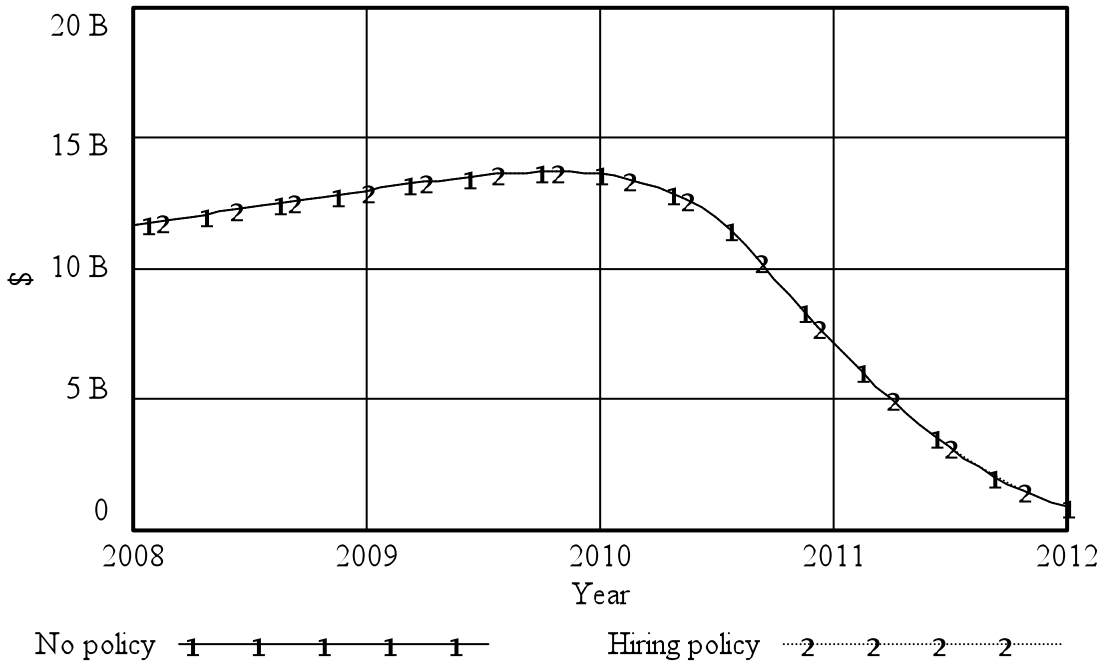


Figure 10 Simulation of FDI under Hiring policy

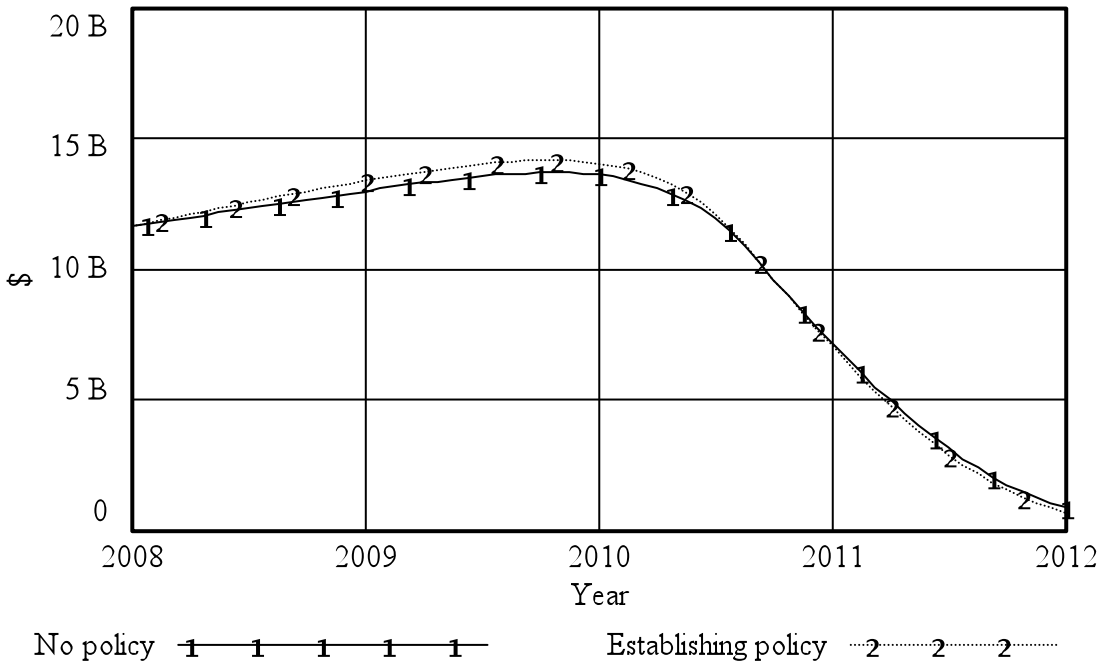
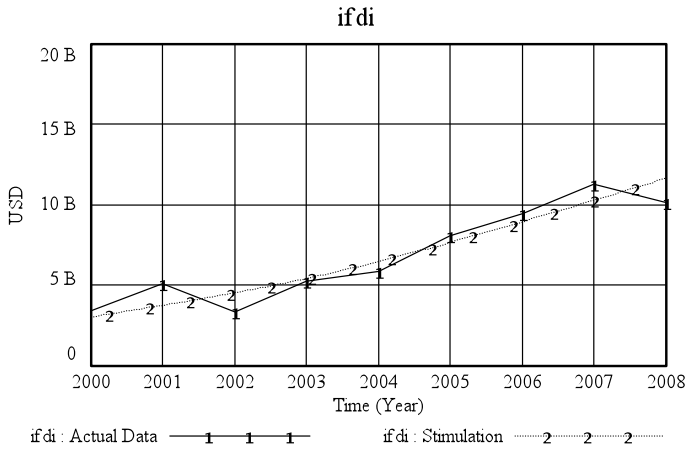
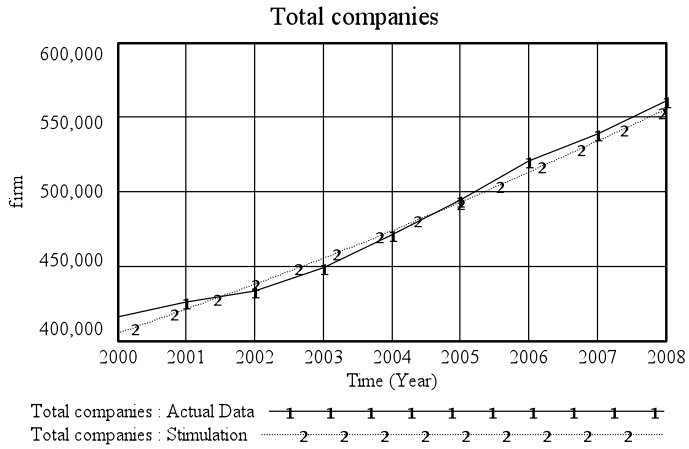
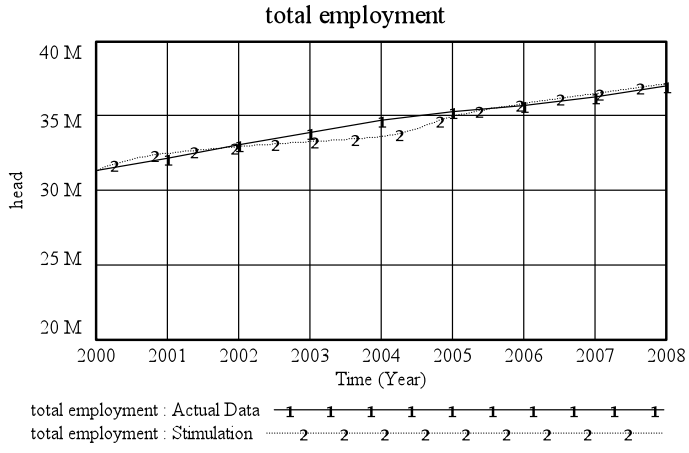


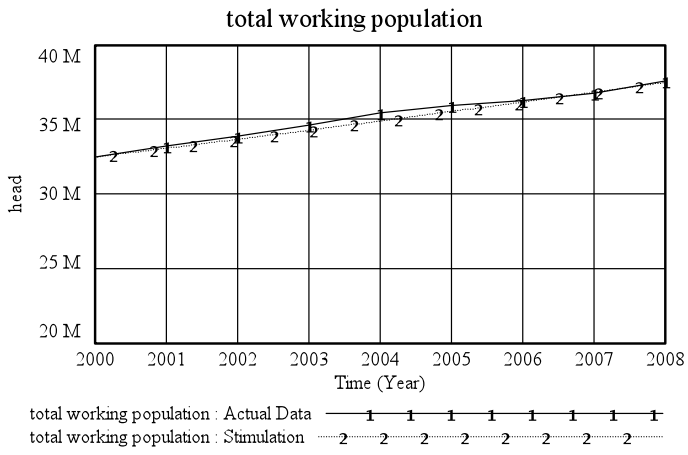
Figure 11 Simulation of FDI under Firm Establishment Policy

Table 1 Initial value of stock variables in the model

Name	**Initial Value**
Firm Module	
• Foreign companies	12,000
• Local FDI-related companies	38,000
• Other industries companies	355,000
• Other industries companies growth ratio	2.78%
Salary Module	
• Foreign firm salary	1,920
• Local FDI-related salary	1,600
• Other industries salary	1,600
• Average global salary	5,660
Job Vacancy Module	
• Jobs per firm	80
Worker Module	
• Unemployed people	1,200,000
• Workers in other industries	27,264,000
• Workers in local FDI-related firms	3,040,000
• Workers in foreign firms	960,000

Table 2: Correlation between simulation results and actual data

Variable	Correlation (R^2)	Graph
Inflow FDI	0.893	
Total number of companies	0.984	
Employment	0.933	

Working population	0.969	
Average local salary	0.857