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CAFTA-DR EFFECTS ON FDI INFLOWS, GROWTH AND DISTRIBUTION OF THE WORKFORCE: A SYSTEM DYNAMICS APPROACH

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ABSTRACT

As regional trading arrangements have spread over the last decades, the study of the relation between trade agreements and foreign direct investment still presents difficulties due to the multi-dimensional character of such relationship. This paper presents a system dynamics model that attempts to shed new light on how some of the Central American Free Trade Agreement (CAFTA-DR). Specifically we look at how the growth and distribution of the workforce in the non-agricultural (or industrial) and agricultural sector in six CAFTA-DR country members. The model results indicate that the provisions we considered tend to industrialize member countries as well as expand the agricultural sector in some countries in the long run. In addition, the model indicates that the treaty provisions drive up the GDP per capita for all member countries.

Key words: Regionalization, FDI inflows, System Dynamics, CAFTA-DR, Workforce distribution.

INTRODUCTION

The U.S.-Central America Free Trade Agreement (CAFTA) was initiated by the Bush administration in January of 2002 in an effort to revitalize the faltering talks for a Free Trade Area of the Americas. Negotiations were completed in December 2003 between the United States, El Salvador, Guatemala, Nicaragua, and Honduras. Costa Rica and the Dominican

Republic joined the accord in 2004, and all six countries formally signed the agreement in May of 2004, thereby creating the U.S.-Central America-Dominican Republic Free Trade Agreement also known as CAFTA-DR.

Implementation of the treaty began in 2006 in El Salvador, Nicaragua, Honduras and Guatemala in 2006. The Dominican Republic began the implementation of the treaty on March 1, 2007 and Costa Rica, approved the implementation agenda in January 2009. (USTR-CAFTA-DR, 2009)

The CAFTA-DR trade agreement includes a comprehensive legal framework of provisions to be implemented by the member countries. In this study we are concerned with the effects of tariff reductions and stronger protections for investors on FDI in general and specifically on the growth and distribution that additional FDI inflows will have on the workforce in the non-agricultural (or industrial) and agricultural sectors. Most of the research, so far, has been concerned with the static effects of regional integration agreements and policies on FDI flows. This study uses a system dynamics approach to understand the effects and interactions of several CAFTA-DR provisions on FDI in all member countries. The systems dynamic model we developed provides an insight into the growth and distribution of the workforce in both sectors through several proposed scenarios determined by changing the values of some of the model variables.

The CAFTA-DR policies considered in the model are the following:

1. Export/Import tariff reductions
2. Strong Protections for U.S. Investors: The agreement establishes a secure, predictable legal framework for U.S. investors in Central America and the Dominican Republic, and contains a commitment to develop an appellate mechanism for investor-state disputes.

REGIONAL INTEGRATION AND FDI: LITERATURE REVIEW

Far from taking place in a single global market, more than 80% of foreign direct investment and over half of the world trade take place in regional blocks. (Rugman, 2000) As regional trading arrangements have proliferated over the last decades, they have posed challenges to economists on both intellectual and policy levels. Even though some integration agreements have been motivated by political considerations, more often the driving force for such agreements is economics. In the short run, integration is expected to stimulate intra-regional trade and investment; in the longer run, it is hoped that the combination of larger markets, tougher competition, more efficient resource allocation, and various positive externalities will raise the growth rates of the participating economies.

The relation between trade agreements such as CAFTA-DR and foreign direct investment is multi-dimensional in nature thus posing difficulties for static studies. The impact may vary depending on the character of existing foreign direct investment: horizontal and vertical investment, or import-substituting and export-oriented investment. In addition, integration between developed countries differs from integration between developing countries depending on how competitive and complementary the economies are. (Blomström & Kokko, 2009).

FDI and Barriers to Trade

Tariff reduction is an important provision of CAFTA-DR. The inflows of FDI could go up if the average level of protection increases as a result of the trade agreement. This surge of inward FDI would not necessarily be evenly distributed, but rather concentrated to the geographical areas with the strongest locational advantages (Levy Yeyati et al., 2003). In general, it is expected that FDI inflows resulting from the CAFTA-DR will be primarily directed towards the services and industrial sectors. In addition, internalization theories imply

that inflows of FDI are likely to increase as a result of regional integration since a larger market makes the region a more attractive investment location. (Blomström & Kokko, 1997; Buckley & Casson, 1976; Dunning, 1977).

CAFTA-DR's provisions regarding access to services and greater investor protections are expected to be a major motive for foreign investment. CAFTA-DR is expected to create a more predictable policy environment for foreign investors, who might otherwise fear that purely national reform efforts are temporary and that various kinds of restrictions may be reintroduced when the political regime changes. Explicit dispute resolution mechanisms are also featured in CAFTA-DR. To the extent that such mechanisms are effective, they should reduce trade and investment disputes between nations covered by the agreements.

CAFTA-DR Framework

While implementation of CAFTA-DR has not been uniform, all signatory countries have made progress in implementing the agreement. However, the debate on the agreement's merit continues. Supporters of CAFTA envision its implementation as the next step after the establishment of the North American Free Trade Agreement (NAFTA) toward achieving a hemispheric free trade agreement. On the other hand, opponents are not persuaded the agreement will benefit all signatory countries and argue that it has not been established whether Central American signatories are economically and politically well suited for inclusion in this new free trade zone. Critics have questioned the advisability of adopting another free trade agreement in light of U.S. experiences under NAFTA. Concerns range from potential negative effects on the economic competitiveness of Central American farmers to threats of further job losses faced by American manufacturing workers. Given these publicly expressed concerns, there is no uniform support for CAFTA-DR's implementation.

Furthermore, there are equally significant concerns about CAFTA-DR's nature and structure regarding its legal effects. (Byrnes, 2009)

The CAFTA-DR agreement extended immediate duty free access to more than half of all U.S. agricultural exports. Average tariffs applied by the member countries to imports of agricultural products from the United States exceed 11 % and on certain import sensitive products, can be more than 150 %. Tariffs on the most sensitive agricultural products will be phased out over periods ranging from five to 20 years. Liberalization will be undertaken using tariff-rate quotas. (Clark, D. P., 2009)

Some of the concerns about the negative impacts of the agreement are summarized in the following table:

Table 1. Potential Negative Impacts of CAFTA-DR

CAFTA Impacts in U.S.	**CAFTA Impacts in Central America**
Trade deficits rise and shifts in production overseas accelerate	Imports of staple crops and falling prices displace subsistence farmers
More U.S. jobs lost, particularly in manufacturing	New opportunities in export-oriented industries insufficient to absorb farmers and other workers displaced by imports
Downward pressure on wages intensifies and income inequality rises	Weakened rules on workers' rights prevent workers from organizing and pull down wages even in export sectors

The Economic Commission for Latin America and the Caribbean (ECLAC) as well as other institutions such as the Institute of Social Studies have published a several studies and reports on the impact of CAFTA on several member countries as well as the impact on different industrial sectors (Sanchez Cantillo & Vos, 2005; Paunovic & Martinez, 2003; Hans et al., 2008; Monge-Gonzalez et al., 2004). The analysis tool used in these reports is the

general equilibrium computational modeling (GCM). Generally, the results of these reports are mixed and do not present polarizing statements.

Suwen Pan et. al (2008) conclude that CAFTA-DR increases the national economic welfare of both the United States and the Central American, member countries. (Pan et al., 2008) D.P. Clark (2009) determines potential factor adjustment problems based on trends in intra-industry specialization over the 1992--2006 period and concludes that all seven CAFTA-DR members should use either much shorter phase-out periods or liberalized all trade immediately. (Clark, D. P. 2009)

DYNAMICS MODEL OF CAFTA-DR

System Dynamics (SD) as a research tool provides two important analytical possibilities. First, it allows us to simulate dynamic changes that occur in the economies of the CAFTA member countries, secondly, it allows us to analyze the interaction of several variables in the economy as opposed to the unidirectional impact of exogenous variables on a dependent variable. An SD model also provides non-linear possibilities among various variables which better reflect economic realities. Finally, system dynamics models have been previously used in policy studies as they can clearly illustrate the effect of the policy in both short-run and long-run. (Thompson & Tebbens, 2008; Fiddaman 2007)

Model Scope and Limitations

In general, it is expected that the services and industrial sectors will benefit the most from the additional FDI expected as a result of implementing the treaty due to a reducing in the FDI barrier. On the other hand, it is also forecasted that the agricultural sector will not exhibit a sustained growth and that the unemployment rate in this sector will increase (Trejos, 2007). However, as the industrial sectors grow, labors from agricultural sectors can transfer

to the industrial sectors. The model is designed based on this phenomenon by assuming that CAFTA implementation encourages the growth of non-agricultural sectors.

The model implements neoclassical assumption that the workforce is homogenous and qualified to work interchangeably in both agricultural and non-agricultural sectors. Because the objective of the model is to observe the movement of local workforces from the implementation of CAFTA, number of workforce is the only resource constraint in the model.

Causal Loop Diagram of CAFTA-DR

The causal loop diagram presented in Figure 1, illustrates in more detail the relationships to be modeled between the workforce in the agricultural and non-agricultural sectors for each CAFTA member country. The causal loop consists of several balancing loops that indicate self-corrections over a period of time and where feedback reduces the impact of a change. Assuming that the agricultural product demand is constant, the balancing loop B1 indicates that when the number of agricultural demand increases, the tendency is to create an agricultural overproduction problem. The overproduction problem in turn would discourage the growth of agricultural firms. Balancing loop B2 indicates that an increase in the demand for agricultural workers (which we translate as an increase in the number of agricultural firms) generates a higher demand for farmers. Assuming that the number of farmers does not change, then a farmer shortage occurs which reduces the agricultural firms' growth. Balancing loops B3 and B4 follow the same reasoning as the balancing loops B1 and B2 applied to non-agricultural industry. Balancing loops B5 and B6 present an increase in wages in both the agricultural and non-agricultural sectors which have an impact on the job vacancies in each sector. The wage difference between the agricultural and non-agricultural

sectors dictates the number of workers who move from the agricultural sector to the non-agricultural sector.

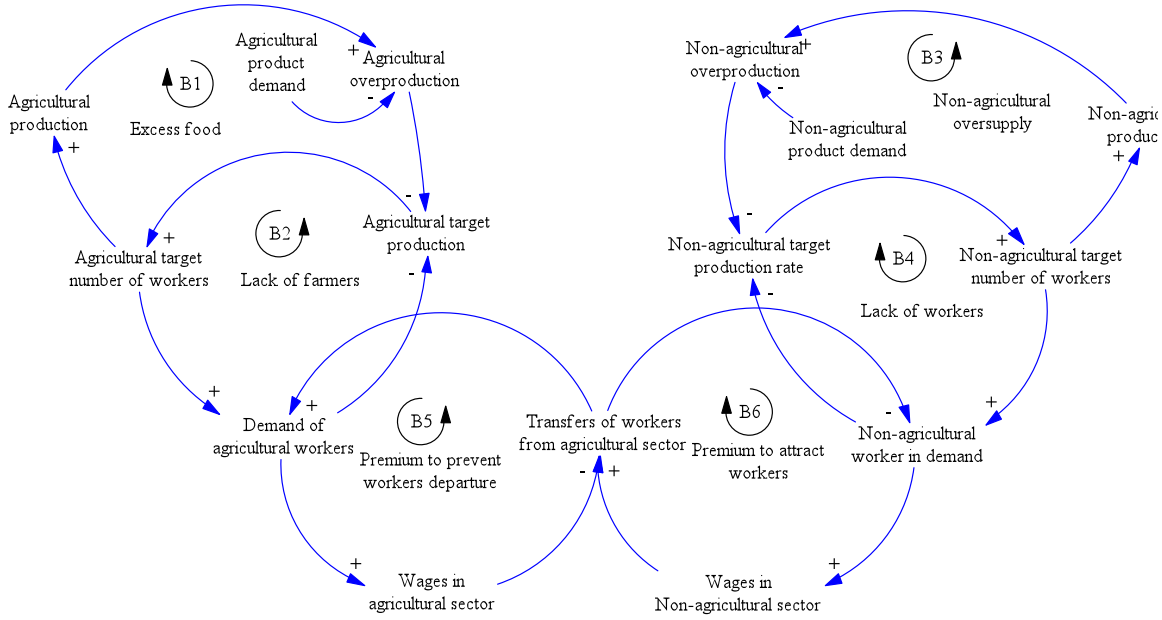


Figure 1: Causal loop diagram for the general effect of CAFTA on distribution of workforce

Simulation methodology

This study simulates the effect of CAFTA-DR on the distribution of workforce based on the relationships shown in Figure 1. The causal diagram in Figure 1 is modified into a stock and flow diagram as shown in Figure 2 which is simulated using Ventana Vensim® software. For explanatory purposes the model in Figure 2 was segmented into 6 parts. The demand for agricultural and non-agricultural products is calculated from the local consumption plus product export minus product import as shown in segment 1 and 2. The production rate is determined by the number of workers in each sector and the worker's productivity as indicated in the segment 3. Segments 4 and 5 show the comparison between the demand and supply volumes. The target production rate increases if the production rate is lower than the

demand and vice versa. The target production rate leads to a target number of workers. If the current number of workers in the each sector is lower than the target, wages in that sector will increase in order to attract more workers as shown in segment 6.

The model is simulated through iterative closed-loop calculation. Each arrow represents the linkage with the arithmetic relationship. The variables in the rectangle or stock variables represent the accumulation of the change over the period of time. The stock variables require an initial value as a starting point for the calculation. Then, the initial value of the stock variables is used to calculate other variables in the model based on the arithmetic relation between each variable. Because the model is a closed-loop model, the stock variables are also changed from other variables. Therefore, the model is simulated based on the relationship and the value of the stock variables at the starting time.

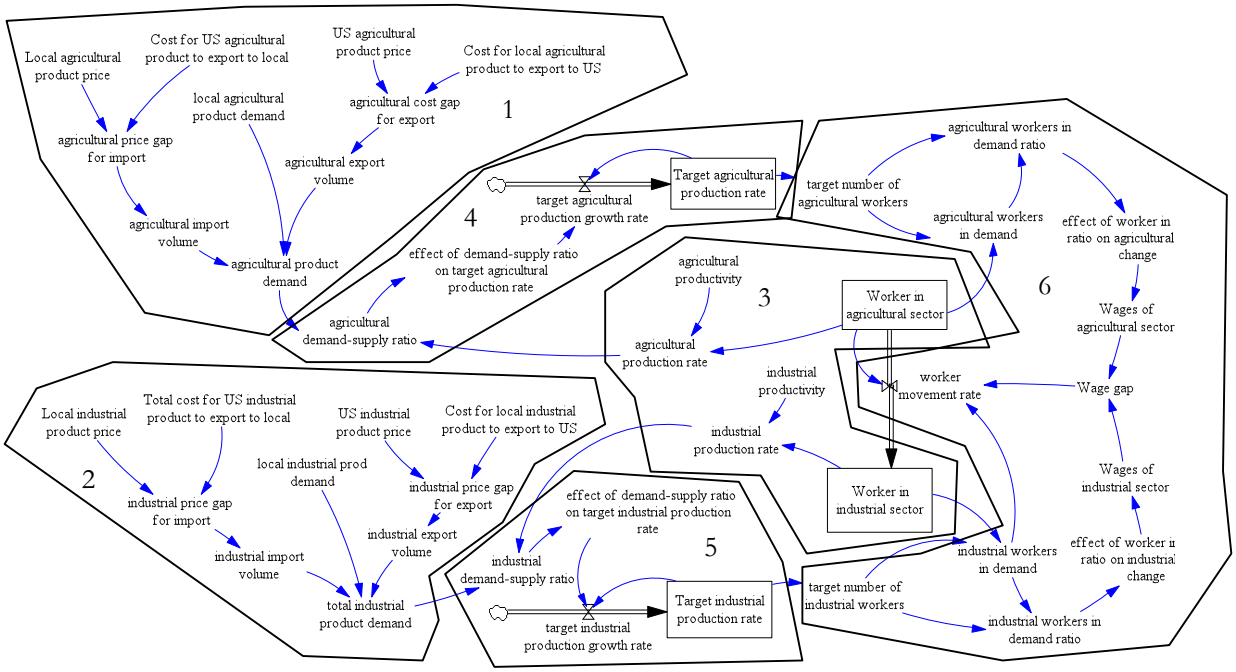


Figure 2: Stock and Flow model to study the effect of CAFTA-DR on worker distribution

MODEL VALIDATION

The model is validated through the comparison between empirical data and the simulation results. The variables to be compared are workforce, employment, and GDP per capita during 2000 and 2008 which were collected from Thomson Datastream®. The fit between empirical data and the simulation is measured from the R-square of each variable for each country as shown in Table .

Table 2 R-Square between the empirical data and the simulation results during 2000 to 2008

Country	Workforce R^2	Employment R^2	GDP per Capita R^2
Costa Rica	0.73	0.49	0.77
Dominican Republic	0.81	0.66	0.70
El Salvador	0.29	0.37	0.97
Guatemala	0.96	0.98	0.93
Honduras	0.17	0.02	0.81
Nicaragua	0.84	0.83	0.81

The good fit between the historical data and the simulation is provided by the high R^2 value for the GDP per capita for all countries as well as the workforce and employment variables in all member countries with the exception of El Salvador and Honduras. Therefore, we conclude that this model can replicate the actual situation to some degree and can be used as a platform to test the effect of the chosen provisions on the workforce distribution and economies of the CAFTA-DR member countries.

RESULTS

Even though CAFTA implementation technically began in 2006 for all member countries except Costa Rica, for simulation purposes we assume that CAFTA is uniformly implemented at the beginning of 2009 and that it takes 5 years to fully implement its provisions. We assume that the import and export tariff are reduced to zero when it is fully implemented. It is generally assumed that the additional FDI will mainly benefit the non-

agricultural sectors in which foreign firms have advantages over the local firms. With the treaty in place, the FDI is assumed to increase by 150%. The model simulation runs until the year 2030 in order to observe the effects of CAFTA in the short term and long term.

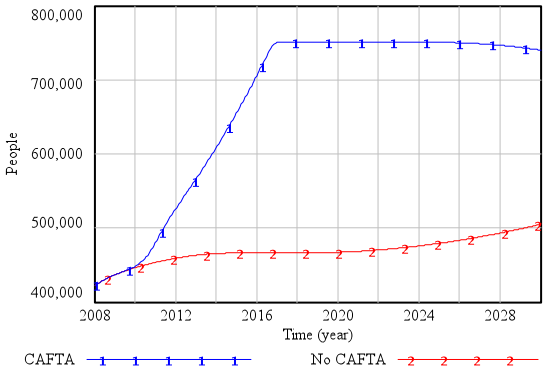
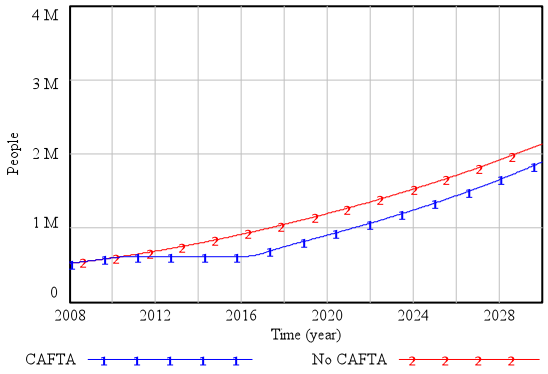
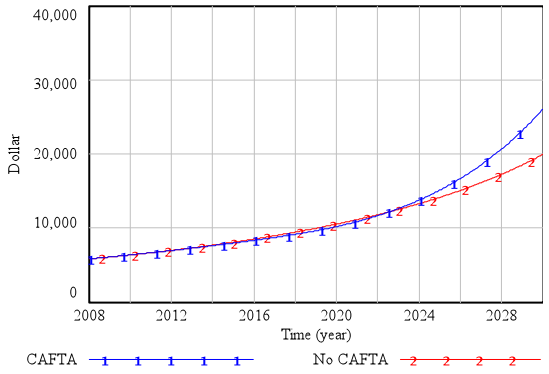
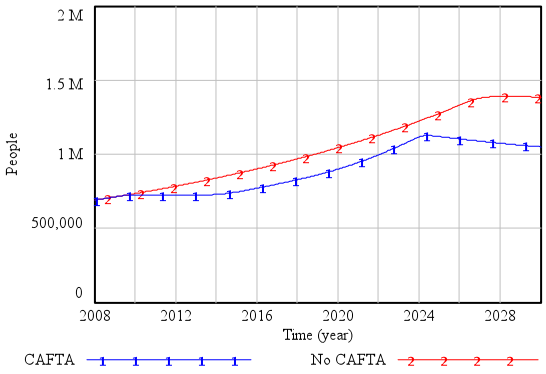
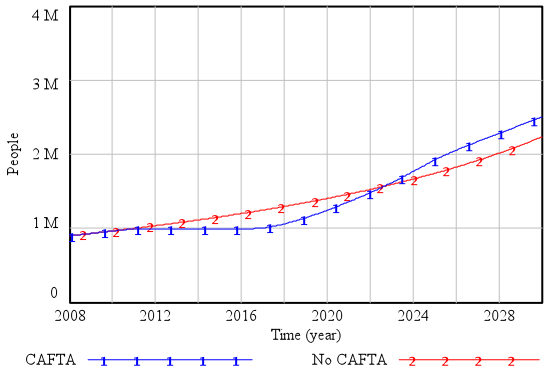
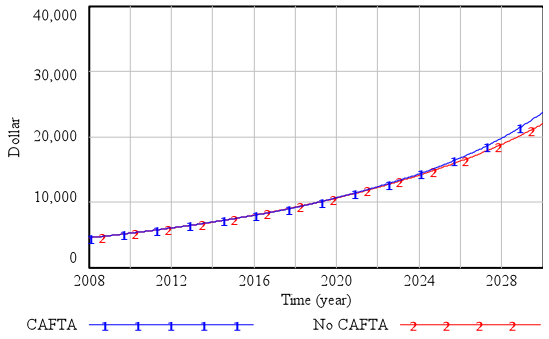
The effect of CAFTA on the number of workers in agricultural and non-agricultural sectors and GDP per capita is shown in Table . The results indicate that each member country will have a different workforce growth and distribution based on the situation before the implementation of the treaty. However, CAFTA-DR increases the import and export volumes of both agricultural and non-agricultural products. The treaty also increases the GDP per capita for all countries in the long term.

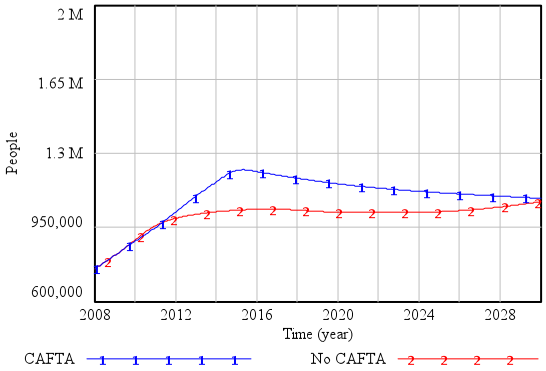
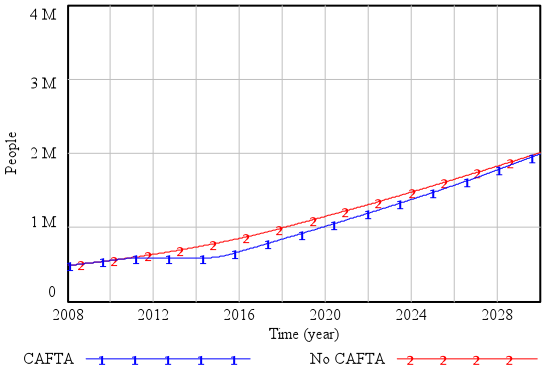
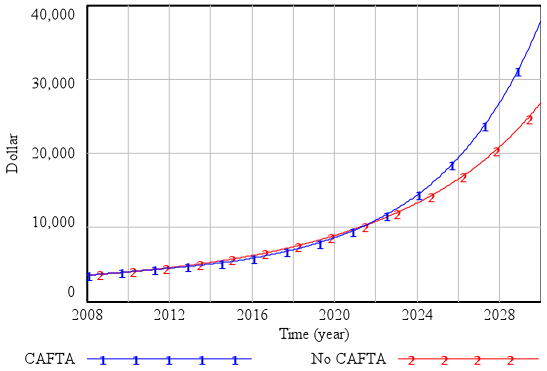
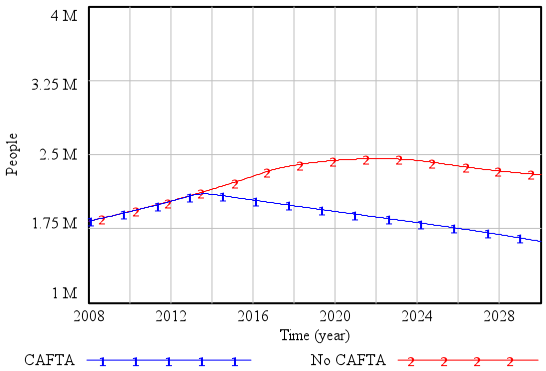
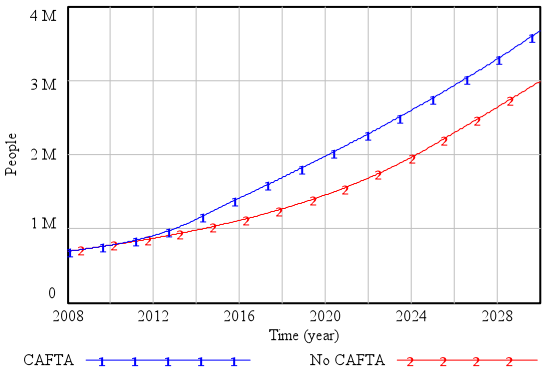
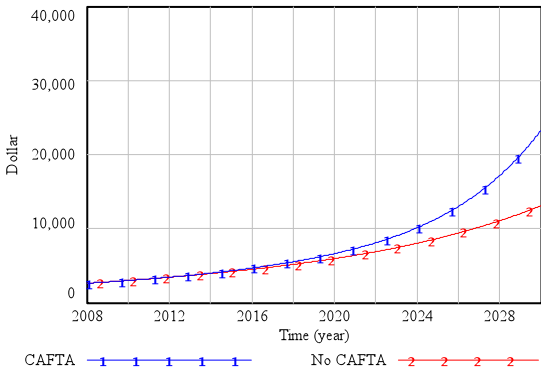
More specifically, the simulation results indicate that the modeled CAFTA-DR provisions stimulate non-agricultural sectors in Dominican Republic, Guatemala, and Nicaragua while it encourages agricultural sectors in Costa Rica, El Salvador, and Honduras. The growth increase in the non-agricultural sectors in the Dominican Republic, Guatemala, and Nicaragua is due to an increase in the non-agricultural exports that outweighs the increase in non-agricultural imports. On the other hand, according to the model the agricultural sector in Costa Rica, El Salvador, and Honduras would grow as a consequence of CAFTA-DR. However, the results show that although agricultural sectors gain more benefits in Costa Rica, El Salvador, and Honduras, the non-agricultural sectors enlarges at a faster rate and will dominate in the long run. This simulation result is somewhat counterintuitive. Much of the criticism of the treaty has been the belief that the agricultural sectors in the member countries will suffer the most. In the case of Costa Rica, the agricultural sector has diversified from the traditional coffee and banana production to so called non-traditional agriculture which includes, flowers, pineapple, palm tree oil, etc. It is plausible to speculate that some of the FDI investment would bring new technologies from which non-traditional agricultural

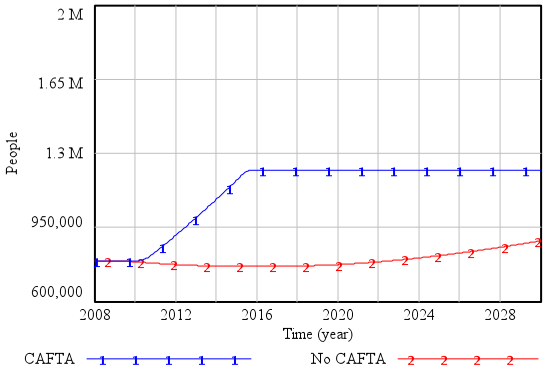
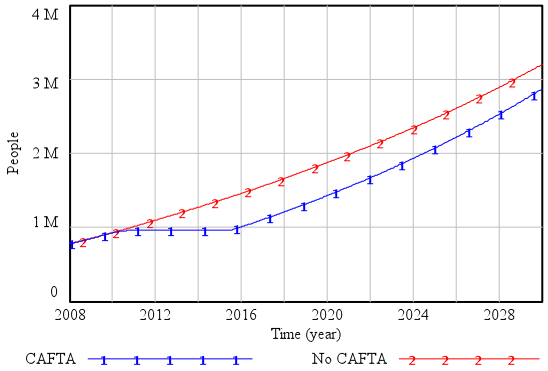
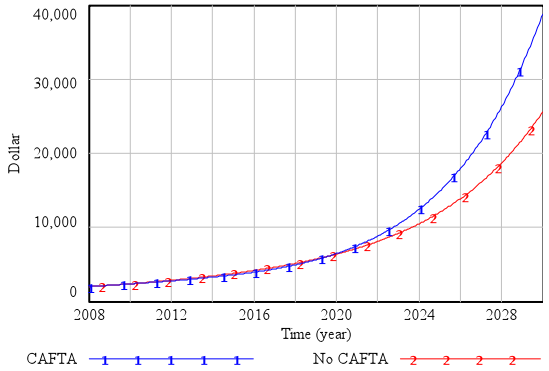
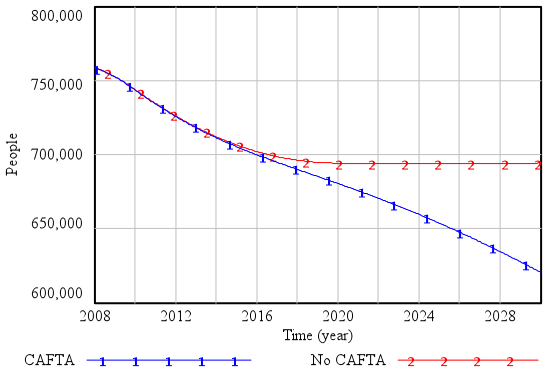
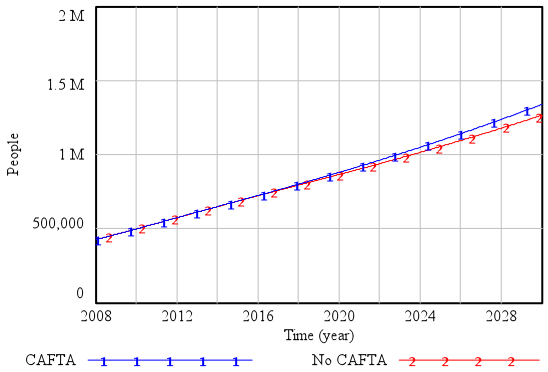
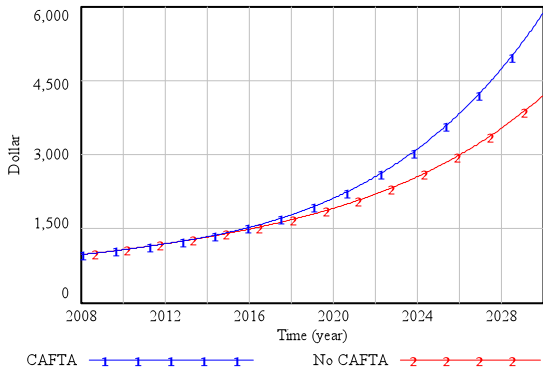
products would benefit the most. In that case, the model results of a significant increase in the agricultural sector in Costa Rica would not be as counter-intuitive as they seemed at a first glance.

In general, the results indicate that CAFTA-DR would increase the wealth of the people in the member countries as represented by the higher GDP per capita in all countries. The higher GDP per capita comes from a higher volume of inflow FDI after the treaty is implemented. Higher foreign investment in turn creates a demand for the workforce, which is the limited resource. Based on game theory principles, firms in both agricultural and non-agricultural sectors would increase the wages to ensure that they get enough qualified workers which would push up the income per capita of the workers in each country.

Table 3 Comparison of workers in agricultural and non-agricultural sectors and GDP/capita for each country if CAFTA is implemented

Country	Workers in agricultural sectors	Workers in non-agricultural sector	GDP per capita
Costa Rica			
Dominican Republic			

Country	Workers in agricultural sectors	Workers in non-agricultural sector	GDP per capita
El Salvador			
Guatemala			

Country	Workers in agricultural sectors	Workers in non-agricultural sector	GDP per capita
Honduras			
Nicaragua			

CONCLUSIONS

The implementation of new policies and laws has effects on the general development of a country's economy. Sometimes the effects are unsatisfactory, other times are successful, and often it is not well known its direct or indirect effects on the economy. On balance, based on this paper's system dynamics model it can be concluded that CAFTA-DR policies of reducing export tariffs and providing investor protections policies are going to affect positively FDI inflows, import, and export value in both agricultural and non-agricultural sectors. Which sector, agricultural or non-agricultural sectors, gains higher benefits depend on the background situation of each country. However, non-agricultural sectors will grow at a higher rate due to a high FDI inflow. Therefore, CAFTA-DR encourages non-agricultural sectors in all countries in the long run. Nevertheless, an increase in workforce demand from the establishment of new foreign operations drives up the wages of local workers and makes the GDP per capita of people in that country increase.

There are several possible extensions to the model which are worth mentioning. First, unintended effects such as growing inequality and ongoing poverty are not predictable using the current model. The model can be refined in order to discern those unintended policy effects.

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