Dynamics of Foreign Investment Under Economic Integration Environment

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An economic integration (EI) is when two or more firms integrate parts of their economy together through free trade agreement such as NAFTA or through economic union such as EU. An EI has been proved to attract foreign investment from countries outside of the EI zone. However, the effect on foreign investment from countries within the EI zone is ambiguous. One theory claimed that a foreign investment from countries within an EI zone will be reduced and is substituted by an international trade. Another theory mentioned that a foreign investment will be increased due to a lower cost of factor relocation. In this paper, we develop a system dynamics model having two countries with one firm in each country. Each firm can decide whether to export products to another country or to invest in that country. The results show that an economic integration will support both international trade and investment if two countries are not significantly different. However, if two countries have different production cost, firms in countries with higher production cost will relocate their operation to the countries with lower production cost and export products to countries with high production cost instead.

Keyword: Economic integration; Foreign investment; International Trade; System dynamics

1. Introduction

An economic integration is the event that two or more countries join parts of their economy together by eliminating the trade and resource movement barrier in order to increase market size, stimulate economic growth, and increase their negotiation power over other countries and regions (Cuervo-Cazurra and Un, 2007). This process has been in focused since the formation of European Union and received an attention again recently due to a development of ASEAN Economic Community (AEC) at the end of 2015 which makes AEC become the third largest economy in Asia and the seventh largest economy in the world.

An economic integration makes countries within the economic integration bloc to become one large market. Because of that, many multinational firms move their operation into the economic integration region after the economic integration takes place to tap into this new market opportunity and gain competitive advantage in this new region (Balasubramanyam and Greenaway, 1992; Bende-Nabende, Ford, and Slater, 2001; Chen and Funke, 2009; Gao, 2005; Motta and Norman, 1996; Yannopoulos, 1990).

A main source of additional investment after an economic integration takes place comes from non-member countries (Motta and Norman, 1996). However, the movement of foreign investment from member countries as a result of an economic integration is inconclusive. On one hand, an economic integration reduces the cost of resource movement between countries, which encourage firms from member countries to invest more (Oh and Rugman, 2012). On the other hand, an economic integration also reduces the cost of exporting product from one country to another member country. Therefore, firms can choose export instead of expanding their operation to another country (Motta and Norman, 1996). This is a theoretical gap that requires an attention to fully understand the effect of an economic integration on foreign investment within an integrated bloc and also to provide a

comprehensive picture for the policy makers to design the policy supporting the intra-regional foreign investment. In this paper, we aim to contribute to this issue by presenting a comprehensive model of intra-regional foreign investment by incorporating both schools of thought.

Most of the study on this issue focuses on the effect of an economic integration in a short-term. The long-term effect of an economic integration is hard to study because there are many uncontrolled factors affecting the results. Only focusing on the short-term results can be misleading because there is a "worse-before-better" scenario in many situations (Sterman, 2000). In this paper, we overcome this limitation by using system dynamics model. As a result, we provide both short-term and long-term analysis of the effect of an economic integration to a foreign investment from member countries, which is also another main contribution of this paper.

There are many situations that can happen when analyzing the effect of an economic integration on a foreign investment, and each situation can have different results. Therefore, we develop two scenarios which are the situation that two countries are identical and the situation that two countries have different production cost. The results show that if two countries are identical, an economic integration will support both international trade as well as maintain the foreign investment in those countries. However, if two countries have different production cost, foreign investment in countries with higher production cost will be withdrawn and the firm will export products from its headquarter to that country instead. The firm who locate in the country with high production cost will also offshore their operation to the countries with low production cost and export products back to their home country.

The structure of this paper will be as follow. First, we will review the theories on the relationship between an economic integration and foreign investment. Then, we will explain the model and the model validation process. After that, the simulation results of two scenarios will be illustrated and follow with the conclusion and implication.

2. Economic integration and foreign investment

The first question to ask before further studying on this topic is whether an economic integration affect a foreign investment. This research question has been addressed tremendously through both qualitative and qualitative approach and the results are consensus that an economic integration can stimulate a foreign investment. Yannopoulos (1990) found that a development of the European Community is correlated with an influx of foreign investment from countries inside and outside of the European Community. Balasubramanyam and Greenaway (1992) studied further and found that a formation of European Community affected the foreign investment only on a specific industry such as banking and non-manufacturing industries. Motta and Norman (1996) showed that the reason for the inflow of foreign investment from non-member countries is to tap into a larger and more accessible market.

There are many factors that affect the change in foreign investment from an economic integration. Bende-Nabende *et al.* (2001) found that the host countries' characteristics determine the effect of an economic integration on foreign investment. An economic integration can encourage foreign investment for developed countries but have an opposite effect for less-developed countries. Donnenfeld (2003) mentioned that an increase in foreign investment from an economic integration is to avoid tariff and non-tariff barrier set by an integrated bloc, which is also supported by MacDermott (2007) and Baltagi, Egger, and Pfaffermayr (2008). Chen and Funke (2009) suggested different reason that an increase in foreign investment is due to a reduction of an institutional uncertainty.

There are different type of foreign investment that is encouraged by an economic integration. Chen (2009) found that an integration with larger markets will increase an

export-platform foreign investment and if the integrated bloc consists of countries with high labor endowment, it will attract foreign investment in labor-intensive industries.

From a previous section, an economic integration can stimulate foreign investment from countries outside of the regional bloc. However, the effect of an economic integration on the intra-regional foreign investment is inconclusive. On one hand, a regional economic integration can encourage an intra-regional foreign investment because of the lower cost of cross-border investment (Oh and Rugman, 2012; Yannopoulos, 1990). On the other hand, an integration can reduce the intra-regional transportation and transaction cost and it is better for firms to centralize their production in one country and export products to other member countries. Therefore, we can see an intra-regional trade to replace foreign investment (Motta and Norman, 1996).

3. Economic integration and intra-regional foreign investment

The effect of an economic integration was widely studied since the era of European custom union (EC) which eliminated the trade barriers of intra-EC trade. Franko (1976) looked at the number of foreign manufacturing subsidiaries and found that foreign subsidiaries of EC firms grew significantly since the formation of the EC. This situation showed a pattern of locational shift of the EC subsidiaries from their home country into other EC countries. However, the study on this issue was not widely conducted due to a lack of reliable data (Yannopoulos, 1990).

The joining of UK into EC membership also created an attention on the intra-regional foreign investment. Mayes (1983) showed that an entrance of UK into EC had no impact on locational pattern of foreign investment in EC. To be specific, UK outward investment to EC countries jumped up considerably from 1971 which is when UK joined EC but the investment from EC into UK did not rise significantly. This result indicated a uni-directional flow of investment from UK into EC.

Motta and Norman (1996) also studied the effect of economic integration by using game theory approach and found that an economic integration stimulates foreign investment from non-member countries. However, intra-regional foreign investment will be gradually replaced by intra-regional trade due to a significantly lowered trade cost.

A reduction in intra-regional foreign investment due to a lower intra-regional trade cost is also supported by Kim (2007). However, Kim (2007) argued that it is only for the horizontal foreign investment, but not for a vertical foreign investment. In the case that countries do not have the same technological level and factor costs, an economic integration will encourage vertical foreign investment from countries with relatively higher technologies and factor costs into countries with lower factor costs such as the case of Korea-China Free Trade Agreement. This finding is also supported by empirical analysis of ASEAN countries that intra-ASEAN foreign investment has increased which due to a regional supply-chain movement (Thangavelu and Narjoko, 2014).

The formation of an economic integration also stimulates foreign investment in case of small countries joining with large countries. Kim, Kim, and Kim (2012) stated that forming an economic integration can stimulate foreign investment from both members and non-member countries due to a tax competition between countries in the economic integration.

4. Model

From the literature, we develop a system dynamics model based on a two-country, two-firm model. We assume that there are two countries – Country A and Country B – and each country has one firm – firm a in Country A and firm b in Country B. Both firms offer the same product. The difference is only on price. Firms can choose to supply products to

local or international market. To serve international market, firms can decide whether to conduct foreign investment by setting up an operation in another country or to export product from the home country to that country. Customers can also select whether to buy local products or imported products based on the product cost.

The model for Country A is the same for that of the Country B. However, we will explain the model for Country A only for simplicity. The stock-and-flow diagram will be shown and accompanying with the equations for each link.

The model starts from the production of firm a in Country A. The production of a in A changes according to the ratio of sales to production, which represents production utilization rate of firm a in Country A. If the production utilization rate is high, the firm will expand its capacity. On the other hand, if the production utilization ratio is low, the production capacity will be reduced to minimize cost, as shown in Figure 1. The sale volume is the sum of local sales and the export sales. The equations for this module are:

'Production of a in A' = 'Production of a in A' + f('Sale-to-production ratio of a in A') (1)

'Sale-to-production ratio of a in A' = 'Total sale of a in A' / 'Production of a in A' (2)

'Total sale of a in A' = 'Sale of a in A' + 'Sale of a export to B' (3)
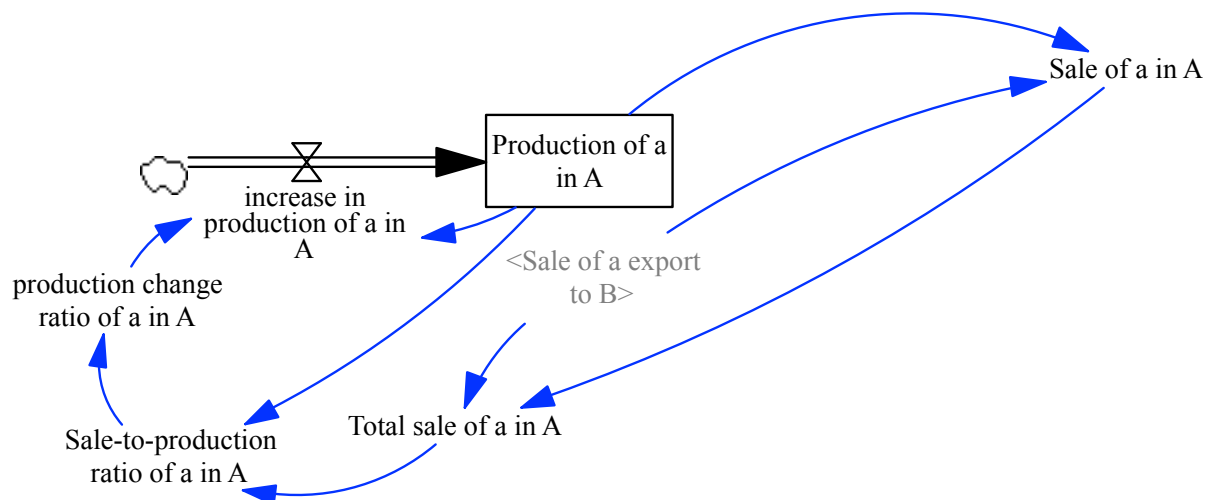

Figure 1 Production of a in A module

The sale volume of firm a in Country A is calculated as a share of total sale of local supplier in country A, which consists of firm a and the foreign investment of firm b that operate in country A as shown in Figure 2. The customers will decide whether to buy product form firm a or firm b based on the product cost. Therefore, the equation for sale of a in A is:

'Sale of a in A' = IF THEN ELSE ('Cost pu of a produced in A'<='cost pu of b produced in A' , MIN ('Production of a in A'-'Sale of a export to B','Sale of local supplier in A') , 0) (4)

We assume that this product is a labor-intensive product. Therefore, the main cost comes from the labor cost. The number of labors is depended on the production capacity, which is adjusted from the sales to production ratio.

'Cost pu of a produced in A' = 'Total cost of a produced in A' / 'Production of a in A' (5)

'Total cost of a produced in A' = 'Employment of a in A' * 'Annual compensation in A' (6)

'Employment of a in A' = 'Employment of a in A' + f('Sale-to-production ratio of a in A') (7)

The cost for the product of firm b in Country A is also calculated using the same method. From that, we get the total local supply capacity in Country A by adding the production capacity of firm a in Country A with that of firm b in Country A.

'Total local production in A' = 'Production of a in A' + 'Production of b in A' (8)
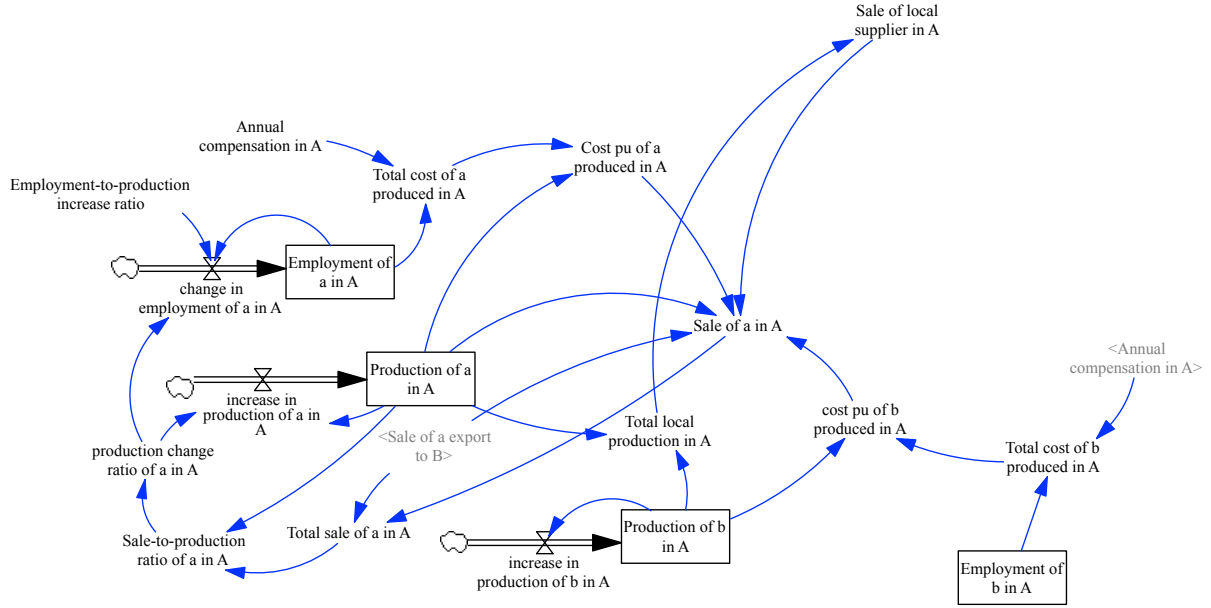
Figure 2 Sale of a in A module

Figure 3 shows how to determine the sales of local suppliers. The sales of local suppliers is depended on the relative cost of local products with the imported products. Customers will buy products solely on price. Therefore, the equations of these relationships are:

'Sale of local supplier in A' = IF THEN ELSE ('local-to-export cost ratio in A'<=1 , MIN('Demand in A','Total local production in A') , 0) (9)

'Local-to-export cost ratio in A' = 'Cost of local supplier in A' / 'Cost of b export to A' (10)

'Cost of local supplier in A' = MIN('Cost pu of a produced in A','Cost pu of b produced in A') (11)

'Cost of b export to A' = 'Cost pu of b produced in B' * (1 + 'Export cost from B to A ratio') (12)

The demand comes from the number of customers, which is also changed according to the demand fulfillment rate. If the demand is not fulfilled, customers will switch to use other products, as shown in Figure 4.

'Demand in A' = 'Customers in A' * 'Annual demand per customer' (13)

'Customers in A' = 'Customers in A' + f('Demand fulfilled ratio in A') (14)

'Demand fulfilled ratio in A' = 'Sale of local supplier in A' + 'Sale of b export to A' (15)

The sale of imported products is depended on the relative product cost. We assume that if the cost is competitive, the firm will allocate 50% of the production capacity to support export market.

'Sale of b export to A' = IF THEN ELSE ('local-to-export cost ratio in A'<1 , 0 , MIN('Demand for import in A','Production of b in B'/2)) (16)

'Demand for import in A' = 'Demand in A' − 'Sale of local supplier in A' (17)
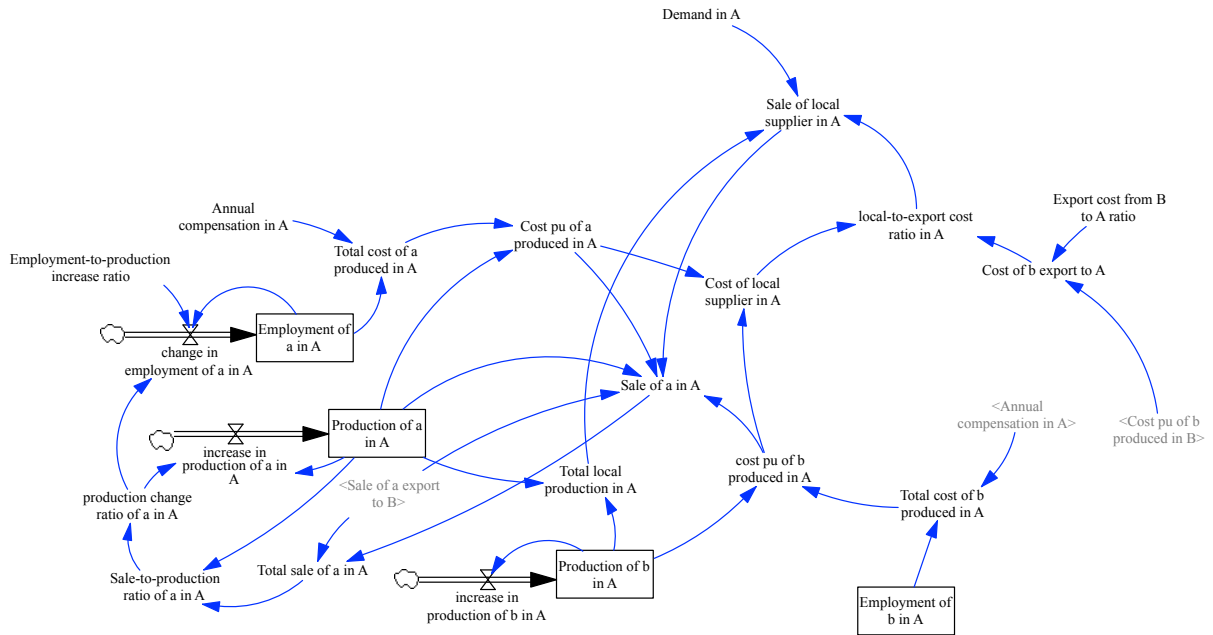
Figure 3 Sale of local supplier in A module
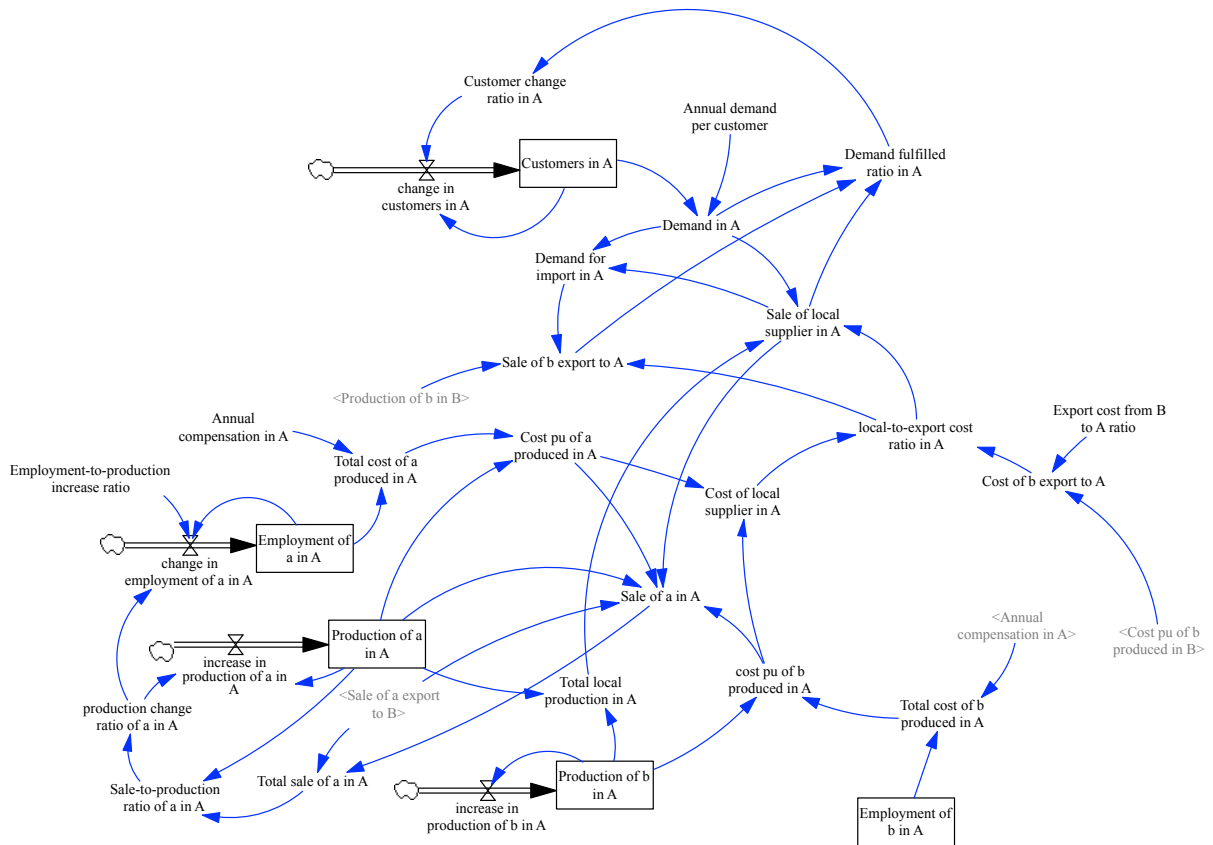
Figure 4 Demand in A module

Lastly, we model the foreign investment module as shown in Figure 5. The foreign investment happens if that firm has not invested before, exporting products to that country is not competitive, and there is a market opportunity in that country. In this model, we measure the market opportunity through demand fulfillment ratio. If the demand fulfillment ratio is low, there is a room for new business. We assume that if the demand fulfillment is lower than 50%, it is a market opportunity.

'Initial FDI of b to A' = IF THEN ELSE('local-to-export cost ratio in A'<1 , IF THEN ELSE('Demand fulfilled ratio in A'<0.5,IF THEN ELSE('Production of b in A'=0 , 2000 , 0),0),0)   (18)
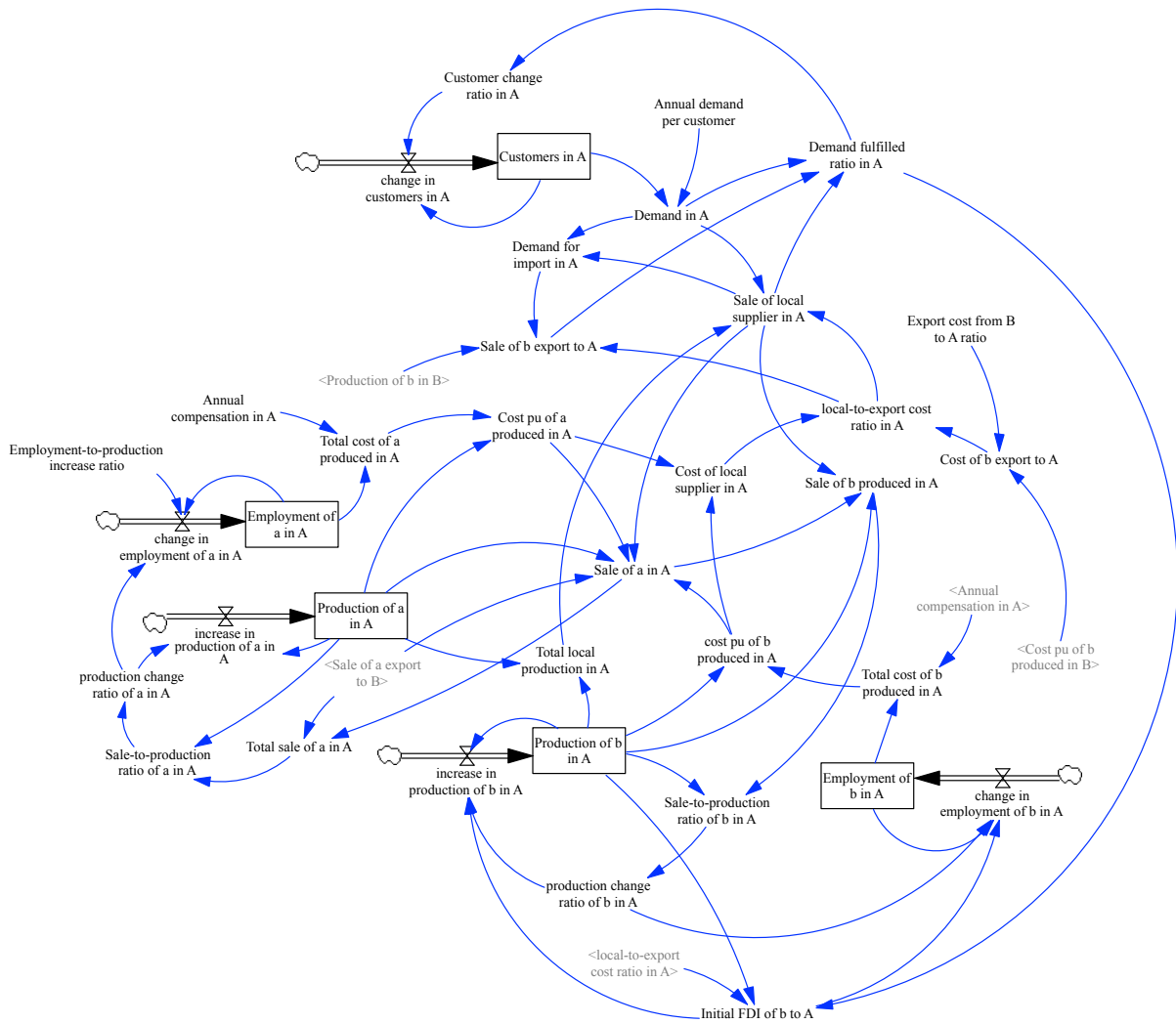
Figure 5 Foreign investment module

5. Model validation

The model is validated based on two situations – the situation without an economic integration and the situation with an economic integration. In both situations, two countries are identical in term of operating cost in addition to a labor cost. We assume that the demand is large that no firm can dominate the market.

The first situation is the situation without an economic integration. In this situation, the export cost is high due to a tariff and non-tariff barrier. Based on the literature, we expect to see that the firms choose the foreign investment strategy instead of exporting products to another country. The second situation is when the economic integration is in place and the imported tax and tariff is eliminated. Based on the literature, firms will choose export over investing in another country.

From the simulation results as shown in Figure 6 and Figure 7, we see the foreign production when there is no economic integration but this foreign investment is absence in the case of an economic integration. We also see the export trend when there is an economic integration which does not happen without an economic integration.

Selected Variables

Production of a in B : Test - Economic integration ——1——1——1——1——1——
Production of a in B : Test - No economic integration ····2·······2·······2·······2·······2·
Production of b in A : Test - Economic integration ——3——3——3——3——3——
Production of b in A : Test - No economic integration — · —4— · - 4- · —4— · - 4- · -
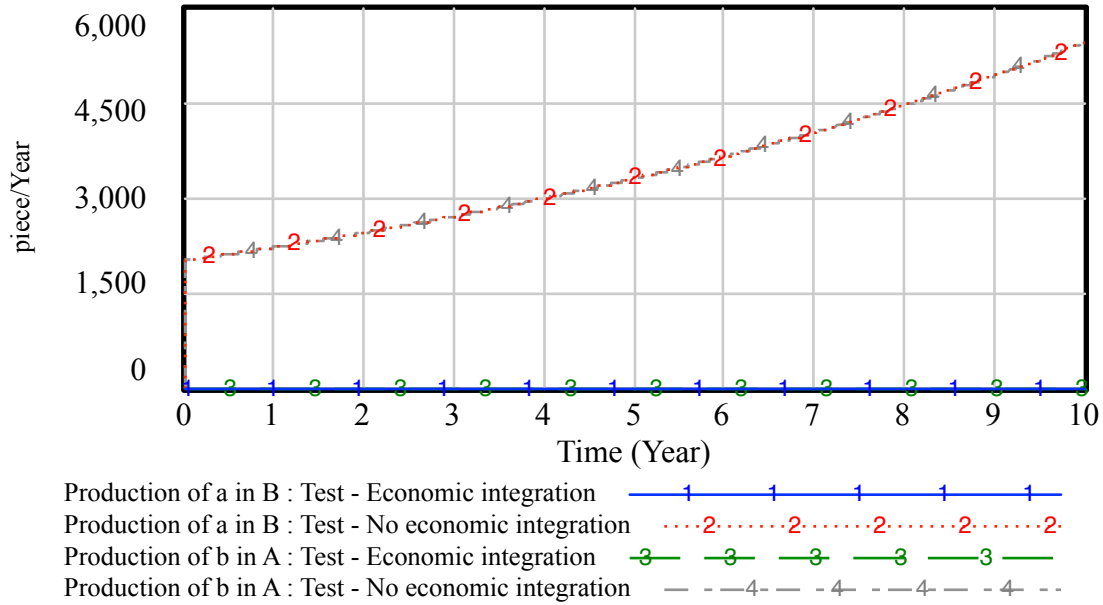
Figure 6 Model validation results on foreign investment

Selected Variables

Sale of a export to B : Test - Economic integration ——1——1——1——1——1——
Sale of a export to B : Test - No economic integration ····2·······2·······2·······2·······2
Sale of b export to A : Test - Economic integration ——3——3——3——3——3——
Sale of b export to A : Test - No economic integration — · —4— · - 4- · —4— · - 4- · -
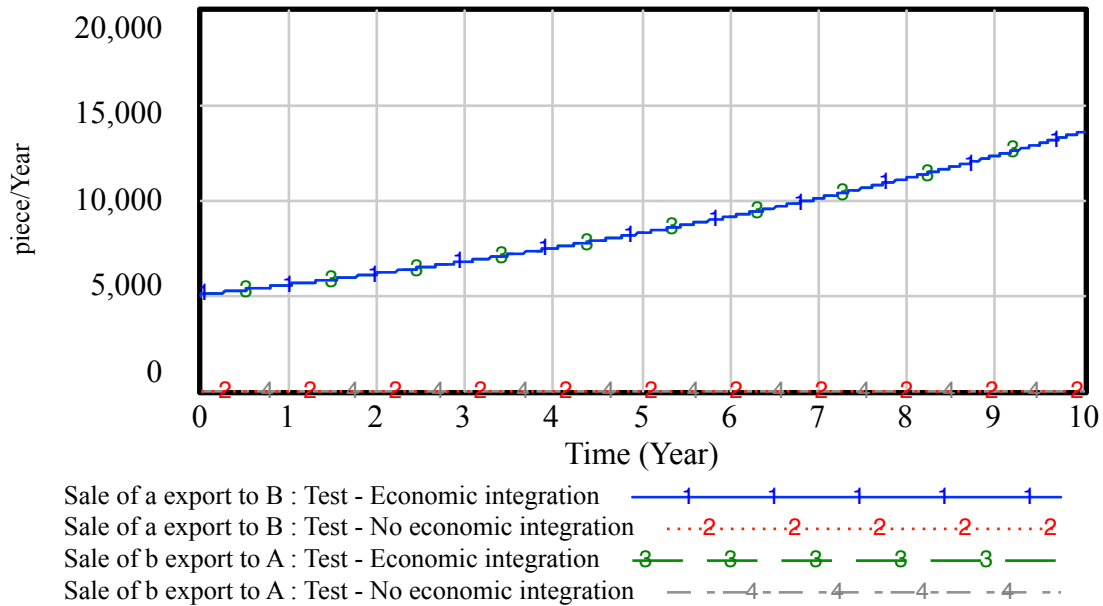
Figure 7 Model validation results on export

From two situations, the model can replicate the results theorized in the literature. Therefore, the model is validated and will be used to examine the pattern of intra-regional foreign investment after the economic integration is formed.

6. Dynamics of foreign investment after economic integration

We aim to analyze the dynamics of foreign investment after the economic integration is in place by using the explained model. An economic integration is implemented in the model through the gradual reduction of the imported cost from 50% of the product cost until

the imported cost is removed. We assume that the economic integration starts at year 0 and it takes 2 years to totally eliminate the imported cost.

We develop two scenarios to study the effect of an economic integration on the foreign investment in different situations. Two scenarios are:

Scenario 1: Two countries are identical

Scenario 2: Country A has lower labor cost than Country B

Scenario 1: Two countries are identical

In this scenario, Country A and Country B has the same market size, and the annual labor cost is the same.

The simulation results show that when the economic integration is fully implemented, the cost of imported products become competitive comparing to the cost of local products. Therefore, as shown in Figure 8, the export volume jumps up on year 2 which is the time that an imported cost is fully eliminated.

Export volume

Sale of a export to B : Scenario 1 - Identical country ——1——1——1——1——1——1——

Sale of b export to A : Scenario 1 - Identical country ·2·····2·····2·····2·····2·····2·····2·
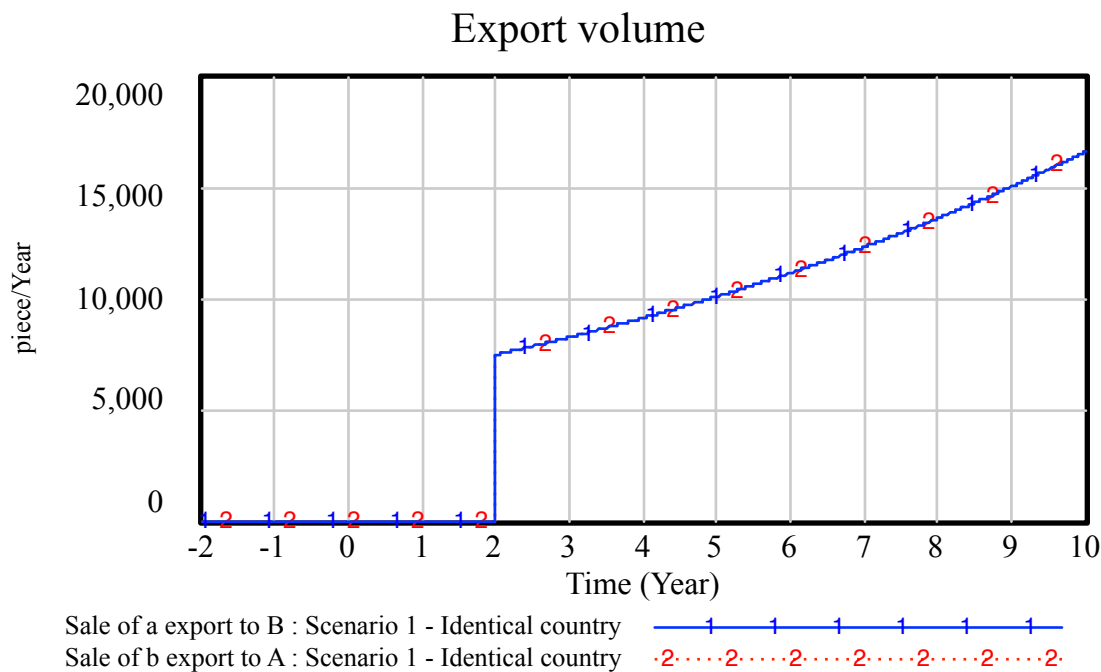
Figure 8 Export volume in Scenario 1 - Two countries are identical

When we look at the foreign operation – firm a in Country B and firm b in Country A, the operation is still expanding after the implementation of an economic integration. This result is contradicted with the theory that an economic integration will stimulate international trade and discourage a foreign investment.

In the model, the foreign investment and the export from home country supports each other. Because the market size is large, firms can also export products as well as expand its foreign operations to support customers in that country, as shown by a low demand fulfillment ratio in Figure 10. This results show a new insight into this issue by showing that firms do not have to choose between foreign investment or trade. If the firms already have international operation, firms can continue their operations with a support from headquarter through exporting strategy if the market size is large.

Production volume of foreign firms

Figure 9 Foreign production volume in Scenario 1 - Two countries are identical

Demand fulfillment ratio

Figure 10 Demand fulfillment ratio in Scenario 1 - Two countries are identical

Scenario 2: Country A has lower labor cost than Country B

In this scenario, we assume that two countries have different operation cost, which is represented in this model through the labor cost. This situation happens when two countries have a significantly different GDP per capita such as Singapore and Vietnam in AEC. This scenario is implemented in the model by setting the Annual compensation in Country A to be 25% lower than that of Country B.

The results show that when firm a can export its product to Country B faster than what happens in scenario 1. It is because the product cost of firm a in Country A is cheaper

than the product cost of firm b in Country B. Therefore, firm a can export product even though the imported cost is only reduced. However, firm b cannot export its product to Country A because the cost is not competitive even though the imported cost is eliminated, as shown in Figure 11.

Export volume

Sale of a export to B : Scenario 2 - Labor cost
Sale of b export to A : Scenario 2 - Labor cost

Figure 11 Export volume in Scenario 2 – Country A has lower labor cost

Production volume of foreign firms

Production of a in B : Scenario 2 - Labor cost
Production of b in A : Scenario 2 - Labor cost

Figure 12 Foreign production volume in Scenario 2 – Country A has lower labor cost

When analyzing the foreign operation in this scenario, we find that when firm a exports product to Country B, firm a starts to withdraw its investment in Country B, as shown in Figure 12. This situation is aligned with the theory that an economic integration will discourage investment and encourage international trade. From this research, it shows that the

mentioned theory is applied only when two countries have different factor cost. However, the foreign operation of firm b in Country A is still expanding due to a cost competitiveness.

Operation of firm b in country A and country B

Figure 13 Operation of firm b in Scenario 2 – Country A has lower labor cost

Cost of local products and imported products in country B

Figure 14 Cost of local suppliers and imported products in Country B in Scenario 2 – Country A has lower labor cost

When we focus on the operation of firm b, we find an interesting pattern as shown in Figure 13. After an implementation of an economic integration, firm b starts to offshore their production from its home country – Country B – to Country A which is more cost effective.

It happens because the product of firm b produced in Country B is no longer cost competitive for both local market and international market as shown in Figure 14.

In summary, a firm will withdraw their foreign investment when the economic integration is in place only if two countries have different cost of production. To be specific, a firm in the country with higher production cost will relocate their operation to a more cost effective country and ship the products back to its home country.

7. Conclusion

There are two contradicted theories on whether an economic integration will stimulate or discourage the foreign investment from countries within an economic integration bloc. This paper tackles this issue by developing a system dynamics model based on the logics of both schools of thought and simulating the model in different scenarios. The results show that an economic integration will encourage both intra-regional trade and investment if two countries are identical. However, if the cost of operation in two countries are significantly different, an economic integration will stimulate a trade from countries with low factor cost to countries with high factor cost, but not in another direction. After an economic integration, foreign firms who operate in a country with high operation cost withdraw their operation and export products from headquarter into that country instead. The local firms who locate in the high operation cost countries also offshore their operation to the countries with better cost efficiency.

This paper creates a significant contribute to the field of foreign investment and economic integration. There is a strong debate in the field whether an economic integration encourages or discourages intra-regional foreign investment. This is the first paper bridging two sites of the debate together by identifying which situation an economic integration supports intra-regional foreign investment and which situation that the intra-regional foreign investment is replaced by intra-regional trade. In addition, this paper suggests that the export does not always replace foreign investment but export and foreign investment can complement each other.

This paper also has a practical implication to the firms that operate in countries which are in the process of economic integration. The firms should consider the operation cost between their home countries and their target countries. If the factor costs are not significantly different, they may use exporting strategy to support their foreign operations. However, if the factor costs are different, they should prepare for the production relocation.

Last but not least, this paper is beneficial to policy makers. When an economic integration is being implemented, the governments can consider if there will be a change in the volume of foreign investment in their countries by looking at the relative cost of operation. Observing this foreign investment trend in advance will provide governments time and opportunity to develop infrastructure to support an inward and outward FDI in the near future.

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