

# **Trade liberalization and Wage inequality – The case of Taiwan**

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# Abstract

In recent years, regional integration is an essential process of trade liberalization. From Taiwanese perspective, Economic Cooperation Framework Agreement, also known as ECFA, is a critical example across strait.

In our research, we simulate the trade environment with Specific-factors model. As the results of Specific-factors model, the factor prices will not equalize after signing ECFA.

With the basis of the assumption of Specific-factors model, we examine our hypothesis in this essay by using GTAP (Global Trade Analysis Project). To predict the welfare changes among skilled and unskilled labors in Taiwan, we use RunGTAP. Also, we compare ECFA with NAFTA (North America Free Trade Agreement).

In conclusion, we find out there are both advantages and disadvantages for signing either FTA or ECFA. Based on RunGTAP results, which show labor in grains and crops industry suffered, we come up with suggestions for our government to minimize the damage. We believe that if ECFA acts a starting role, Taiwan's GDP per capita will increase and so will social welfare.

Keywords: Taiwan; Labor; Trade liberalization; Regional Integration; Free Trade Agreement; Wage Inequality

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# 1. Introduction

According to the statistics launched by World Trade Organization, the surge in Regional Trade Agreements, so called RTAs, has continued unabated since the early 1990s, and 462 RTAs have been notified to the GATT/WTO up to February 2010. At that same date, 271 agreements were in force, which means many countries in the world would like to reduce the trade barriers and pursue the trade liberalization<sup>1</sup>

Concerning that regional integration is an essential process of trade liberalization, from Taiwanese perspective, Economic Cooperation Framework Agreement, also known as ECFA, is a critical example of the regional integration across strait, and it raised a wild discussion in Taiwan. Based on the Heckscher-Ohlin and Specific-factors model, one country will develop the comparative advantage industry to trade with the other countries in the world for the sake of increasing the domestic welfare. Some people use the Heckscher-Ohlin model to predict the effect of signing ECFA. Hence, they believe the relative factor prices in two countries will equalize. Also, they are concerned about the wage level in Taiwan will converge to the wage level in mainland China. However, others contend we should simulate the trade environment with Specific-factors, as the results of Specific-factors model, the factor prices will not equalize after signing ECFA.

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<sup>1</sup> Homepage of World Trade Organization, [Http://www.wto.org](http://www.wto.org)

Owing to the assumption of Specific-factors model are closer to the reality, we assume the factor price will not equalize eventually, and we are going to examine our hypothesis in this essay by using GTAP, abbreviates of Global Trade Analysis Project .

Since the trade liberalization will bring out the income redistribution in different types of labors, we will use RunGTAP to predict the welfare changes among skilled and unskilled labors in Taiwan. Furthermore, we will compare ECFA with another regional integration in the world, for example, the North America Free Trade Agreement (NAFTA). By making comparison, we can find the similarities give some suggestion to our government. By reviewing the literatures, we found there are lots of researches focusing on the effect of signing ECFA with China. But in the process of trade liberalization, we believe Taiwan might sign the RTAs with other Asian advanced countries in the future in order to improve the welfare of Taiwanese labors.

However, there are few papers we can find for discussing this issue, so we decide to figure out the consequences in the case of signing FTAs with other countries. Being located in the center of East Asia, Taiwan shares a close relationship with neighbor countries in the long run, from culture, politics, to economy. Faced with the prevalence of East Asian economic integration, we should consider: “What influence will occur in Taiwan?” and “What is its significance to Taiwan?” To explore the issues

above, we'll firstly define Trade Liberalization and Wage Inequality; secondly, with Heckscher-Ohlin Theorem and Stolper-Samuelson Theory, we analyze and predict the possible results; furthermore, we should seek the solution to confront this trend by using GTAP model. Eventually, we will find out the impact and significance of East Asia economic integration on Taiwan. Taiwan is located in the center of East Asia. We share a close relationship in culture, politics and economy with our neighbors. We should find out what change will be in the economic environment due to the integration of our neighbor countries, what's the significance to Taiwan and seek the solution to confront this situation.

## **2. Literature Review**

### **2.1 Definition of Trade Liberalization**

By definition, trade liberalization is the removal of or reduction in the trade practices that thwart free flow of goods and services from one nation to another. It includes dismantling of tariff, such as duties, surcharges, and export subsidies as well as non-tariff barriers, such as licensing regulations, quotas, and arbitrary standards. Free trade is a system of trade policy that allows traders to act and or transact without interference from government. According to the law of comparative advantage the policy permits trading partners mutual gains from trade of goods and services.<sup>2</sup>

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<sup>2</sup> BusinessDictionay.Com, [Http://www.businessdictionay.com/definition](http://www.businessdictionay.com/definition)

Under a free trade policy, prices are a reflection of true supply and demand, and are the sole determinant of resource allocation. Free trade differs from other forms of trade policy where the allocation of goods and services amongst trading countries are determined by artificial prices that may or may not reflect the true nature of supply and demand. These artificial prices are the result of protectionist trade policies, whereby governments intervene in the market through price adjustments and supply restrictions. Such government interventions can increase as well as decrease the cost of goods and services to both consumers and producers.<sup>3</sup>

## 2.2 Heckscher-Ohlin Theory

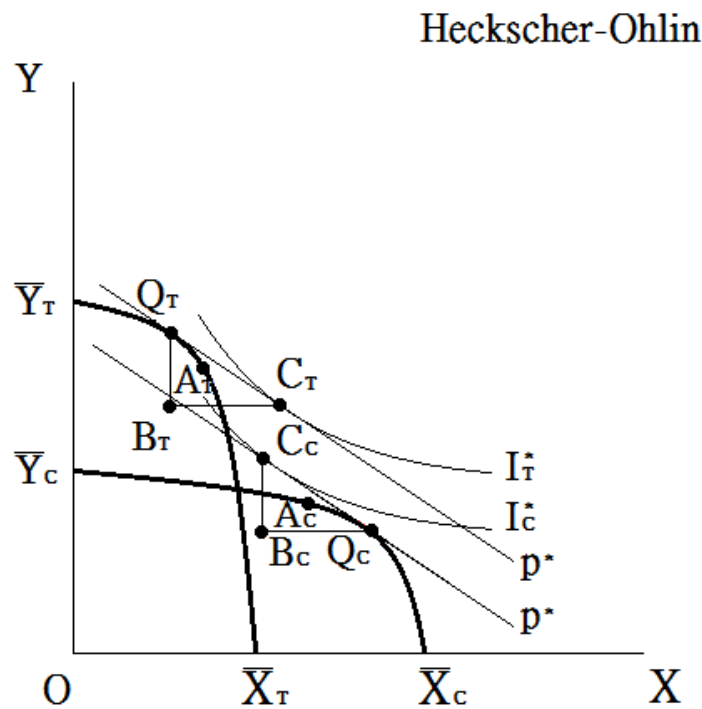
Based on the Heckscher-Ohlin theory, the country which has abundant labor would export the labor-intensive goods, as well as the country which has plentiful capital would produce the capital-intensive goods for trading.<sup>4</sup> Figure 1 depicts the circumstances which Heckscher-Ohlin theory indicates. We assume two countries are Taiwan and China. In the beginning, point A represents two countries with autarky economy. As a result,  $A_T$  is the production and consumption point in Taiwan without trading, and  $A_C$  denotes the autarky situation in China. By the Heckscher-Ohlin theory, the two countries should specialize.

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<sup>3</sup> Wisegeek, <http://www.wisegeek.com/what-is-trade-liberalization.htm>

<sup>4</sup> James R. Markusen, James R. Melvin, William H. Kaempfer, and Keith E. Maskus, 1995. International trade : theory and evidence”, New York : McGraw-Hill

Figure 2.1 Heckscher-Ohlin Theory



From the Figure 2.1, we can find out the world price  $p^*$  after free trade was introduced, and to follow the rules of comparative advantages, the domestic production and consumption points are different now. Each country will produce the products with comparative advantages. Then we can clearly find out indifference curve rise after the trade, which means total social welfare has rose in both countries. In the case of Taiwan and China, Taiwan has a higher capital-labor ratio relatively according to the government data, so Taiwan produces and exports the capital-intensive goods. On the other hand, in the case of Taiwan and the U.S.A., Taiwan has a lower capital-labor ratio. Hence, Taiwan would export the labor-intensive goods



theoretically. However this is not the case in reality. We will explain it in the following section.

Moreover, the Factor Price Equalization Theorem assume the capital was immobile in different countries, it become closer to real world and indicates that free trade would equalize the rate of return in the same factors through the equalization of relative commodity prices with some particular conditions. The assumptions include following:

1. There are only two countries in the world.
2. The producing technology and the preference in two countries are completely same.
3. There are merely two products in the world.
4. There is no trade barrier and market distortion.
5. The production function is Constant Return to Scale.

The experience of East Asia in the 1960s and 1970s and the experience of Latin America in the late 1980s and early 1990s, the increased openness appears to have widened rather than narrowed skill differentials in wages.<sup>5</sup>

We apply the theory into the scenario of our research. When it comes to the trade endowment comparison between Taiwan and China, Taiwan has relatively higher

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<sup>5</sup> Adrian Wood,1997

capital-labor ratio, for example in the semi-conductor, steel and petrochemical industry. The theory tells us Taiwan will specialize in producing capital intensive goods and export them. So in the case of EFCA, Taiwan will export the capital intensive goods and import the labor intensive goods.

On the contrary, if Taiwanese government decide to sign a reciprocal Free Trade Agreement with the U.S in some day, Taiwan has a relatively low capital-labor ratio, so we predict that the U.S will produce the capital intensive goods and import labor intensive goods from Taiwan.

### **2.3 Stolper-Samuelson Theory**

Trade liberalization causes change in commodity price, the Stolper – Samuelson theory was developed to explain the influence of price change on factor return. It predicts that in a constant return to scale economy which produces two kinds of good, the raise in commodity price will cause the raise of return on the factor which is intensively used to produce this commodity, in the meanwhile reduce the return on the less intensively used factor. For example, if the price of the labor intensive good rises, the real wage rises and the real capital rent falls.

### **2.4 Application and Inference**



The assumptions in these theories are somehow not consistent with the real world. So we can easily discover that the theory result will not match with the reality











completely. First of all, there are more than two countries in the world. Second, millions of goods are traded in the market. Third, trade barriers like tariffs, quotas and technical regulations exist in almost every market. Fourth, total factor productivity between countries are usually different, moreover, some firms in the industries have monopoly power to distort the market as well as the consumers' preference are different. These inconsistencies have led the theories to put a wrong conclusion for the current international trade status. To determine the effect of a trade policy, we should seek a more credible measure.

### 3. Current Trade Status in Taiwan

According to the statistical data from International Monetary Fund, Taiwan ranked 38th in the list of GDP per capita in 2009, with \$16,392 per person. The US and China are two important and influential trade partners of Taiwan; on the list of GDP per capita in 2009, the US ranked 9th, with \$46,381 per person, and China ranked 98th, with \$3,678 per person. These two countries happen to be a developed country, and a developing country respectively. Therefore, we will make inference as to the possible consequence of tariff reduction.

Table 3.1 List of countries by GDP (nominal) per capita

Rank	Country	USD\$
1	 Luxembourg	104,512
2	 Norway	79,085

3	 Qatar	68,872
4	 Switzerland	67,560
5	 Denmark	56,115
6	 Ireland	51,356
7	 Netherlands	48,223
8	 United Arab Emirates	46,857
9	 United States	46,381
10	 Austria	45,989
38	 Taiwan	16,392
98	 China	3,678

Data Source: International Monetary Fund

## 3.1 With China

### 3.1.1 Current Trade Status between Taiwan and China

Starting from 2010, global economy has been bouncing back gradually, and Asia suppliers play a crucial part in-between. Particularly, the recovery of China export will lead the export of Taiwan and other Asian countries to grow.

According to the statistics, the gross trade amount of Taiwan to China (Hong Kong not included) is up to \$86,594 million. China ranks 1st in terms of Taiwan export market, with \$62,090 million, and China is simultaneously the biggest source of Taiwan trade surplus, with \$37,587 million. Among the gross export goods, machinery equipment accounts for the biggest part, followed by optical instruments and plastics articles.

As for import, China ranks 2nd in terms of Taiwan import source, with \$24,503

million in 2009. The most part is machinery equipments, followed by mechanical appliances and plastics articles.

### 3.1.2 Facts and Figures

Table 3.2 Trade Statistics of Taiwan to China

Unit : \$USD Million ; %

Year	Export			Import			Net Export	
	Dollar	Weight	Growth Rate	Dollar	Weight	Growth Rate	Dollar	Growth Rate
2001	25,607.4	20.3	-6.7	5,903.0	5.5	-5.2	19,704.4	-7.1
2002	31,528.8	23.3	23.1	7,968.6	7.0	35.0	23,560.2	19.6
2003	38,292.7	25.4	21.5	11,017.9	8.6	38.3	27,274.8	15.8
2004	48,930.4	26.8	27.8	16,792.3	10.0	52.4	32,138.1	17.8
2005	56,271.5	28.4	15.0	20,093.7	11.0	19.7	36,177.8	12.6
2006	63,332.4	28.3	12.5	24,783.1	12.2	23.3	38,549.3	6.6
2007	74,245.9	30.1	17.2	28,015.0	12.8	13.0	46,230.9	19.9
2008	73,977.8	28.9	-0.4	31,391.3	13.1	12.1	42,586.5	-7.9
2009	62,090.9	30.5	-16.1	24,503.7	14.0	-21.9	37,587.2	-11.7

Data source: Bureau of Foreign Trade, Ministry of Economy, Taiwan

Table 3.3 Gross Trading Volume United

Unit : \$USD Million ; %

Year	Gross Trading Volume		
	Dollar	Weight	Growth Rate(%)
2001	31,510.4	13.4	-6.4
2002	39,497.4	15.9	25.3
2003	49,310.6	17.7	24.8
2004	65,722.7	18.7	33.3
2005	76,365.2	20.0	16.2
2006	88,115.5	20.6	15.4
2007	102,260.9	21.9	16.1
2008	105,369.1	21.2	3.0

2009	86,594.6	22.9	-17.8
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Data source: Bureau of Foreign Trade, Ministry of Economy, Taiwan

Table 3.4 Comparisons between Main Importing Sources of China

Goods (HS)	Import Country	2010 Jan-Feb		2009 Jan-Feb		Growth/Decrease		
		Dollar	Weight	Dollar	Weight	Dollar	Growth Rate	Weight
Gross	Gross	301565.5	100.0	183227.0	100.0	118438.4	64.7	-
	Japan	37784.6	12.5	24167.0	13.2	13617.5	56.3	-0.67
	Korea	30610.7	10.2	19271.2	10.5	11339.5	58.8	-0.37
	Taiwan	25422.6	8.4	14445.4	7.9	10977.2	76.0	0.54
	U.S.A	23654.4	7.8	16558.9	9.0	7095.5	42.9	-1.2
	Germany	15933.1	5.3	10921.1	6.0	5012.0	45.9	-0.68
85 Electrical machinery and equipment and parts thereof	Gross	65253.7	100.0	44757.4	100.0	20496.4	45.8	-
	Taiwan	10836.9	16.6	6366.4	14.2	4470.6	70.2	2.39
	Korea	10242.9	15.7	6403.0	14.3	3840.0	60.0	1.39
	Japan	9385.2	14.4	6561.0	14.7	2824.2	43.0	-0.28
	Malaysia	5979.5	9.2	3168.4	7.1	2811.1	88.7	2.08
	U.S.A.	3421.5	5.2	2521.6	5.6	899.9	35.7	-0.39
90 Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof	Gross	19007.0	100.0	11473.9	100.0	7533.1	65.7	-
	Korea	5082.6	26.7	2857.7	24.9	2224.9	77.9	1.83
	Taiwan	4677.1	24.6	1885.2	16.4	2791.9	148.1	8.18
	Japan	2972.0	15.6	1875.8	16.4	1096.1	58.4	-0.71
	U.S.A.	1436.0	7.6	1229.8	10.7	206.1	16.8	-3.16
	Germany	1008.3	5.3	743.6	6.5	264.7	35.6	-1.17
39 Plastics and articles thereof	Gross	14660.9	100.0	8387.5	100.0	6273.4	74.8	-
	Korea	2476.9	16.9	1673.1	20.0	803.7	48.0	-3.06
	Japan	2345.0	16.0	1274.0	15.2	1071.0	84.1	0.81
	Taiwan	2308.0	15.7	1511.2	18.0	796.8	52.7	-2.28
	U.S.A.	1619.9	11.1	693.0	8.3	9.26	133.7	2.79
	Germany	618.7	4.2	277.5	3.3	341.2	123.0	0.91

Data source: China Custom Statistics

### 3.1.3 Analysis

According to the Statistics, the gross import of China amounts to \$301570 million, which grows by 64.7%. Among the top 10 trade partners of China, Taiwan ranks 3rd, and the growth rate is 76%, which is more than that of Korea 58.8 % and Japan 56.4%. (Table 3.4)

However, a recent phenomenon found is that Taiwan's export dependency rate on China increases year by year; on the other hand, the market shares of Taiwan export goods in China decreases oppositely, from 12.90% in 2002 to 8.43% in 2010 Jan-Mar. This phenomenon signifies that for Taiwan, China's importance rises; for China, Taiwan's importance goes down.

This phenomenon can be explained by regional trade integration and shows the importance of FTAs between Taiwan and China, which is ECFA. The increase of Taiwan's export dependency rate on China is a natural process under regional trade integration. In fact, not only Taiwan but also Korea and Japan have increase on their export dependency rate on China, which are 21.6% to 23.85% and 16.0% to 18.9%, respectively. This is an overall trend under Asian trade integration. Also, Taiwan's export dependency rate on China is about to reach the peak, the rate will gradually become steady in the future.

The decrease of the market share of Taiwan export goods in China reflects the importance and urgency signing ECFA. In 2002, the market share rate of Taiwan export goods is 12.9%, and it has decreased to 8.43% in January to March, 2010. The reason is because of the high tariff export rate and non-tariff trade barriers, which make it difficult for Taiwan to trade with China. If ECFA is contracted, the reduction on tariff and the removal of non-tariff trade barriers will encourage more Taiwan products to enter China.

## **3.2 With the U.S.**

### **3.2.1 Current Trade Status between Taiwan and the U.S.**

Since Taiwan joined in WTO, whether in economic, educational, scientific or technical issues, Taiwan and the United States have been very closely. In 2009, the commercial trade of goods in Taiwan and the United States reached 46.8 billion U.S. dollars. While U.S. imports from Taiwan amounted to 28.4 billion U.S. dollars, U.S. exports to Taiwan accounted for 18.4 billion U.S. dollars. This results in a deficit of 10 billion U.S. dollars of United States. In addition, Taiwan is the United States' 10<sup>th</sup> largest trading partner, 15<sup>th</sup> largest export market and 9<sup>th</sup> largest import source.

Observed the data in 1984, Taiwan's exports to the United States accounted for 48% of exports; Taiwan's share of U.S. exports had dropped to 11.6% in 2009.



However, the first two trading partners of the United States are Canada and Mexico;

Canada exported to the United States accounted for 75% of its exports, while Mexico's

exported to the United States share of its exports were up 80.5%, this data shows how

important of FTA is, and so is the ECFA for Taiwan.

### 3.2.2 Facts and Figures

Table 3.5 Trade statistic between Taiwan and the U.S Unit : \$USD Million ; %

Year	Export			Import			Net Export	
	Dollar	Weight	Growth Rate	Dollar	Weight	Growth Rate	Dollar	Growth Rate
2001	27,654.8	22.5	-20.56	18,228.8	16.9	-27.45	9,426.	-2.71
2002	26,763.4	20.4	-3.22	18,094.1	16.0	-0.74	8,669.3	-8.03
2003	25,941.2	17.9	-3.07	16,819.8	13.2	-7.04	9,121.4	5.21
2004	28,121.6	16.1	8.41	21,632.4	12.8	28.61	6,489.2	-28.86
2005	28,510.2	15.0	1.38	20,987.7	11.5	-2.98	7,522.5	15.92
2006	31,428.0	14.7	10.23	22,498.3	11.1	7.20	8,929.7	18.71
2007	31,071.4	13.2	-1.13	26,309.2	12.0	16.94	4,762.2	-46.67
2008	29,614.7	12.1	-4.69	26,133.0	10.9	-0.67	3,481.7	-26.89
2009	22,692.7	11.7	-23.37	17,974.7	10.3	-31.22	4,718.	35.51

Data source: Bureau of Foreign Trade, Ministry of Economy, Taiwan

Table 3.6 Gross trade volume between Taiwan and the U.S Unit : \$USD Million ; %

Year	Gross Trading Volume		
	Dollar	Weight	Growth Rate (%)
2001	45,883.6	19.941	-23.45
2002	44,857.5	18.451	-2.24
2003	42,761.0	15.755	-4.67
2004	49,754.0	14.533	16.35

2005	49,497.9	13.342	-0.51
2006	53,926.3	13.002	8.95
2007	57,380.6	12.659	6.41
2008	55,747.7	11.536	-2.85
2009	40,667.4	11.032	-27.05

Data source: Bureau of Foreign Trade, Ministry of Economy, Taiwan

Observed the data above, we discovered the tendency of exports and imports from 2001 to 2009 between Taiwan and the United States clearly. The exports and outputs became more balanced; however, the largest differences occurred in 2008 to 2009, which exports 29,614.7 million had dropped to 22,692.7 million dollars and imports had decreased from 26,133.0 million dollars to 17,974.7 million dollars.

To examine further, in 2008, Taiwan was the United States 13th largest goods export market<sup>6</sup>. The top goods imported to Taiwan were: electrical machinery (\$6.5 billion), machinery (\$3.9 billion), iron and steel (\$1.4 billion). Besides, agricultural product was another main import product from the United States. For example, soybeans (\$952 million), coarse grains (\$814 million), wheat (\$327 million) and red meats fresh/ chilled/ frozen (\$177 million).

As one of import countries in U.S., Taiwan was the United States' 12th largest supplier of goods imports in 2008. The five largest import categories were: electrical

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<sup>6</sup> Office of the United States Trade Representative, Executive Office of the President, <http://www.ustr.gov/countries-regions/china/taiwan>

machinery (\$14.6 billion), machinery (\$5.5 billion), iron and steel Products (\$2.2 billion), vehicles (\$2.0 billion), and plastic (\$1.4 billion). Taiwan imported agricultural products totaled \$237 million, leading categories include: processed fruit and vegetables (\$31million), nursery products and cut flowers (\$27 million), and snack foods, including chocolates (\$26 million).

### 3.2.3 Analysis

In the process of collecting information, we discover that there are some several discussions about the impact if Taiwan signs FTA with the United States. Reviewing these, we come up with some possible advantages that Taiwan will gain from signing FTA with the U.S. Firstly, the overall total welfare and GDP will improve; secondly, total trade volume will be affected; thirdly, some specific sectors affected would be more pronounced. For example, Taiwan's textile and apparel industries would be more affected.

Taiwan and the United States gain better social welfare, "USITC(United States International Trade Commission) estimates that the total U.S. welfares gains from an FTA with Taiwan-assuming that all the anticipated sectoral effects come to pass would be \$200 million"<sup>7</sup>, for Taiwan the gains are greater in both absolute and relative terms.

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<sup>7</sup> NICHOLAS R. LARDY AND DANIEL H. ROSEN. (2004). US-Taiwan Free Trade Agreement Prospects.

Because FTA will reduce tariff and non-tariff trade barriers, which can increase the trade amount between two countries, “US imports from Taiwan are expected to increase by 18 percent, or \$7.0 billion.”<sup>8</sup> Therefore, if FTA can be contracted, it will create a reciprocal and a win-win situation.

## **4. Empirical Methodology**

GTAP is a multinational, multi-sectoral and general equilibrium model under the Global Trade Analysis Project. In the structure of GTAP model, sub-models can be built and connected into a multinational, multi-sectoral and general equilibrium model. These sub-models can describe the productions, consumptions and governmental expenses of each country in detail. While conducting policy simulations in this model, we can simultaneously explore the impact of the policy on the productions and outputs between countries and between sectors.

We have used the GTAP aggregate program to set up the whole simulating environment of the international trade. In this research, we create the new regional aggregation firstly. In order to know the differences of economic indexes among East Asian countries after reducing the trade barriers across Taiwan Strait (Economic Cooperation Framework Agreement), we set most of East Asian countries out of the regional categories, which are Japan, Korea, Taiwan, and China. On the other hand,

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<sup>8</sup> NICHOLAS R. LARDY AND DANIEL H. ROSEN. (2004). US-Taiwan Free Trade Agreement Prospects.

we consider U.S.A. to be a critical trade partner for Taiwan, so U.S.A. is independent role in our research as well.

Because of simplifying the trade environment, we remain the sector and factor category unchanged. We started simulating the situation with RunGTAP, removing the existing trade barriers between countries, begin with the cross strait trade. Both Taiwan and China exempt their tariffs on trade commodity to each other. For the FTA between Taiwan and the U.S.A., we assume that ECFA already exist then remove the tariffs on trade commodity. Results will be analyzed in the following section.

## **5. Simulation Results: A Taiwan-China FTA**

As general economic principles, free trade will increase the overall welfare in the countries. But how does the benefits allocate? Will the individual better off with the free trade condition? Simulated with GTAP database, we have observed the change of total social welfare between concerned nations, the rate of return of skilled labor and unskilled labor, and the variance of labor employment rate. Comparing the GTAP simulative changes with the current trade data we have found, we will reveal the meaning behind the figures and analyze the consequences under Free Trade Agreement in the future.

## 5.1 Background of Taiwan-China FTA

As we know from the previous part, the trade relationship between Taiwan and China is so inseparable that we have to pay close attention to it.

When it comes to the background of Taiwan-China FTA, we have to consider from the establishment of WTO, the purpose of setting up WTO is increase the extent of trade liberalization, and it does reach its goal. However, in order to look for more trade opportunities and new markets, there are more and more countries which with geographical relations to sign FTA recently. Actually, regional economic integration has been a trend among the world. In Asia, the most representative organization is ASEAN. After the signing of ASEAN Plus One, China and ASEAN countries which are Thailand, Malaysia, Indonesia, Philippines, Singapore, Brunei, exempt 90% tariff from each other since 2010, and the other ASEAN countries include Vietnam, Myanmar, Cambodia, Laos will also exempt 90% tariff since 2015. Moreover, the major trade competitors of Taiwan, Korea and Japan, are also planning to sign FTA with ASEAN separately. The situation will make the relative price of Taiwan export goods higher than other Asian countries, even lead to Taiwan goods be marginalized from Asian market. In order to prevent the situation happening, and strengthen the economic cooperation relationship, Taiwan and China are planning to sign a regional integration agreement, ECFA.

ECFA, a abbreviation of the Economic Cooperation Framework Agreement, its mains contents are eliminating the trade barriers, promoting the openness of commodity market and trade in service, investment protection, defensive measures, and economic cooperation.

According to the prediction of Chung-Hua Institution by using GTAP, after signing the ECFA, the economical growth rate will increase 1.65%-1.72%, and the total number of employee will increase to 257- 264 thousand. Besides, based on the government research, signing ECFA can also get other advantages as followings: entering China market earlier than competitive countries, attracting foreign firms to invest in Taiwan and it will help Taiwan economic construction to transformation, being the outpost of foreign firms for entering China market, helping industrial supply chain without leaving, increasing the competitive strength of industry, speeding up Taiwan to be the center of industries.

However, there are some problems might happen after signing ECFA, inclusive of some industries losing their welfare, increasing the level of relying on China economics<sup>9</sup>, etc. Nevertheless, there is a controversial issue which arouses discussion- the change of wage level after signing ECFA, and we will use GTAP model to predict and analysis the possible conclusion on the following part.

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<sup>9</sup> ECFA official website, Bureau of Foreign Trade (R.O.C) , <http://www.ecfa.org.tw/>

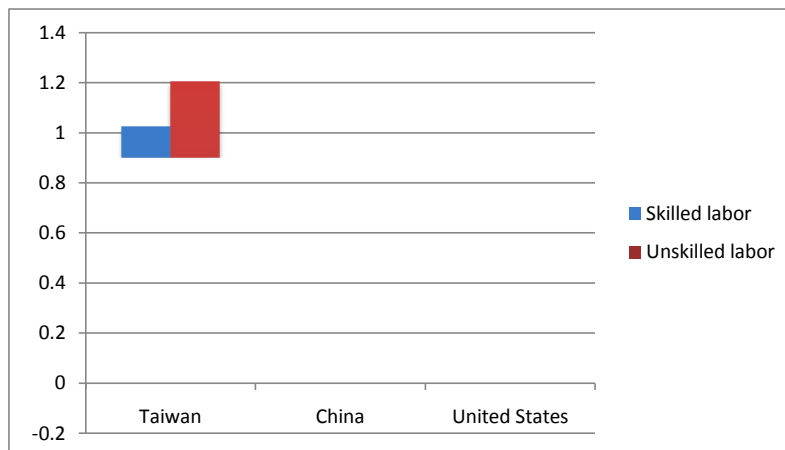
## 5.2 Simulation Result of Taiwan-China FTA

Assuming tariff will become 0 % across Taiwan Strait when Taiwan-China FTA is valid. The previous section we have already discussed the importance of the U.S from Taiwanese perspective, which the U.S. is a large trade partner for Taiwan nowadays. Here we add the U.S for the sake of comparing with the following research topics.

Country / Labor	Skilled Labor	Unskilled Labor
Taiwan	1.024	1.202
China	0.156	0.180
United States	-0.003	-0.004

Table 5.1 Wage Change Rate (%) of labor (Ratio of return to primary factor I to CPI)

Figure 5.1 Wage Change Rate (%) of labor (Ratio of return to primary factor I to CPI)



From the Table 5.1, although the wage rates of skilled and unskilled labor increase in both Taiwan and China, Taiwan has a greater growth rate. And skilled and unskilled labors' wage rates decrease in the U.S. The unskilled labors' reactions are



greater than skilled.

Industry / Country	Taiwan	China	United States
Grains and Crops	-2.102	-0.005	0.004
Livestock and Meat Products	-0.468	-0.090	0.005
Mining and Extraction	-1.749	-0.017	0.008
Processed Food	-0.797	0.035	-0.002
Textiles and Clothing	6.672	-0.005	-0.037
Light Manufacturing	-1.976	0.086	-0.004
Heavy Manufacturing	1.196	0.036	-0.002
Utilities and Construction	1.873	0.243	-0.007
Transport and Communication	-0.211	0.018	0.002
Other Services	-0.327	-0.056	0.001

Table 5.2 Quantity Change Rate (%) of **SKILLED** Labor Demand in different industry

From the Table5.2, we compare the SKILLED labors wage differences between the industries and countries.

Taiwan: The largest demand increase in the textile and clothing industry for skilled labors, the second is utilities and construction industry and the third in heavy manufacturing. Grains and crops industry cuts the most significant demand for skilled labor, followed by the light manufacturing industry then the mining and extraction industry.

China: The largest demand increase in the utilities and construction industry for skilled labor, the second is light manufacturing industry and the third in heavy manufacturing. Livestock and meat products industry cuts the most significant

demand for skilled labor, followed by the other services industry then the mining and extraction industry.

The United States: The largest demand increase in the mining and extraction industry for skilled labor, the second is livestock and meat products industry and the third in grains and crops industry. Livestock and meat products industry cuts the most significant demand for skilled labor, followed by the utilities and construction industry then the light manufacturing industry.

Industry / Country	Taiwan	China	United States
Grains and Crops	-2.148	-0.012	0.005
Livestock and Meat Products	-0.556	-0.102	0.005
Mining and Extraction	-1.785	-0.021	0.009
Processed Food	-0.996	0.009	-0.001
Textiles and Clothing	6.448	-0.034	-0.036
Light Manufacturing	-2.200	0.056	-0.004
Heavy Manufacturing	0.972	0.006	-0.001
Utilities and Construction	1.632	0.211	-0.006
Transport and Communication	-0.501	-0.021	0.003
Other Services	-0.551	-0.086	0.002

Table 5.3 Quantity Change Rate (%) of **UNSKILLED** Labor Demand in different industry

From the Table 5.3, we compare the UNSKILLED labors wage differences between the industries and countries after the ECFA.

Taiwan: The largest demand increase for unskilled labor is in the textile and clothing industry, the second is utilities and construction industry and the third in

heavy manufacturing. Light manufacturing industry cuts the most significant demand for unskilled labor, followed by the grains and crops industry then the mining and extraction industry.

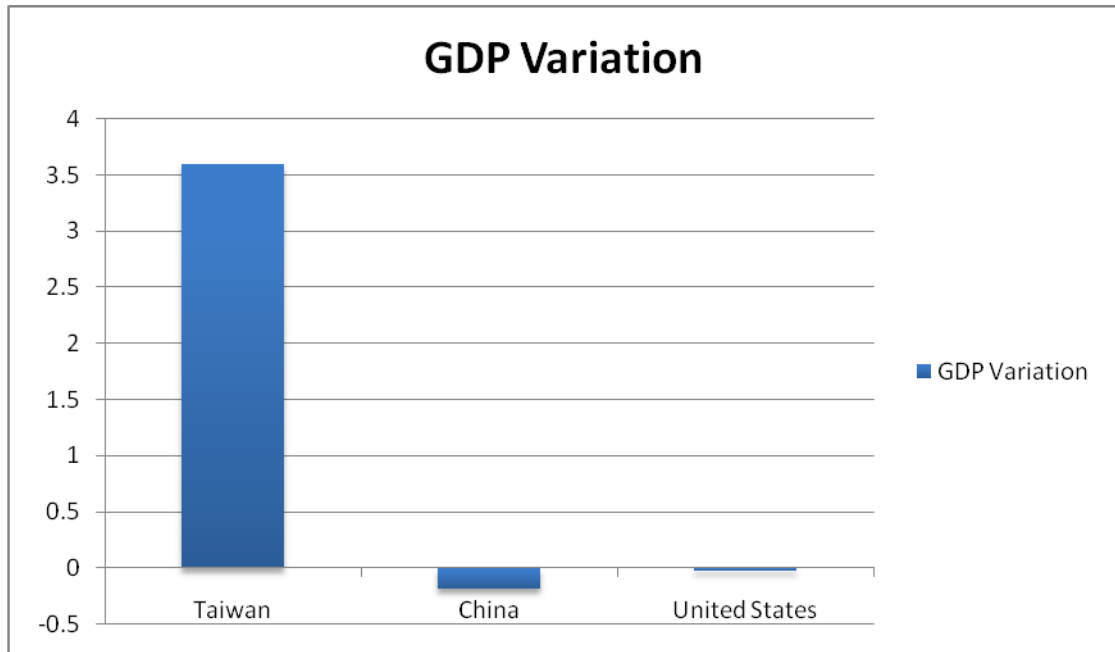
China: The largest demand increase for unskilled labor is in the utilities and construction industry, the second is light manufacturing industry and the third in processed food industry. Livestock and meat products industry cuts the most significant demand for unskilled labor, followed by the other services industry then the textiles and clothing.

The United States: The largest demand increase for unskilled labor is in the mining and extraction industry, the second is livestock and meat products industry and the third in grains and crops industry. Textile and clothing industry cuts the most significant demand for unskilled labor, followed by the light manufacturing industry then the utilities and construction industry.

GDP% / Country	Taiwan	China	United States
Change in value of GDP	3.593	-0.185	-0.028

Table 5.4 GDP Variation (Change in value of GDP)

Figure 5.4 GDP Variation (Change in value of GDP)

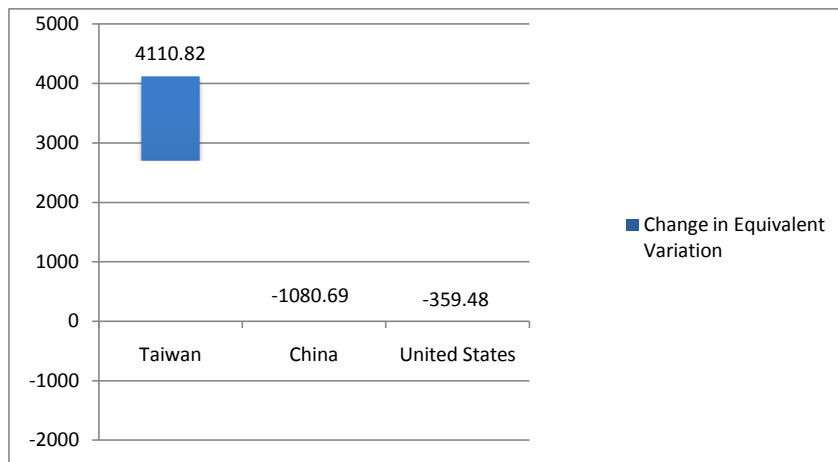


From Table 5.4, we can tell only Taiwan gets the positive change in value of GDP, both China and the United States lost in value of GDP.

Equivalent Variation	Taiwan	China	United States
Change in EV	4110.82	-1080.69	-359.48

Table 5.5 Welfare Change (Equivalent Variation in US million)

Figure 5.5 Welfare Change (Equivalent Variation in US million)



From the Table 5.5, only Taiwan gets the growth in social welfare, both China and the United States lost in social welfare.

### **5.3 Results Analysis**

The textile and clothing industry improves a lot after ECFA because there are many non-tariff trade barriers in the Chinese market. According to the president of TAIWAN TEXTILE PRINTING DYEING and FINISHING INDUSTRIAL ASSOCIATION<sup>10</sup>, the textile cooperation faces the cumbersome processes, resulting in making many troubles to the clothing customers. Other countries, for example, the ASEAN countries can export to mainland China immediately by the zero tariffs. The differences cut down the profits that can be earned. Once the ECFA is valid, the Taiwanese textile companies have the same treatment from mainland China.

What people concern the most shall be the change in social welfare, if the trade liberalization causes the increase of social welfare, the people in the specific country will live a better life. In the GTAP model, the Equivalent Variation measures the change of consumer surplus, which represents for the social welfare changes when tariff become zero. As we see in the previous section, the reason why the EV of Taiwan changes the most is due to the term of trade in Taiwan better off. Moreover, because Taiwan is a small country in the world trade market, which has no

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<sup>10</sup> TAIWAN TEXTILE PRINTING DYEING & FINISHING INDUSTRIAL ASSOCIATION  
<http://www.prt dyeing.org.tw/>

price-making power, according to the trade theory, the prices of good in the small country fluctuate with the shock more easily, so in the case of ECFA, we consider that Taiwan will gain more than China and the U.S. Second, we suggest that the different preference for Taiwanese and Chinese products redistribute the gain from trade.

## **6 Simulation Results: A Taiwan-US FTA**

### **6.1 Background of Taiwan-US FTA**

The U.S. has the largest and most technologically powerful economy in the world<sup>11</sup>, which means its economy has deep relations with world economy. The U. S. is party to many bi-lateral and multi-lateral trade agreements. Countries with which the U.S. has active bi-lateral trade agreements include: Australia, Bahrain, Chile, Israel, Jordan, Morocco, Peru, Oman, and Singapore. The active multi-lateral trade agreements that the U.S. has signed include the North American Free-Trade Agreement and the Central America-Dominican Republic Free Trade Agreement (CAFTA-DR). The U.S. trade agreements with Panama, Korea, and Columbia are pending congressional approval. The U.S. is also in negotiations on trade agreements with Malaysia, Thailand, the United Arab Emirates, and the Southern African Customs Union (SACU) which includes Botswana, Lesotho, Namibia, South Africa,

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<sup>11</sup> CIA, the WORLD FACTBOOK,  
<https://www.cia.gov/library/publications/the-world-factbook/geos/us.html>

and Swaziland.<sup>12</sup> From that information above, we can find that the U.S. makes efforts in signing FTA with other countries.

Because of the sovereignty problems, Taiwan faces some obstacles on participating in international organizations, for instance, WHO and UN, and the dilemma also reveal in the economic area, including signing FTA with other countries.

As the vice-minister of Foreign Affairs Andrew Hsia said, government set signing FTA with the U.S. as a long-term political goal, but as the current economic situation and the cautious attitude of the U.S. government for signing FTA with other countries, it's hard for Taiwan to sign FTA with the U.S.

Because Taiwan and the U.S. governments do not discuss the US - Taiwan FTA contents formally, so we can only observe those FTAs which the U.S. signed with other countries and government saying to infer the possible contents. When we see the US-Singapore agreement, the rules of origin annex runs 284 pages, with textiles and apparel as well as agriculture getting very detailed treatment. Many of the rules are clearly crafted to manage the effect of “free trade” to ensure that something other than a truly level playing field is created between the parties, so we can infer that the content in agriculture sector would be detailed. As the Liberty Times report saying , the U.S. government have indicated that if Taiwan and the U.S. signed FTA in the

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<sup>12</sup> Export.gov, <http://www.export.gov/FTA/index.asp>

future, the contents would be very modest and complete, and the U.S. governments would request Taiwan to open the market comprehensive, including the controversial industries, beef, pork, agriculture products, rice.

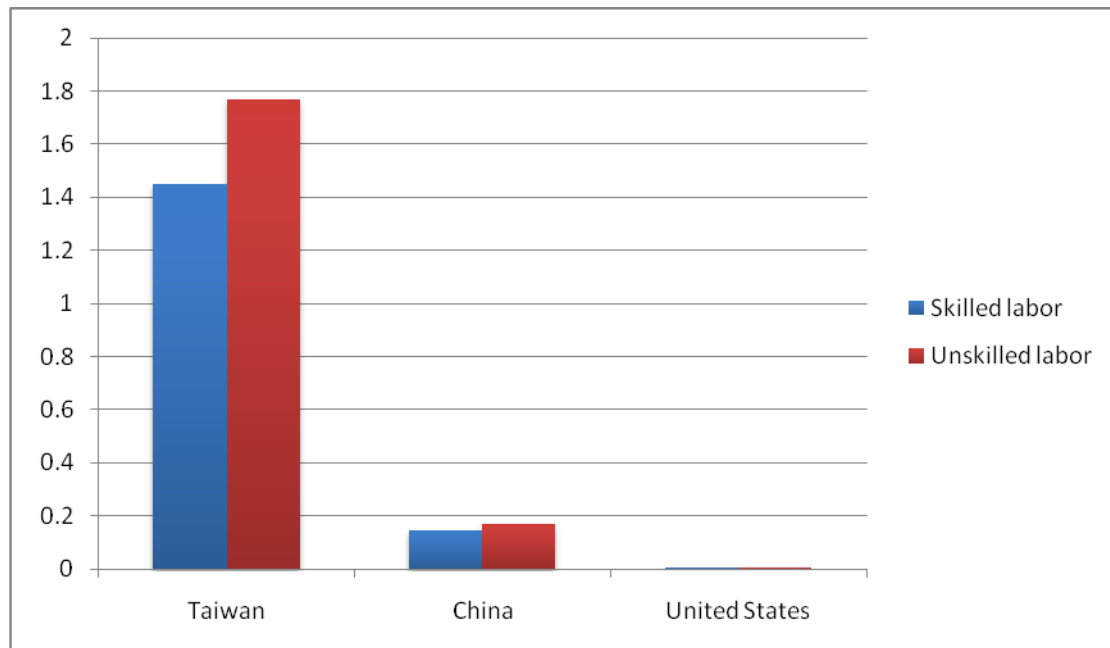
## 6.2 Simulation Result of U.S FTA

Assuming there is no tariff between Taiwan and China as well as Taiwan and the U.S.

Country / Labor	Skilled Labor	Unskilled Labor
Taiwan	1.450	1.767
China	0.145	0.169
United States	0.007	0.007

Table 6.1 Wage Change Rate (%) of labor (Ratio of return to primary factor I to CPI)

Figure 6.1 Wage Change Rate (%) of labor (Ratio of return to primary factor I to CPI)



From the Table 6.1, although all of the three countries get a rising wage rates,



Taiwan has the greatest change of wage rate, and the United States is the lowest.

Moreover, the influence of the FTA is greater for unskilled labor.

Industry / Country	Taiwan	China	United States
Grains and Crops	-4.330	-0.018	0.141
Livestock and Meat Products	-2.907	-0.119	0.196
Mining and Extraction	-2.221	-0.003	-0.002
Processed Food	-0.086	0.024	0.028
Textiles and Clothing	15.874	-0.054	-0.400
Light Manufacturing	-0.437	0.086	-0.031
Heavy Manufacturing	0.634	0.066	0.016
Utilities and Construction	2.403	0.229	0.011
Transport and Communication	-0.218	0.024	0.004
Other Services	-0.472	-0.061	0.000

Table 6.2 Quantity Change Rate (%) of **SKILLED** Labor Demand in different industry

From the Table 6.2, we compare the SKILLED labors wage differences between the industries and countries after the signing FTA with the U.S which means the tariff equals zero not only between Taiwan and China but also between Taiwan and the U.S.

Taiwan: The largest demand increase for skilled labor is in the textile and clothing industry, the second is utilities and construction industry and the third in heavy manufacturing. Grains and crops industry cuts the most significant demand for skilled labor, followed by the mining and extraction industry then the mining and extraction industry.

China: The largest demand increase for skilled labor is in the utilities and construction industry, the second is light manufacturing industry and the third in heavy manufacturing. Livestock and meat products industry cuts the most significant demand for skilled labor, followed by the other services industry then the textile and clothing industry.

The United States: The largest demand increase for skilled labor is in the livestock and meat products, the second is grains and crops industry and the third in processed food industry. Textile and clothing industry cuts the most significant demand for skilled labor, followed by the light manufacturing industry then the mining and extraction industry.

Industry / Country	Taiwan	China	United States
Grains and Crops	-4.412	-0.024	0.140
Livestock and Meat Products	-3.064	-0.131	0.196
Mining and Extraction	-2.285	-0.008	-0.002
Processed Food	-0.442	-0.003	0.027
Textiles and Clothing	15.474	-0.085	-0.401
Light Manufacturing	-0.837	0.056	-0.032
Heavy Manufacturing	0.234	0.036	0.016
Utilities and Construction	1.971	0.196	0.011
Transport and Communication	-0.736	-0.015	0.003
Other Services	-0.872	-0.091	-0.001

Table 6.3 Quantity Change Rate (%) of **UNSKILLED** Labor Demand in different industry

From the Table 6.3, we compare the UNSKILLED labors wage differences between the industries and countries after signing FTA with the U.S which means the tariff equals zero not only between Taiwan and China but also between Taiwan and the U.S.

Taiwan: The largest demand increase for unskilled labor is in the textile and clothing industries, the second is utilities and construction industry and the third in heavy manufacturing. Grains and crops industry cuts the most significant demand for unskilled labor, followed by the livestock and meat products industry then the mining and extraction industry.

China: The largest demand increase for unskilled labor is in the utilities and construction industry, the second is light manufacturing industry and the third in heavy manufacturing industry. Livestock and meat products industry cuts the most significant demand for unskilled labor, followed by the other services industry then the textiles and clothing.

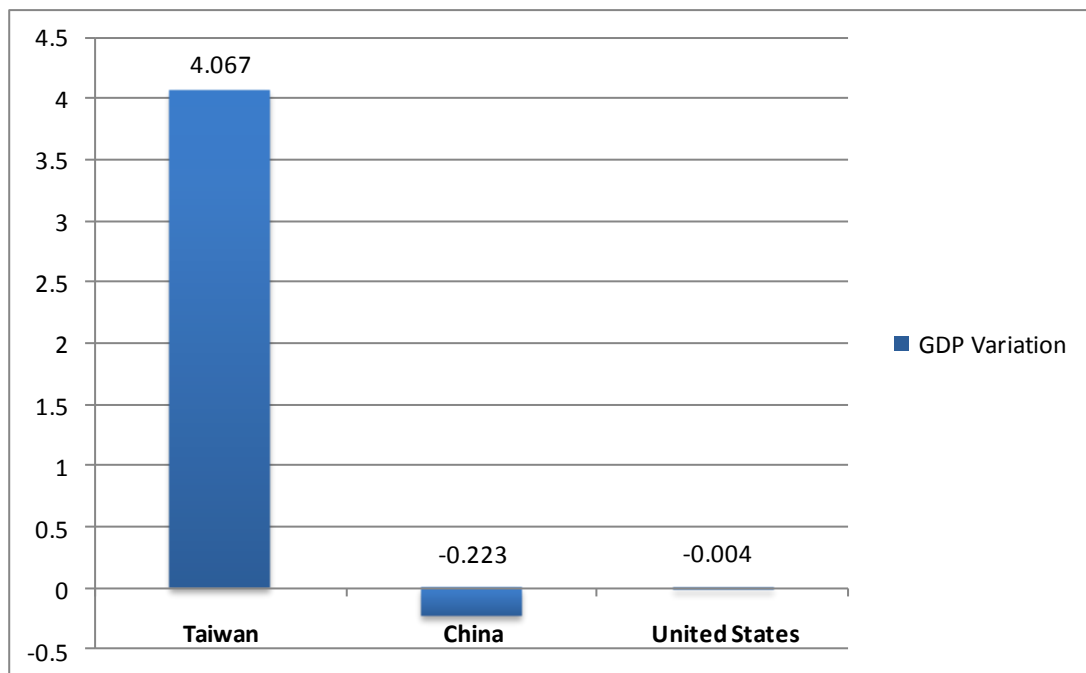
The United States: The largest demand increase for unskilled labor is in the livestock and meat products industry, the second is grains and crops industry and the third in heavy manufacturing industry. Textile and clothing industry cuts the most significant demand for unskilled labor, followed by the light manufacturing industry

then the mining and extracting industry.

GDP% / Country	Taiwan	China	United States
Change in value of GDP	4.067	-0.223	-0.004

Table 6.4 GDP Variation (Change in value of GDP)

Figure 6.4 GDP Variation (Change in value of GDP)

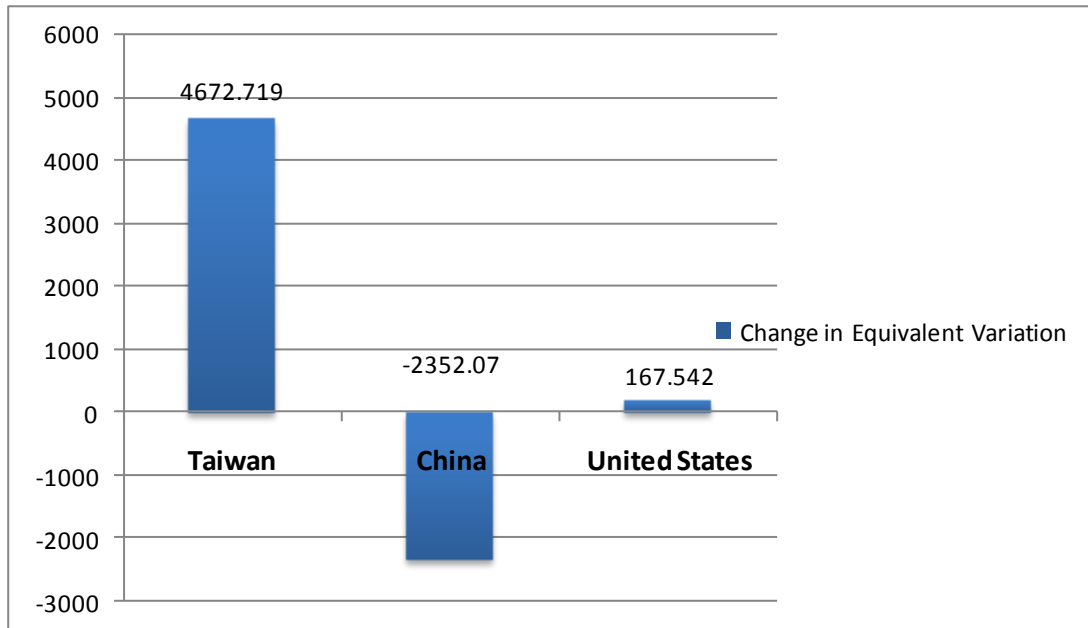


From Figure 6.4, we can tell that only Taiwan gets the positive change in value of GDP, both China and the United States lost in value of GDP.

Equivalent Variation	Taiwan	China	United States
Change in EV	4672.719	-2352.07	167.542

Table 6.5 Welfare Change (Equivalent Variation in US million)

Figure 6.5 Welfare Change (Equivalent Variation in US million)



Taiwan gets the largest growth in social welfare, but China suffers a dramatic decrease. Comparing the U.S social welfare with the ECFA part, the social welfare of the U.S has become positive.

### 6.3 Results Analysis

If we arrange the Free Trade Agreement with advanced countries, we could earn more gains from trade. This agreement also raises the U.S social welfare, compare with the Figure 6.5, the changes of social welfare in the U.S increase, which means the trade liberalization causes the reciprocal results. Taiwanese social welfare becomes higher because free trading with advanced countries brings us new technology, which increase the total factor productivity. And the firms produce more value-added products and make more profits from trade. So after signing FTA with the U.S, we gain more than merely signing ECFA with China. The labor demand in

some industry does promote and cause the wage to rise, no matter skilled or unskilled labor. Still, some industry like grains and crops suffer a damage cause, the skilled and unskilled labors wage and quantity demand decrease.

## **7. Conclusion**

Although we know that to sign FTA will bring us more profits on trade, however, there are still disadvantages resulting from unequal distribution of gain form trade no matter signing ECFA with China or FTA with the U.S, and this also cause the wage inequality in different industries. For instance, the labor in grains and corps industry would suffer a lot, so the government should consider ways to solve this inequality before signing these FTA. For example, the government ought to assist the farmers to transform the growing method or to refine the agriculture industry, as a result, cultivating the tourism agriculture or explore the new species of plants would be good ways.

According to our research, we found out Taiwan has a great potential to develop free trade, and we believe that signing ECFA would be the first stage of pursuing free trade. Nevertheless, the current international political environment for Taiwan is tough, if ECFA acts a starting role, as we have mentioned above, the GDP per capita will increase and so will social welfare if we step on liberalizing trade.

Finding a way to prevent the immediate shock to industries that may experience

loss in free trade agreement is to make a gradual progress. For example, when making the schedule to exempting tariffs, agriculture industry should be put in the last steps of liberalization to get enough time for reacting.

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