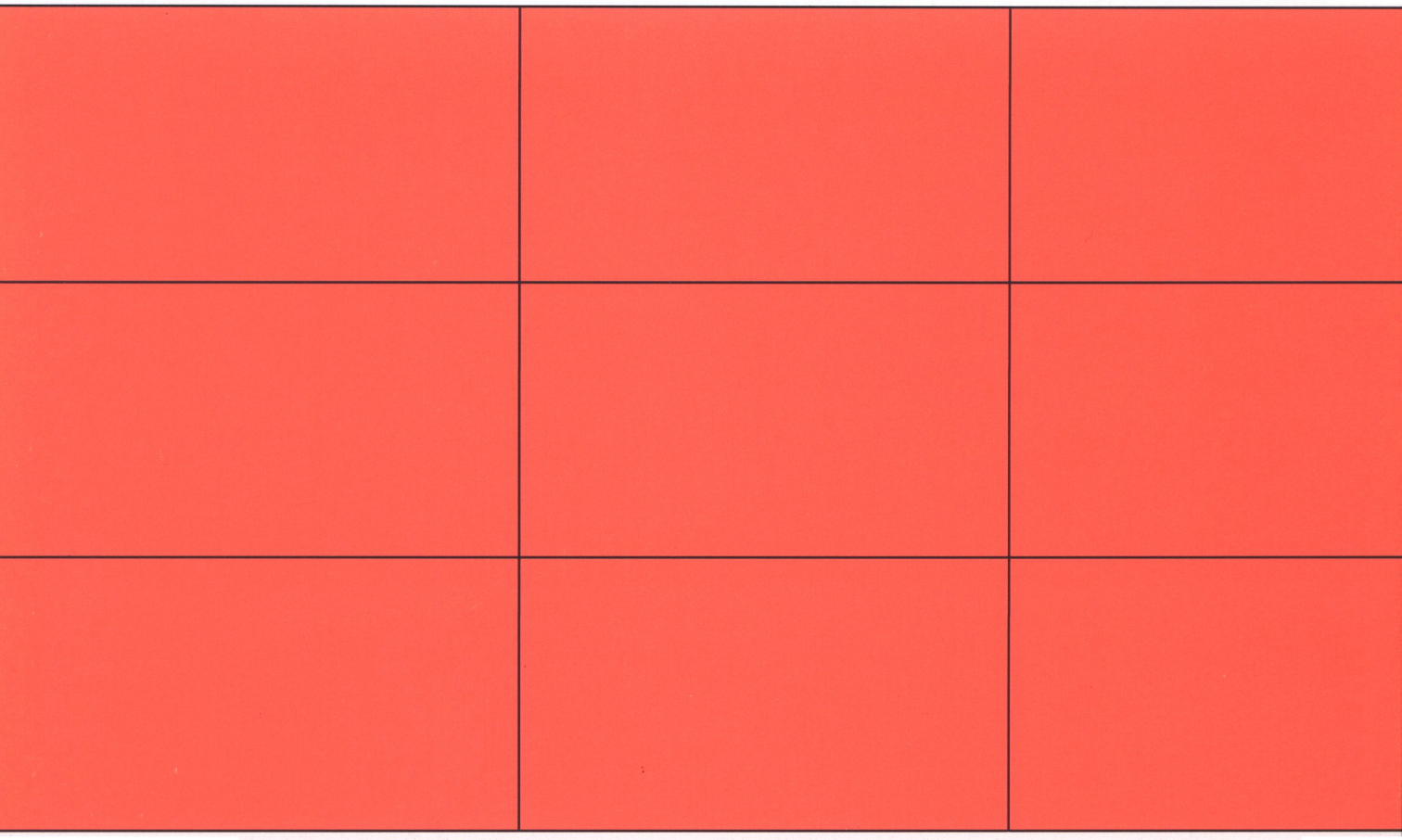
The Impacts of the Thailand-U.S. Free Trade Agreement on the Automotive Industry: Gains from Trade, Adjustments Needed, and Employment Implications

Piriya Pholphirul



Thailand Development Research Institute

The Impacts of the Thailand-U.S. Free Trade Agreement on the Automotive Industry: Gains from Trade, Adjustments Needed, and Employment Implications

By

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1. INTRODUCTION

Automotive and component manufacturers comprise the world's largest industry, employing 3-4 million workers directly and about another 9-10 million indirectly in parts and components. The automotive industry is also highly linkage-intensive, both forward and backward to other sectors. The automotive industry therefore plays a central role in global trade for both developed and developing countries and it usually is an important matter in trade negotiations.

Further, the automotive industry is one of the most important components in a country's process of industrialization. Owing to the intensity of global competition, Free Trade Agreement (FTA) issues have been raised to promote the volume of trade and economic growth in various countries. An FTA is likely to have different impacts on different sectors, according to the level of protection and patterns of comparative advantage. This paper examines the impact of the Thailand-United States FTA on the automobile industry. It starts by analyzing various issues such as the likelihood of the FTA formed between the two countries benefiting the automotive industry. It also discusses this sector's likely impact on trade and investment flows between both countries as well as other possible linkages that might be strengthened through an FTA. The automotive industry will be analyzed and classified into three sub-sectors: (1) automobile/car assembly, (2) spare parts and components, and (3) motorcycles.

The automotive sector provides a cross-section of United States-Thai bilateral trade and protection patterns and the comparative advantage of industrial structure between both countries. The methodology combines the analytical tools to answer the following set of questions. First, what is the industrial structure and bilateral trading pattern of the automotive industry between Thailand and United States? Second, how can the automotive industries of Thailand and the United States gain benefit under the Thailand- United States FTA? Third, what are the potential items that Thailand and the United States should expect would provide the most gains from the FTA? Fourth, what are the strengths, weaknesses, and opportunities about which the Thai and United States automobile industries should be concerned under the conditions of the Thailand-United States FTA? The study is based on the analytical indicators of revealed comparative advantage (RCA) and comparable trade structure between both countries. The following section will discuss overviews of the United States and Thai automotive industries and the trade volume between both countries. Section 3 provides analytical indicators of RCA, the RCA rank correlation, and the level of intra-automobile trade in order to observe the potential gains from trade cooperation between both countries. Section 4 presents an impact assessment and discusses the adjustment needed for Thailand to cope under this free trade arrangement. Section 5 discusses the employment implications of the automotive sector. Section 6 provides the conclusion.

2. OVERVIEW OF THE UNITED STATES AND THAI AUTOMOTIVE INDUSTRIES

Thailand and the United States are major producers of motor vehicles and components. Each of them is active in export markets; the United States is the world's second largest producer following Japan, and Thailand is the largest producer in the Southeast Asian region. In addition, the Thai automotive industry is the third largest industry in Thailand, after textiles and electrical goods. The Thai automotive industry traces its origins to the establishment of the Thai Motor Industry Company in 1961 in line with the

Government's import substitution strategy. Thus, the industry qualified for investment support from the Board of Investment (BOI) in 1964. The automobile assembly industry was granted support under the Industrial Promotion Act, which allowed a 50 percent reduction in tariffs and business taxes on completely knocked-down (CKD) kits. In addition, the industry has been protected by high tariffs on imported completely built-up (CBU) automobile units (Thammavit 1997). During the period 1974-1977, the production of peripheral auto parts, such as starters, alternators, filters, exhaust pipes, radiators, and safety glass, increased dramatically. Protection measures had been launched in 1972 to aggressively promote the automobile industry. At that time, the Thai government limited the number of assembly plants and model series; it also established minimum levels for local content, i.e., 25 percent of the assembled products had to be from components manufactured in Thailand. The percentage was raised from 25 to 50 percent within five years. Consequently, the industry expanded rapidly beginning in the late 1980s as a result of the country's strong economic growth and competition among the producers. Thailand has been the most successful of the ASEAN countries in attracting investment in the automotive sector, with a number of large investments having been made by major global producers.

After a severe downturn in the industry experienced after the Asian financial crisis of 1997-1998, the government agreed to abolish the policies related to local content on January 1, 2000 and it announced a new automotive tariff structure to make up for the abolishment of the local content requirements. Even though the automotive industry sufferred a huge impact as a result of the crisis, it was able to side-step the economic recession by shifting its strategy from domestic consumption to export promotion. Compared with all the ASEAN member countries, Thailand is currently the largest automotive exporter; export volume was 180,000 vehicles in 2002, an increase of 3 percent compared with 175,000 vehicles in 2001.[1]

In terms of the supply side, the relatively transparent legal and government policies supporting this industry served to enhance the attitude of foreign companies and investors. During the late 1990s, most of the world's largest automotive makers from Japan, North America, and Europe invested heavily in expanding or improving their existing production or in building new facilities from the ground up. Owing to the heavy investments and strong competitiveness in this industry, Thailand's Ministry of Industry formulated a master plan for industrial development during the period 2002-2006. Its aim is to improve Thailand's competitiveness in the global market and build up sustainability in the automobile industry. The master plan advocated the substitution of imported products by domestic products and the acquisition of foreign currency through export promotion (Thailand Automotive Institute 2002).

Among the main strategies to achieve targeted goals in the master plan are human resource development, enhancing the competitiveness of the Thai automotive industry, and market expansion by opening markets through free trade areas.

The automobile industry in the United States has long been a reflection of the national self-image. Following the textile and steel industries, automobile production in that country is among the largest manufacturing industries; the automobile industry is a critical driver of the economy, contributing substantially to employment and productivity. Motor vehicle production accounts for over 5 percent of private sector GDP. As the world's

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[1] The largest exporters by volume are Mitsubishi Motors, AutoAlliance Thailand (Ford/Mazda joint venture), and General Motors (GM) Thailand. Principally, Mitsubishi and AutoAlliance export pick-up trucks, while GM exports minivans.

second largest producer and consumer of automobiles, the United States is the world's most important country for investment and competition among other global automobile producers. The United States automotive industry has restructured itself to achieve a global presence through extensive international alliances; the industry has also worked to attain greater cooperation among domestic rivals, and improve its responsibility and trustworthiness among consumers. One of the greatest challenges facing the U.S. automotive industry is the high level of competition with foreign automobile sellers, especially those in Japan. The three major automobile producers, namely, General Motors, Ford, and Chrysler, the "Big-3," as well as other traditional United States producers have been losing market share to Japanese motor vehicle assemblers.

Japanese automakers began producing in the United States in the 1980s in order to avoid the constraints posed by an agreement to voluntarily restrain the export of Japanese passenger vehicles to the United States. Transplanted Japanese companies producing locally have been successful in increasing the number of Japanese cars sold in the United States market because they are responsive to it. The Japanese automobile producers Honda, Mitsubishi, Nissan, Subaru-Isuzu, and Toyota account for approximately 18 percent of the market in the United States. Because of increasing competition, American automobile producers are under intense pressure to increase the quality, efficiency, performance, fuel efficiency, and safety of their cars as well as product diversity. United States automotive producers, especially the Big-3, have expanded their cooperation with foreign partners in various ways. Normally, these partners include European and Japanese automakers; the American producers have established plants abroad in order to access international markets and control costs. Considered in terms of international operations through multinational firms, the Big-3 automobile producers are more likely to service global markets through international production systems compared with European producers, which use exports from their national production systems for this purpose. Therefore, the United States automobile industry has gained international market share, and it benefits from the use of low-cost suppliers of spare parts and components.

The United States consistently runs a deficit in motor vehicle trade. The persistent trade deficit can be attributed to several factors, including the decision of GM and Ford to produce in foreign markets instead of relying on exports from the United States. During the period 1997-2001, the United States deficit in motor vehicle trade increased by over 50 percent. The deficit increased in particular among trading partners such as Canada (31%), Japan (23%), Mexico (71%), Germany (62%), and South Korea (248%). Table 1 provides more details.

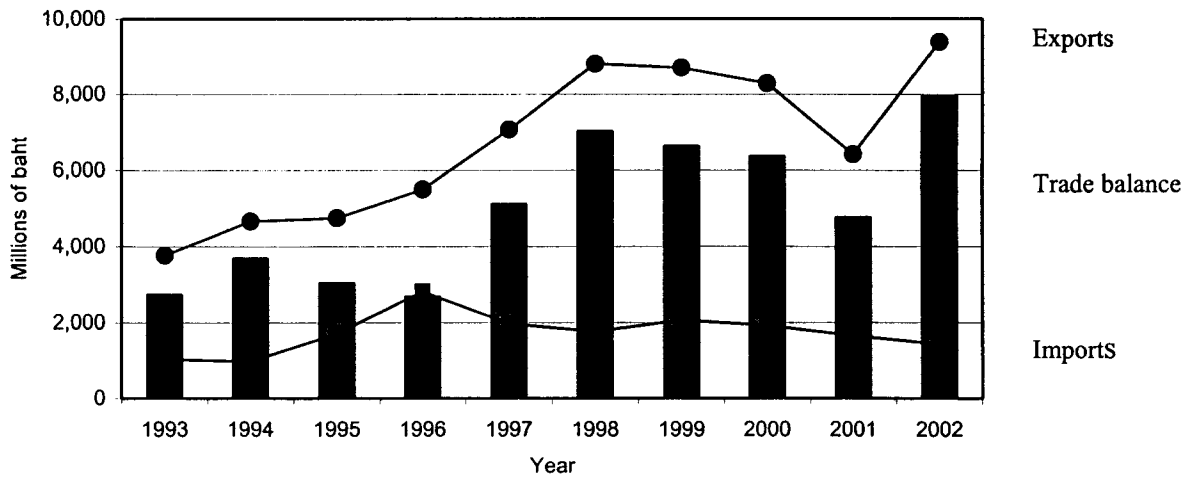
Table 1 United States Automotive Industry Trade Balance, by Major Selected Countries, 1997-2001 (Unit: Millions of U.S. dollars)

Country	1997	1998	1999	2000	2001
Japan	-26,347	-27,745	-31,308	-33,735	-32,460
Canada	-21,682	-24,301	-32,138	-31,171	-28,315
Mexico	-10,340	-10,976	-13,537	-17,818	-17,717
Germany	-8,669	-11,322	-14,019	-14,241	-14,080
South Korea	-1,822	-1,685	-2,870	-4,765	-6,335
United Kingdom	-1,355	-1,398	-1,843	-2,481	-2,199
Sweden	-1,808	-1,977	-2,064	-2,147	-2,167
Belgium	-518	-910	-895	-892	-1,002
Austria	8	12	17	-26	-608
Brazil	239	86	20	-129	-601
All others	3,683	2,910	1,022	677	865
Total	-68,612	-77,305	-97,614	-106,727	-104,619

Source: Office of Industries (2002), Table 8.

A comparison between Thailand and the United States in export and import volumes of the overall automotive sector is shown in Figure 1. It shows that Thailand has gained a surplus in trade with the United States and the surpluses have increased since the financial and economic turmoil that began in Thailand in 1997. In 2002, Thailand reached its highest trade surplus with the United States in terms of the automotive industry, i.e., 7,957 million baht.

Figure 1
Exports and Imports from/to Thailand to/from the United States: 1993-2002



Source: Customs Department, Ministry of Finance, Thailand.

An overview of the automobile sector in Thailand and the United States should be discussed before analyzing trade cooperation between both countries; the following sections cover three main categories, namely, car assembly, spare parts and components, and motorcycles.

2.1. Car Assembly

Currently, there are 16 car assemblers in Thailand. More than 80 percent of the total production is accounted for by four Japanese producers: Toyota, Honda, Mitsubishi, and Nissan. Thailand has become the largest assembler of automobiles in the region, especially for light pick-up trucks. Thailand is therefore a major base for regional exports. For example, Honda uses Bangkok as its headquarters for the ASEAN market. Mitsubishi and Mazda also use Thailand for the production of one-ton pick-ups and diesel trucks.

With regard to Thailand's relationship with United States automobile producers, the Big-3 entered Thailand's automobile assembly market during the mid-1990s.[2] AutoAlliance, a joint-venture between Ford and Mazda, has been using Thailand as a production base for the "Ford Ranger" and "Mazda Fighter" light trucks; currently, the Ford Explorer, the Ford Everest, and Ford Escape are being produced in Thailand partly for domestic use but mainly for export globally. General Motors (GM) also launched a corporate policy to use Thailand as a production and export base for the "Chevrolet Alfa" and "Chevrolet Zafira" passenger cars. The one-ton "Isuzu DMAX" truck is a product of joint research and development involving GM and Isuzu. Although Chrysler does not yet have any projects in Thailand, it has unveiled plans for using Thailand to make cars, predominantly for export globally. The author's calculation of data using PC-TAS[3] indicates that the export volume of Thailand's automobile assembly industry in 2000, allocated according to the six-digit harmonized system (HS), was concentrated in the following areas: "Gas(oline)-powered trucks" (HS: 870431), "Diesel-powered trucks with gross vehicle weight (GVW) not exceeding 5 tonnes" (HS: 870421), and "Diesel-powered trucks with GVW exceeding 5 tonnes" (HS: 870422). In addition, according to the same source of data, the Thailand's imports of automotive products in 2000 were concentrated in "Buses with a seating capacity of more than nine persons" (HS: 870290), "Diesel-powered buses with a seating capacity of more than nine persons" (HS: 870210), and "Gas-powered trucks" (HS: 870431).

The United States automotive assembly industry is highly concentrated. In 2001, traditional manufacturers, or the Big-3, accounted for approximately 76 percent of United States passenger vehicle production. Light trucks or pick-ups accounted for a little less consideration compared with passenger cars. United States motor vehicle and related production is concentrated in the Midwestern region of the country, especially in and around Detroit. This region provides locational advantages for motor vehicle producers ranging from headquarters, offices and research and development (R&D) centers to plants producing parts and components, as well as tool suppliers. However, United States assembly processes nowadays are less competitive compared with those of other countries

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[2] It had a presence before but had to leave in the early 1980s owing to an economic recession in the United States.

[3] PC-TAS is trade analysis data software package provided by the United Nations.

with advantages in terms of the labor intensity required for production. This sector actually requires extensive training periods for certain segments of the production process.[4]

A comparison of the production volume of passenger cars and commercial vehicles (pick-ups or light trucks) in the United States and Thailand shows that the production and capacity utilization of American producers are relatively higher than those of Thai producers (Table 2). With regard to vehicle production in Thailand, production is concentrated in light trucks and pick-ups, which account for approximately 59 percent of the overall production, followed by passenger cars (31%) and commercial vehicles (10%). However, in comparing the assemblers in Thailand, they are either subsidiaries of multinational corporations or joint venture companies linked mostly with Japanese car producers. The American automotive producers in Thailand, for example, GM, Ford, and Chrysler, still have not captured meaningful production shares compared with the Japanese producers. Ford Motors (a joint venture with Mazda) accounts for approximately 12.9 percent of Thailand's production while GM accounts for approximately 6.5 percent of the production share. The DaimlerChrysler Group, which has had a relatively large presence in the global market for quite some time, does not have a plant for automobile assembly in Thailand (Thailand Automotive Institute 2002).

Figure 2 shows the trade balance of both countries with regard to the car assembly industry, highlighting their respective export and import volumes. It indicates that Thailand still faces a large trade deficit with the United States with regard to car assembly. However, the amounts have been decreasing since 2000, when the local content requirement was abolished and Thai assemblers began producing for export in addition to substituting for imports. In 1996, the deficit reached its highest level of approximately 2,188.7 million baht; in 2002, it dramatically decreased to 333.2 million baht.

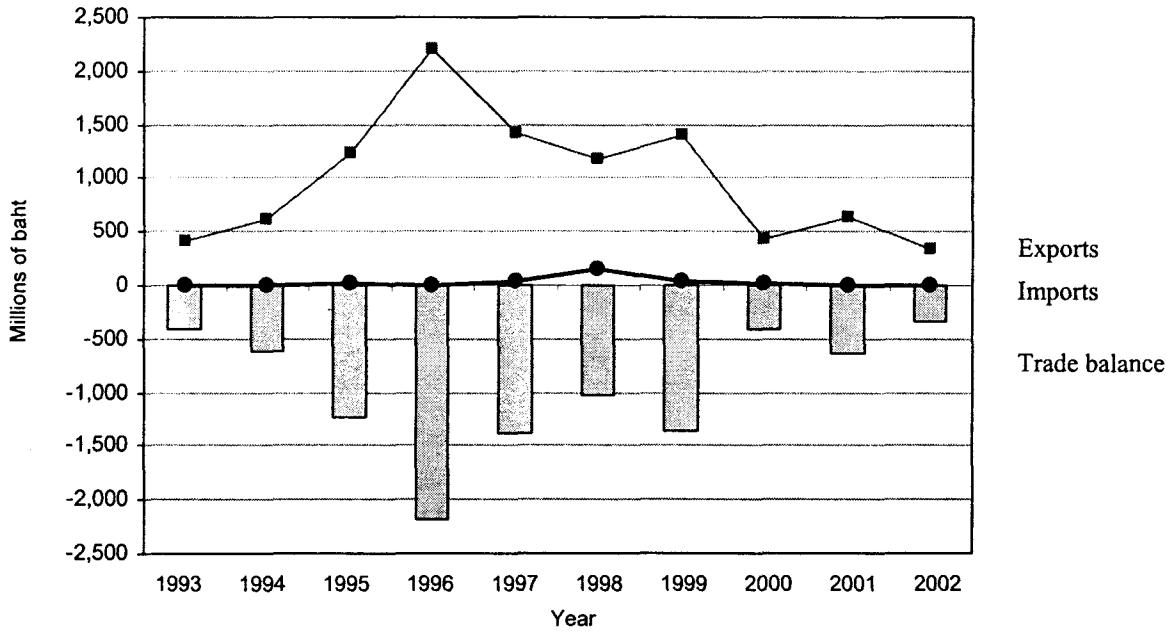
Table 2 United States/Thailand Domestic Production Units of Passenger Cars and Pick-Ups (Thousands of vehicles)

Year	United States[a]		Thailand[b]	
	Passenger cars	Trucks/pick-ups	Passenger cars	Trucks/pick-ups
1993	6,530	5,166	145	246
1994	6,809	5,173	110	287
1995	6,133	5,360	127	347
1996	5,794	5,872	139	358
1997	5,793	6,414	112	223
1998	5,981	6,640	32	122
1999	5,743	6,987	73	244
2000	4,818	6,081	97	299
2001	5,111	6,996	156	292
2002	5,105	7,220	169	374

Sources: [a] United States. Bureau of Transportation Statistics.
[b] Thailand Automotive Institute.

[4] Even though robots are used for tasks such as welding, painting, and materials-handling, skilled labor is still necessary for the highly efficient organization of the production process.

Figure 2
Car Assembly Industry Trade between Thailand and the United States: 1993-2002



Source: Customs Department, Ministry of Finance, Thailand.

Breaking down the data into the six-digit HS indicators shows that the volume of the United States automobile exports globally was concentrated in "Gas-powered trucks" (HS: 870431), "Dump trucks designed for off-highway use" (HS: 870410), and "Diesel-powered trucks with GVW not exceeding 5 tonnes" (HS: 870421). The data show that similar products, namely, "Gas-powered trucks" (HS: 870431), "Diesel-powered trucks with GVW not exceeding 5 tonnes" (HS: 870421), and "Diesel-powered trucks with GVW exceeding 5 tonnes" (HS: 870422), were imported by that country. This implies a considerably high degree of intra-industry trade in both countries. In terms of bilateral trade between both countries, Thailand's exports to the United States of assembled automobiles were concentrated mainly in "Diesel-powered trucks with a GVW exceeding 5 tonnes" (HS: 870422) and "Gas-powered trucks with a GVW not exceeding 5 tonnes" (HS: 870431). However, Thailand's imports from the United States comprised items classified as "Dump tricks designed for off-highway use" (HS: 870410) and "Snowmobiles, golf carts, and similar vehicles" (HS: 870310).

Thailand's current economic improvement, supportive government policies, and private sector strategies have led to more than 10 percent growth annually by the automotive assembly industry. The sales volume of both passenger cars and commercial vehicles has also grown more than 10 percent annually. Therefore, to increase the potential of the Big-3 automobile producers, all of them among other international auto giants should establish or expand their manufacturing plants in Thailand and benefit from the strategic location of this regional base.

2.2 Spare Parts and Components

Thailand's spare parts and components manufacturers should gain huge advantages from being the largest and most qualified in the region. There are about 1,709 automotive parts suppliers in Thailand, 709 of which are "direct suppliers" (OEM: Ordinary Equipment

Manufacturers); 386 of them supply car assemblers, 201 supply motorcycle assemblers, and the remaining 122 supply both car and motorcycle assemblers. Because approximately 80 percent of Thailand's automobile assembly capacity belongs to Japanese companies, most of these direct suppliers are members of Japanese *keiretsu*. These companies can be categorized into three groups, a subsidiary of Japanese companies, a joint venture with Japanese technology owners, and a company being provided technical assistance by, or in licensing agreements with Japanese firms.[5] The second groups of auto parts manufacturers are called "indirect suppliers," "raw material suppliers," or "supporting suppliers" (REM: Replacement Equipment Manufacturers) and account for about 1,000 manufacturers. Most of the spare parts suppliers are normally considered small and medium-size enterprises (SMEs); competition in the spare parts and components market has become stronger and much more intense after Thailand liberalized its trade policy.

Initially, auto parts production has always correlated with automotive production. However, the degree of correlation has become less, especially after the policy of trade liberalization was implemented, in that the policy on local content was abolished in 2000. This consequently caused the automobile assemblers to strategize a "global sourcing" policy; the domestic producers of auto parts and components have been facing fiercer competition from foreign producers since 2000. The greater competition therefore caused the auto parts producers in Thailand to channel the spare parts production into exports to foreign markets. In overall bilateral trade between the two countries, Thailand has achieved trade surpluses with the United States for spare parts. Figure 3 shows that the trade surpluses have been increasing significantly subsequent to the 1997 crisis. The floating of the Baht currency in July 1997 is believed to have increased the volume of exports, enabling Thai auto parts producers to penetrate foreign markets.

Based on the six-digit HS data, Thailand's exports of spare parts were concentrated in three areas: "ignition wiring sets & other wiring" (HS: 854430), "motor vehicle parts" (HS: 870899), and "radio receivers not capable of operation without external source of power" (HS: 852721). Thailand's imports for the spare parts industry were mainly "motor vehicle parts" (HS: 870899), "articles of plastics or of other materials of Nos. 39.01 to 39.14" (HS: 392690), and "articles, iron or steel" (HS: 732690).

In the United States, the automotive parts industry has long played a vital role in the economy. Automotive parts accounted for 4.8 percent of the total shipments of manufacturers from that country, while the value of production in the United States automotive parts industry for 2001 was about $191 billion. Sales of United States OEM reached $182.1 billion in 2002 (an increase of 9.5 percent over sales of $166.4 billion in 2001). However, owing to fierce competition in this sector, American auto parts manufacturers have been preparing for a decline in the domestic market by diversifying geographically, increasing research and development, turning to joint ventures, seeking more module contracts, and leaving marginal segments. In terms of international trade volume, the United States was the world's leading exporter of automotive parts in 2000, accounting for 19.6 percent of the world's exports. In 2002, the value of these exports reached $50.1 billion, a 0.6 percent increase over that of 2001. Cross-border exports account for a significant proportion of the United States exports of auto parts: in 2002 exports to Canada and Mexico accounted for approximately 78.4 percent of the total automotive parts exported (Office of Automotive Affairs 2003).

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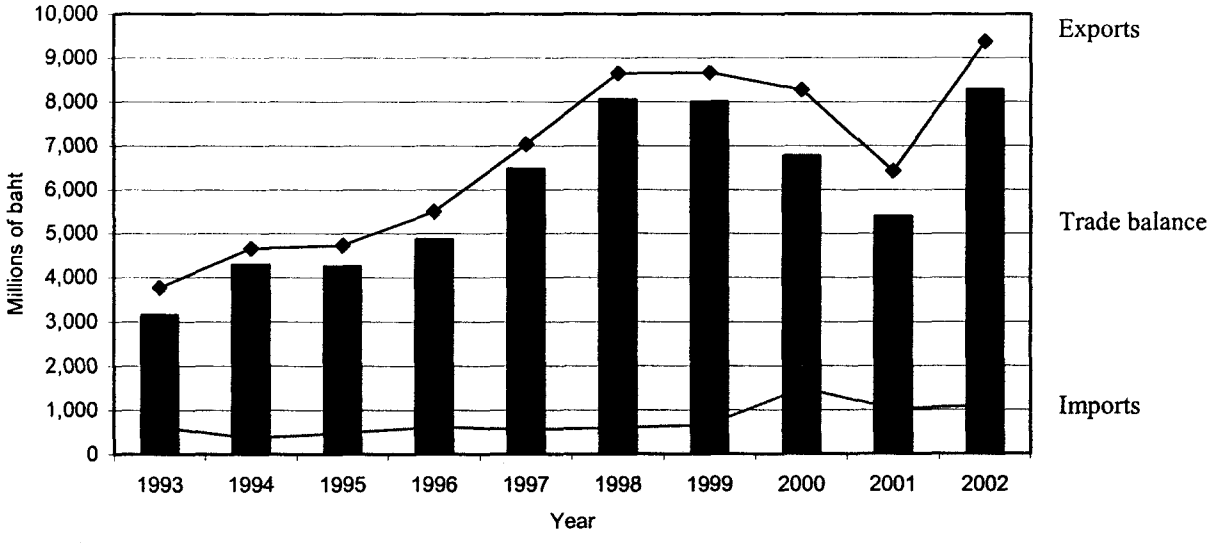
[5] However, in recent years, there have been many investments made by non-Japanese suppliers, including 100% Thai owned companies.

Figure 3
Spare Parts Industry Trade between Thailand and the United States: 1993-2002



Source: Customs Department, Ministry of Finance, Thailand.

Based on the six-digit HS data, the United States export of automobile parts globally was concentrated in "Motor vehicle parts" (HS: 870899), "Parts and accessories of bodies for motor vehicles" (HS: 870829), and "Engines, spark-ignition/reciprocating, displacing more than 1,000 cc" (HS: 840734). Spare part imports by the United States were also concentrated in "Motor vehicle parts" (HS: 870899), "Engines, spark-ignition/reciprocating, displacing more than 1,000 cc" (HS: 840734), and "Parts and accessories of bodies for motor vehicles" (HS: 870829).

With regard to bilateral trade between both countries in 2000, the items Thailand exported to the United States were "Ignition sets and other wiring sets used in vehicles, aircraft etc." (HS: 854430), "Articles of vulcanized rubber, other than hard rubber" (HS: 401699), and "Radiators for motor vehicles" (HS: 870891). Thailand's imports from the United States were concentrated in "Articles, iron or steel" (HS: 732690), "Articles of plastics or of other materials of Nos. 39.01 to 39.14" (HS: 392690), and "Motor vehicle parts" (HS: 870899). It is clear that the automobile sector is linked to many related sectors and that it involves employment to a great extent. Owing to the financial constraints posed by economic turmoil and greater competition, the automotive parts producers have employed cost-cutting strategies and a policy that seeks mergers in order to avoid bankruptcy. Increasing automotive parts exports to the United States under bilateral trade agreements therefore would be a key strategy for sustaining the industry's growth.

2.3 Motorcycle Assembly

Besides automobile assembly and the parts/components sector, Thailand has a relatively significant motorcycle sector; however, this sector has received the least attention in analysis of the automobile industry owing to its relatively small volume. The motorcycle assembly industry should be of concern because of its growing production capacity as well as its growing export volumes. As one of the world's leading motorcycle producers,

Thailand has five motorcycle assemblers: (1) Thai Honda Manufacturing (Honda), (2) Kawasaki Motors Enterprise (Kawasaki), (3) International Vehicles (Cagiva), (4) Siam Yamaha Motor (Yamaha), and (5) Thai Suzuki Motor (Suzuki). Table 3 presents Thailand's production capacity of five motorcycle assemblers.

Table 3 Thailand's Production Capacity of Motorcycle Industry in 2000

Assembly plants	Units	Production capacity share (%)
Thai Honda Manufacturing (Honda)	850,000	40.9
Thai Suzuki Motor (Suzuki)	550,000	26.4
Siam Yamaha Motor (Yamaha)	420,000	20.2
Kawasaki Motor Enterprise (Kawasaki)	200,000	9.6
International Vehicles (Cagiva)	60,000	2.9
Total	2,080,000	100.0

Source: Office of Industrial Economics, Ministry of Industry, Thailand.

Based on the six-digit HS data, both motorcycle assembly and the motorcycle parts that Thailand exports globally are concentrated in "Motorcycle parts" (HS: 871419), "Motorcycles with reciprocating engine" (HS: 871120), and "Bicycle brakes, including coaster braking hubs" (HS: 871494). The volume of imports into Thailand for the motorcycle sector was much less than the export volume. Thailand's motorcycle industry is highly competitive globally. Thailand's imports for the motorcycle industry are concentrated in "Motorcycle parts" (HS: 871419), "Bicycle parts" (HS: 871499), and "Bicycle pedals and crank-gear and parts" (HS: 871496).

The importance of the motorcycle sector to Thailand and the United States is in international trade: the United States is the main importer of motorcycle items from Thailand. The volume of exports from the United States in this industry is much less than that of imports. The main exported items in this sector are "Motorcycles with reciprocating piston engines" (HS: 871150), "Motorcycle parts" (HS: 871419), and "Bicycle frames and forks" (HS: 871491). However, compared with the domestic demand as reflected in the volume of imports by the United States, bilateral trade between both countries still indicates an expanding volume of trade between both countries.

Therefore, trade cooperation between Thailand and the United States as well as future prospects for establishing an FTA between both countries seem bright. The Thailand-United States FTA should also benefit Thailand especially in terms of inflows of direct investment by American automobile companies. This would be a natural force creating employment, upgrading managerial skills for Thai labor, and transfering technology to Thai automotive producers.

The next section explains the benefits, based on technical methodology and analysis, that a bilateral free trade area arrangement between Thailand and the United States is expected to provide: a significant spur in two-way trade and investment in the automotive sector and benefits for both countries. The concept is to analyze whether the automobile industries of both countries would be benefited upon the establishment of the bilateral FTA. The methodologies are based on comparing the trade structure in automobiles between both countries and determining the likelihood that trade creation should occur within three categorized sub-sectors: (1) car assembly, (2) parts and components, and (3) motorcycles.

3. METHODOLOGY AND ANALYSIS

Deciding whether or not the automobile industry of both Thailand and the United States would benefit from joining the FTA is based on various issues. The most important aspect is to consider how the FTA would promote trade and economic development in both countries. Referring to an international trade theory, the fundamental motivation behind any regional arrangement is to improve the welfare of those member countries through a reduction in or elimination of trade barriers in the region in order to boost trade. After signing the FTA both countries would enjoy welfare gains if the *trade creation* effect exceeds the welfare-reducing *trade diversion* effect.

Prior to studying the specific methodologies, it is worthwhile to assess the measures of RCA to explain the country's export potential for the automotive industry (Table 4).[6] The RCA measure indicates whether a country is in the process of extending the production of products in which it has trade potential with its partners. The RCA indices are presented for the period 1996-2003 to compare the competitiveness of Thailand, the United States and other major countries as exporters of motor vehicles and components. The results of the estimation clearly indicate that Japan has gained the highest degree of comparative advantage as a global exporter; the RCA indices are greater than unity for all three sectors: vehicle assembly, some spare parts, and motorcycles. For Thailand, there has been a substantial increase in the RCA indices related to the export of commercial vehicles, for which the RCA index increased from 0.31 in 1996 to 2.25 in 2003. However, Thailand has a comparatively lower RCA for passenger car assembly, for which the RCA index is only 0.01 in 2003. The RCA indices for the United States automobile assembly industry decreased slightly over the five-year period 1996-2000, before increasing to greater than unity in 2003, at which time its competitiveness was balanced between both passenger cars and commercial vehicles. Besides, Japan and the European Union (EU) countries are also major exporters which have gained a comparative advantage in exporting globally. In contrast to Thailand, South Korea is more competitive in exporting passenger cars than commercial vehicles.

With regard to the spare parts industry (Table 5), even though the indices for Thailand have been increasing, from 0.45 in 1996 to 0.68 in 2000, the RCA indices for this sector are still less than unity, which implies that Thailand is less competitive compared with global exporters. Thailand achieved the highest RCA for electronic items, i.e., an index greater than unity. The United States has considerably higher RCA indices for spare parts, ranging from 1.30 in 1996 to 1.35 in 2003, and aluminum items have the greatest potential.

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[6] The Revealed Comparative Advantage (RCA) is computed as RCA = $(X_{IK}/\Sigma X_K)/(X_{IW}/\Sigma X_W)$, where X_{IK} is the value of sector I exports to country K, and X_{IW} is the total value of the global exports of sector I.

Table 4 Revealed Comparative Advantage Index (RCA): Automotive Assembly

Country or area/Products	1996	1997	1998	1999	2000	2001	2002	2003
Thailand								
- Passenger cars	0.01	0.01	0.06	0.07	0.15	0.09	0.05	0.01
- Commercial cars	0.31	0.80	1.05	1.83	2.02	1.84	2.04	2.25
All items	0.29	0.72	0.94	1.60	1.80	1.65	1.83	2.02
United States								
- Passenger cars	0.78	0.60	0.53	0.49	0.64	0.82	0.90	1.14
- Commercial cars	0.96	0.98	0.90	0.81	0.90	0.81	0.94	1.12
All items	0.94	0.94	0.86	0.77	0.87	0.81	0.93	1.12
European Union								
- Passenger cars	1.11	1.23	0.95	1.00	1.06	1.11	1.15	1.14
- Commercial cars	0.87	0.84	0.92	0.95	1.02	0.98	0.95	1.00
All items	0.89	0.88	0.93	0.96	1.02	0.99	0.97	1.01
Japan								
- Passenger cars	1.68	1.67	1.86	3.03	2.87	2.61	2.52	2.23
- Commercial cars	2.08	1.99	1.90	1.55	1.43	1.45	1.61	1.61
All items	2.05	1.96	1.90	1.75	1.60	1.57	1.70	1.67
China								
- Passenger cars	0.00	0.00	0.00	0.00	0.01	0.02	0.04	0.11
- Commercial cars	0.07	0.06	0.04	0.03	0.04	0.04	0.04	0.04
All items	0.06	0.06	0.04	0.02	0.04	0.04	0.04	0.05
South Korea								
- Passenger cars	2.00	2.28	5.72	4.71	3.81	4.12	2.62	2.30
- Commercial cars	0.92	0.87	0.81	0.70	0.69	0.76	0.70	0.70
All items	1.02	1.00	1.37	1.24	1.06	1.13	0.90	0.86

Source: Author's calculation of data using the PC-TAS software package of the United Nations.

Table 5 Revealed Comparative Advantage Index (RCA): Spare Parts

Country or area/Products	1996	1997	1998	1999	2000	2001	2002	2003
Thailand								
- Plastics	0.60	0.55	0.56	0.52	0.56	0.60	0.65	0.69
- Tires and rubber	0.69	0.78	0.80	0.94	1.03	1.12	1.16	1.19
- Brakes and pads	0.39	0.37	0.37	0.64	0.58	0.71	0.74	0.77
- Glass	0.27	0.27	0.27	0.41	0.49	0.43	0.56	0.69
- Iron and steel	0.54	0.60	0.58	0.57	0.70	0.67	0.75	0.83
- Copper and alloys	0.79	0.93	0.94	1.02	1.09	1.11	0.97	0.83
- Aluminum	1.09	0.57	0.58	0.44	0.40	0.46	0.53	0.60
- Jaws and tools	0.24	0.27	0.29	0.23	0.25	0.22	0.22	0.22
- Metal	0.26	0.33	0.32	0.40	0.53	0.46	0.66	0.86
- Machinery	0.50	0.47	0.48	0.40	0.53	0.50	0.52	0.54
- Electronics	0.94	0.92	0.95	1.06	1.07	0.98	1.07	1.16

Country or area/Products	1996	1997	1998	1999	2000	2001	2002	2003
- Motor parts	0.09	0.12	0.12	0.23	0.30	0.31	0.39	0.47
- Photographic and optical items	0.50	0.66	0.70	0.26	0.30	0.43	0.48	0.54
- Clocks and watches	0.00	0.03	0.03	0.03	0.23	0.06	0.24	0.41
- Motor seats	0.06	0.06	0.05	0.07	0.10	0.11	0.14	0.17
All items	0.45	0.46	0.48	0.50	0.58	0.57	0.62	0.68
United States								
- Plastics	1.23	1.25	1.30	1.37	1.50	1.44	1.37	1.32
- Tires and rubber	0.78	0.91	0.91	0.93	0.98	0.97	0.96	0.87
- Brakes and pads	0.97	0.93	0.77	0.96	1.09	0.83	0.73	1.04
- Glass	1.48	1.62	1.52	1.49	1.65	1.60	1.58	1.65
- Iron and steel	1.19	1.07	1.15	1.20	1.29	1.21	1.23	1.17
- Copper and alloys	1.15	1.03	0.86	0.87	0.96	0.93	0.87	0.77
- Aluminum	1.68	2.74	3.34	2.21	2.72	2.64	2.77	2.57
- Jaws and tools	1.18	1.20	1.23	1.04	1.15	1.12	1.05	1.05
- Metal	1.39	1.35	1.26	1.48	1.70	1.58	1.61	1.50
- Machinery	1.11	1.19	1.19	1.31	1.39	1.35	1.46	1.38
- Electronics	1.11	1.08	1.04	1.11	1.16	1.12	1.11	1.03
- Motor parts	1.68	1.76	1.69	1.70	1.72	1.69	1.69	1.57
- Photographic and optical items	1.40	1.48	1.54	1.72	1.86	1.94	1.89	1.91
- Clocks and watches	0.15	0.23	0.65	2.05	1.71	1.25	0.35	0.26
- Motor seats	0.77	0.84	0.90	1.34	1.54	1.52	1.55	0.72
All items	1.30	1.35	1.33	1.39	1.45	1.42	1.44	1.35
European Union								
- Plastics	1.23	1.19	1.18	1.07	1.04	1.06	1.09	1.14
- Tires and rubber	1.16	1.15	1.11	1.08	1.09	1.05	1.02	1.02
- Brakes and pads	1.18	1.15	1.18	1.10	1.05	0.99	0.94	0.72
- Glass	1.21	1.22	1.22	1.25	1.24	1.20	1.23	1.25
- Iron and steel	1.13	1.14	1.12	0.97	0.96	1.00	1.01	1.02
- Copper and alloys	1.38	1.35	1.35	1.27	1.33	1.36	1.38	1.33
- Aluminum	0.74	0.70	0.70	0.90	0.86	0.88	0.80	0.97
- Jaws and tools	1.21	1.16	1.15	0.91	0.94	0.88	0.86	0.85
- Metal	1.25	1.25	1.25	1.19	1.15	1.11	1.08	1.15
- Machinery	1.12	1.12	1.12	1.06	1.04	1.05	1.04	1.08
- Electronics	0.97	0.96	0.95	0.91	0.89	0.89	0.87	0.90
- Motor parts	1.07	1.07	1.10	1.06	1.08	1.05	1.05	1.07
- Photographic and optical items	1.12	1.09	1.03	0.99	0.98	0.96	0.99	1.00
- Clocks and watches	1.50	0.85	1.01	1.00	1.02	0.97	0.99	0.87
- Motor seats	1.28	1.40	1.31	1.37	1.25	1.27	1.15	1.13
All items	1.10	1.09	1.09	1.04	1.03	1.02	1.02	1.05
Japan								
- Plastics	0.55	0.58	0.55	0.58	0.61	0.58	0.62	0.66
- Tires and rubber	1.59	1.55	1.57	1.59	1.54	1.62	1.69	1.73
- Brakes and pads	1.37	1.43	1.52	1.62	1.72	1.92	2.36	2.89
- Glass	0.58	0.46	0.39	0.31	0.34	0.37	0.34	0.34
- Iron and steel	1.08	1.07	0.92	0.88	0.95	0.95	0.99	0.97
- Copper and alloys	0.67	0.64	0.64	0.68	0.80	0.62	0.55	0.57

Country or area/Products	1996	1997	1998	1999	2000	2001	2002	2003
- Aluminum	0.22	0.18	0.13	0.15	0.15	0.13	0.13	0.19
- Jaws and tools	0.81	0.72	0.58	0.49	0.46	0.45	0.41	0.40
- Metal	1.03	0.86	0.62	0.65	0.72	0.72	0.70	0.67
- Machinery	2.13	1.93	1.69	1.81	1.89	1.94	1.88	1.82
- Electronics	1.47	1.34	1.26	1.33	1.36	1.32	1.34	1.31
- Motor parts	1.72	1.46	1.29	1.34	1.47	1.57	1.57	1.62
- Photographic and optical items	1.66	1.61	1.47	1.36	1.61	1.35	1.25	1.43
- Clocks and watches	1.14	1.79	1.53	1.86	2.66	4.08	5.00	5.05
- Motor seats	0.21	0.17	0.06	0.07	0.21	0.11	0.09	0.49
All items	1.65	1.48	1.33	1.38	1.45	1.49	1.49	1.50
China								
- Plastics	2.40	2.43	2.12	1.68	1.63	1.48	1.36	1.17
- Tires and rubber	0.52	0.47	0.52	0.64	0.73	0.69	0.69	0.66
- Brakes and pads	0.01	0.05	0.04	0.03	0.05	0.03	0.02	0.02
- Glass	0.26	0.27	0.40	0.48	0.58	0.68	0.56	0.49
- Iron and steel	1.00	1.00	1.01	1.01	1.05	1.09	1.09	1.07
- Copper and alloys	0.59	0.74	0.96	0.77	0.54	0.63	0.68	0.67
- Aluminum	0.43	0.33	0.47	0.35	0.35	0.37	0.33	0.34
- Jaws and tools	3.84	3.48	3.37	3.06	2.98	3.11	2.96	2.91
- Metal	0.58	0.62	0.65	0.61	0.61	0.82	0.94	0.93
- Machinery	0.30	0.28	0.27	0.33	0.35	0.36	0.34	0.32
- Electronics	0.85	0.81	0.79	0.86	0.87	0.84	0.85	0.85
- Motor parts	0.11	0.10	0.12	0.16	0.18	0.21	0.22	0.21
- Photographic and optical items	0.35	0.38	0.41	0.47	0.47	0.52	0.80	0.54
- Clocks and watches	0.22	1.02	0.47	0.51	0.90	0.69	0.99	1.20
- Motor seats	0.05	0.04	0.03	0.08	0.12	0.11	0.16	0.17
All items	0.50	0.49	0.48	0.52	0.54	0.54	0.54	0.51
South Korea								
- Plastics	0.75	0.72	0.61	0.58	0.47	0.51	0.56	0.60
- Tires and rubber	2.07	1.88	1.93	1.79	1.61	1.86	1.78	1.66
- Brakes and pads	0.04	0.05	0.06	0.10	0.20	0.19	0.29	0.33
- Glass	0.04	0.03	0.07	0.06	0.06	0.08	0.07	0.06
- Iron and steel	0.46	0.46	0.46	0.39	0.39	0.46	0.43	0.41
- Copper and alloys	0.16	0.13	0.26	0.32	0.34	0.41	0.37	0.40
- Aluminum	0.50	0.28	0.39	0.46	0.33	0.36	0.43	0.46
- Jaws and tools	0.16	0.10	0.11	0.08	0.07	0.10	0.11	0.13
- Metal	0.15	0.17	0.16	0.17	0.16	0.18	0.27	0.36
- Machinery	0.14	0.15	0.18	0.19	0.22	0.28	0.28	0.30
- Electronics	0.58	0.54	0.48	0.44	0.50	0.56	0.60	0.64
- Motor parts	0.33	0.44	0.38	0.46	0.41	0.51	0.55	0.74
- Photographic and optical items	0.14	0.14	0.16	0.17	0.21	0.25	0.30	0.32
- Clocks and watches	0.01	0.03	0.02	0.04	0.06	0.18	0.50	1.28
- Motor seats	0.01	0.98	0.02	0.02	0.03	0.05	0.02	0.17
All items	0.47	0.49	0.47	0.47	0.45	0.53	0.55	0.62

Source: Author's calculation of data using the PC-TAS software package of the United Nations.

In the motorcycle sector (Table 6), after Japan, Thailand seems to have gained a global comparative advantage in exporting both motorcycle assemblies and motorcycle parts. Even though its trade volume is still quite low compared with the overall sector, Thailand still has more room to seek greater opportunities to boost exports from this sector, especially that of motorcycle spare parts, the RCA indices of which ranged between 3.39 in 1996 and 2.87 in 2003. China may become a major competitor with Thailand; the RCA indices for China's motorcycle assemblies and spare parts significantly increased over from 0.99 in 1996 to 2.00 in 2003.

The RCA indices indicate the likelihood of Thailand, the United States and other countries succeeding as major exporters and achieving global competitiveness in the export of various automotive industry products.

Table 6 Revealed Comparative Advantage Index (RCA): Motorcycles

Country or area/Products	1996	1997	1998	1999	2000	2001	2002	2003
Thailand								
- Motorcycle assembly	1.79	1.61	1.17	1.27	0.90	0.83	1.03	1.23
- Motorcycle parts	3.39	2.81	3.55	2.68	2.68	2.88	2.87	2.87
All items	2.41	2.08	2.00	1.85	1.60	1.62	1.75	1.88
United States								
- Motorcycle assembly	0.56	0.53	0.45	0.32	0.34	0.50	0.58	0.61
- Motorcycle parts	0.49	0.51	0.57	0.42	0.39	0.44	0.45	0.49
All items	0.53	0.53	0.49	0.36	0.36	0.48	0.53	0.56
European Union								
- Motorcycle assembly	0.72	0.78	0.76	0.75	0.69	0.73	0.82	0.79
- Motorcycle parts	0.76	0.78	0.85	0.67	0.66	0.69	0.72	0.75
All items	0.74	0.78	0.79	0.72	0.68	0.72	0.78	0.78
Japan								
- Motorcycle assembly	5.84	5.82	6.42	6.21	5.92	6.41	5.99	5.39
- Motorcycle parts	3.58	3.53	3.07	2.47	2.50	2.87	2.72	2.66
All items	4.95	4.92	5.24	4.68	4.57	5.04	4.69	4.31
China								
- Motorcycle assembly	0.17	0.21	0.19	0.37	1.63	1.54	1.11	1.82
- Motorcycle parts	2.28	2.50	2.72	2.01	2.21	2.46	2.32	2.26
All items	0.99	1.11	1.08	1.04	1.86	1.89	1.59	2.00
South Korea								
- Motorcycle assembly	0.68	0.54	0.58	0.63	0.49	0.28	0.22	0.19
- Motorcycle parts	0.13	0.13	0.14	0.17	0.21	0.26	0.24	0.18
All items	0.47	0.38	0.43	0.44	0.38	0.27	0.23	0.19

Source: Author's calculation of data using the PC-TAS software package of the United Nations.

The RCA rank correlation is one of the indicators used to analyze the comparables of trade structure between countries. It implies the possible net effects on the automotive industry of both the United States and Thailand under their bilateral FTA conditions. More specifically, this instrument of Spearman's rank correlation between RCA indices helps to determine whether both countries would encounter trade creation or trade diversion upon joining the FTA; it does so by showing the similarities of trade structure between both countries. If the similarities in trade patterns mean a similarity of comparative advantage, they will comprise an important indicator to determine whether trade between Thailand and the United States would be complementary and substitutable. Complementarities should be generated from trade among countries with different comparative advantage patterns, such as labor-intensive production and capital-intensive production. Therefore, the countries which have a complementary trade structure should realize trade creation as a result of bilateral trade. Countries which have similarities in trade structure implying a high correlation of RCA indices would therefore face a high degree of substitutability. The decision to join a trade bloc may therefore decrease the possibility of trade creation but result in trade diversion owing to the high gap between the tariffs imposed on member countries and those on non-member countries. The higher is the degree of the RCA correlation index, the more substitutable the trade patterns would be and the less likely would be trade creation. On the other hand, the lower (or more negative) are the RCA correlation coefficients, the more complementary would be the trade structures between the countries and the more likely would be trade creation. This paper shows how the Spearman's rank correlation of RCA coefficients of the automotive industry should be among Thailand, the United States and other major exporters of automotive items.

The RCA rank correlation coefficients of a number of Thailand's trade partners in automotive sub-sectors are presented below (Table 7). Countries with a higher (positive) rank correlation indicate similar export structures to that of Thailand and tend to have less potential for trade creation. RCA rank correlations are also presented for United States cases. The RCA rank correlation indices show that Thailand is likely to gain less benefit in the car assembly industry from forming an FTA with the United States compared with a similar arrangement with others such as the EU, Japan, and South Korea. The RCA rank correlation index indicates a 22.7 percent degree of substitution (0.227) of car assembly between Thailand and the United States. The RCA rank correlation indices show that trade creation in the car assembly industry is less likely to happen for the United States if an FTA is formed with Thailand compared with others such as the EU, South Korea, and Japan.

However, with regard to the RCA rank correlation indices of the spare parts industry, Thailand should experience trade creation if it forms an FTA with the United States. The index shows that Thailand's spare parts industry is about 11.2 percent complementary (-0.112) with that of the United States for benefiting the spare parts industry (Table 8). South Korea and China seem also to be competitors with Thailand in this sector. In the case of the United States, even though trade creation for the spare parts industry should exist if the United States decides to form an FTA with Thailand, other competitors such as South Korea and China, and EU countries display a more negative degree of complementary and thus would benefit more if the United States decides to join an FTA. Notice that if Japan joins an FTA with Thailand, Thailand should experience the most gains in the motorcycle sector compared with other sectors in the automotive industry. The coefficient index of RCA correlation is about 0.015. The correlation index also shows that China and Japan seems to be the main competitors for Thailand in this sector in the United States market, which has a greater degree of trade complementary.

Table 7 RCA Rank Correlation of Automotive Industry between Thailand and Selected Countries/Area

Automotive industry	United States	European Union	Japan	China	South Korea
Car assembly	0.227	-0.009	-0.373	0.009	-0.391
Motorcycles	0.015	0.018	-0.268	0.600	0.486
Parts and components	-0.112	-0.186	0.113	0.267	0.202

Source: Author's calculation of data using the PC-TAS software package of the United Nations.

Table 8 RCA Rank Correlation of Automotive Industry between United States and Selcted Countries/Area

Automotive industry	Thailand	European Union	Japan	China	South Korea
Car assembly	0.227	-0.600	-0.564	0.300	-0.536
Motorcycles	0.015	0.274	-0.444	-0.209	0.112
Parts and components	-0.112	-0.267	-0.099	-0.164	-0.240

Source: Author's calculation of data using the PC-TAS software package of the United Nations.

4. ASSESSMENT OF IMPACTS AND ADJUSTMENTS NEEDED

In considering the margin of preference between both countries, it is believed that both Thailand and the United States automotive sector should gain from forming the aforementioned bilateral FTA, which should be considered from the perspective of its direct effect on tariff reduction between the countries as both countries would enjoy a "margin of preference." However, a comparison between the pre-FTA and post-FTA rate should be discussed in the future as using the United States-Singapore FTA as the norm would not be acceptable, especially for the automotive sector, since Singapore agreed to reduce tariffs to zero. Nevertheless, the United States may be expected to gain a larger margin of preference for passenger cars (currently 60-80%), and commercial cars (40-60%), which are close to post-FTA rates.[7] Additionally, Thailand should gain directly from the export of pick-up trucks (commercial cars), which should benefit from the 25 percent tariff schedule that the United States imposes compared with the 0-2 percent import duties that will apply after forming the bilateral FTA with the United States. Moreover, the motorcycle sector (motorcycle assembly and spare parts) should also benefit in terms of a possible increase in exports from Thailand to the United States market as a result of a reduction in the general 10 percent tariff schedules on motorcycle assemblies and the 20 percent tariff on motorcycle spare parts that would be reduced to zero.

Nevertheless, even though Thailand and the United States each would significantly gain from the bilateral FTA, there are some concerns about the strengths, weakness, and opportunities for both countries. The integration of new markets under the FTA not only would generate more trade, but also inject new business operations into the automotive industry in Thailand. This includes the encouragement of Thailand's vehicle assembly industry with regard to higher direct foreign investment inflows from the Big-3 for producing 1-ton pick-ups, which has been considered Thailand's "product champion" for 30

[7] If the United States-Singapore framework is not used, the AFTA rate can be applied as Thailand's post-FTA rate in order to observe the margin of preference. See Chapter 3 in Thailand Development Research Institute (2003).

years. Therefore, one of the possible prominent effects of the bilateral FTA should be increased exports of 1-ton pick-ups and light trucks to the the United States, the demand for which is approximately several million units per year. At the same time, Thailand could become a new export market for the United States for 1.5-ton light trucks. Even though Thailand is a small market, it could be expected to grow under the FTA in response to the availability of competitively priced large vehicles. The FTA may possibly change the consumption style of Thai consumers toward the use of 1.5-ton light trucks imported from the United States.

For parts and components, the expansion, especially of OEM operations, would have direct flow-on benefits for Thailand and help raise the scale of operations. The integration involving both countries should provide strong incentives for component companies, Thai and American, to become suppliers to OEMs in both markets. This therefore would lead to two-way investments in production capacity and trade in parts and components. For its part, Thailand should be expected to increase its import market share in the United States. Some items, especially those in the *after-market* normally produced by Thai SMEs, have the potential to enter the United States market in new product areas as the industry continues to develop. Some exports of spare part items from Thailand are under GSP rules, which makes them more competitive in the United States market. In addition, Thailand's trade liberalization policy and trade promotion efforts have built confidence among foreign investors in the spare parts market. However, shortages of raw materials such as steel, plastic, and chemical products have caused higher costs in the production of spare parts. Therefore, even though there may be instantaneous developments in production processes and innovations, the high cost of raw materials remains a major obstacle for producers of spare parts in Thailand to compete with those from other countries.

Another major benefit that Thailand could expect from signing the FTA with the United States is technology transfer. The United States automotive industry is already engaged in the transfer of skills to the Thai industry and this process is likely to increase once the FTA is fully implemented. An example of such transfer is the provision of technical assistance by a United States vehicle company that trained engineering staff in Thailand. Nevertheless, more newly-graduated engineers, especially in the spare parts industry, are still needed to fulfill the total demand of this industry for trained engineers.

To reap benefits from access to the United States market and US investment in Thailand, Thai suppliers must attain minimal international standards in three areas: quality, cost, and delivery time (QCD). In terms of product quality, a defect ratio of less than 100 parts per million (ppm) has long been the norm. Some assemblers such as GM have started to demand a higher standard, i.e., less than 20 ppm. While the requirement poses no major difficulties for most first-tier suppliers, most Thai lower-tier suppliers are struggling with current defect rates of more than 1,000 ppm. In terms of system quality, direct and indirect suppliers are required to obtain QS 9000 and ISO 9000 certification, respectively. Most direct suppliers have long adopted quality management systems. They are thus well positioned to attain the ISO 9000 and QS 9000 standards. The situation is rather different for indirect suppliers since many of them appear unable to meet the standards.

In addition, automotive assemblers in Thailand usually follow monopsony strategies by pressuring for cost reductions. Many assemblers have set targets for their suppliers to reduce prices 20-30 percent within two to three years. For example, GM has adopted a cost-reduction target of about 5 percent per year. While most direct suppliers have managed to reach the cost reduction targets, problems still remain for many small indirect suppliers. In

addition to the suppliers' efforts, the government should be accommodative by reforming the distorting tariff structure that imposes high costs on suppliers.

The shortening of product life-cycles and the adoption of just-in-time (JIT) procurement by assemblers have also resulted in a more frequent delivery time and lower volume per delivery for suppliers. To comply with the JIT system, suppliers also need to strengthen quality control measures, since one defective part can disrupt the whole production line of their customers.

For first-tier suppliers, design and test capabilities are increasingly required. Until recently, direct suppliers had received orders and related blueprints from assemblers. All that suppliers had to do was produce parts according to the blueprints. Increasingly, however, they are being given only functional specifications, e.g., dimensions and physical properties, and they are required to propose the design. The problem is that developing design and test capabilities requires hugh investments in facilities and skills acquisition, which are still out of reach for most domestic first-tier suppliers.

Finally, suppliers will be required by their customers to adopt the use of information technology (IT), particularly the Internet and electronic data interchange (EDI), in their supply chain management. The adoption of IT is aimed at achieving better interaction between assumblers and suppliers, shorter lead times, lower inventories and improvements in procurement, production and distribution. Again, the adoption of IT will involve a fixed-cost investment that requires large production volumes in order to be cost efficient.

5. EMPLOYMENT IMPLICATIONS

This section is aimed at analyzing the impacts of the Thailand-United States FTA on employment in Thailand's automotive industry. Piriya (2005) constructed the computable general equilibrium (CGE) method to evaluate the impacts of ASEAN Free Trade Areas (AFTA) on wage earning and employment in various sectors. It determined that more gains will be realized in the form of higher wages as well as more employment for Thai laborers employed in the automotive industry.[8] The implications for labor in this sector should be analyzed according to differentiated skills, sex, and age.

One of the urgent labor problems in this sector is the acute shortage of skilled workers, including technicians and managers. Thailand has a total of 72 colleges or universities, but only 34 of them grant mechanical engineering degrees and only two of them grant degrees in automotive and transportation engineering. Therefore, specific and relevant engineering courses and training should be established in more such institutions. Many companies may face delays in the process of technological upgrading as a result. The high level of protection afforded to an industry enables it to survive even without sufficient engineers and technicians. Because this industry is capital-intensive, skills training and manpower development are required for the industry to meet the demands of changing technologies and consumer tastes. In addition, because of the industry's varying size companies, big producers should have a better chance to select professionals than small and medium-size companies, because they can afford to pay more for smarter and more effective workers.

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[8] Nevertheless, with the model's limitations, CGE excludes some important factors that should vary among these three sectors, for example, the returns to scale in production, production intensity, share of exports/imports to sectoral production. Quantitative analysis might produce some errors unless more sectoral information has been considered.

With regard to Thailand's Labor Force Survey, total employment in the spare parts and components industry increased sharply from 14,846 workers in 1990 to 84,228 workers in 2003, or about 24 percent annually (Table 9). Male workers dominate this industry; they account for about 70 percent of the total number employed. However, there is not much difference between men and women in terms of monthly wages, about 9,175 baht per month for males and 8,786 baht per month for females. Compared with other industries regarding the degree of education of workers, employees in this industry are more highly educated: only 22.1 percent have just a primary school education; 16.9 percent attended secondary school; 18.1 percent are high school graduates, 26.3 percent are graduates of vocational schools, and 16.6 percent are university graduates. Because this is considered a capital-intensive industry, more skilled workers are required in this sector owing to all the work involving machinery and other technical equipment. Nonetheless, based on data from the Labor Force Survey, the cost structure of producing spare parts and components shows that about 58.3 percent of the costs are for raw materials, 15.8 percent of the costs are for other expenditures and only 3.1 percent of the total is for wages.

Table 9 Employment in Spare Parts and Components Industry

Year	Employment by sex		Total employed	Monthly wages (baht)		Weighed average montly wages
	Males	Females	(N)	Males	Females	(baht)
1990	8,710	6,136	14,846	3,308	3,522	3,397
1991	20,945	3,885	24,830	3,588	4,008	3,654
1992	18,583	4,392	22,974	3,880	5,253	4,142
1993	29,007	9,304	38,311	4,376	3,671	4,204
1994	16,360	6,334	22,694	5,313	2,928	4,647
1995	24,968	6,408	31,376	4,829	5,157	4,896
1996	39,854	24,265	64,119	4,324	3,178	3,890
1997	33,875	10,860	44,735	3,838	6,240	4,422
1998	25,625	14,475	40,100	6,042	5,076	5,693
1999	56,487	27,386	83,873	5,258	5,848	5,450
2000	39,672	33,017	72,689	4,380	7,146	5,636
2001	44,477	12,410	56,887	9,016	5,057	8,152
2002	54,335	24,373	78,709	7,630	6,010	7,128
2003	53,895	30,333	84,228	9,175	8,786	9,035

Source: Thai Labor Force Survey.

With regard to working standards, the Thailand-United States FTA should result in improved safety and better working conditions for laborers for the following reasons:

(i) The desire to preserve the good name of the world-class firms themselves.

(ii) Clients from the United States might claim as a non-tariff barrier Thai exporters with weak working conditions.

(iii) Within the automotive sector, the costs incurred in encouraging safety in the workplace are considerably lower than costs incurred by sickness, accidents, and injuries that firms would have to cover.

(iv) Better working conditions help to improve labor productivity and develop a firm's human capital.

Therefore, sectors that do not meet the international standards for good working conditions will face more difficulties in a globalizing economy. The degree of losses in this sector in 2003 can be seen in the following statistics: of the 7,827 workers classified as incapable of work owing to sickness, injury, and death, 6,689 were male. This could lead to the conclusion that the male workers employed in this sector face more risks than females. Classified by type of losses, 79.9 percent of the workers were temporarily disabled for fewer than three days (much higher than the national average); 17.2 percent of the workers were temporarily disabled for more than three days; 2.8 percent were permanently disabled (higher than the national average); and only 0.05 percent had died (much lower than the national average) (Table 10).[9] Nevertheless, it can be observed that, since the number of employees in this sector has been increasing dramatically, the ratio of losses to the number of workers is decreasing. In comparing among the different categories, the ratio of losses has been decreasing in the categories of death, permanent partial disability, and temporary disability for more than three days. Work safety in the parts and components industry in relative terms seems to be less severe, even though the workers in this sector still face more risks compared with the national standard.

Table 10 Injuries and Degree of Loss of Workers in Parts and Components Industry (Unit: Number of Cases)

Year	Death	Permanent total disability	Permanent partial disability	Temporary disability over 3 days	Temporary disability under 3 days	Total
2000	7	0	221	1,337	5,101	6,666
(%)	(0.11)	(0.00)	(3.32)	(20.06)	(76.52)	(100)
2001	3	0	212	1,282	5,164	6,661
(%)	(0.05)	(0.00)	(3.18)	(19.25)	(77.53)	(100)
2002	6	0	191	1,305	5,455	6,957
(%)	(0.09)	(0.00)	(2.75)	(18.76)	(78.41)	(100)
2003	4	0	222	1,348	6,253	7,827
(%)	(0.05)	(0.00)	(2.84)	(17.22)	(79.89)	(100)

Source: Thai Social Security Office.

In classifying by types of establishment, 73.0 percent of the firms in the parts and components sector have been established in the form of private and public companies, 13.1 percent of them are in the form of State and government-owned enterprises, and the remaining 13.9 percent are unincorporated companies. Therefore, the majority (about 86.1%) of the laborers employed in this sector are working in the formal sector. Labor protection in the form of social security and unemployment insurance should be applied for those workers. Because of the capital-intensive characteristics of this sector, unskilled workers may not gain from a higher demand for products owing to greater trade liberalization. However, since there is still a shortage of skilled personnel such as engineers, computer technicians, and designers, such skilled workers may gain from trade

[9] The contributions by employers to the Worker's Compensation Fund is the highest, i.e., the equivalent of 1 percent of each worker's monthly wage. This level of employer contribution is considered to be the highest among all other industries. Thus, it can be implied that the workers in this sector might be at greater risk of injury etc., compared with those in other sectors.

liberalization. Therefore, enhancing the long-term capacities of workers in this sector, e.g., through on-the-job training and basic education, is absolutely essential. Since the majority of workers are employed in the formal sector, the adverse shocks from trade liberalization should not harm laborers in this sector compared with those in other sectors. Even though the majority of workers employed in this sector are males, discrimination against female workers is not likely to exist in this sector as may be observed in the wage differentials for men and women.

6. CONCLUSION

From the Thai perspective, the United States and Thailand are strongly complementary in their spare parts industries and weakly complementary in the motorcycle sector. As a result, the Thailand-United States FTA should benefit both countries in terms of trade creation. In particular, Thai car assemblers and parts manufacturers should be able to expand their exports to the United States market owing to the reduction of trade barriers and other trade facilitation measures included under the FTA. Thailand is also likely to attract more investment from United States car manufacturers because of its strong clusters. Nevertheless, there should be concerns about the strengths, weaknesses, and opportunities of the Thai automotive industry and whether it would really benefit from the FTA. One of the main obstables that Thailand should be aware of is the competition that exists among other countries such as China and South Korea with regard to investment incentives. There should be a discussion about easing rules and regulations and the settlement of disputes between the Thai government and foreign investors. Another obstacle is the lack of innovation and technology transfer; this situation should improve along with United States foreign investment inflows. To capture all these potential benefits, however, Thailand-based assemblers and suppliers need to improve product quality, reduce costs and improve delivery time. First-tier suppliers also need to develop design capability. To this end, the government should support the private sector by setting up design and test facilities and investing more in the training of human resources.

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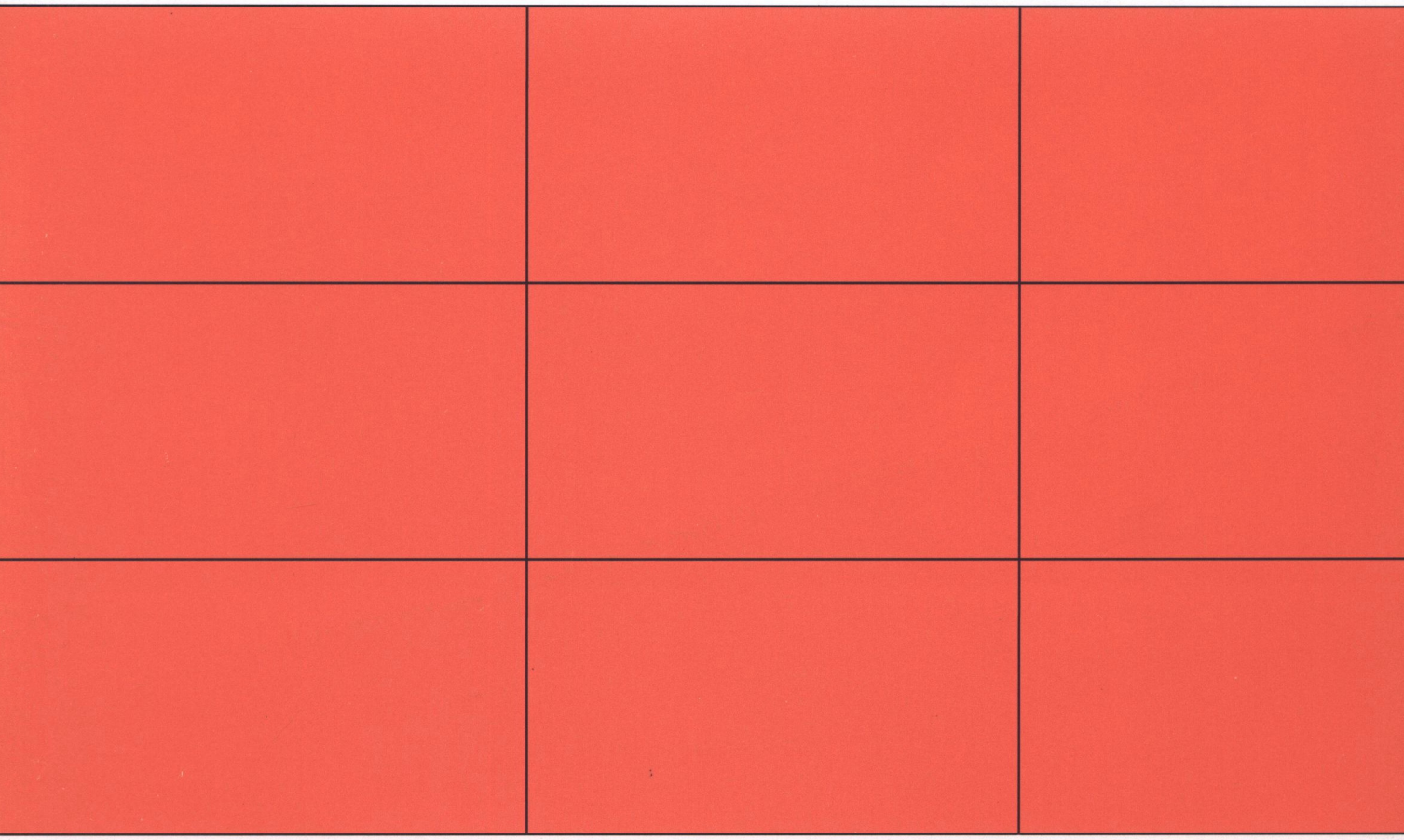

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