

**THE IMPACT OF RUBBER OLIGOPOLY ON FDI INFLOW:  
THE CASE OF THE INTERNATIONAL TRIPARTITE RUBBER  
ORGANIZATION (ITRO), 1990-2007**

**THESIS**

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**UNIVERSITY OF INDONESIA  
FACULTY OF ECONOMICS  
MASTER OF PLANNING AND PUBLIC POLICY  
DEPOK  
DECEMBER, 2008**

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**Submitted in partial fulfillment of the requirements for  
the Degree of Master of Economics**

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DECEMBER, 2008**

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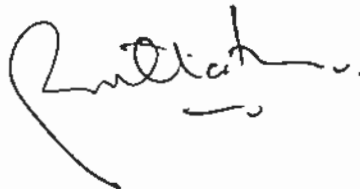
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## ABSTRACT

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As the top three largest producers and exporters of natural rubber covering over 70% of world production and 60% of world exporters, Indonesia, Thailand and Malaysia had agreed to establish the International Tripartite Rubber Organization (ITRO) in 2001 to control the quantity of rubber supply and hence the price of rubber. ITRO can therefore be seen as a discriminatory trade policy developed by member countries in the form of oligopoly. This study aims to analyze the relationship between this oligopoly scheme through the implementation of ITRO with FDI inflow from non member to member states in rubber products industry, as well as with other factors using panel data observation, i.e. the fixed effect model, for the three member of the organization over the period of 1990-2007. This study shows that the implementation of the oligopoly scheme from the tripartite member countries, represented by the dummy variable of the time of ITRO implementation, positively affect FDI inflow on rubber products industry. In addition, it also proves that natural rubber production, RGDP, real exchange rate and degree of openness have a positive influence in encouraging FDI inflow on rubber products industry in the tripartite member countries.

Judul : Dampak Oligopoli Karet terhadap Arus Masuk *FDI*: Studi Kasus *International Tripartite Rubber Organization* (ITRO), 1990-2007

Indonesia, Thailand dan Malaysia merupakan negara produsen dan eksportir terbesar di dunia dengan *share* produksi dan ekspor dunia sebesar 70% dan 60%. Pada tahun 2001, mereka membentuk ITRO dengan tujuan mengatur produksi dan harga internasional karet alam. Berdasarkan hal tersebut, pembentukan ITRO dapat dilihat sebagai *discriminatory trade policy* yang dibuat oleh negara anggotanya dalam bentuk skema oligopoli. Tesis ini bertujuan untuk menganalisa hubungan antara skema oligopoli melalui pembentukan ITRO dengan *FDI inflow* dari negara non anggota di industri karet serta faktor-faktor utama lainnya dari *FDI inflow* di industri karet. Metodologi yang digunakan adalah metode data panel yaitu model efek tetap dengan cakupan periode 1990-2007. Hasil penelitian membuktikan bahwa pembentukan ITRO, yang direpresentasikan oleh variabel *dummy* tahun pembentukannya dan faktor-faktor utama yaitu produksi karet alam, PDB riil, nilai tukar riil dan *degree of openness* memiliki hubungan positif terhadap *FDI inflow* di industri karet di ketiga negara tersebut (Indonesia, Thailand dan Malaysia).

### Keywords:

ITRO, oligopoly scheme, rubber products, FDI, dummy variable, panel data, fixed effect model



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## CHAPTER 1 INTRODUCTION

### 1.1 Research Background

Since 2006, the Ministry of Trade has developed a road map to increase export, particularly for non-oil and gas<sup>1</sup>. The value and growth of non-oil and gas exports in 2007 was US\$ 91.9 million and 15.5% respectively, in which the role of the 10 main products was very significant. The export share of those products was about 48.6%; however, it was declining from 51.8% in 2006. In addition, export growth of the 10 main products also declined to 8.5% in 2007 from 12.7% in 2006.

The deceleration of the growth in export volume in 2007 compared to 2006 occurred in most of the main products either manufactures or agricultural based products. One of the sectors which did not decelerate was rubber and rubber product. The empirical data shows that the export value of that product reached US\$ 6,220.7 million, relatively high compared to other products. It is therefore important to highlight the role of this product and its future improvement as one of Indonesia's major commodities contributing strongly to the increase in export value.

With the largest rubber plantation area in the world, followed by Thailand and Malaysia respectively, Indonesia resides in the second position of the world market share production, i.e. 26%, while Thailand at this moment becomes the largest one with 33% and Malaysia on the third position with more or less 13% world market share (Anwar, 2006, p.5). From 2000, Indonesian natural rubber has been exported to 10 biggest importing countries, i.e. USA, Japan, China, Singapore, Korea, Canada, Germany, Brazil, France and South Africa. In addition, these exports indicate an increasing growth of share from time to time and it is predicted to keep increasing in the future.

---

<sup>1</sup> The road map was focused on 10 main products (i.e. shrimp, coffee, palm oil, cacao, rubber and rubber product, textile and product textile, footwear, electronics, automotive component, and furniture), 10 potential products (i.e. handicraft, fish and fish product, medicine herbs, leather and leather products, processed food, jewelry, essential oils, spices, stationary non paper, and medical instrument and appliances) and 3 services product (i.e. design [arts, fashion, jewelry, crafts], information technology [animation, graphic, multimedia] and construction) which reflected the potency of Indonesian products. This roadmap has been known as Project 10-10-3.

As the top three largest producers and exporters of natural rubber, covering over 70% of world production and more than 60% of world exports, Indonesia, Malaysia and Thailand had agreed to establish the International Tripartite Rubber Organization (ITRO) in 2001 (Ministry of Trade, 2006) which aims to manage rubber production in an effort to maintain orderly market growth and thus guarantee a minimum price to their domestic producers. In addition, ITRO also aims to revive rubber price to the level which is remunerative to the procedures on the basis of targeted prices, as well as to manage the imbalance in supply over demand. Below this corporation, the members agreed to form the International Tripartite Rubber Council (ITRC) and the International Rubber Consortium Limited (IRCo) as the tools to increase and stabilize the natural rubber price, of which each tool has different instrument to reach the target.

The tripartite members, through ITRC, designed production quota policy known as Supply Management Scheme (SMS) in 2001, of which they agreed to reduce their production of 4%. In addition, they also set the second mechanism, Agreed Export Tonnage Scheme (AETS) in 2002, of which they should reduce the export volume of 10%. In order to complement the previous two schemes, SMS and AETS, the tripartite members agreed on setting up the International Rubber Consortium Limited (IRCo) and carried out the Strategic Market Operation (SMO) in 2004, which has the scenario to buy or to sell the natural rubber whenever the price of natural rubber declines or increases, respectively. The reference price of natural rubber, which was agreed on March 9<sup>th</sup>, 2004 at the ministerial meeting in Bangkok, was US\$ 1.10/kg (Ministry of Trade, 2005).

As the ITRO works in the control of rubber products in its three member countries, ITRO can be seen as a discriminatory trade policy developed by the member states (internal factors) in the form of oligopoly. In the previous study done by Verico (2008), discriminatory policy in trade designed by the member states would change the strategy of non member states from trade to long term investment (FDI) in member states.

Discriminatory policy can happen in two ways, i.e. external factors and internal factors. External factors are developed by foreign countries while internal factors are developed by the member states consisting of two forces, i.e. producers



and consumers. The external factors are developed by the FDI donor countries which attempt to enlarge their production capacity by relocating their investment so that they can produce goods at minimum cost. The existing cooperation in South East Asia with respect to that are the so called Regional Production Network (RPN) policy that is used by Japanese investors to produce a product partly in various countries at the region, SIJORI growth triangle (Singapore-Johor-Riau) that is used by Singapore to transfer its industries to its closest neighbors (i.e. Indonesia and Malaysia) and Special Economic Zone in Batam, Bintan and Karimun. On the other hand, the internal factors are developed by FDI recipients countries which attempt to influence non member state to invest in their countries. The existing cooperation regarding to the internal factor from the consumer forces is the ASEAN Free Trade Area which diminished tariff barrier between members but maintained higher tariff barrier to non member states; moreover, producers from non member states are expected to change their strategy from trade to investment (Verico, 2008). On the supply side forces of the internal factor, the existing cooperation is the implementation of ITRO, which is at work in the control of rubber products in Indonesia, Thailand and Malaysia.

As the previous study mentioned above was only focused on the consumer force and AFTA as the object of the study, this thesis will analyze the relationship between the discriminatory policy on natural rubber which comes from the supply side (producers, i.e. Indonesia, Malaysia and Thailand) and investment creation from non member states, particularly in rubber products industry.

In addition to that, by comparing between products liberalized among AFTA's members and products open to non member investors<sup>2</sup>, all three member states (Indonesia, Malaysia and Thailand) liberalize trade in rubber under the scheme of AFTA while at the same time liberalize their domestic market for rubber to foreign investors (see table 1.1. below for details). This suggests that the implementation of ITRO supports AFTA to pursue a discriminatory trade policy towards non member states.

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<sup>2</sup> Verico has proven that AFTA, as trade discrimination from the demand side (internal factor), is significant in boosting intra industry trade between Indonesia, Thailand and Malaysia. Brief explanation about his study would be presented in chapter 3, i.e. the literature study.

**Table 1.1. Comparison between AFTA Trade Liberalization and FDI liberalization in Indonesia, Malaysia and Thailand**

Trade Liberalization among AFTA Members (Products Liberalized)	FDI Liberalization (Products open to NON MEMBERS Investors)		
	Indonesia	Malaysia	Thailand
AFTA Cement, Ceramic & Glass, Chemicals, Cooper Cathodes, Electronics, Fertilizers, Gems & Jewelry, Leather, Pulp and Paper, Plastics, Pharmaceuticals, <b>Rubber</b> , Textiles, Vegetable Oils, Wooden & Rattan Furniture	Animal Breeding, Brown Sugar, Coal, Coffee, Coconut, Corn, Cashew Nuts, Clove, Cacao, Processing, Carpet, Chicken Processing, <b>Crude Palm Oil</b> , Fish Cultivation, Feedstock, Fruit Processing, Industrial Plantation Forest, Layer, Meat, Natural Gas, Orange, Pepper, Palm Fruit, Peanut, Pineapple, <b>Rattan</b> , Rhizome, <b>Rubber</b> , Sugar, Soybean, Tea, <b>Wood Furniture-Plywood</b>	Electrical & <b>Electronics</b> , Engineering Supporting, Food Processing, Life Sciences, Machinery & Equipment, <b>Chemicals, Rubber, Textiles &amp; Apparel</b> , Transport Equipment, Basic Metal, <b>Wood Industry</b> , Real Estate, ICT, Financial Services, Utilities, Hotel and Tourism	Beverages, <b>Chemicals</b> , Cleaning Preparation, Construction Materials, Equipments, <b>Electronic &amp; Electrical</b> , Furniture, Foods, Footwear, Iron and Steel, <b>Leather, Paper, Petroleum, Rubber, Jewelry</b> , Software, Yachting

Source: ASEAN Secretariat, BKPM Indonesia, MIDA Malaysia, BoI Thailand (processed) in Verico, K., 2008

\* The bold products are similar to those under AFTA liberalization

\*\*Indonesia, Thailand and Malaysia promote foreign investment in rubber

This thesis will analyze the relationship between the discriminatory policy on natural rubber which comes from the supply side (producers), namely Indonesia, Malaysia and Thailand, and investment creation from non member states. The discriminatory policy is defined as the cooperative producer action under ITRO. Investment is represented by Foreign Direct Investment (FDI) inflow from non member states to Indonesia, Malaysia and Thailand in rubber products industry.

## 1.2 Research Questions

Based on the position of ITRO as an example of discriminatory trade policy, a detailed study is needed to see how this oligopoly scheme would give benefit to its member, particularly Indonesia. There are two research questions to be proposed:

- a. Does the oligopoly/ cartel scheme represented by the implementation of ITRO result in investment creation (FDI inflow) from non member countries, thus changing their strategy from trade to investment on rubber products in member countries?
- b. What are the other potential factors that affect inflow of FDI on rubber products in the tripartite member countries and how are the levels of significance as well as the elasticity of those factors with relation to FDI inflow as the dependent variable?

## 1.3 Research Objectives

In line with the research questions above, this thesis has two ultimate objectives:

- a. To analyze the relationship between the oligopoly scheme on natural rubber products (i.e. the implementation of ITRO) which comes from the supply side (producers, i.e. Indonesia, Malaysia and Thailand) and investment creation from non member states (FDI inflow) on rubber products;
- b. To investigate other potential factors that affect inflow of FDI on rubber products in the tripartite member countries and also to find out the significance as well as the elasticity of the intended factors (independent variables) with relation to FDI inflow as the dependent variable;

## 1.4 Research Coverage

The study consists of desk study on internal factors of trade discrimination particularly coming from producer forces, as well as secondary data which covers that matter. It is limited to examining the oligopoly scheme (i.e. the

implementation of ITRO) and investment relations from the rubber products in the tripartite member countries of ITRO, namely Indonesia, Thailand and Malaysia.

Furthermore, the study also takes into account other potential factors that would affect the FDI inflow on rubber products industry which is limited to annual data of variables. The variables are FDI inflow on rubber products industry (dependent), real gross domestic product, real exchange rate, production on natural rubber (HS 4001) and degree of openness (i.e. exports plus imports over GDP) within period of 1990-2007 yearly and using econometric panel data model.

The justification in using that period of time is due the relevant time period for analyzing the linkage tendency between investment and the implementation of the ITRO at which it covers several years before and after the implementation of ITRO (2001).

### **1.5 Research Hypothesis**

As mentioned earlier, the largest consumers of natural rubber are Japan, USA, EU and Australia, none of whom are ASEAN members. Hypothetically, discriminative trade policy through the implementation ITRO will affect non member states to change from trade to investment by investing in rubber products in Indonesia, Malaysia or Thailand. The forming of ITRO is expected to have positive impact on FDI inflow on rubber products.

As the market size of the host country market is usually measured by gross domestic product, it captures high demand, prospects for economies of scale, good economic health and absorptive capacity which give positive signal to foreign investors. Large market size is expected to have a positive impact on FDI, particularly FDI inflow on rubber products.

Other macro economy indicator is the real exchange rates. A rise in the real exchange rate, i.e. the real depreciation, implies a decrease in the relative price of domestic goods (the host country) in terms of foreign goods (home countries). Therefore, a real depreciation of the host country currency favors home country purchases of host country assets and leads to an increase in inward FDI in the host country. Furthermore, with regard to relative labor cost, a real depreciation of the host country currency allows home country investors to hire

more labor for a given amount of the home country currency, and therefore is associated with an increase in inward FDI in the host country.

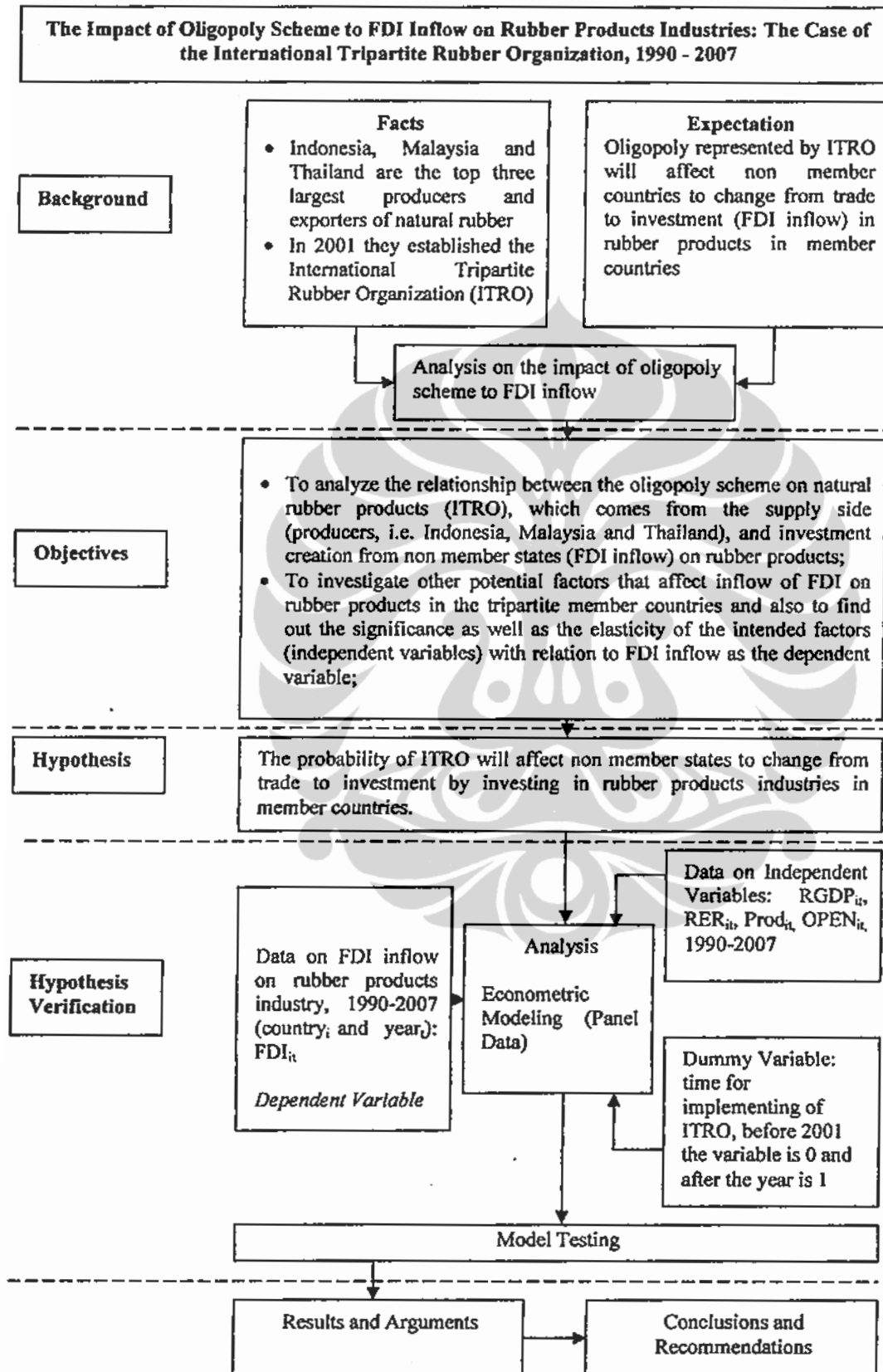
In relation with production on natural rubber (HS 4001), it is known as the basic constituent of many products. Consequently, as the major raw material (input) for most of rubber based industry; therefore, the higher level of production would be expected to have a positive impact on FDI, particularly on rubber products sector. Nevertheless, it might be argued that an increase in foreign investment on rubber products industry in member countries, by bringing in more knowledge and capital, would play an important role in increasing the production of natural rubber as the major input for most of rubber based industry. Therefore, by applying the causality test, specifically on FDI in rubber product industry and production on natural rubber, it is possible to demonstrate the fallacy of the widely held belief that FDI has a positive effect upon the production.

In addition, the trade to GDP ratio, i.e. exports plus imports over GDP, is often used to proxy the degree of openness. This ratio suggests how a country is being integrated into the new economic order. It is expected to have positive impact on FDI inflow on rubber products.

#### **1.6 Research Contributions**

This research would give some contribution to academic society as a study platform in order to analyze the discriminatory trade policy from the supply side (producers) which might have the effect on increasing FDI inflow in particular sector, in this case rubber products. In addition, this research would also be used as a perspective for the policy maker, i.e. the government, that the plausibility for improving one of the main products such as rubber products might be approached not only through export but also through the investment creation.

## 1.7 Conceptual Framework



### **1.8 The Outline of the Thesis**

Five chapters follow this introduction. Chapter 2 describes about common reviews on the tripartite members' economy along with natural rubber profile on each of tripartite member countries. In addition, the nature of the International Tripartite Rubber Organization as well as its derivative organization, i.e. International Tripartite Rubber Council and International Rubber Consortium would be discussed.

Chapter 3 discusses literature studies used on this thesis. Moreover, it elaborates particular theories on oligopoly and FDI with addition to determinant factors on FDI and previous empirical studies on it.

Chapter 4 carries out the research methodology conducted to meet the objectives of the study. It consists of the construction of the model, data and sources, operational definition of variables, the estimation method and procedures for estimating panel data regression.

Chapter 5 presents the results and analysis of this study. It puts forward the main findings from empirical analysis along with interpretation.

Chapter 6 summarizes the thesis main findings. In addition, recommendation which consists of policy implications and recommendation on future study are also proposed here.

## CHAPTER 2

### TRIPARTITE MEMBERS' ECONOMY, NATURAL RUBBER PROFILE AND THE INTERNATIONAL TRIPARTITE RUBBER ORGANIZATION

#### 2.1 Tripartite Members' Economic Profile<sup>3</sup>

##### 2.1.1 Indonesia's Economic Profile

Indonesia has a market economy with most major sectors open for foreign investment. However, the state still plays a substantial role, owning more than 150 companies and administering prices on several basic goods, such as rice, fuel and electricity. It also still regulates those areas of business that are open to foreign investment.

Until the late 1980s, the Indonesian economy relied mostly on the exploitation of its abundant natural resources and agriculture. A restructuring of the economy resulted in a shift of focus to manufacturing industries which aimed at creating more jobs.

During the Asian financial and economic crisis of 1997, the Indonesian economy was among the worst affected. In the years leading to the crisis, Indonesia had enjoyed steady economic growth, averaging almost 7% per year. In 1998, however, Indonesia experienced negative GDP growth of 13.7% and unemployment rose to 15-20%. Economic stability became the priority of subsequent governments. The banking sector was recapitalized as the government undertook a debt restructuring process and improved the oversight of capital markets. As a result, the economy has managed to achieve economic growth averaging 5% yearly since 2000. Real GDP grew by 6.3% in 2007, the fastest rate since the Asian financial crisis of 1997-1998. Structural reforms have led to some progress, but poor infrastructure, unemployment (10.6% of working age population) and poverty rates (17.7%) still relatively high, a complex regulatory environment and corruption hamper investment and growth.

Moreover, the non-bank financial sector, including pension funds and insurance, remains weak. Capital markets are underdeveloped. The high global

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<sup>3</sup> This section was collected from compiling several internet based sources which published related countries' profile. Particular links are provided on references list.



price of oil in 2007 has increased the cost of domestic fuel and electricity subsidies, and has been contributing to concerns about higher food prices.

Since November 2004, the Government of Indonesia have embarked on a course aimed at stimulating growth and foreign investment in order to create employment, alleviate poverty and accelerate economic and social development. This includes an unpopular cut in fuel subsidies aimed at easing budgetary pressure. At the same time, the government has moved to curb the subsequent inflationary reflexes, retaining macro-economic stability through a vigilant monetary policy. It has also embarked on a cautious yet determined anti-corruption campaign, while reforming the judiciary and taxation system and increasing law enforcement.

In coordination with the business community, the government has developed a range of programs to restore confidence in the Indonesian economy and investment climate. Furthermore, the government has announced a policy package for improving the investment climate and is currently busy implementing this. The package aims to streamline investment procedures such as customs and taxes, deregulate labor and synchronizing national with regional regulations. Indonesia's new investment law, passed in March 2007, seeks to address some of the concerns of foreign and domestic investors.

Compared to other countries in the region, Indonesia is not particularly export focused. Some 26% of GDP is derived from trade, with exports mainly in the oil, mining and agricultural sectors, and imports in manufactured goods. The government has revised up their inflation forecast to 11% from only 7% early this year, 2008, due to the increase in world oil prices.

### **2.1.2 Thailand's Economic Profile**

In the 25 years before the South East Asian downturn in 1997, Thailand's economy was transformed from being primarily agro-based to one of the most diverse in the region. Before 1997, the Thai economy had years of export-driven growth—averaging 9.4% for the decade up to 1996. Relatively abundant and inexpensive labor and natural resources, fiscal conservatism, open foreign

investment policies, and encouragement of the private sector underlay the economic success of the era.

However, the 1997 financial crash devastated the Thai economy. The Thai currency, Baht, collapsed, and huge amounts of short-term capital flowed out of the country overnight. The Thai stock market dropped 75% in 1997, and the largest Thai finance company collapsed. The economy slowly recovered thanks in part to an IMF 'rescue package' of almost \$20bn, as well as imposed governmental austerity measures.

Since 1997, there has been consistent push for structural reform, moving away from the raw industry of old, and investing more in education, agriculture, value-added industry, and technology. Though privatization efforts in finance, telecommunications, and energy sectors are evidence of the continued impetus towards liberalism, self-sufficiency has also been a goal of a Thai economy that had become wary of dependence on foreign investment after 1997.

Active promotion of Foreign Direct Investment particularly after 2001, when the Thai Government introduced a dual-track policy aimed at strengthening domestic economic fundamentals and raising the nation's international profile which resulted in the rapid development of an export-orientated industrial capability driven by a quality labor-intensive manufacturing sector producing products such as computer accessories and automotive parts.

Thailand's economy is friendly to enterprise and investment, with a well-developed infrastructure. In recent years, it has pursued many free trade agreements abroad, notably with China, Japan, and the US, indicative of the economy's export-driven character. The Thai market is a magnet for foreign investment and low prices with a high price/earning ratio, combined with a weak dollar and US economic slowdown will likely lead to growth later in the year.

Thailand has a healthy quantity of foreign exchange reserves and a relatively small external debt which are two factors that that help insulate it from external shocks. It has been quick to respond to global changes in economic patterns, and has made steps away from heavy industry and towards value-added services and industry.

With a well-developed infrastructure, a free-enterprise economy, and generally pro-investment policies, Thailand appears to have fully recovered from the 1997-1998 Asian Financial Crises. The country was one of East Asia's best performers from 2002-04. Boosted by strong export growth, the Thai economy grew 4.5% in 2007. Bangkok has pursued preferential trade agreements with a variety of partners in an effort to boost exports and to maintain high growth.

By 2007, the tourism sector had largely recovered from the major 2004 tsunami. Following the military coup in September 2006, investment and consumer confidence stagnated due to the uncertain political climate that lasted through the December 2007 elections. Foreign investor sentiment was further tempered by a 30% reserve requirement on capital inflows instituted in December 2006, and discussion of amending Thailand's rules governing foreign-owned businesses. Economic growth in 2007 was almost entirely due to robust export performance, despite the pressure of an appreciating currency. Exports have performed at record levels, rising nearly 17% in 2006 and 12% in 2007. Export-oriented manufacturing, in particular automobile production, and farm output are driving these gains.

### **2.1.3 Malaysia's Economic Profile**

Malaysia is one of South East Asia's more successful economies. Recent GDP growth has raised per capita income to US\$6,721 in 2007 (close to twice of it in PPP terms), transforming a commodities-based economy into one with a large, export-oriented manufacturing sector. Malaysia's economy has continued to grow robustly since then, most recently by 5.3% in 2005, 5.9% in 2006 and 6.3% in 2007. Nowadays the services sector (rising to nearly 54% of GDP in 2007) is increasingly important; while both commodities (palm oil and rubber) and oil and gas remain substantial sectors and have benefited from record high prices.

Since the Asian financial crisis, Malaysia has made good progress in reforming its banking and financial system. Local banks have been consolidated and there is phased liberalization to allow greater competition. Malaysia has developed its Islamic Finance capability and is now a major hub in the Asia Pacific region. The Government has also progressively dismantled the exchange

and other controls imposed during the Asia Crisis-including abandoning the Ringgit peg to the dollar in July 2005 in favor of a managed float.

In mid-2007 the government announced salary rises for civil service employees and pensioners and has also moved to allow Malaysians to make easier withdrawals for home purchases from their compulsory retirement funds, which should provide a strong boost for the real estate and construction sectors. Another step taken by the government is to cut corporate tax rates by 1% in 2008 and a further 1% in 2009. The budget liberalized the rules governing foreign investment in the property market and eased conditions governing the hiring of highly skilled foreign workers.

On the other hand, the government is facing complaints about its hard decisions on the issue of subsidies. Malaysia's single largest export group, electronics and electrical goods, has shown a decline, but the trade balance for 2007 overall was positive, although down slightly from the same period in 2006. The new development corridors—the Iskandar Development Region (IDR) and the Northern (NCER) and Eastern (ECER) Corridor Economic Regions – are a potential source of growth. Progress on the restructuring of the government-linked companies (GLCs) has also helped to improve the performance of some major players in the economy.

Since 2003, Malaysia has tried to move the economy farther up the value-added production chain by attracting investments in high technology industries, medical technology, and pharmaceuticals. The Government of Malaysia is continuing efforts to boost domestic demand to wean the economy off of its dependence on exports. Nevertheless, exports - particularly of electronics - remain a significant driver of the economy. As an oil and gas exporter, Malaysia has profited from higher world energy prices, although the rising cost of domestic gasoline and diesel fuel forced Kuala Lumpur to reduce government subsidies. In addition, healthy foreign exchange reserves and a small external debt greatly reduce the risk that Malaysia will experience a financial crisis over the near term similar to the one in 1997.

## **2.2 Tripartite Members' Natural Rubber Profile**

### **2.2.1 Indonesia's Natural Rubber Profile**

In Indonesia, production of rubber is dominated by smallholdings. Production of rubber estates currently accounts for only 20% of total production. There are around 418 estates cultivating rubber spreading in 19 provinces. Most of the estates are located in North Sumatra, South Sumatra, Riau and Java.

In 2006, natural rubber (NR) production in Indonesia reached 2,637 million tons, an increase of 6.16 % over 2005. The volume of NR export was 2,287 million tons, which also shows an increase of 12.94% as compared to 2005. (Most of) Indonesia's NR production comprises Technically Specified Rubber known as Standard Indonesian Rubber (SIR), Ribbed Smoked Sheets (RSS) and the concentrated latex at the volume of 2,182,133 tons, 391,692 tons and 63,605 tons respectively.

There were 123 rubber processors, exporters and 24 traders in July 2007. Raw materials produced by the smallholders in the form of lumps are mostly for SIR-20 accounting for more than 83% of the total export. The other products were RSS (15%), concentrated latex and other types of NR (2%). SIR-20 is still the most highly demanded product compared to the others.

In 2006, 86.71% of total production was exported to the major consumers such as United States, Japan, Singapore, China, Canada, South Korea, Germany and others. The rest was consumed by domestic market. Export of NR in 2007 is estimated at 2.379 million tons, an increase of 4%.

#### **2.2.1.1 Programs and Plans Implemented**

The Government of Indonesia has implemented financial assistance for new planting and replanting which is in line with the policy of Estate Crops Revitalization Program. Under the scheme, the farmers will be supported by credit with interest rate of 10%. The government subsidized the difference between the market interest rate and the interest rate applied to the smallholders.

Two of the focuses of the government are to continue the quality improvement at the farm level and to meet the requirements of the consumers.

Moreover, good quality rubber may improve transparency in trading which in turn will give a better bargaining position to farmers while facilitating a reasonable price in accordance to the improved product quality.

For the development of rubber industries, the program include strategies to increase local consumption and diversification of downstream products, especially tire, transmission and conveyor belts, glove, and industrial rubber products. In order that the large global demand of NR can be fulfilled until 2010, Government of Indonesia has decided to facilitate the development scheme of replanting program of 50,000 ha and new planting program of 10,000 ha annually starting in 2007 as part of the Government of Indonesia national policy on agriculture revitalization. Up till now, neither replanting cess nor the export duty is applied by the government, except tax and local government retribution.

#### **2.2.1.2 Key Developments in NR Processing, NR Marketing and Downstream Rubber Goods Manufacturing**

Prices of all grades surged across-the-board in the first three quarters of 2007. The price of SIR 20 increased Rp 1,355/kg or 7.5% to Rp 19,397 /kg on 2007 from Rp 18,042/kg on the last trading day of 2006. The long term objectives of the NR industry are to make it more efficient, to generate reliable income for producers, and to ensure fair and remunerative rubber price to support about 1.4 millions households.

As the national policy for rubber industries in Indonesia is an integrated one, which involves many sectors from upstream to downstream including on farm, marketing sector, and supporting services, the policy shall also consider the market development according to international supply and demand balance. Therefore, if their programs are well applied, they will not only support sustainable rubber industries, but also ensure stable balance in supply and demand with a view to achieve a fair and remunerative price, so that both producers and consumers can get optimum benefit from rubber industry.

Domestic downstream rubber industry is continuously developing. Currently, Indonesia has several types of rubber based products, namely: tires and inner-tires, latex goods, industrial rubber goods, general rubber goods and

footwear. In addition, the total production of tire for cars and commercial vehicles in 2006 was 47,335 thousand units which showed an increase of 0.55% from that of in 2005 i.e. 47,074 thousand units, and in 2007 is increase 7.26% or 50,774 thousand units. Indonesia's export value of rubber products were US\$774.9 million (2004), US\$951.2 million (2005), and US\$1,144.9 million (2006). This indicated an average growth of 33.08% during that period. Indonesia has also proposed special facilities for some of its leading industries, particularly market access, as unanimously stated in free trade agreement (FTA) between ASEAN-China and ASEAN-Korea, and bilateral FTA with Japan (Indonesian-Japan Economic Partnership/IJ-EPA).

### **2.2.1.3 Constraints and Challenges Identified for Expanding Area and Improving Productivity in the Future**

As the second largest producer of natural rubber, Indonesia does not have any constraint on the expansion of rubber plantation. The government program on improving productivity is mainly focused on replanting the damage and senile rubber plantation belong to farmers. It is reported that a replanting program of approximately 10,000 ha per year for supply until 2020 and new planting program of approximately 50,000 ha, have been planned nationally by the government. Nevertheless, there are still constraints and challenges as follows.

- a. The natural rubber plantation in Indonesia is mainly owned and managed by small scale or smallholders as the owner and the labor of the plantation. The rubber plantation is managed as a family business with less hired labor. Considering the important role of NR smallholders in the development of NR industry of Indonesia, the Government of Indonesia has launched various projects and schemes to improve productivity as well as the income of the rubber farmers.
- b. Three main challenges faced in improving productivity are preference to other crop over rubber, fund availability to support the replanting program and inadequacy of infrastructure extension.
- c. During the last few years, the price of crude palm oil is very much 'attractive' for not only other crops but also rubber farmers although in

terms of the commodity prices, the price of NR is still higher than other crops. However, compared to the palm oil, especially with the rapid growth of global demand for food stock and renewable energy, the NR price is less attractive and has led farmers to shift from planting rubber to palm oil. Financial support is another challenge for improving smallholders' productivity. In spite of the government policy to provide soft small scale credit, its availability is less than the needy.

- d. In addition, the extension services for the rubber farmers have become a problem for years because of the limitation of extension infrastructure. Recently, with the assistance of the World Bank, the extension service has been revitalized by improving methodology, increasing capacity of physical infrastructure as well as the human resources.

#### **2.2.1.4 Strength and Opportunities for Expanding Area and Improving Productivity in the Future**

In order that good performance of rubber plantation with high latex and also high timber production can be achieved, Indonesia through its Research Centre continuously provide high yielding clones, including the latest clone which is released by Ministry of Agriculture in 2007, IRR 112. Currently, with other previous high yielding clones (latex, latex-timber, timber clones) were recommended and dominated all bud-wood gardens, replanting and new planting.

Furthermore, the government has been implementing subsidized loans for rubber plantations through a revitalization program since the beginning of 2007. The program is aimed to develop smallholder rubber plantation through replanting and new planting program.

As a member of ITRC, there is a need to ensure that the adoption and implementation of both mechanism i.e. Agreed Export Tonnage Scheme (AETS) and Supply Management Scheme (SMS) are in operation due to maintain the price level which gives good remunerative for the farmers and fair for the consumers. Recently the price of natural rubber on farm level has encouraged the smallholders and other rubber planters to expand planting area and improve the existing plantation through the replanting program.



### 2.2.1.5 Strategies and Plans for the Future

The Government of Indonesia has come up with a comprehensive National Strategy for Rubber Industry Development of the following:

- a. Basic Principle, i.e. high value added finished products, foreign exchange received, direct investment and job opportunity for rubber products industries; optimizing and increasing production capacity for the existing industry; creating product diversification; and developing of industrial supports, such as: raw materials availability, energy, infrastructures and machinery and equipment industry.
- b. Development Strategy, i.e. increasing productivity and natural rubber quality; developing rubber goods for export and import substitution; and promoting investment for high value added rubber goods and automotives parts industry.
- c. Government of Indonesia has considered Rubber Association of Indonesia's proposal on new investment in crumb processing. Therefore, it is recommended that Ministry of Agriculture could provide the raw material due to the current excess of 600,000 tons installed capacity over raw material.
- d. Government of Indonesia has developed bud-wood gardens in 16 major rubber producing provinces amounted more than 900 ha for the last 10 years and will be continued with bud-wood village gardens managed by smallholders to provide high yielding clones for replanting and new planting program.
- e. To accelerate smallholder's estate crops development through expansion, replanting and new planting activities by conducting the NR revitalization. It will be completed in 2010.
- f. To continue the quality improvement of smallholder rubber products.
- g. To increase a better bargaining position of farmers while facilitating a reasonable price in accordance to the improved product quality.
- h. The national policy for rubber industries in Indonesia is an integrated one, which involves many sectors from upstream to downstream including on-farm activities, processing, marketing sector, and supporting services.

- i. The policy shall also consider the market development according to international supply and demand balance.
- j. To implement Indonesia National Standard (SNI) or NR quality for rubber processing and implementing International Standard System and Environment Management System International Standard (ISO 9000 and ISO 14000).
- k. To increase local consumption by encouraging diversification of rubber-based industries and to develop the quality of downstream rubber products for both domestic and export markets.
- l. To empower the smallholder institution through establishment of farmer cooperative in order to improve their quality and bargaining position.
- m. To improve the accessibility of farmers to partnership system of production in processing and marketing.

#### **2.2.2 Thailand's Natural Rubber Profile**

The southern part of Thailand has a monsoon climate, which is highly conducive to rubber tree cultivation. This climate helps Thailand's rubber farmers achieve high yields, roughly 1.76 tons of rubber per hectare, and has allowed Thailand to lead the world in natural rubber production since 1991.

In 2006, Thailand's NR production reached 3.137 million tons, an increase of 6.8% over 2005. The volume of NR export was 2.771 million tons, which also shows an increase of 5.3% as compared to 2005. Thailand's NR production consists mainly of Technically Specified Rubbers (TSR) or Standard Thai Rubber (STR), Ribbed Smoked Sheets (RSS) and the concentrated latex. The 2006 production was comprised of 1,192,055 tons of STR, 1,035,206 tons of RSS, 721,505 tons of latex concentrates and 185,088 tons of other types of rubber. STR, RSS, concentrated latex and other types of rubber constituted 38%, 33%, 23% and 6% respectively of the total output in 2006.

There are 348 rubber processing factories in operation, 339 rubber exporters and 1,953 rubber dealers in 2006. Rubber smallholders in Thailand contributed 95% in term of total rubber planted area and 90% of total rubber production. Raw materials produced by the smallholders consist mostly of rubber

sheets (USS and RSS) which constitute approximately 55% of total rubber output in the country and about 23% are in the form of field latex and the remaining 22% in the forms of cup lumps and other types of raw materials.

Approximately 89% of the total NR production was exported to over 66 countries worldwide. Among those countries, China was the largest importer followed by Japan, Malaysia, the US, South Korea and the E.U. In 2006, the share of NR exports to China, Japan, Malaysia, the U.S, South Korea and the E.U was 27%, 18%, 16%, 7%, 6% and 9% respectively.

For the domestic rubber market, at present there are three central rubber markets located in the Southern part of Thailand, Hat Yai, Suratthani and Nakorn Srithammarat. These Central Rubber Markets (CRM) are now trading 4 types of rubber, namely, the Ribbed Smoked Sheets (RSS), Unsmoked Sheets (USS), Air Dried sheets (ADS) and the field latex. In 2006 the volume of rubber traded at the three Central Rubber Markets was 114,921 tons or 3.7% of the total production. Although the volume of rubber traded through the Central Rubber Markets was so small, the CRM has played a significant role in providing price discovery to the farmers with transparency and price reference for the overall local markets especially in the new planting areas in the Northeast. Rubber dealers and smallholders in this region refer to CRM prices when making deals.

The Agricultural Futures Exchange of Thailand (AFET) was established in May 2004. Compared with other futures market, the volume of RSS3 traded in AFET is still small. The volumes of RSS3 traded in AFET from 2004 up to 2006 were 14,890 contracts, 59,366 contracts and 82,048 contracts respectively.

#### **2.2.2.1 Programs and Plans Implemented**

The Thai Government has implemented the sponsored project of developing 160,000 hectares of new planting in the non-traditional area (North and Northeast region) during 2004-2006. Under the scheme, the government supplies farmers with only planting materials, but smallholders can apply for soft loan from the government bank for their investment.

Rubber replanting program has been implemented in Thailand since 1961. Up to present, a total of 1.436 million hectare has been replanted with new rubber

clones. Smallholders will be provided with subsidies for replanting their rubber holdings both in cash and in kind worth 56,250 baht (about US\$1,640) per hectare during the immature period (6.5 years). Replanting rubber with other crops will also get the same amount of subsidy.

For exporters, they can apply for packing credit from the bank for export assistance. The interest rate for this kind of credit is lower than the usual loan rate. Thailand collects replanting cess from rubber export at the rate of 1.40 baht (4 US cent) at present. There is no other export duty except the replanting cess.

#### **2.2.2.2 Strategies and Plans for Future**

The Ministry of Agriculture and Cooperatives has come up with a comprehensive Roadmap for Rubber Industry Development for the period of 2006-2008. Below are some of the plans and strategies to be implemented:

- a. To establish 4 new Central Rubber Markets, one markets each in the South and the East (Yala and Rayong province) and 2 markets in the Northeast region (Buriram and Nong Kai province).
- b. To set up the single market system for all the three central rubber markets in the 3 provinces in the South.
- c. To set up 30 network markets of the Central rubber markets in the 7 provinces in the South. (The three strategies above are in regard with marketing)
- d. To promote and encourage smallholders to produce appropriate raw materials for STR processing.
- e. To promote and encourage smallholder-cooperatives to produce bale RSS. (The two strategies above are in regard with processing)
- f. To set up central testing laboratories for tires and gloves.
- g. To help improve processing technology in small and medium enterprises (SME) sector.
- h. To promote and stimulate demand for rubber products such as those from the government procurement. (The three strategies above are in regard with downstream strategies)

### **2.2.3 Malaysia's Natural Rubber Profile**

Malaysia had been the largest natural rubber producing country for most of the 20<sup>th</sup> century, until it was relegated to third position in the early 1990s. Back in the mid-1970s, Malaysia accounted for almost half of the world's natural rubber output. Following the steady decline in production since the second half of the 1980s, its share dropped to 11.5% in 1999. It has been argued that as the Malaysian economy advanced, the cost of opportunity of producing natural rubber increased. Higher wages in the city attracted workers, which made labor scarce as well as land and capital relatively expensive for NR production.

Rubber production in Malaysia is dominated by the smallholding sector which accounts for 96% of total rubber planted area and contributes 95% of the total natural rubber production. Approximately 80% of the rubber produced by the smallholders is in the form of cup-lumps, which are sold to the dealers who then pass on to the processors for processing into Technically Specified Rubber (TSR), predominantly Standard Malaysian Rubber (SMR). The remaining 20% of the output is collected as field latex for direct sale to latex concentrate processing factories.

SMR, therefore, formed the bulk of NR processed in Malaysia in 2006, accounting for more than 80% of the total, the greater part of the balance being latex concentrate, with a small proportion of other higher SMR grades and ribbed smoke sheet. All of the SMR grades have shown some increase in production except SMR L where there was a marginal decrease.

#### **2.2.3.1 Programs and Plans Implemented**

Malaysia continued to focus in improving and maintaining high performance standard of the processing sector in order to strengthen Malaysia's position to meet with more stringent consumers' demand for quality and reliability of NR supplies. A new element in domestic processing is the emphasis on making Malaysia's rubber industry environmentally friendly.

Replanting is the main thrust of strategies to promote development of the rubber smallholding sector to increase smallholders' income. A systematic

replanting program is already in place to ensure that all smallholdings with old and uneconomic rubber will be replanted with high yielding rubber clones.

Smallholders are encouraged to diversify their farming activities, concentrating on integrating on-farm rubber and off-farm alternatives, mainly food production to supplement their incomes.

In view of the expected conversion of rubber area to other economic land uses, there is a need to increase both land and labor productivity to compensate for the decline in hectareage. Therefore, the rubber smallholders are encouraged to plant with high yielding clones such as Latex Timber Clones of RRIM 2000 series or other advanced planting materials as well as to adopt the best available agronomic practices.

The Malaysian government imposes a cess of 13.92 cent/kg (US 3.98 cents/kg) on all rubber produced in Peninsular Malaysia, comprising of 4.00 cent/kg (US 1.14 cents/kg) of Research and Development Cess and of 9.92 cent/kg (US 2.84 cents/kg) of Replanting Cess.

Replanting cess is channeled to Rubber Industry Smallholders Development Authority (RISDA) into a replanting fund, which is employed to finance, in the form of replanting grant and material inputs, to smallholders at different stages of replanting during the immature period.

No other forms of financial assistance are given for new planting or replanting. Nevertheless, support and extension services unit of government's agencies continue to provide technical know-how to the smallholders to enhance their efficiency and improve the agronomic practices of the smallholdings farming.

### **2.2.3.2 Key Developments in NR Processing, NR Marketing and Downstream Rubber Goods Manufacturing**

Prices of all grades surged across-the-board in the first three quarters of 2007. The price of SMR 20 increased 147 cent/kg or 23.4% to 775.50 cent/kg on 24 October 2007 from 628.50 cent/kg on the last trading day of 2006.

Strong consumer demand particularly from China causes tight supply due to unusual wet weather and flood in three major producing countries contributing

to the positive development in the global rubber market. Active rubber futures market and surge in crude oil prices have further enhanced market sentiment.

The present basic customs (import) duties for the six products are:

a.	TSR	0%
b.	RSS	0%
c.	Latex	0%
d.	Other NR forms	0%
e.	New pneumatic tires of truck	30%
f.	Synthetic rubber (SBR)	
	Latex	0%
	in primary forms	0%
	not in primary forms	25%

Malaysia's preferential import duty for each FTA (2007) for the above six products are:

		ASEAN- China FTA	ASEAN- Korea FTA	Malaysia- Japan FTA
a.	TSR	0%	0%	0%
b.	RSS	0%	0%	0%
c.	Latex	0%	0%	0%
d.	Other NR forms	0%	0%	0%
e.	New pneumatic tires of truck	12%	30%	27.27%
f.	Synthetic rubber (SBR):	0%	0%	0%
	in primary forms	0%	0%	0%
	not in primary forms	12%	13%	18.75%

Source: Malaysian Rubber Board, 2007.

### **2.2.3.3 Constraints and Challenges Identified for Expanding Area and Improving Productivity in the Future**

The main constraints of the rubber industry are:

- a. Large number of smallholders (more than 250,000 families) with an average size of about 2.3 hectare scattered all over the country.
- b. Relatively low adoption of latest technologies and agronomic practice owing to preference to achieving short-term gains, financial constraint, and lack of proper skills and technical know-how.
- c. Age of the rubber smallholders is also another factor that slowdown the technology transfer and productivity growth. The average age of smallholders/land owners is 53 years old in 2006 though is slightly younger than the average age of 55.8 years old in 2002 (RISDA's census 2002).

### **2.2.3.4 Strength and Opportunities for Expanding Area and Improving Productivity in the Future**

The government of Malaysia has conducted the replanting program of at least 20,000 ha of rubber to rubber with high yielding timber-latex clones and the wider adoption of Low Intensity Tapping Systems (LITS), i.e. ethephon for young trees less than 15 years old and gaseous stimulation for mature trees above of 15 years to address the issue of shortage of rubber tappers. In addition, it has also conducted a continuously research of producing rubber tress that would yield more latex and timber. The above measures will increase land productivity and offset the declining planted area to ensure that production of natural rubber will be at least maintained at the current level.

### **2.2.3.5 Strategies and Plans for the Future**

The future strategies which are conducted by the Government of Malaysia are as follows.

- a. To continue the policy of active promotion of low intensity tapping system (LITS) to address the issue of labor shortage.



- b. To further improve productivity and income through consolidation, exploitation and clone breeding to ensure sustainability of this sector as well as rubber industry as a whole.
- c. To modernize the upstream sector for ensuring the rubber industry to remains attractive in terms of income to the smallholders.
- d. To continue diversify the downstream sector into other high-value dry rubber products, especially industrial rubber goods and general rubber goods.

### **2.3 The International Tripartite Rubber Organization (ITRO)**

#### **2.3.1 The Establishment of ITRO**

The existing rubber organization prior to the ITRO was International Natural Rubber Organization (INRO) which was established in 1979. The objective of INRO was to stabilize the prices on the international market for natural rubber to around the medium and long term market trend, as a contribution to balanced growth of supply and demand (UNCTAD, 2005). The stabilization was done under guidance of the International Natural Rubber Agreement (INRA) through buffer stock operation. This operation is conducted by buying the natural rubber when the international price is lower than the reference price, or selling the natural rubber when the international price is higher than reference price. The reference price was fixed on INRA in 1995 in Malaysia Ringgit or Singapore Dollar.

The termination of INRA started from the different interest on natural rubber price between exporting and importing countries. The adjustment procedure has been made more and more automatically to avoid political discussions on a desired price development. It has to be pointed out that the natural rubber exporting countries were never really happy with the concept of "just following the market trend." They were in favor of some room for directing the market process. The importing countries on the other hand considered this concept in conformity with the market development as the only possible way for

bringing more stability to the market. This difference in view has finally led to the termination of the Agreement (Rubber-stichting, 1999).

In 1998 the exporting Member Countries of INRO asked for an autonomous increase of the reference price with 5% in relation to the economic/currency crisis in South-East Asia. As this proposal was against the prevailing market trend it was rejected for fundamental reasons by the importing Member Countries. However, there was some sympathy for the proposal by the importing countries for changing the basket of currencies in which the reference price was expressed to a single currency, namely the Singapore Dollar. This change would have had an implicit effect on a substantial increase of the reference price. For fundamental reasons this proposal could not be accepted by the exporting members. In this situation Indonesia, Malaysia and Thailand decided to withdraw from INRO. Considering this the Council of INRO decided in December 1999 to liquidate the organization.

Because the INRO was dispersed, psychologically the price of natural rubber in international markets dropped and the decrease continued up until 2001 and reached the lowest point of \$US 0.46/kg (Ministry of Trade, 2006). The low price, not only impacts on the performance of natural rubber export, but also impacts the farmer's welfare. An effort to increase the price of natural rubber on the international market would be needed to increase the welfare of the farmers.

In order that the situation above might be overcome, the three big rubber producing countries made an agreement in tripartite cooperation. Thailand, Indonesia and Malaysia, pledged work collectively to ensure fair income for small rubber producer of the three countries (Ministry of Trade, 2006). The ministers from these three countries conducted the Joint Ministerial Declaration (Bali Declaration) on December 12<sup>th</sup>, 2001 to establish the ITRO, to be the framework through which the three major rubber producing countries will cooperate to address the problem of oversupply and low rubber prices, with the aim of restoring the rubber industry to an economically viable and stable industry in the interest of the producer and consumer. The objectives of ITRO (Ministry of Trade, 2006) are:

- a. To revive natural rubber prices to levels which are remunerative to the producers;
- b. To manage the imbalance in supply over demand of which has largely resulted in the depressed price.

As the initial stage, the members agreed to make the natural rubber supply measures, i.e. the Supply Management Scheme (SMS) and the Agreed Export Tonnage Scheme (AETS), to ensure that the above objectives and targets are attained (Ministry of Trade, 2006). Supply Management Scheme (SMS) has the objective of controlling rubber production. The procedures of the reduction are as follows.

- a. Revitalizing non productive rubber trees;
- b. Limiting the opening of new plantation areas;
- c. Converting some rubber plantation to the others plantations such as crude palm (diversifying the rubber plantation).

Firstly, the three members agreed to reduce the rubber production of 4% per year for two years (2002–2003) through SMS mechanism which counted average production for last four years (1997–2000). Another mechanism, the Agreed Export Tonnage Scheme (AETS), is aimed to control the quantity of exported rubber. The three members agreed to reduce the export of 10% per year starting in January 2002 and counted base as net export realization for 1997 – 2000.

The mechanisms for implementation and coordination are:

- a. Each country set up a National Tripartite Rubber Corporation (NTRC) as a subsidiary organ of ITRO to implement and monitor the AETS in each country. In Indonesia the government has appointed The Indonesian Association of Rubber Producers (GAPKINDO) as NTRC through ministerial decree 58/MPP/Kep/1/2002 on January 31<sup>st</sup>, 2002;
- b. The three countries will jointly establish an International Tripartite Rubber Council (ITRC) as the highest governing body of the ITRO to oversee and coordinate implementation of the SMS and AETS to ensure that the targets and objectives are attained.

Besides overseeing and coordinating the implementation of the SMS and AETS, ITRC also has to decide and determine the price level for the implementation of AETS.

### 2.3.2 The Establishment of International Rubber Consortium (IRCo)

In line with the establishment of ITRO, on August 8<sup>th</sup>, 2002, the tripartite countries met again in Bali to sign the Memorandum of Understanding (MoU) on setting up of the International Rubber Consortium Limited (IRCo) to carry out Strategic Market Operation (SMO) which complement the above two schemes SMS and AETS. Shareholder agreement of IRCo establishment was gained on October 6<sup>th</sup>, 2003 in Bali (UNCTAD, 2005) and IRCo was officially registered on April 28<sup>th</sup>, 2004. Based on the MoU, which was agreed by the three members, this cooperation was named with "International Rubber Consortium Limited" (IRCo).

The headquarters of IRCo is located in Bangkok, Thailand. Thus, respecting the establishment and operation of IRCo, it will be managed by the rules of Thailand. In terms of start - up capital, it has been agreed by the three members that the paid up of the capital was US\$ 4.5 million. Furthermore, according the MoU, the members should invest for the asset with the comparison of 2 : 1.5 : 1 for Thailand: Indonesia: Malaysia.

The objectives of IRCo are:

- a. To achieve a long term price trend that is stabilized, sustainable and remunerative to the farmers;
- b. To maintain a supply-demand balance to ensure adequate supply of Natural Rubber in the market at fair prices.

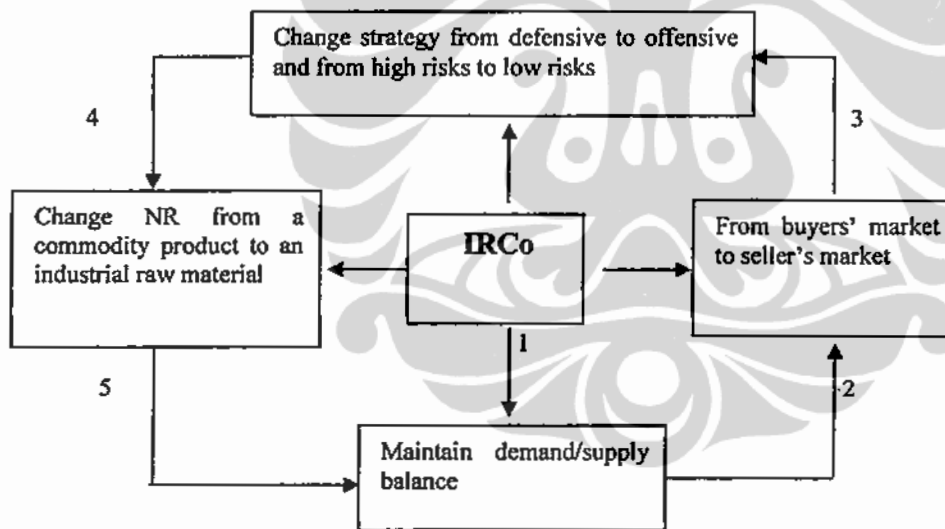
If ITRC has the measures such as the SMS and AETS, IRCo has the measure of Strategic Market Operation (SMO) which has the reference price of natural rubber of US\$ 1.10/kg (Ministry of Trade, 2005). Whenever the natural rubber price decreases to US\$ 1.10/kg, then IRCo members agreed to impose the mechanism of SMS and AETS. If this is not successful in increasing the price of natural rubber to higher than US\$ 1.10/kg, the Board of Directors of IRCo should buy the natural rubber to overcome this problem. On the other hand, when the

price of natural is high, the IRCo should sell or release the natural rubber on to the market.

### 2.3.3 IRCo's Strategic Framework

In order that IRCo can immediately get down to review, formulate and implement its strategies, all the requirements above should be properly put in place. Strategies might have to be revised from time to time in order to fit with the changing situation. IRCo proposes the following Strategic Framework:

- a. Maintaining demand/ supply balance;
- b. Changing from buyers' market to sellers' market;
- c. Changing strategy from defensive to offensive and from high risks to low risks;
- d. Changing NR from a commodity product to an industrial raw material.



**Figure 2.1. The Strategic Framework of IRCo**

Source: D.G. ITC, Ministry of Trade

## CHAPTER 3 LITERATURE STUDY

### 3.1 Oligopoly and International Trade

Oligopoly is a market in which only a few firms compete with one another, and entry by new firms is impeded (Pyndyck and Rubinfeld, 2005, p.435)<sup>4</sup>. Furthermore, in oligopolistic markets, the products may or may not be differentiated. Thus, the only matter is that only a few firms account for most or all of total production. Global oligopoly can occur if substantial scale economies internal to each firm give large firms a cost advantage over any smaller rival firms (Pugel, 2007, p.100).

In an oligopolistic market, each firm knows that any action that it takes (i.e. lowering its price, increasing its advertising or introducing a new product) is likely to provoke reactions from its rivals. The interdependence among oligopoly firms thus can be considered as a game. The outcome of the game depends on which strategy each firm chooses. The best outcome for both firms together is usually for both to restrain their competition, in which case they both earn substantial economic profits. Nevertheless, if they can not cooperate with each other, then the play of the game may result in both competing aggressively.

If one firm decides to restrain its competition, the other firm often can earn even higher profits by competing aggressively to gain a large market share. In this regard, the first firm may suffer losses rather than earn profits. Since both of them know that the other is likely to act in this way, so neither is willing to restrain its competition. Both firms compete aggressively and earn low profits. They are caught in what so called "a prisoners' dilemma"<sup>5</sup>.

The firms can attempt to find a way out of the dilemma by cooperating to restrain their competition. If they can, then they both earn substantial profits; rather than both earning low profits. The cooperation might be tacit or implicit,

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<sup>4</sup> Oligopoly can be defined domestically or internationally; moreover, it might form as company or countries. In the context of this thesis of which it has a topic of oligopoly in the form of countries, the explanation of firms is considered as countries.

<sup>5</sup> The prisoners' dilemma is a classic example in game theory, in which two prisoners must decide separately whether to confess to a crime; if a prisoner confesses, he will receive a lighter sentence and his accomplice will receive a higher one, but if neither confesses, sentences will be lighter than if both confess.

based on recognition of mutual interests and patterns of behavior established over time. However, even if the firms can somehow agree to cooperate, the cooperation is always in danger of breaking down. Each firm has an incentive to try to gain even more profit by "cheating" on the agreement.

Consequently, in reality, the application of game theory to oligopoly has its limit but it thus highlight that cooperating with rivals is possible (though not assured) in an oligopoly. Firms in an oligopoly can earn economic profits and these can be substantial if competition is restrained.

In regard to the pattern of trade for a product produced by a global oligopoly, if substantial scale economies exist, production tends to be concentrated in a few countries in order to take advantage of the scale economies. These countries will then tend to be net exporters of the product, while other countries are importers.

Firms initially chose these production locations for a number of reasons. One of those, presumably, was that comparative advantage indicated low-cost production with access to required factor inputs at these locations. Once the production locations are chosen and high-volume production achieves scale economies in these locations, the pattern of production and trade can persist even if other countries could potentially produce the good more cheaply.

Given established production at other locations, production may not develop at a potentially lower-cost location. The reason is that the production level at this new location would have to be large enough to gain the cost benefits of the scale economies which mean that the new producers must gain a large share of the market. This may not be possible without an extended period of losses for the entrant due to the increase in supply lowers prices and establishing firms in other locations may fight the entrant using other competitive reaction. Therefore, given the risk of substantial losses, production in this lower cost location may fail to develop.

Regarding to the national location or ownership of a global oligopoly, national well-being might be a matter to be considered, especially if the oligopoly firms earn economic profits on their export sales (i.e. arisen from the ability to charge high export prices to foreign buyers) and thus enhance the country's term

of trade. In conclusion, the national gain from having high-profit oligopoly firms in a country is the basis for national government to use various policies to influence location decisions to favor domestic production.

### 3.1.1 Collusive Oligopoly: The Cartel Theory

Cartel is a market in which some or all firms explicitly collude, coordinating price and output levels to maximize joint profits (Pyndyck and Rubinfeld, 2005, p.436). A cartel therefore may seem like a pure monopoly due to the firms in a cartel appear to operate as though they were parts of one big company. Nevertheless, a cartel differs from a monopoly in two important respects. First, cartels rarely control the entire market, so therefore they must consider how their pricing decisions will affect non-cartel production levels. Second, because the members of a cartel are not part of one big company, they might be tempted to “cheat” their partners by undercutting prices and grabbing bigger shares of the market<sup>6</sup>.

In practice, cartels are often defined internationally. The Organization of Petroleum Exporting Countries (OPEC) and the International Bauxite Association (IBA) are examples of international cartel which have succeeded in raising world oil and bauxite prices above competitive levels. Nonetheless, most international cartels dealing with other commodity, e.g. copper, tin, coffee and cocoa, have failed to raise prices.

Regarding to that, there are two conditions for cartel success. First, a stable cartel organization must be formed in which members agree on price and production levels and then adhere to that agreement. However, agreeing is not easy. Different members may have different costs, different assessments of market demand and even different objectives. They may therefore want to set price at different levels. Furthermore, each member of the cartel will be tempted to “cheat” by lowering its price slightly to capture larger market share than it was allotted. Most often, only the threat of a long-term return to competitive prices deters cheating of this sort. Nevertheless, if the profits from cartelization are large enough, that threat may be sufficient.

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<sup>6</sup> This has resulted that many cartels tend to be unstable and short-lived.



The second condition is the potential of monopoly power. It implies that even if a cartel can solve its organizational problems, there will be little room to raise price if it faces a highly elastic demand curve. Potential monopoly power might be the most important condition for success; if the potential gains from cooperation are large, cartels members will have more incentive to solve their organizational problems.

In the analysis of cartel pricing, a cartel usually accounts for only a portion of total production and must take into account the supply response of competitive (non-cartel) producers when it sets price. Figure 3.1. below illustrates the case of OPEC on cartel pricing. Total Demand  $TD$  is the total world demand curve for crude oil and  $S_c$  is the competitive (non-OPEC) supply curve. The demand for OPEC oil  $D_{OPEC}$  is the difference between total demand and competitive supply, and  $MR_{OPEC}$  is the corresponding marginal revenue curve.  $MC_{OPEC}$  is OPEC's marginal cost curve (OPEC has much lower production costs than non-OPEC producers). OPEC's marginal revenue and marginal cost are equal at quantity  $Q_{OPEC}$ , which is the quantity that OPEC will produce. From the OPEC's demand curve, the price will be  $P^*$ , at which competitive supply is  $Q_c$ .

Suppose petroleum-exporting countries had not formed a cartel but had instead produced competitively. Price would then have equaled marginal cost. The competitive price is therefore determined from the point OPEC's demand curve intersects its marginal cost curve,  $P_c$ . Thus,  $P_c$  is much lower than the cartel price,  $P^*$ . Because both total demand and non-OPEC supply are inelastic, the demand for OPEC oil is also fairly inelastic; therefore, the cartel has substantial monopoly power.

The total demand and non-OPEC supply curves in figure 3.1. apply to a short-or intermediate-run analysis. In the long run, both demand and supply will be much more elastic, which means that OPEC's demand curve will also be much more elastic. It is expected that in the long run OPEC would be unable to maintain a price that is so much above the competition level.

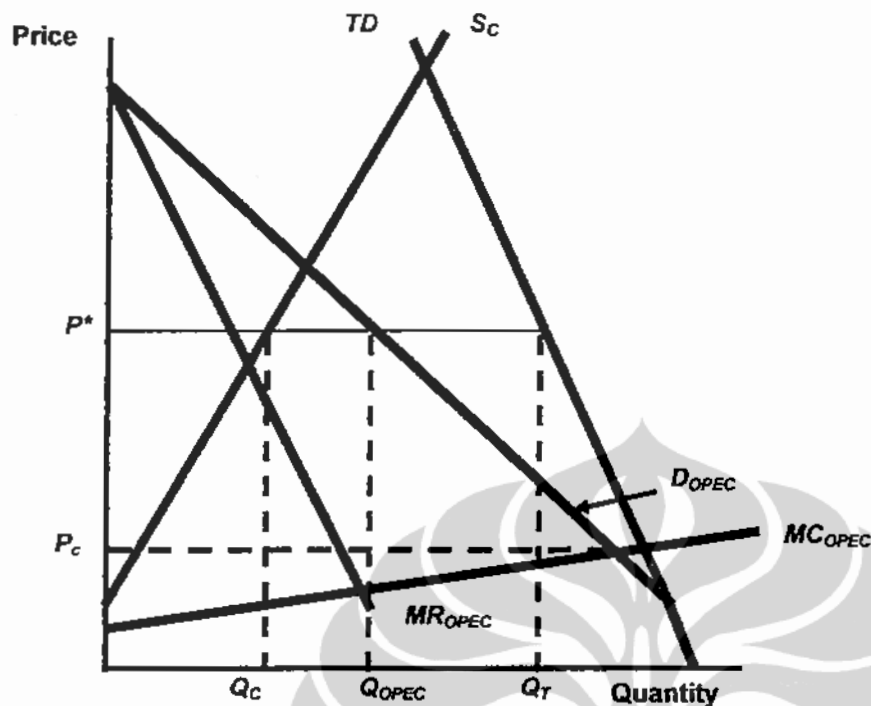


Figure 3.1. The OPEC Oil Cartel

Source: Pindyck and Rubinfeld, 2005

### 3.1.2 Evidence on International Cartel: The Organization of Petroleum Exporting Countries (OPEC)

The OPEC was created by a treaty among five countries, i.e. Iran, Iraq, Kuwait, Saudi Arabia and Venezuela, in Baghdad in 1960. Since that time, the following countries joined: Qatar (1961), Indonesia and Libya (1962), United Arab Emirates (1967), Algeria (1969) and Nigeria (1971). Ecuador and Gabon joined in 1973 and withdrew in 1992 and 1995, respectively.

History records that the greatest seizure of monopoly power in world history was the price-raising triumph of the OPEC in 1973-1974 and again in 1979-1980 (Pugel, 2007, p.305). A chain of events in late 1973 revolutionized the world oil economy. In a few months' time, the 13 members of OPEC effectively quadrupled the dollar price of crude oil, from \$2.59 to \$11.65 a barrel. Oil-exporting countries became rich almost overnight. The industrial oil-consuming countries sank into their deepest depression since the 1930s. The relative price of

oil (what the price of a barrel of oil could buy in terms of manufactured exports from industrial nations) tripled.

The sequel was a plateau of OPEC prosperity, a further jump and finally growing signs of weakness. From 1974-1978, the relative price of oil dipped by about a sixth, but stayed much higher than it had been at any time before 1973. Next, the second "oil-shock" came in 1979-1980. Led by the Iranian Revolution and growing panic among oil buyers, the relative oil price increased more than doubled. In the mid-1980s, however, OPEC weakened. The relative price of oil dropped suddenly in late 1985, from four to five times the old (pre-1973) real price in 1980-1984 to less than two times the old price for 1986-1989.

The "oil-shock" in 1973-1974 and 1979-1980 were not the result of a failure of supply or exhaustion of earth's available resources. The world's "proved reserves" of known and usable oil have grown even faster than world oil consumption. Nor were the costs of oil extraction raising much. The oil price jumps were human made. The key was that world demand was growing faster than non-OPEC supplies. Postwar oil discoveries have been very unevenly distributed among countries. The share of OPEC countries in world crude oil production rose to over 50% by 1972. Furthermore, OPEC's share of proved reserves was over two-thirds.

During that period, the United States was for the first time becoming vulnerable to pressure from oil-exporting country due to its reliance on oil imports. Consequently, the two factors above, i.e. the OPEC countries growing importance in world production and the growing U.S. reliance on oil imports, had made the oil price increase in 1973 and 1979.

### **3.1.3 The Limits of Cartel Power**

In line with the "rules" that is required for a cartel to be effective, theoretically there are some rules which are:

- a. The higher the marginal cost of production, the higher the price.
- b. The higher the elasticity of demand, the lower the price. If demand is elastic, buyers easily to find other ways of spending their money if the product rises much.

- c. The larger the share of world production controlled by the cartel, the higher the price. Controlling more of the world production effectively increases the demand for the cartel's production.
- d. The larger elasticity of supply of non-cartel producers, the lower the price. The elasticity of non-cartel supply acts in the same way that the elasticity of demand does. The cartel refrains from raising the price too much because doing so results in too large a loss of sales.

These rules also suggest forces that work increasingly against cartels. When the cartel is first set up, it may enjoy low elasticity and a high market share. Yet, its very success in raising price is likely to set four anti-cartel trends which might decline the cartel power:

a. **Sagging demand**

First, the higher the price will make buying countries look for new ways to avoid importing the cartel's product. If the search for substitutes has any success at all, imports of the buying countries will drop over time for any given cartel price. These countries' long-run demand curve for imports of the product is more elastic than their short-run demand curve. This happened to OPEC. As theory predicts, the oil-importing countries slowly came up with ways to conserve on oil use.

b. **New competing supply**

Second, the initial cartel success will accelerate the search for additional supplies in non-cartel countries. If the cartel product is an agricultural crop, such as sugar and coffee, the cartel's price hike will cause farmers in other countries to shift increasing amounts of land, labor and funds from other crops into sugar or coffee. If the cartel product is a mineral resource, such as oil or copper, non-cartel countries will respond to the higher price by redoubling their explorations in search of new resources. If the non-cartel countries have that, their competing supply will become increasingly elastic with time. That also happened to OPEC of which other countries discovered new oil at a faster rate.

c. Declining market share

Third, the cartel's world market share will fall over time. In order to raise the product's price without piling up unsold inventories, the cartel must cut its output and sales. Since non members will be straining to raise their output and sales, the cartel's share of the market will drop even if all of its members cooperate solidly. OPEC's share of world oil production fell from over half in the early 1970s to less than a third in 1985.

d. Cheating

Theory says that the incentive for member s to cheat on cartel agreement tends to undermine the whole cartel. A cartel member might raise the output above the agreed production quota to slightly decrease the price and increase its revenue from the extra buyers. OPEC members cheated on the cartel. Up to the mid-1980, the largest producer, Saudi Arabia, has to hold the cartel together by cutting its production while others cheated. Then the Saudis themselves shifted to a more competitive stance and the relative price of oil fell dramatically in late 1985.

### 3.2 Foreign Direct Investment (FDI) Theory

By definition, FDI is an investment made abroad either by establishing a new production facility or by acquiring a minimum share of an already existing company (Ethier, 1995, pp. 303-4; Lawler and Seddighi, 2001, p. 353)<sup>7</sup>. FDI is characterized by "the existence of a long-term relationship between the direct investor and the enterprise and a significant degree of influence by the direct investor on the management of the enterprise" (IMF, 1993, p. 86). A direct investor may be an individual, a firm, a multinational company (MNC), a financial institution, or a government. FDI is the essence of MNCs<sup>8</sup> because part of their production is made abroad. Furthermore, MNCs are the major source of FDI of which they generate 95% of world's FDI flows.

<sup>7</sup> FDI is associated with production abroad, which cannot be confined to manufacturing abroad.

<sup>8</sup> A MNC is an enterprise operating facilities of production abroad. An enterprise is called MNC if at least 25% of its world output is made outside its country of origin. The terms MNC, multinational enterprise (MNE), and transnational corporation (TNC) are used interchangeably. According to the latest estimates, there are 65,000 TNCs today operating about 850,000 foreign affiliates (United Nations, 2002)

When the setting-up of a new site abroad is financed out of capital raised in the direct investor's country, FDI is referred to as greenfield investment (Lawler and Seddighi, 2001, p. 363). The use of the term greenfield FDI has been widened to cover any investment made abroad by establishing new productive assets. Another type of FDI is cross-border or international merger and acquisitions (M&A). A cross-border M&A is the transfer of the ownership of a local productive activity and assets from a domestic to a foreign entity (United Nations, 1998, pp. 212-4). Profits not repatriated by direct investors but kept in a host country to finance future ventures constitute the third type of FDI called reinvested earnings (Kenwood and Lougheed, 1999, p. 253).

FDIs, viz. Greenfield, M&A, reinvested earnings FDIs, can also be classified into three other categories: export-oriented FDIs, market-development FDIs, and government initiated FDIs (Reuber *et al*, 1973, pp. 72-81).

The purpose of an export-oriented FDI is either to extract raw materials or to manufacture component parts or finished goods at a lower cost for export to the investor's home country or elsewhere. Such an investment is also called vertical FDI. The purpose of a market-development FDI, sometimes called import-replacement FDI, is to produce locally goods and services for sale in the recipient country. Such an investment is also called horizontal FDI. A government-initiated FDI is one initiated and subsidized by the recipient country.

### 3.2.1 The Determinants of FDI

FDI flowing into any country depends upon the rate of return on investment and the certainties and uncertainties surrounding those returns. Therefore, private investors compare the potential return and risks of their investment in the context of different investment destinations.

The literatures on the determinants of FDI are very rich. Majeed and Ahmad (2007) stated that in earlier literature the determinants of FDI were described theoretically without giving empirical results. Latter on, the studies based on empirical analysis have increasingly appeared in the literature. These studies differ from the earlier studies on the basis of theory. First the pure economic theory, that of international trade and the theory of firm were adopted as

the theoretical base for empirical study of FDI determinants. These theories assume the presence of perfect competition and identical production function and attribute FDI flows to difference in the interest rates across countries. But it hardly explains the large volume of FDI flows across countries.

Recent theories as a base for FDI, and in particular of MNCs growth, have turned to the explanations based on market imperfections, oligopolistic interdependence and the possession of the monopolistic advantage. It is assumed that for FDI to take place a necessary condition is that the investing firms have some monopolistic advantages, not possessed by local competitors.

In addition, the expectations of private investors in a host country are guided by a host of economic, institutional, and regulatory and infrastructure related factors. Before making an investment, investors look at certain major economic policy issues particularly relating to trade, labor, governance and the regulatory framework, and the availability of physical and social infrastructure.

Some of the fundamental determinants of FDI, such as geographical location, resource endowment and size of the market, are largely outside the control of the national policy (UNCTAD, 2003). However, national economic policies to create conducive investment environment, and particularly the investment framework, can help to make FDI inflows consistent with economic potential. Countries can also act on their economic determinants to maximize their economic potential. The East Asian FDI boom before 1997 showed that the accrual of the benefits of FDI depends largely on factors such as income, growth and appropriate infrastructure and labor policy. Sound macroeconomic fundamentals, along with other factors such as stable exchange rate policies, low inflation, and sustained growth, influence the decision of investors in a host country.

According to Dunning (1988 and 1993), multinational firms enjoy three distinct types of advantages to producing abroad. They are Ownership advantages; Locational advantages; and Internalization advantages.

The ownership advantages are in the form of firm-specific intangible assets, such as technology, know-how in production and marketing or management. Thus, producing abroad enables the firm to minimize transaction

costs and increase productive efficiency. Locational advantages, therefore, complete what is known as the eclectic ownership, location and internalization (OLI) paradigm which is frequently used to explain investment abroad in the form of FDI.

Furthermore, locational advantages can be grouped into five main categories (Sahoo, 1996), which are: macroeconomic fundamentals; infrastructural facilities; availability and costs of specific inputs; market size and growth prospect; and FDI and trade regulatory policies.

Having the overview above on determinants of FDI, the potential determinants of FDI can be summed up as follows:

a. **Market size**

The aim of FDI in emerging developing countries is to capture the domestic market. Market size is generally measured by GDP and per capita income. Thus, an economy with a large market size (along with other factors) should attract more FDI. Market size is important for FDI as it provides potential for local sales, greater profitability of local sales to export sales and relatively diverse resources, which make local sourcing more feasible (Pfefferman and Madarassy, 1992); moreover, it provides more opportunities for sales and also profits to foreign firms, and therefore attracts FDI (Wang and Swain, 1995).

b. **Growth prospects and positive country conditions**

Along with market size, the prospect of growth (generally measured by growth rates) also has a positive influence on FDI inflows. Countries that have high and sustained growth rates receive more FDI flow than volatile economies (Durham, 2002).

c. **Labor cost**

Cheap labor is another important determinant of FDI inflow to developing countries. A high wage-adjusted productivity of labor attracts efficiency-seeking FDI both aiming to produce for the host economy as well as for export from host countries (Loree and Guisinger, 1995).



d. Infrastructure facilities

The availability of quality infrastructure, particularly electricity, water, transportation and telecommunications, is an important determinant of FDI. When developing countries compete for FDI, the country that is best prepared to address infrastructure bottlenecks will secure a greater amount of FDI (Loree and Guisinger, 1995).

e. Openness and export promotion

The key hypothesis from various theories is that gains from FDI are far higher in the export promotion (EP) regime than the import promotion regime. The theory proposes that import substitution (IS) regimes encourage FDI to enter in cases where the host country does not have advantages leading to extra profit and rent seeking activities. However in an EP regime, FDI uses low labor costs and available raw materials for export promotion, leading to overall output growth. Trade openness generally positively influences the export-oriented FDI inflow into an economy (Gastanaga *et al.*, 1998).

### 3.2.2 Causality between FDI and Countries' Product: Empirical Evidences<sup>9</sup>

A number of empirical studies have been undertaken to establish results in regard to the causal relationship between FDI and countries' product (i.e. GDP in most studies). One possible direction of causality is from FDI to GDP. Theoretically, FDI may affect GDP positively because it increases production via enhancing labor productivity, and introduces new technologies embedded in the capital by moving capital from capital-rich countries to capital-scarce economies. Some studies underlining that FDI affects GDP are Hsiao and Hsiao (2006), Zhang (2001) and Duttaray (2001).

The alternative direction of causality is that GDP may be a determinant of FDI. Theoretically, it is so due to higher growth rates of economy cause the growth in demand. Thus, it might lead to the opportunities for inflowing

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<sup>9</sup> Most studies analyzed the causality relation between foreign investment and countries' product using total FDI and GDP due to their scope of study was in the aggregate level. Nevertheless, this thesis was focusing on specific sector, i.e. rubber and rubber product. Therefore, by having the same analogy on the causality between FDI and GDP, this study tested the causality between FDI in rubber product and production on natural rubber.

investment. Studies conducted by Saha (2005) and Choe (2003) found that higher growth rates attract more FDI. In addition, a set of study conducted by Chowdhury and Mavrotas (2006) and Mottaleb (2007) have shown evidence that there is bi-directional causality between FDI and GDP.

### 3.2.3 Previous Empirical Studies on FDI

#### 3.2.3.1 Majeed and Ahmad (2007)

The study analyzed the relationship between FDI and its common determinants in developing countries of the world using panel data of 49 countries for the period 1970-2004. By using panel data model, they applied fixed effects model to clearly identify the factors affecting FDI in developing countries. They stated that MNCs invest in those particular countries of which they expect higher rates of return on their investments. They used economic and non-economic factors which determine the profits of firms on foreign direct investment.

The economic factors include macro-economic indicators of performance problems like external debt, high rates of inflation, trade and investment policies of the government and physical infrastructure. The non-economic factors are political instability, bureaucratic bottlenecks and law and order situation of the country. The model, which they have developed, takes into account those factors, which play an important role in the determination of FDI in the developing countries. Specified equation for FDI inflow is as follow.

$$FDI = f(EX_{it}, GDP_{it}, GROW_{it}, DA_{it}, EXCH_{it}, BOP_{it}, ED_{it}, SAV_{it}, DI_{it}, CRED_{it}, GC_{it}, IT_{it}, TV_{it}, TP_{it}, UP_{it}, FDI_{it-1}) \dots \dots \dots (3.1)$$

where the subscript  $i(=1, \dots, n)$  represents country and  $t(=1, \dots, T)$  the period of time (years). The variables appearing in the equation are defined as follows.

- EX = Exports as a percentage of GDP;  
 FDI = Foreign Direct Investment as a percentage of GDP;  
 GDP = Gross domestic production in constant prices of 1989;  
 GROW = Annual percentage of growth rate of GDP in percentage;  
 DA = Domestic absorption is equal to GDP plus trade deficit;

EXCH	=	Real exchange rate. It is obtained by multiplying the nominal ER with US CPI and then divided by domestic CPI;
BOP	=	Balance of payments as a percentage of GDP;
ED	=	External debt as a percentage of GDP;
SAV	=	National savings as a percentage of GDP;
DI	=	Domestic investment as a percentage of GDP;
CRED	=	Credit facilities to domestic sector as a percentage of GDP;
GC	=	General government consumption expenditures as a percentage of GDP;
OD	=	Official development assistance as a percentage of GDP;
IT	=	Indirect taxes as a percentage of GDP;
TV	=	Number of televisions per 1000 persons;
TP	=	Number of telephones per 1000 persons;
UP	=	Urban population as a percentage of total population;
FDI(-1)	=	Foreign Direct Investment as a percentage of GDP in the previous year.

The analysis shows that GDP, economic growth, domestic absorption and exports positively affect FDI, a result consistent with market seeking behavior of multinational corporations. On the other hand external debt and BOP deficit have negative effects on FDI. The effect of domestic investment in explaining FDI flow is negative. This is so because an increase in domestic investment leaves little room for FDI. The effect of taxes is negative and insignificant. The negative relationship implies that lack of fiscal incentives is a hurdle for FDI.

### 3.2.3.2 Verico, K. (2008)

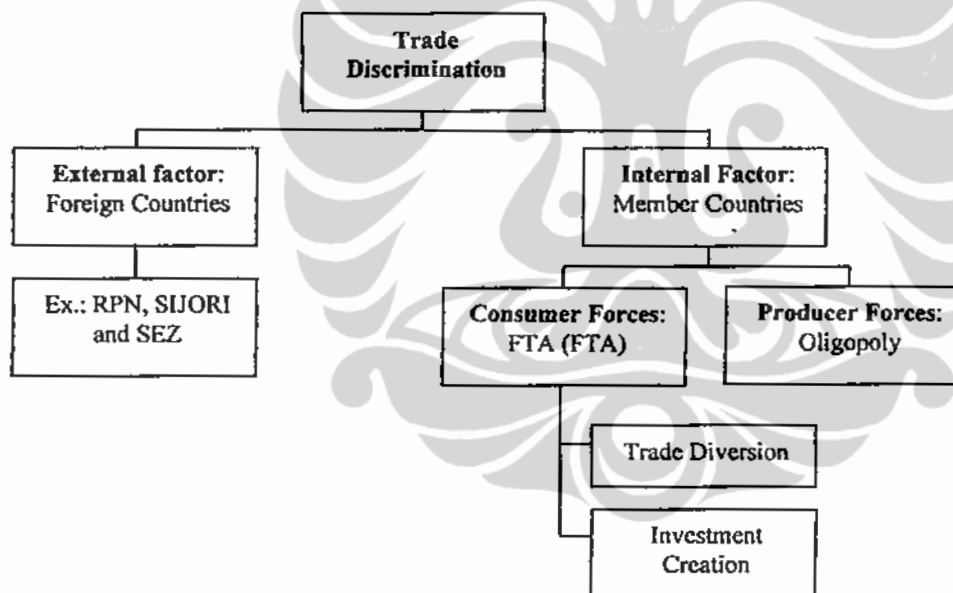
The study analyzed the relationship between trade and FDI in Southeast Asia. Trade refers to intra industry trade among ASEAN member countries; while, FDI inflow refers to long term investment from non ASEAN states to these countries<sup>10</sup>. The study has two main focuses which differentiate it with other studies, i.e. it examines formal trade barriers and it focuses on the demand side

<sup>10</sup> The study is limited to examining trade and investment relations in three of the original ASEAN member states, namely Indonesia, Thailand and Malaysia.

(countries who are FDI recipients set discriminatory trade barriers to influence non member states to invest in their countries).

According to Verico, discriminatory policy in trade designed by the member states generates trade diversion to non member states. This changes the strategy of non member states to long term investment (FDI) in member states. He divided the discriminatory policy in trade in two ways as follows.

- a. External Factors which are developed from foreign countries, e.g. Special Economic Zone (SEZ).
- b. Internal factors which are developed from member countries and consist of two forces, i.e. consumers (demand side, e.g. FTA) and producers (supply side, e.g. oligopoly)<sup>11</sup>. Demand can be shown when states diminish trade protection among members while maintaining trade barriers to non members; meanwhile, producers aim to control a product's price.



**Figure 3.6. Discriminatory Trade Policy:  
External and Internal Factors in Southeast Asia**

Source: Verico 2008

<sup>11</sup> The idea that trade discrimination might come from producers' forces was genuinely proposed by Verico. Nevertheless, his study was only focusing on the demand forces of trade discriminatory policy, particularly the impact of the ASEAN FTA on the pattern of intra trade and investment relations. Using his theory as a based hypothesis, the author will examine the producer forces with addition on empirical data and econometric model.

Moreover, he built an econometric model to prove his hypothesis. The model is constructed as follows.

$$FDI_t = \beta_0 + \beta_1 * \log(I_t) + \beta_2 * T_t + \beta_3 \log(in_t) + D_{FTA} + D_{CR} + e_t \dots (3.2)$$

where:

- $FDI_t$  = The value of long term investment (FDI) inflow to Indonesia, Malaysia and Thailand from non ASEAN member states
- $I_t$  = Intensity index within Indonesia, Malaysia and Thailand;  
Hypothesis: FDI is affected by I index with positive relation.
- $T_t$  = Intra trade index within Indonesia, Malaysia and Thailand;  
Hypothesis: FDI is affected by T index with positive relation.
- $in_t$  = Proportion of intra trade within Indonesia, Malaysia and Thailand;  
Hypothesis: FDI is affected by in index with positive relation.
- $D_{FTA}$  = Dummy variable for time implementing of FTA (before 2000 the variable is 0 and after that year is 1); Hypothesis: FDI is affected by the time of implementation of AFTA with positive relation.
- $D_{CR}$  = Dummy variable for time for crisis (before 1998 the variable is 0 and after that year is 1); Hypothesis: FDI is affected by the time of economic crisis with positive relation.

As he used Indonesia, Malaysia and Thailand as a representative for ASEAN, he proved that ASEAN Free Trade Area (AFTA) is significant in boosting intra industry trade between particular countries. Moreover, his study found that the intra industry trade proportion ( $in$ ) is the best indicator to explain the impact of intra industry trade to FDI inflow<sup>12</sup>.

The study proved that increasing intra industry trade between the three countries increased FDI inflow. It also found that FDI inflow was significantly affected by the economic crisis. In sum, the implementation of AFTA produced trade discrimination which generated trade between member states (Indonesia, Malaysia and Thailand) and trade diversion to non member states. Trade diversion

<sup>12</sup> Note that he used three indicators, i.e. intensity index ( $I$ ), proportion of intra industry trade to total trade ( $in$ ) and intra trade industry index ( $T$ ), to analyze intra industry trade.

pushes non member states to change their strategy from trade to investment; hence, FDI inflow to these three countries has increased.

In addition to that, the study argues that AFTA is part of an internal factor that has been created by the government action at regional level due to their consumer interest. It founds that AFTA has also been supported by an internal factor from producers' force. The three countries, as the largest world exporters of natural rubber, had created a cartel named the International Tripartite Rubber Organization (ITRO) to control the international price of rubber. This cooperative scheme is a kind of market force that supports AFTA to pursue a discriminative trade policy towards non member states. Furthermore, the three member states agreed to liberalize trade in rubber under the scheme of AFTA while at the same time liberalized their domestic market for rubber to foreign investors<sup>13</sup>.

### 3.2.3.3 Mottaleb, K.A. (2007)

The study analyzed that by bridging the gap between domestic savings and investment and bringing the latest technology and management know-how from developed countries, foreign direct investment (FDI) can play important role in achieving rapid economic growth in the developing countries. Using panel data from 60 low-income and lower-middle income countries for the period 2003-2005, he firstly identified the influential factors that determine FDI inflow in the developing countries and secondly empirically demonstrated the relationship between economic growth and FDI.

He postulated that countries with better physical infrastructure and business friendly environment, receive more FDI compared to others. In addition, countries with higher per capita GDP and higher GDP growth rate are more likely to receive larger amount of FDI compared to others. Having those hypotheses above, he developed an econometric model to empirically examine them, the following equation will be estimated:

$$\ln(FDI)_{it} = \lambda_0 + \lambda_1 \ln(GDP)_{it} + \lambda_2 GDPGR_{it} + \lambda_3 INV_{it} + \lambda_4 INTER_{it} + \lambda_5 TELE_{it} + \lambda_6 TRC_{it} + \lambda_7 TRD_{it} + \lambda_8 CPI_{it} + \lambda_9 BC_{it} + \lambda_{10} TR_{it} + \xi_{it} \dots (3.3)$$

<sup>13</sup> See table 1.1. at chapter one of this thesis for details comparison between AFTA Trade Liberalization and FDI liberalization in Indonesia, Malaysia and Thailand.

where,

FDI	=	Foreign direct investment
GDP	=	Gross domestic product
GDPGR	=	Annual growth rate of GDP per capita GDP
INV	=	Industrial value added (% of GDP)
INTER	=	Internet user (per 1000)
TELE	=	Telephone mainline (per 1000)
TRC	=	Time required to enforce a contract (days)
TRD	=	Time required to start a business (days)
CPI	=	Corruption perception index
BC	=	Cost of business start-up procedures (% of GNI per capita)
TR	=	Trade (% of GDP)

$\zeta$  is the error term with white-noise properties and  $\lambda_0$  is a scalar parameter.  $\lambda_1 - \lambda_{10}$  are the parameters of interest. Finally,  $i$  ( $i=1-60$ ) stands for individual countries and  $t$  ( $t=2003, 2004, 2005$ ) for the sample years.

In order that the relationship between economic growth and FDI can be determined, he also estimated the following equation:

$$Y_{it} = b_0 + b_1 \ln(FDI)_{it} + \mu_{it} \dots\dots\dots 3.4$$

where,

Y	=	A set of dependent variables that include $\ln$ (GDP), annual GDP growth rate and export of goods and services (%GDP)
FDI	=	Foreign direct investment
$b_0$	=	Scalar parameter
$b_1$	=	parameters
$\mu$	=	The random error term

As random effect has been applied for the estimation purpose, the results are as follows.

GDP	=	Positive direction and highly significant
GDPGR	=	Positive direction and highly significant
INV	=	Positive direction and highly significant

INTER	=	Positive direction and statistically significant
TELE	=	Zero and insignificant
TRC	=	Insignificant
TRD	=	Insignificant
CPI	=	Positive direction and insignificant
BC	=	Negative direction and statistically significant
TR	=	Insignificant

Overall, the findings support the hypotheses that in one hand market size and market potentials, and the better infrastructural facilities positively affect FDI inflow. On the other hand, unfriendly business environment and high business start-up costs discourage FDI inflow in the developing countries. In addition to the causality of FDI in terms of GDP, the result showed that FDI inflow affected economic growth significantly and positively.

In conclusion, his study proves that by bridging the gap between domestic savings and investment and by enhancing knowledge spillover, FDI can play important role in industrial advancement and economic growth in the developing countries. It can be concluded that large GDP and high GDP growth rate, business friendly environment and modern communication facilities, such as internet encourage FDI inflow in the developing countries.



## CHAPTER 4

### RESEARCH METHODOLOGY

#### 4.1 The Construction of the Model

The ultimate objective of this study is to analyze the relationship between the oligopoly scheme on natural rubber products based on the implementing of ITRO, which comes from the supply side (producers, i.e. Indonesia, Malaysia and Thailand), and investment creation from non member states (FDI inflow) on rubber products. The study is based on the hypothesis proposed by Verico (2008), i.e. discriminatory trade policy might come from producers' forces; hence, the forming of ITRO by Indonesia, Thailand and Malaysia as a limited regional organization could be one of the example of the strength of producer forces. Nonetheless, his study was focusing only on the demand forces of trade discriminatory policy, particularly the impact of the ASEAN FTA on the pattern of intra trade and investment relations. Therefore, the author would prove the particular hypothesis by using empirical data and econometric model.

Furthermore, the model proposed in this thesis would use most significant variables that have been employed on prior studies related to determinant factors of FDI<sup>14</sup> with addition on relevant variables related to FDI in rubber products sector. While FDI on rubber products is used as dependent variable, this thesis would use several independent variables which significantly affect FDI based on previous studies (i.e. gross domestic product, degree of openness and real exchange rate), representative variable regarding to FDI on rubber products sector and ITRO, the organization of natural rubber producing countries (i.e. production on natural rubber) and dummy variable for time of implementing of ITRO (before 2001 the variable is 0 and after the year is 1).

The model thus takes into account those factors, which play an important role in the determination of FDI inflow on rubber products in the tripartite member countries, i.e. Indonesia, Thailand and Malaysia. The proposed equation for FDI inflow on rubber products is as follow.

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<sup>14</sup> Mostly, studies on the determinant factors of FDI are conducted by using total FDI. There is hardly any studies that conducted FDI determinants with specific emphasize on FDI in particular sector.

$$FDI_{it} = f(PROD_{it}, RGDP_{it}, OPEN_{it}, RER_{it}, DITRO_{it}) \dots\dots\dots(4.1)$$

+            +            +            +            +

where the subscript  $i$  ( $=1, \dots, n$ ) represents country and  $t$  ( $=1, \dots, T$ ) the period of time (years). The variables appearing in the equation are defined as follows.

- FDI* = FDI inflow on rubber products industries  
*PROD* = Production of natural rubber  
*RGDP* = Real gross domestic product  
*OPEN* = Degree of openness. It is the trade to GDP ratio which is equal to (exports + imports)/GDP  
*RER* = Real exchange rate. It is obtained by multiplying the nominal ER with US CPI and then divided by domestic CPI;  
*DITRO* = Dummy variable for time for implementing of ITRO, before 2001 the variable is 0 and after the year is 1.

In order that the elasticity of dependent variable to each of independent variables might be determined, the double logarithm would be applied on both dependent variable and independent variables. Given the double logarithm<sup>15</sup> on both sides of the model (except for *OPEN* and *DITRO*); hence, the model would be as follow.

$$\ln(FDI)_{it} = \beta_0 + \beta_1 \ln(PROD)_{it} + \beta_2 \ln(RGDP)_{it} + \beta_3 (OPEN)_{it} + \beta_4 \ln(RER)_{it} + \beta_5 (DITRO)_{it} + e_{it} \dots\dots\dots(4.2)$$

It is important to note that there are two other important variables, i.e. natural rubber price and investment climate, which hypothetically also play significant role in determining the FDI inflow on rubber products industry and the existence of the ITRO itself. Unfortunately, regarding to the natural rubber price and the investment climate, the research is limited to the availability of annual data with respect to the observed period (i.e. 1990-2007). Due to that, those variables were omitted during the specification of the fittest model.

Nevertheless, in regard to the investment climate, Verico (2008) in his study has summarized the selected cost of doing business indicators among the

<sup>15</sup> Noted that logarithm here means natural logarithm; nevertheless, in the econometric software used on this study (Eviews 5.1), it is expressed with log.

tripartite member countries<sup>16</sup>. It is found that they offer various incentives to FDI investors. Each country has own competitive advantage: Indonesia has the cheapest labor and the lowest average corporate profit tax; Malaysia has the lowest dividend tax and Thailand has the lowest value added tax (VAT) on imported inputs and telecommunication cost (phone and internet rates).

In line with the model specification above, the expected sign of each independent variable are described as follows.

a. **The production on natural rubber**

In relation with production on natural rubber (HS 4001), the higher level of production would be expected to have a positive impact on FDI, particularly on rubber products sector. Natural rubber is known as the basic constituent of many products. Consequently, as the major raw material (input) for most of rubber based industry; therefore, the higher the production of natural rubber, by all means, will encourage investors to invest more on particularly rubber based industry in major producing countries. As the result, FDI inflow on rubber products industries might increase due to that. Nevertheless, as stated on prior chapter, it might be argued that an increase in foreign investment on rubber products industry in member countries, by bringing in more knowledge and capital, would play an important role in increasing the production of natural rubber as the major input for most of rubber based industry. Therefore, the causality test, specifically on FDI in rubber product industry and production on natural rubber, should be conducted to see the non-existence of widely held belief that FDI might have a positive effect upon the production.

b. **The real gross domestic product**

The market size hypotheses argue that inward FDI is a function of the size of the host country market, usually measured by GDP. We take gross domestic product as a proxy for market size. High demand, prospects for economies of scale, good economic health and absorptive capacity are the factors that give green signal to foreign investors. Combined effect of such factors can be captured by market size. Large market size is expected to

<sup>16</sup> The summary of facilities for FDI investors in Indonesia, Malaysia and Thailand is attached in appendix I.

have a positive impact on FDI, particularly FDI inflow on rubber products. The positive impact is also justified in literature by Majeed and Ahmad (2007), and Mottaleb (2007).

c. **The degree of openness**

The trade to GDP ratio, i.e. exports plus imports over GDP, is often used to proxy the degree of openness. This ratio suggests how a country is being integrated into the new economic order. It implies that the more outward oriented tripartite members' economies will attract more FDI inflow (particularly in rubber products). It is expected to have positive impact on FDI inflow on rubber products. The positive impact is also justified in literature by Sahoo (2006).

d. **The real exchange rate**

Exchange rate affects FDI in several ways. A rise in the exchange rate in terms of host country currency over the home country currency implies a depreciation of the host country currency. A real depreciation of the host country currency favors home country purchases of host country assets and therefore leads to an increase in inward FDI in the host country. Furthermore, with regard to relative labor cost, a real depreciation of the host country currency allows home country investors to hire more labor for a given amount of the home country currency, and therefore is associated with an increase in inward FDI in the host country.

e. **The forming of ITRO (dummy variable)**

As mentioned earlier above, oligopoly is a form of producer forces of which it creates discriminatory trade policy. ITRO has an objective to control the quantity of natural rubber production, in turn controlling the price of natural rubber. Therefore, the forming of ITRO would give signal to investors from non member countries, particularly major consumers of natural rubber, of which by investing in one or more member countries they might have advantages through the mechanism of this particular scheme. Thus, the forming of ITRO is expected to have positive impact on FDI inflow on rubber products industry.

**Table 4.1. The Expected Sign of Independent Variables**

Independent variables	Expected sign
PROD	+
RGDP	+
OPEN	+
RER	+
DITRO	+

#### 4.2 Data and Sources

This study is based on the information from tripartite member countries of ITRO, i.e. Indonesia, Thailand and Malaysia, from the year of 1990 until 2007. The data for FDI inflow on rubber products industries have been retrieved from Investment Coordinating Board Republic of Indonesia (BKPM), Board of Investment Thailand (BOI) and Malaysia Industrial Development Agency (MIDA). The data for production on natural rubber have been retrieved from Rubber Association of Indonesia (GAPKINDO) and International Rubber Study Group (IRSG). The data for gross domestic product, exchange rate and exports and imports (for computing degree of openness) have been retrieved from IFS-IMF CD-ROM (IFS Database 1990-2007).

**Table 4.2. Data and Sources**

Data	Units	Source
FDI on rubber products	Million US\$	BKPM, BOI, MIDA
Production on natural rubber	Thousand Ton	GAPKINDO, IRSG
Real GDP	Million US\$*	IFS-IMF CD-ROM
Degree of openness	Percent	IFS-IMF CD-ROM
Real exchange rate	National currency/US\$	IFS-IMF CD-ROM

\*Measures in 2000 prices

#### 4.3 Operational Definition of Variables

As the equation model has been proposed above, the operational definition of both variables (i.e. dependent and independent variables) are as follows.

a. **The FDI inflow on rubber products industry**

This independent variables is represented the value of Foreign Direct Investment (FDI) inflow from non member states to Indonesia, Malaysia and Thailand within the given period (t) in the rubber products industries. The data which retrieved from related institution dealing with investment on each country (i.e. BKPM, BOI and MIDA) is the value of foreign investment projects approved in rubber products industries. The unit measurement is in million US\$.

b. **The production on natural rubber**

This variable is represented the quantity of natural rubber (HS 4001) produced in country i within a given period (t). In this regard, the unit measurement is in thousand ton.

c. **The real gross domestic product**

Gross Domestic Product (GDP) is defined as the value of all final goods and services produces in country *i* within a given period (*t*). In regard to real GDP, it measures changes in physical output in the economy between different time periods by valuing all goods produced in the two periods at the same prices. Real GDP is computed by dividing nominal GDP with GDP deflator. In order that each country might have equal unit, the nominal GDP, which counted as national currency for its unit, is transformed to US\$. Thus, the variable is computed by dividing it with nominal exchange rate (market rate, period average). Following that, the real GDP would then be computed by dividing the nominal GDP with the GDP deflator (2000=100), using 2000 as a base year and then multiplying this by 100. Consequently, each observed country would have an equal unit, i.e. (million) US\$ which measures in 2000 prices.

$$RGDP_u = \frac{NGDP_u}{ER_u} \times \frac{1}{GDPdeflator(2000 = 100)} \times 100 \dots\dots\dots(4.3)$$

d. **The degree of openness**

The degree of openness is the trade to GDP ratio. It is computed as follow: exports of goods and services plus imports of goods and services over

GDP in country  $i$  within a given period ( $t$ ). The unit measurement is in percentage.

$$OPEN_{it} = \frac{(EX_{it} + IM_{it})}{GDP_{it}} \times 100 \dots\dots\dots(4.4)$$

e. **The real exchange rate**

The real exchange rate is the ratio of foreign to domestic prices, measured in the same currency in country  $i$  within a given period ( $t$ ). It measures a country's competitiveness in international trade. Furthermore, It is obtained by multiplying the nominal exchange rate (national currency/US\$) with US CPI and then divided by domestic CPI. Thus, the unit measurement is in national currency per US\$.

$$RER_{it} = NER_{it} \times \frac{CPI(US)_t}{CPI(domestic)_{it}} \dots\dots\dots(4.5)$$

f. **The forming of ITRO (dummy ITRO)**

The dummy ITRO is the dummy variable for time for implementing of ITRO, before 2001 the variable is 0 and after the year is 1.

#### 4.4 The Estimation Method

This study would be estimated using panel data regression model. The justification in using that particular method is that the author believes each country being observed has different characteristics while at the same time they are also considered as one unity under ITRO. In addition, the study employed time series and cross section data at the same time in order to get a large number of data points, thus increasing the degrees of freedom as well as reducing the collinearity among explanatory variables that will improve the efficiency of econometric estimates (Hsiao, 1999, pp.1-2). Other advantages of using panel data according to Baltagi (2005, pp. 4-7) are as follows.

- a. Panel data could control the individual heterogeneity;
- b. Panel data are better able to study the dynamics of adjustment;
- c. Panel data are better able to identify and measure effects that are simply not detectable in pure cross section or pure time series data;

- d. Panel data allow to constructing and test more complicated behavioral models than purely cross section or time series data.

In regard with panel data regression model, it has three kinds of estimation approach, i.e. pooled least square model (PLS), fixed effect model (FEM) and random effect model (REM). Further explanation would be described as follows.

#### 4.4.1 The Pooled Least Square Model

The simplest approach in panel data regression model is to disregard the space and time dimension of the pooled data and just estimate the usual OLS regression. As panel data employed time series and cross section data at the same time; hence, it would be noticed that N is the number of cross section units and T is the number of time period. The total observation by doing panel data method thus would be N multiplied with T. In addition, the function of the PLS method can be written as follows.

$$Y_{it} = \alpha + \beta_j x_{it}^j + e_{it} \dots \dots \dots (4.6)$$

$$i=1, 2, \dots, N$$

$$t=1, 2, \dots, T$$

where, i is called the cross-sectional identifiers and t is called the time series identifiers.

In the PLS model above, it is assumed that the intercept value of each variable is equal; moreover, it is also assumed that the slope coefficients of the variables are all identical for the entire cross-sectional units. Obviously, those are highly restricted assumptions. Therefore, despite its simplicity, the PLS may distort the true picture of the relationship between Y and X's across the cross-sectional units. It does not take into account the so called specific nature of the cross-sectional units.

#### 4.4.2 The Fixed Effects (FEM) or Least-Square Dummy Variable (LSDV) Model

In order that the "individuality" of each cross-sectional unit might be taken into account, the intercepts should be allow to vary for each cross-sectional unit but still assuming that the slope coefficients are constant across them. This



approach is known as the fixed effect model. The model thus can be written as follows.

$$Y_{it} = \alpha_i + \beta_j x_{it}^j + e_{it} \dots\dots\dots(4.7)$$

where,

- $Y_{it}$  = The dependent variable in period t for cross-sectional unit i  
 $\alpha_i$  = The different intercept among cross-sectional units  
 $x_{it}^j$  = The independent variable j, in period t for cross-sectional unit i  
 $\beta_j$  = The parameter for variable j  
 $e_{it}$  = The error term in period t for cross-sectional unit i

In addition to the equation above, dummy variables should be included to allow the intercepts to vary among cross-sectional units. The equation thus would be as follows.

$$Y_{it} = \alpha_i + \beta_j x_{it}^j + \sum_{i=2}^n D_i \alpha_i + e_{it} \dots\dots\dots(4.8)$$

The dummy variables ( $D_i$ ) are now being added into equation 4.7 as much as ( $N-1$ ) due to avoid perfect collinearity among independent variables. Due to the used of dummies to estimate the fixed effects, equation 4.8 is also known as least-squares dummy variable model (LSDV).

The used of FEM can not be employed unless the regression equation has a few cross-sectional units. If it has many cross sectional units, it will decrease in the number of degree of freedom that will eventually decrease the efficiency of the estimated parameter.<sup>17</sup> In conclusion, the term of fixed effect is due to the fact that, eventhough the intercept may differ across individuals, each individual's does not vary over time; hence, it is time invariant<sup>18</sup>.

#### 4.4.3 The Random Effects (REM) or Error Components Model

As mentioned above that the decision to apply FEM can cause the trade off in terms of decreasing the degree of freedom, the third approach of panel data regression model, i.e. REM might overcome this kind of trade off. In REM, the

<sup>17</sup> Using this approach, the number of degree of freedom would be  $(NT)-N-K$ .

<sup>18</sup> It is related with the use of  $\alpha_j$  instead of  $\alpha_{it}$

cross section, time series and combination error are put together into one error component. The equation which underlying the random effects model are as follows.

$$Y_{it} = \alpha + \beta_j x_{it}^j + e_{it} \dots\dots\dots(4.9)$$

$$e_{it} = u_i + v_t + w_{it} \dots\dots\dots(4.10)$$

where,

$u_i \sim N(0, \delta_u^2)$  = Cross section error components

$v_t \sim N(0, \delta_v^2)$  = Time series error components

$w_{it} \sim N(0, \delta_w^2)$  = combination error components

REM also assumed that individual error components do not correlate one to another, as well as there are no autocorrelation among the combination error.

There are two points regarding to the estimation method using REM. First, the sum of random effect value is equal to zero (0) due to the error components ( $e_{it}$ ) are the time series and cross-sectional combination. Secondly, the value of  $R^2$  is obtained from the transformation of Generalized Least-Square (GLS) regression, thus random effect could be estimated with GLS method.

#### 4.5 Procedures for Estimating Panel Data Regression

This study consist of time series observation ranging from 1990-2007 and cross section covering three countries as the member of ITRO, namely Indonesia, Thailand and Malaysia. Therefore, the number of observation would be 54 observations.

The prior sub chapter has described briefly that panel data might have several types of estimation approach, i.e. pooled least square model, fixed effect model and random effect model. Furthermore, models have to be estimated by appropriate approach that able to overcome problems on them.

In deciding which estimation approach is the best for this study, there are several steps to be taken. Judge et al. have observed some criteria on how to choose between FEM and REM (Gujarati, 2003). They are as follows.

- a. If T (the number of time series data) is large and N (the number of cross-sectional units) is small, there is likely to be little difference in the values

of the parameters estimated by FEM and REM. Hence, the choice here is based on computational convenience. On this respect, FEM might be preferable.

- b. When  $N$  is large and  $T$  is small, the estimates obtained by the two methods can differ significantly. Recall that in REM,  $\beta_{it} = \beta_t + \varepsilon_i$ , where  $\varepsilon_i$  is the cross-sectional random component, whereas in FEM we treat  $\beta_{it}$  as fixed and not random. In the latter case, statistical inference is conditional on the observed cross-sectional units in the sample. This is appropriate if it is strongly believed that the individual, or cross-sectional, units in sample are not random drawings from a larger sample. In that case, FEM is appropriate. However, if the cross-sectional units in the sample are regarded as random drawings, then REM is appropriate, for in that case statistical inference is unconditional.
- c. If the individual error component  $\varepsilon_i$  and one or more regressors are correlated, then the REM estimators are biased, whereas those obtained from FEM are unbiased.
- d. If  $N$  is large and  $T$  is small, and if the assumptions underlying REM hold, REM estimators are more efficient than FEM estimators.

In addition of those criteria, in order that the approach regression model might be appropriate, some test should also be examined to see the good of fitness of the regression model. The implementation of those tests would be supported with the econometric software package, i.e. Eviews 5.1. Those tests are described as follows.

#### 4.5.1 The Multicollinearity Test

Multicollinearity is defined as the existence of a perfect, or exact, linear relationship among some or all explanatory variables of a regression model. Furthermore, if the multicollinearity is perfect, the regression coefficients of the explanatory variables are indeterminate and their standard errors are infinite. If multicollinearity is less than perfect, the regression coefficients, although determinate, possess large standard errors (in relation to the coefficients

themselves), which means the coefficients can not be estimated with great precision or accuracy.

There are some indicators to detect this problem, they are *inter alia*:

- a. The  $R^2$  value is high and the F-stat value is significant; nevertheless, the individual  $t$  tests will show that none or very few of the partial slope coefficients are statistically different from zero (insignificant);
- b. High pair-wise correlations among regressors after finding out the coefficient correlation matrix among them.

#### 4.5.2 The Chow Test

This test is done to find which estimation approach is appropriate between PLS or FEM. The underlying hypotheses are:

- $H_0$  = The intercepts and slope coefficients are constant across individual, i.e. PLS model (Restricted)
- $H_1$  = The intercepts and slope coefficients are vary across individual, i.e. FEM (Unrestricted)

Moreover, the rejection for the null hypothesis is based on the F statistics which was formulated by Chow as follows:

$$F = \frac{\frac{SSR_1 - SSR_2}{N-1}}{\frac{SSR_2}{NT - N - k}} \dots\dots\dots(4.11)$$

where,

- $SSR_1$  = The residual sum squares from the restricted model (PLS Model).
- $SSR_2$  = The residual sum squares from the unrestricted model (FEM).
- $N$  = The number of cross-section units.
- $T$  = The number of time series.
- $k$  = The number of explanatory variables (including the intercept).

Regarding to the Chow test, it follows the F statistic distribution, i.e.  $F_{N-1, NT-N-k}$ . As a result, if the value of Chow test ( $F_{stat}$ ) is higher than  $F_{table}$ , the null

hypothesis is rejected. Regarding to that, the better estimation approach is the Fixed Effect Model.

#### 4.5.3 The Hausman Test

The Hausman test is examined to find which estimation approach is appropriate between FEM or REM. The underlying hypotheses are:

$H_0$  = Random Effects Model

$H_1$  = Fixed Effect Model

The basis for the rejection of null hypothesis is based on the statistical consideration of *Chi-Square Statistics*. If the hausman test is significant (i.e. the probability of the test  $< \alpha$ ), therefore the FEM is the better estimation approach to be applied.

As a notification, this study was not conducted the Hausman Test since the software package (Eviews) requires the number of cross section bigger than the number of coefficients (including intercept) for Random Effects Model estimation. The constructed model, as stated above, has only three cross-section units and six numbers of coefficients. Due to this limitation, the option on which the estimation approach is appropriate is lies between the PLS model and FEM. Nevertheless, the justification on selecting the number of cross-sectional units is based on the number of member countries of the ITRO, the ultimate object of the study. Therefore, the number of cross-sectional unit can not be added with respect to the objective of the study.

#### 4.5.4 The Heterocedasticity Test or The Lagrange Multiplier Test (LM Test)

The LM test is conducted to detect the presence of heteroscedasticity in the estimation model by compared between the probabilities of the cross-section chi-square and the significance level. If the probability of the cross-section is less than the probability of significance level, the model has cross-section heteroscedasticity. The underlying hypotheses are as follows.

$$H_0 = \sigma_i^2 = \sigma^2 \text{ (homoscedasticity structure)}$$

$$H_1 = \sigma_i^2 \neq \sigma^2 \text{ (heteroscedasticity structure)}$$

The LM statistic value follows the chi-square ( $\chi^2$ ) distribution and is formulated as follows.

$$LM = \frac{T}{2} \sum_{i=1}^n \left[ \frac{\sigma_i^2}{\sigma^2} - 1 \right]^2 \dots\dots\dots(4.12)$$

where,

$$\sigma_i^2 = \text{Variant residual equation at } i \text{ (the higher restriction equation)}$$

$$\sigma^2 = \text{sum square equation}$$

If the value of LM statistic is higher than the value of chi-squares table, thus the null hypothesis is rejected which means that there is a heteroscedasticity problem.

#### 4.6 Pairwise Granger Causality Test between FDI in Rubber Products and Production on NR

The Pairwise Granger Causality (PGC) test is designed to find the relationship between dependent and independent variables. Here the dependent variable is FDI inflow on rubber products industry which is affected by independent variable, i.e. production on NR.

The PGC test uses null hypothesis that the independent variable does not affect the dependent variable. If the F stat is significant or its probability is less than 10%, 5% or even 1% then the independent variable significantly impacts the dependent variable. The test is important to seek whether there is a one way causality from production to FDI, from FDI to production or bi-directional causality between them. The PGC test would be conducted partially on each tripartite member countries and is conducted using Eviews 5.1.

## CHAPTER 5

### RESULT AND ANALYSIS

#### 5.1 Statistic Descriptive Analysis

##### 5.1.1 The Development of FDI on Rubber Products Industry in Tripartite Member Countries

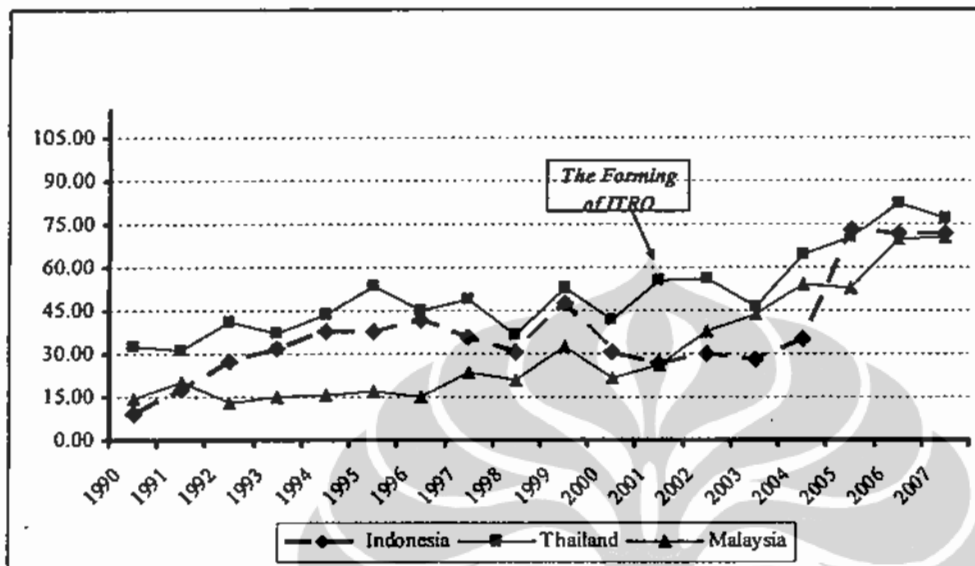
The FDI on rubber products industry data in Indonesia, Thailand and Malaysia has been fluctuated during the scope of period of this study, i.e. 1990-2007; nevertheless, it has an increase trend since the year of 2001 to the present. In Indonesia, from 2000-2001, FDI was decreased from US\$ 30.46 million to US\$ 26.90 million (11.70%) but in the following years FDI was showing an increase trend, i.e. increased to US\$ 29.91 million (11.21%), decreased to US\$ 28.10 million (6.06%), increased to US\$ 35.55 million (26.51%), increased to US\$ 73.02 million (105.40%), decreased to US\$ 71.63 million (1.90%) and increased to US\$ 71.67 (0.06%) million respectively up till 2007.

In Thailand, the trend, more or less, was also in the same pattern. From 2000-2001, FDI was slightly increased from US\$ 41.66 million to US\$ 55.61 million (33.48%) and in the following years FDI was showing an increase trend, i.e. increased to US\$ 56.42 million (1.46%), decreased to US\$ 46.39 million (17.78%), increased to US\$ 64.67 million (39.40%), increased to US\$ 70.78 million (9.44%), increased to US\$ 82.43 million (16.47%) and decreased slightly to US\$ 77.33 million (6.19%) respectively up till 2007.

Meanwhile, in Malaysia, From 2000-2001, FDI was slightly increased from US\$ 21.86 million to US\$ 26.27 million (20.17%) and in the following years FDI was showing an increase trend, i.e. increased to US\$ 37.63 million (43.24%), increased to US\$ 43.51 million (15.63%), increased to US\$ 54.11 million (24.36%), decreased to US\$ 52.97 million (2.11%), increased to US\$ 70.23 million (32.58%) and increased to US\$ 70.29 million (0.09%) respectively up till 2007.

This shows that 2001 is important as turning points in the flow of FDI in the respected sector. This model uses the time as dummy variable to examine

2001 as the implementation of ITRO. Figure 5.1. below describes the development on FDI on rubber products industry in the tripartite member countries from 1990-2007.



**Figure 5.1. The Development of FDI on Rubber Products Industries in Tripartite Member Countries in Million US\$, 1990-2007**

Source: Processed by the author based on data from BKPM, BOI and MIDA

### 5.1.2 The Real GDP Movement in Tripartite Member Countries

As stated in the prior chapter that Real GDP is a proxy for market size, the market size hypotheses argue that inward FDI is a function of the size of the host country market. High demand, prospects for economies of scale, good economic health and absorptive capacity are the factors that give green signal to foreign investors. Consequently, combined effect of such factors can be captured by market size.

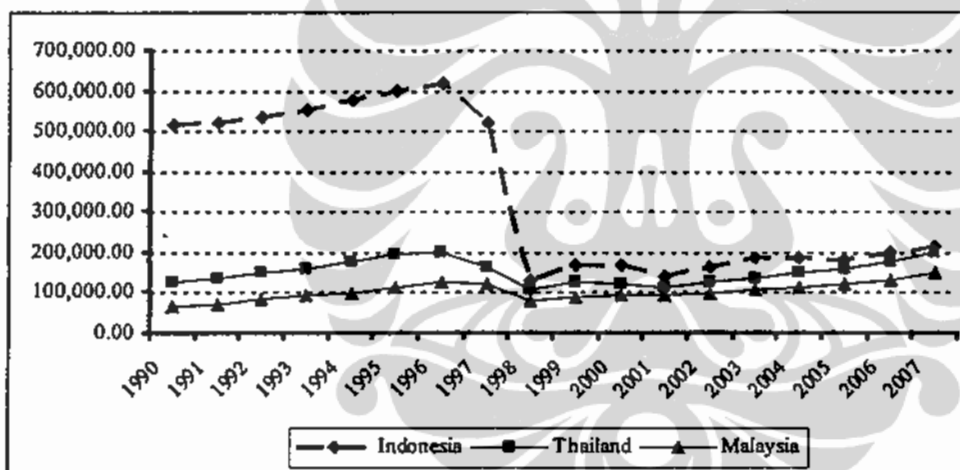
In regard to that, the real GDP in Indonesia increased from 1990-1996; however, it decreased from 1997-1998. The economic crisis is the main reason for the decline on real GDP. Having 2000 as a base year for GDP deflator of which it is used as the denominator for computing real GDP, the economic crisis indicates that the price has increased over the crisis period. Hence, the GDP deflator was increased and led to the decrease in real GDP. The real GDP was slightly fluctuated from 1998-2001, i.e. it increased 28.49% from 1998-1999 but



decreased 2.14% and 14.78% in 1999 through 2001. After 2001, with an exemption on 2004-2005 of which it decreased 2.66%, Indonesia's real GDP increased up till 2007.

Following the same pattern, the real GDP in Thailand also increased from 1990-1996; nonetheless, due to economic crisis, it decreased from 1996-1998. It fluctuated in the period of 1998-2001, i.e. it increased 14.25% from 1998-1999 but slightly decreased 1.26% and 7.77% in 1999 through 2001. After 2001, Thailand's real GDP increased up till 2007.

As well as Indonesia and Thailand, the real GDP in Malaysia also increased from 1990-1996 but it decreased from 1996-1998, due to economic crisis. Having recovered faster than its two compatriots, after 1998, Malaysia's real GDP increased up till 2007. Figure 5.2. below depicts the tripartite member countries' real GDP from 1990-2007.



**Figure 5.2. The Real GDP in Tripartite Member Countries in Million US\$, 1990-2007**

Source: Processed by the author based on data from IFS-IMF

### 5.1.3 The Natural Rubber Production Movement in Tripartite Member Countries

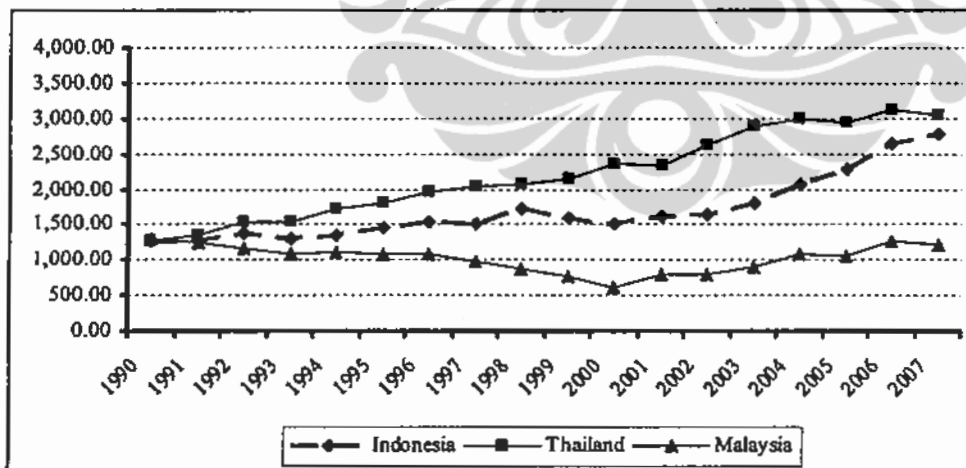
Given natural rubber as the major raw material (input) for most of rubber based industry, the availability of natural rubber is considered to be one of the constituent factors affecting inward investment on rubber products sector.

Consequently, being majoring producer countries, the tripartite member countries have one advantage to encourage investors to invest on the particular sector.

With respect to this issue, the production of natural rubber in Indonesia has experienced a significant increase during 1990-2007. Its production only decreased in 4 different periods, i.e. in the period 1992-1993, 1996-1997, 1998-1999 and 1999-2000 which equal to 6.18%, 1.45%, 6.70% and 6.13% respectively.

Thailand also experienced a significant increase during the observed period. Having a significant increase in most of period, its production has decreased in 4 different periods, i.e. in the period 1992-1993, 2000-2001, 2004-2005 and 2006-2007 which equal to 0.50%, 1.15%, 1.58% and 2.58% respectively.

In accordance with Malaysia, unlike two other member states, the production of natural rubber showed a fluctuate trend from the year 1990-2007. Its production decreased from 1990 up till 2000, with exemption on the period of 1990-1993 (increased 2.45%). Moreover, its production showed an increase trend from the year 2000 through 2007 but with 2 different decreasing periods, i.e. 2004-2005 (2.72%) and 2006-2007 (5.37%). The figure below shows the movement trend on tripartite members' natural rubber production.



**Figure 5.3. The NR Production in Tripartite Member Countries in Thousand Ton, 1990-2007**

Source: Processed by the author based on data from IRSG and GAPKINDO

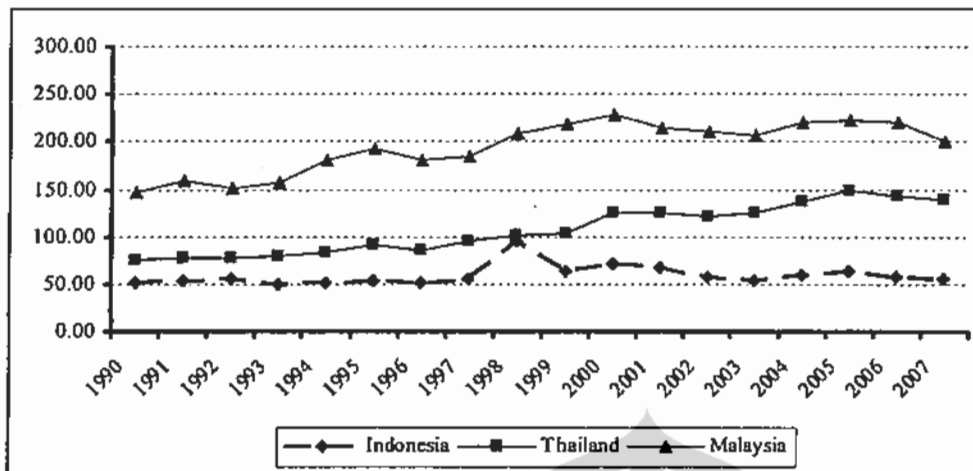
#### 5.1.4 The Degree of Openness Proportion in Tripartite Member Countries

The prior chapter of this study has stated that the trade to GDP ratio, i.e. exports plus imports over GDP, is often used to proxy the degree of openness. This ratio suggests how a country is being integrated into the new economic order. Therefore, the more outward oriented a country thus lead to inward investment from the foreign.

Indonesia's degree of openness proportion has been fluctuated since 1990-2007. The reason for that is the component of the openness itself. It is divided not only from exports and imports as the numerator but also the GDP as the denominator. Furthermore, Indonesia experienced the highest proportion in the year of 1998, i.e. 96.19%, but ever since that the openness has relatively shown the negative trend up till 2007, i.e. 54.69%. Nevertheless, the proportion index indicates that Indonesia is an outward oriented country.

On the other hand, Thailand's degree of openness proportion has relatively shown a positive trend from 1990 through 2007. The highest proportion index is in the year 2005, i.e. 148.3% and it slightly decreased to 143.56% and 139.02% in the following year. The index indicates that Thailand is also an outward oriented country.

In relation to Malaysia, it also has relatively shown the positive trend on the degree of openness index. In fact, it is the highest among the tripartite member countries. As well as Indonesia and Thailand, Malaysia is considered to be an outward oriented country also. Figure 5.4. below shows the degree of openness index in the tripartite countries from 1990 through 2007.



**Figure 5.4. The Proportion of Degree of Openness in Tripartite Member Countries (%) from 1990-2007**

Source: Processed by the author based on data from IFS-IMF

### 5.1.5 The Real Exchange Rate Movement in Tripartite Member Countries

The real exchange rate (RER) measures a country's competitiveness in international trade. While this study defines the real exchange rate as the ratio of foreign to domestic prices, measured in the same currency in country  $i$  within a given period ( $t$ ) thus a rise in the exchange rate in terms of host country currency over the home country currency implies a depreciation of the host country currency. The prior chapter has described the depreciation of the host country currency is associated with an increase in inward FDI in the host country.

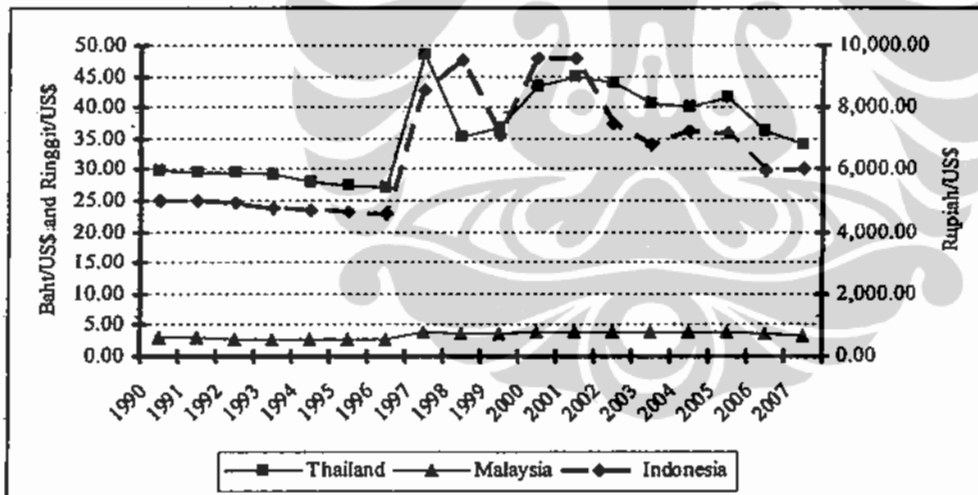
In relation with Indonesia, regarding to the scope of period being observed, the sharp depreciation<sup>19</sup> of its RER occurred firstly in the period of 1996-1997. Due to the economic crisis, the RER kept depreciating in the following period, i.e. 1997-1998. On the following period, 1998-1999, the RER appreciated 25.12% toward US dollar and depreciated again as much as 34.98% in the period of 1999-2000. Moreover, Indonesia's RER slightly appreciated during 2000-2003 and again depreciated 6.06% during the next period, 2003-2004. From

<sup>19</sup> Note that the term of depreciation and appreciation here refer to real depreciation and real appreciation. Thus, real depreciation defines as a decrease in the price of the domestic goods in term of foreign goods and conversely.

2004 through 2006, it slightly appreciated and finally it depreciated again 0.94% in the period of 2006-2007, reaching the value of Rp. 6,039.12 per US\$.

In Thailand, the RER was also fluctuating in the period of 1990-2007. Firstly, Thailand's RER appreciated during the period of 1990-1996. Due to the crisis, the RER depreciated sharply 78.79% in the period of 1996-1997. The next period, although it appreciated firstly in the period 1997-1998, it depreciated again until 2001. From 2001-2007 the RER showed the appreciation trend except in the period of 2004-2005, i.e. it depreciated 3.89%. In 2007, Thailand's RER reached the value of 33.93 Baht/US\$.

In Malaysia, eventhough the RER was fluctuating too in the period 1990-2007, the fluctuation was not as much as in Indonesia and Thailand. The highest depreciation occurred in the period of 1996-1997 (53.40%). Besides that period, Malaysia's RER showed a relatively stable movement. In 2007, it reached the value of 3.46 ringgit/US\$. Figure 5.5. below describes the RER movement in tripartite member countries from 1990-2007.



**Figure 5.5. The Real Exchange Rate in Tripartite Member Countries (Domestic Currencies/US\$) from 1990-2007**

Source: Processed by the author based on data from IFS-IMF

## 5.2 The Result of Preliminary Tests for Estimating Panel Data Regression

### 5.2.1 The Result of the Multicollinearity Test

The Multicollinearity test was conducted by using the coefficient correlation matrix in the supporting econometric software, i.e. Eviews 5.1. Furthermore, the pairwise correlation among independent variables thus could be found out from the coefficient correlation matrix. The following step was to seek the pair-wise correlation value among regressors whether it is higher from 0.8 or not. In accordance to the rule of thumb, the higher value than 0.8 indicates that there is multicollinearity among regressors, on the contrary, if it is lower than 0.8, it indicates no multicollinearity among them. The result from the coefficient correlation matrix showed that there is no multicollinearity among variables since all the correlation value was lower than 0.8.

**Table 5.1. The Pairwise Correlation Matrix**

	<i>RGDP</i>	<i>PROD</i>	<i>OPEN</i>	<i>RER</i>	<i>DITRO</i>
<i>RGDP</i>	1.000000	-0.013362	-0.590939	0.468955	-0.255970
<i>PROD</i>	-0.013362	1.000000	-0.383880	0.082688	0.424997
<i>OPEN</i>	-0.590939	-0.383880	1.000000	-0.662714	0.199917
<i>RER</i>	0.468955	0.082688	-0.662714	1.000000	0.048071
<i>DITRO</i>	-0.255970	0.424997	0.199917	0.048071	1.000000

### 5.2.2 The Result of the Chow Test

In order that the Chow test could be conducted, the estimation result using PLS (no weights) and FEM (no weights) should be conducted first. The result is attached in Appendix 2 and 3. Moreover, the result was applied in equation (4.11) and it was compared with the critical value of *F-table* ( $\alpha = 0.05, 2, 45$ ). While the result of the Chow test was 4.0411, the critical value of the *F table* was 3.2043. Therefore, the null hypothesis was rejected and it could be concluded that the model has an individual effect and thus should be estimated using FEM or REM as the estimation approach. As stated before in the prior chapter that due to the cross-section units is smaller than the number of coefficients, the constructed model was not able to be run with the REM using Eviews 5.1. Consequently, the

Hausman test could not be tested and the FEM is concluded to be the fittest approach to estimating the model.

**Table 5.2. The Chow Test Result**

$H_0$	SSR 1	SSR 2	Chow-stat	F-table
	(PLS)	(FEM)		( $\alpha=0.05, 2, 45$ )
No Individual Effect	6.38773	5.41515	4.0411	3.2043
<b>Result</b>		<b>Conclusion</b>		
Chow-stat > F-table		There is individual effect; FEM is preferred		
$H_0$ is rejected				

### 5.2.3 The Result of the LM Test

The following step was to conduct the LM test using the equation (4.12) which aimed to detect the presence of heteroscedasticity in the estimation model. Based on the computation of the LM test, the value of LM was 78.0355. On the other hand, the value of the  $\chi^2$ -table ( $\alpha = 0.05, 2$ ) was 5.991. The residual covariance matrix is attached in Appendix 4. Due to the value of LM was higher than the  $\chi^2$ -table; therefore, the null hypothesis was rejected which meant that there was the heteroscedasticity in the estimated model.

**Table 5.3. The LM Test Result**

$H_0$	LM	$\chi^2$ -table
		( $\alpha=0.05, 2$ )
Homoscedasticity	78.0355	3.2043
<b>Result</b>		<b>Conclusion</b>
LM > $\chi^2$ -table		Heteroscedasticity
$H_0$ is rejected		

One of the treatments that could be taken regarding to the problem, was using an option called *white cross-section* in the Eviews 5.1. The estimation result using FEM (*no weights; white cross-section*) is attached in Appendix 5. In conclusion, the fittest estimation approach based on all stages from the preliminary test which has been conducted is the Fixed Effect Model. In addition to that, since FEM does not require an assumption of which the model is free from the serial correlation problem, the autocorrelation test thus can be neglected (Nachrowi and Usman, 2006, p.330 and p.334).

### 5.3 The Result of the Pairwise Granger Causality

In this study, FDI inflow on rubber products industry is assumed to be affected by production in NR. Nevertheless, based on prior empirical studies, it is argued that between the two variables above might have a one way causality from production to FDI, from FDI to production or bi-directional causality. The study must test which of those is the most possible relation between FDI and production so that it would not mislead the constructed model in which FDI is affected by production.

Table 5.4. below presents the summary result of the PGC test between production on NR and FDI inflow in rubber products industry on each tripartite member countries.

**Table 5.4. The Summary of the Pairwise Granger Causality**

Null Hypothesis	F-stat	Prob	Result and Interpretation	
PROD_IND does not Granger Cause FDI IND	10.09	0.01	<i>H0</i> is rejected	One way direction from production on NR to FDI inflow on rubber products industry (in Indonesia)
FDI_IND does not Granger Cause PROD IND	0.01	0.91	<i>H0</i> is Accepted	
PROD_THAI does not Granger Cause FDI THAI	8.76	0.01	<i>H0</i> is rejected	One way direction from production on NR to FDI inflow on rubber products industry (in Thailand)
FDI_THAI does not Granger Cause PROD THAI	0.004	0.95	<i>H0</i> is Accepted	
PROD_MAL does not Granger Cause FDI MAL	0.43	0.52	<i>H0</i> is Accepted	No relation between production on NR to FDI inflow on rubber products industry (in Malaysia)
FDI_MAL does not Granger Cause PROD MAL	1.72	0.21	<i>H0</i> is Accepted	

Based on PGC test, this study found that there is one way direction of causality between production on NR leading to FDI on rubber products industry in Indonesia and Thailand. On the other hand PGC test did not find any relation between those variables in Malaysia.

Nevertheless, since the construction model takes into account the tripartite member countries as one unity under ITRO, the majority result might be taken as the result of which production on NR leading to FDI on rubber products industry



in tripartite member countries. Consequently, this study assumes that the higher level of production on NR indicates the higher the incentive to invest in the tripartite member countries.

## 5.4 Empirical Result and Interpretation

### 5.4.1 Empirical Result

From the previous sub-chapter, it can be concluded that the fittest estimation approach in accordance with the panel data regression is the FEM (*no weights; white cross-section*). The report on the empirical results based on pooled data for three ITRO member countries over the period 1990-2007 thus can be summarized in the table 5.5. and 5.6. below:

**Table 5.5. Parameter Estimates of the Fixed Effect Model**

FDI inflow on Rubber Products Industry [LOG (FDI?)] as a Dependent Variables		
Variables	Expected sign	Coefficient
C	+/-	-4.4822* (2.2314)
LOG (PROD?)	+	0.3801** (0.1807)
LOG (RGDP?)	+	0.2837* (0.1430)
OPEN?	+	0.0042* (0.0024)
LOG (RER?)	+	0.2676** (0.1542)
D <sub>ITRO?</sub>	+	0.3873*** (0.1311)
R <sup>2</sup>	0.6253	
Adj R <sup>2</sup>	0.5682	
DW-stat	0.72	

Note: The numbers in parentheses are the standard error

\*\*\* The statistic significance at  $\alpha=1\%$

\*\* The statistic significance at  $\alpha=5\%$

\* The statistic significance at  $\alpha=10\%$

Table 5.6. Country Specific Intercepts of the FEM

Countries	Fixed effects
Indonesia	-1.1162
Thailand	0.5328
Malaysia	0.5834

The regression result is described as follows:

$$\ln(FDI)_{it} = -4.4822 + 0.3801\ln(PROD)_{it} + 0.2837\ln(RGDP)_{it} + 0.0042(OPEN)_{it} + 0.2676\ln(RER)_{it} + 0.3873(DITRO)_{it} + e_{it} \dots\dots\dots(5.1)$$

#### 5.4.2 The Interpretation of the Estimation Result

The main findings of the study are as follows. The dummy variable, i.e. time for implementing of ITRO, turned out to be significant and have positive impact on FDI inflow on rubber products industry. In line with that, the other variables, i.e. production on natural rubber, RGDP, degree of openness and RER, also turned out to be significant and have positive impact on FDI inflow on rubber products industry. In detailed, the interpretation of each independent variable is described as follows.

##### 5.4.2.1 The Production on Natural Rubber

In relation with production on natural rubber, the model proves significant acceptance ( $\alpha = 5\%$ ) of the hypothesis. The increasing production on natural rubber in tripartite member countries increases FDI inflow on rubber products industry to these countries. As these results show, the elasticity of FDI inflow on rubber products industry with respect to production on natural rubber is about 0.38%, suggesting that if the production on natural rubber goes up by 1%, on average, the FDI inflow on rubber products industry goes up by about 0.38% (*ceteris paribus*).

Natural rubber is known as the major input for most of rubber based industry; therefore, the higher the production of natural rubber would encourage investors to invest more on rubber based industry particularly in tripartite member countries. In this respect, the relationship of FDI inflow on rubber products

industry with respect to production on natural rubber is inelastic which indicates that FDI inflow on rubber products industry is relatively less responsive to changes on production on natural rubber.

#### 5.4.2.2 The Real Gross Domestic Product

The model also supports the market size hypothesis that large market size has a positive impact on FDI, in this respect, FDI on rubber products industry. It proves the hypothesis in statistic significant at 10%. The result shows that the elasticity of FDI inflow on rubber products industry with respect to real gross domestic product is about 0.28%, suggesting that if the real gross domestic product goes up by 1%, on average, the FDI inflow on rubber products industry goes up by about 0.28% (*ceteris paribus*).

The increase on RGDP not only indicates high demand, prospects for economies of scale, good economic health and absorptive capacity, but also indicates a country's power to import such intermediate goods for supporting their industry. In this respect, the relationship of FDI inflow on rubber products industry with respect to RGDP is inelastic which indicates that FDI inflow on rubber products industry is relatively less responsive to changes on RGDP.

#### 5.4.2.3 The Real Exchange Rate

As it is stated that the real exchange rate measures a country's competitiveness in international trade, a rise in the exchange rate in terms of host country currency over the home country currency favors home country purchases of host country assets and, with respect to relative labor cost, a real depreciation of the host country currency allows home country investors to hire more labor for a given amount of the home country currency. Therefore, it is associated with an increase in inward FDI in the host country.

The estimated model proves that the coefficient of the RER is positive and significant at 10%. According to the estimated model, the elasticity of FDI inflow on rubber products industry with respect to real exchange rate is about 0.27%, suggesting that if the real exchange rate goes up by 1%, on average, the FDI inflow on rubber products industry goes up by about 0.27% (*ceteris paribus*). In

this respect, the relationship of FDI inflow on rubber products industry with respect to RER is inelastic which indicates that FDI inflow on rubber products industry is relatively less responsive to changes on RER.

#### 5.4.2.4 The Degree of Openness

The degree of openness suggests how a country is being integrated into the new economic order. It implies that the more outward oriented tripartite members' economies, indicated by the higher ratio of the degree of openness, will attract more FDI inflow. The estimated model proves that the coefficient of the degree of openness is positive and significant at 10%.

Having the semilog model (log-lin model) on the degree of openness variable, the one that might be directly interpret is the relative change in FDI (the regressand) with respect to the degree of openness (the regressor), i.e. the semielasticity or the rate of growth.

The rate of growth (over a period of time) can be found by taking the antilog of the estimated coefficient and subtracting 1 from it and multiplying the difference by 100. As a result, the rate of growth on FDI inflow on rubber products industry is about 0.42%. In this respect, if the ratio of the degree of openness goes up by 1%, the FDI inflow goes up by about 0.42% (*ceteris paribus*).

#### 5.4.2.5 The Forming of ITRO (dummy variable)

It is presumed that trade discrimination represented by the time of the implementation of ITRO would affect non member countries to change from trade to investment by investing in rubber products in member countries. A new form of limited regional relations, i.e. ITRO, was established in 2001 by Indonesia, Thailand and Malaysia with an objective to control the price of natural rubber. Therefore, the model uses the time of the implementation of ITRO as dummy variable of 0 before 2001 and 1 after.

The estimated model proves significant acceptance of the hypothesis as the implementation of ITRO, represented by the dummy variable, has a positive

relation with respect to FDI inflow on rubber products industry and significant at 1%. The coefficient of the dummy variable is about 0.387.

Since the regressor is dummy variable and the regressand is logarithmic, the relative change in the regressand (i.e. semielasticity), with respect to the dummy regressor can be obtained by taking the antilog (to base e) of the estimated dummy coefficient and subtract 1 from it and multiply the difference by 100. Consequently, the percentage change is about 47.26%, suggesting that after the implementation of the ITRO ( $D=1$ ), *ceteris paribus*, the FDI inflow on rubber products industry is higher by about 47.26% compared to the time before the implementation of ITRO.

The objectives of ITRO are to revive natural rubber prices to levels which are remunerative to producers and to manage the imbalance in supply over demand, which has largely resulted in the depressed prices. In order that the objective can be achieved, there are two mechanisms on ITRO, i.e. the Supply Management Scheme (SMS) and the Agreed Export Tonnage Scheme (AETS). While the SMS is aimed to control natural rubber production in the long term, the AETS is aimed to control the quantity of exported rubber. Non member countries will invest in one or more of these three countries to capture the incentives due to this kind of market force. This explains why FDI inflow on rubber products industry has increased in tripartite member countries with regard to the implementation of this cooperation scheme.

As the ITRO represents the oligopoly scheme created by Indonesia, Thailand and Malaysia, a huge discriminatory trade policy was created by them. From the objective of ITRO which stated above, it can be concluded implicitly that whenever the market price of natural rubber is falling, ITRO decreases its output. In other word, when the price of natural rubber is rising, ITRO would attempt to increase its output. Moreover, when market price is steady, ITRO keeps its output unchanged. Indeed, this is exactly a kind of behavior expected of a competitive producer. Following the requirements needed on the oligopoly scheme, thus in order that ITRO might be successful in achieving its objective, Indonesia, Thailand and Malaysia as ITRO's member countries should conduct a cooperative collusion.

## CHAPTER 6

### CONCLUSION AND RECOMMENDATION

#### 6.1 Conclusion

The objective of this study has been to analyze the relationship between the oligopoly scheme on natural rubber products (ITRO) which comes from the supply side (producers, i.e. Indonesia, Malaysia and Thailand) and investment creation from non member states (FDI inflow) on rubber products industry. In addition, this study also attempt to investigate other potential factors that affect inflow of FDI on rubber products in the tripartite member countries and also to find out the significance as well as the elasticity of the intended factors (independent variables) with relation to FDI inflow as the dependent variable.

For this purpose, the study used a panel data observation for the three member of the organization over the period of 1990-2007. The fixed effects model is employed for the estimation of the relationship of FDI inflow on rubber products industry with the oligopoly scheme and its potential common determinants based on the panel data.

Based on the result and analysis of the regression on FDI inflow on rubber products industry in the ITRO member countries (i.e. Indonesia, Thailand and Malaysia), a number of conclusions can be drawn from the study, which are summarized as follows.

- a. The study shows that the implementation of the oligopoly scheme from the tripartite member countries (i.e. Indonesia, Thailand and Malaysia), represented by the dummy variable of the time implementation of ITRO, has a positive and significant relation with respect to FDI inflow on rubber products industry. The result also indicates that after the implementation of the ITRO, the FDI inflow on rubber products industry is higher compared to that before. The objectives of ITRO are to revive natural rubber prices to levels which are remunerative to producers and to manage the imbalance in supply over demand, which has largely resulted in the depressed prices. This kind of market forces will encourage non member

countries to invest in one or more of these three countries to capture the incentive through this oligopoly scheme.

- b. The natural rubber production has a positive and significant influence on FDI inflow on rubber products industry. Natural rubber is known as the major input for most of rubber based industry; therefore, the higher the production of natural rubber would encourage investors to invest more on rubber based industry in tripartite member countries due to the availability of the intermediate goods. Given the fact that there is still much debate regarding the causality relation between FDI and production, this study assessed this relation through PGC test. The result indicates the existence of causality in production on NR leading to FDI inflow on rubber products industry in tripartite member countries, but not vice versa. This result seems to confirm the prior conclusion stated before. In this respect, the relationship of FDI inflow on rubber products industry with respect to natural rubber production is inelastic which indicates that FDI inflow on rubber products industry is relatively less responsive to changes on production on natural rubber.
- c. The real gross domestic product (RGDP) has a positive influence and significant on FDI inflow on rubber products industry. The result supports the market size hypothesis that the increase on RGDP indicates high demand, prospects for economies of scale, good economic health and absorptive capacity; therefore, the higher the RGDP would encourage investors to invest more on rubber based industry in tripartite member countries. In other words, the result is consistent with market seeking behavior of multinational corporations. In this respect, the relationship of FDI inflow on rubber products industry with respect to RGDP is inelastic which indicates that FDI inflow on rubber products industry is relatively less responsive to changes on RGDP.
- d. The real exchange rate (RER) has a positive influence and significant on FDI inflow on rubber products industry. The RER measures a country's competitiveness in international trade, a rise in the exchange rate in terms of host country currency over the home country currency favors home

- country purchases of host country assets and, with respect to relative labor cost, a real depreciation of the host country currency allows home country investors to hire more labor for a given amount of the home country currency. Therefore, the real depreciation tends to make the FDI inflow on rubber products industry increase in tripartite member countries. In this respect, the relationship of FDI inflow on rubber products industry with respect to RER is inelastic which indicates that FDI inflow on rubber products industry is relatively less responsive to changes on RER.
- e. The degree of openness has a positive influence and significant on FDI inflow on rubber products industry. As the degree of openness suggests how a country is being integrated into the new economic order, it implies that the more outward oriented tripartite members' economies, indicated by the higher ratio of the degree of openness, will attract more FDI inflow. In the case of the degree of openness was not using the term of natural logarithm in the regression model, then the direct result of the estimated model indicates the rate of growth of the FDI inflow on rubber products industry in tripartite member countries (the semielasticity).
- f. The inelastic relationship of FDI inflow on rubber products industry with respect to its determinant factors, i.e. natural rubber production, RGDP and RER, indicates that the decision on investing faced by the investors with respect to those variables is not a spontaneous causality. The FDI inflow on rubber products industry in tripartite member countries therefore is less responsive to changes on its determinant factors (partially). Nevertheless, among the respected variables, natural rubber production is the most elastic variables affecting FDI inflow on rubber products industry, followed by RGDP and RER. Thus, it indicates that the availability of natural rubber as major input for rubber products industry plays an important role on encouraging investors on rubber products industry.



## 6.2 Recommendation

### 6.2.1 Policy Implication

- a. The implementation of ITRO by Indonesia, Thailand and Malaysia is based on the common interest of the member countries to cooperate in furthering the interest of the rubber smallholders and the rubber industry in their respective countries. There are several things to be underlined with respect to this organization. Firstly, they have the same interest on the same commodity, namely natural rubber. They are the major producers and the largest exporters of natural rubber in the world; therefore, they agreed to found an organization, based on one of their main commodity, which might able to benefit them in the international environment. Secondly, they reside in the same region, i.e. the south-east Asia, thus it can be considered as a sub-regional cooperation. This fact supports the particular cooperation, suggesting that they are able to interact effectively. Thirdly, since the objective of ITRO is to control the international price of natural rubber; hence, this cooperative producer action is a kind of internal market force that is proven by this study affecting non member states to change from trade to investment by investing in rubber products in the tripartite member countries. All of these facts have an implication that in terms of creating investment, the government of Indonesia, along with the government of Thailand and Malaysia have to conduct a cooperative collusion to be lasted in the long run, in which they have to design an up-to-date credible policy mechanism (i.e. incentive and penalty mechanism) to avoid one or more member countries "cheating".
- b. The tripartite member countries should also take into account the long run effect of this cooperation which might result in the declining of its world market share since non member countries would respond in the search of additional supplies. In addition, buying countries will also respond in the search for substitutes of natural rubber which make their long-run demand curve for imports of the product is more elastic than their short-run demand curve. These imply that the tripartite member countries probably

would be wise to charge a lower mark up so that the erosion of its market share would be slowed down.

- c. In accordance with existing different types of discriminatory trade policy occurred in south-east Asia which stated in the first chapter, i.e. from external factor (e.g. RPN, SIJORI and SEZ) and from internal factor (e.g. AFTA), the oligopoly scheme might be a complementary to those existing cooperation form. In addition, with respect to boosting the FDI inflow from foreign, the internal factors of discriminatory trade policy tends to be more effective since the member states have the power to arrange and control the rule of the game.
- d. Since the cooperation under ITRO is classified as one of discriminatory policies in trade and the tripartite member countries are also the members of the World Trade Organization, sooner or later they have to deal with the WTO rules which are opposed to trade discrimination in principle. One of the possible results from trade discrimination is the complaint from other countries, i.e. the importing countries with respect to injury in their national well-being. Having the possibility of that, the tripartite should anticipate that with reasonable reasons and justification on doing such cooperation.

#### **6.2.2 Recommendation on Future Study**

- a. In this study the author did not take into account the price the investment climate factors which might play an important role in determining the FDI inflow, in this respect on rubber product industry, and the existence of the cooperation. Consequently, the author suggests using these factors for further investigations.
- b. Moreover, the author also did not take into account the non-economic factor such as, political instability, bureaucratic bottlenecks and law and order situation of the country with respect to the constructed model; therefore, the author suggests using these factors for further investigations.
- c. This study did not use the exports on rubber products due to the fact that FDI and exports might have the simultaneous effect since they both can be

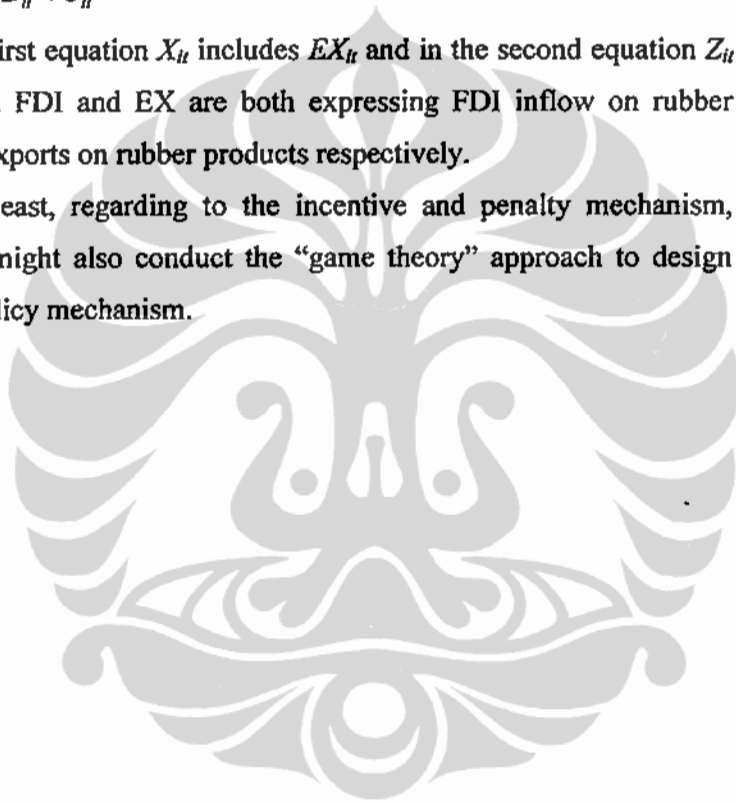
either substitutes or compliments. Therefore, for further and more comprehensive investigations, the author suggest to adding exports on rubber and rubber product and build a simultaneous model based on the presumption that both FDI and exports might become the independent variable at the same time. The following simultaneous model would be as follows.

$$FDI_{it} = \alpha_i + \beta X_{it} + \varepsilon_{it}$$

$$EX_{it} = \delta_i + \theta Z_{it} + \varepsilon_{it}$$

where, in the first equation  $X_{it}$  includes  $EX_{it}$  and in the second equation  $Z_{it}$  includes  $FDI_{it}$ . FDI and EX are both expressing FDI inflow on rubber products and exports on rubber products respectively.

- d. Last but not least, regarding to the incentive and penalty mechanism, further study might also conduct the “game theory” approach to design that kind of policy mechanism.

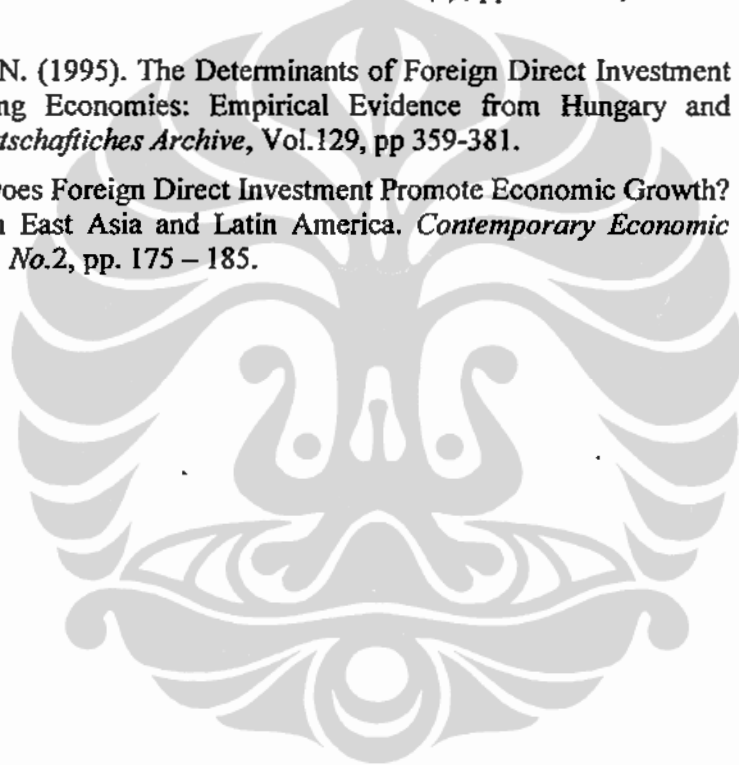


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## Appendix 1

## Facilities for FDI Investors in Indonesia, Malaysia and Thailand

Investment Incentives	Indonesia	Malaysia	Thailand
<b>Import Tariff</b>	Imported Input VAT 10%; Dividend Tax 20%; Average Corporate Profit Tax 20%;	Imported Input VAT 10%, Dividend Tax 10%, Average Corporate Profit Tax 23%	Imported Input VAT 5%-10%, Dividend Tax 10%-15%, Average Corporate Profit Tax 27%
<b>Cost of Doing Business (selected indicators)</b>	Average Minimum Wage/month: US\$75; Water/m <sup>3</sup> : US\$1.2; Industry (III): Loading Cost US\$2.97; Usage Cost/kVA: US\$ 0.05; Phone/minute at peak time: US\$0.25; Internet/month: US\$49.5	Average Minimum Wage/month: US\$151; Water/m <sup>3</sup> : n/aUS\$; Industry (III): Loading Cost n/aUS\$; Usage Cost/kVA: n/aUS\$; Phone/minute at peak time: US\$0.26; Internet/month: US\$86.7	Average Minimum Wage/month: US\$170; Water/m <sup>3</sup> : US\$0.35; Industry (II): Loading Cost US\$6.26; Usage Cost/kVA: n/aUS\$; Phone/minute at peak time: US\$0.1; Internet/month: US\$43.73

Source: based on data from ASEAN Secretariat, BKPM Indonesia, MIDA Malaysia, BOI Thailand, 2008 in Verico (2008)

## Appendix 2

## The Result of the Pooled Least Square Model Regression (no weights)

Dependent Variable: LOG(FDI?)				
Method: Pooled Least Squares				
Date: 11/26/08 Time: 02:06				
Sample: 1990 2007				
Included observations: 18				
Cross-sections included: 3				
Total pool (balanced) observations: 54				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.712050	2.331775	-2.449657	0.0180
LOG(RGDP?)	0.253773	0.130851	1.939395	0.0583
LOG(PROD?)	0.803795	0.191743	4.192035	0.0001
OPEN?	0.002364	0.002262	1.045128	0.3012
LOG(RER?)	-0.017541	0.037980	-0.461863	0.6463
DITRO?	0.364408	0.145768	2.499908	0.0159
R-squared	0.558017	Mean dependent var		3.570736
Adjusted R-squared	0.511977	S.D. dependent var		0.522195
S.E. of regression	0.364798	Akaike info criterion		0.925494
Sum squared resid	6.387730	Schwarz criterion		1.146492
Log likelihood	-18.98834	F-statistic		12.12029
Durbin-Watson stat	0.584779	Prob(F-statistic)		0.000000



## Appendix 3

## The Result of the Fixed effect Model Regression (no weights)

Dependent Variable: LOG(FDI?)				
Method: Pooled Least Squares				
Date: 11/26/08 Time: 02:08				
Sample: 1990 2007				
Included observations: 18				
Cross-sections included: 3				
Total pool (balanced) observations: 54				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.482206	3.991910	-1.122823	0.2673
LOG(RGDP?)	0.283706	0.172420	1.645434	0.1067
LOG(PROD?)	0.380133	0.242267	1.569064	0.1235
OPEN?	0.004196	0.003370	1.245359	0.2193
LOG(RER?)	0.267621	0.388051	0.689654	0.4939
DITRO?	0.387260	0.137504	2.816362	0.0071
Fixed Effects (Cross)				
_IND--C	-1.116186			
_THAI--C	0.532834			
_MAL--C	0.583352			
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.625312	Mean dependent var	3.570736	
Adjusted R-squared	0.568295	S.D. dependent var	0.522195	
S.E. of regression	0.343104	Akaike info criterion	0.834390	
Sum squared resid	5.415149	Schwarz criterion	1.129054	
Log likelihood	-14.52852	F-statistic	10.96698	
Durbin-Watson stat	0.715393	Prob(F-statistic)	0.000000	

## Appendix 4

## The Result for the LM Test

## The Residual Covariance Matrix

	_IND	_THAI	_MAL
_IND	0.173839	0.014076	0.039623
_THAI	0.014076	0.051552	-0.03103
_MAL	0.039623	-0.03103	0.07545

	_IND	_THAI	_MAL
_IND	0.936826	0.994808	0.985419
_THAI	0.994808	0.981051	1.011491
_MAL	0.985419	1.011491	0.972328

The sum of the diagonal on matrix above describes  $\sum_{i=1}^n \left[ \frac{\sigma_i^2}{\sigma^2} - 1 \right]^2$ , i.e. 2.890204.

After multiplying it with  $T/2$ , i.e.  $54/2=27$ , the result would be 78.03552. The result then has to be compared with the  $\chi^2(\alpha=0.05, 2)$  table. Since the LM value is higher than the  $\chi^2(\alpha=0.05, 2)$  table, 3.2043, the null hypothesis is rejected indicating that there is heterocedasticity problem.

## Appendix 5

## The Result of the Fixed effect Model Regression

(no weights; white cross-section)

Dependent Variable: LOG(FDI?)				
Method: Pooled Least Squares				
Date: 11/26/08 Time: 02:09				
Sample: 1990 2007				
Included observations: 18				
Cross-sections included: 3				
Total pool (balanced) observations: 54				
White cross-section standard errors & covariance (no d.f. correction)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.482206	2.231439	-2.008661	0.0505
LOG(RGDP?)	0.283706	0.143041	1.983390	0.0533
LOG(PROD?)	0.380133	0.180777	2.102776	0.0410
OPEN?	0.004196	0.002393	1.753838	0.0861
LOG(RER?)	0.267621	0.154272	1.734730	0.0895
DITRO?	0.387260	0.131148	2.952849	0.0049
Fixed Effects (Cross)				
_IND-C	-1.116186			
_THAI-C	0.532834			
_MAL-C	0.583352			
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.625312	Mean dependent var		3.570736
Adjusted R-squared	0.568295	S.D. dependent var		0.522195
S.E. of regression	0.343104	Akaike info criterion		0.834390
Sum squared resid	5.415149	Schwarz criterion		1.129054
Log likelihood	-14.52852	F-statistic		10.96698
Durbin-Watson stat	0.715393	Prob(F-statistic)		0.000000