

**THE DETERMINANTS OF US OUTGOING FDI
IN THE FOOD-PROCESSING SECTOR**

by

Lei Xun

A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Master of Science with a major in Agricultural and Resource Economics

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Lei Xun

Approved: _____
Titus O. Awokuse, Ph.D.
Professor in charge of thesis on behalf of the Advisory Committee

Approved: _____
Thomas W. Ilvento, Ph.D.
Chair of the Department of Food and Resource Economics

Approved: _____
Robin W. Morgan, Ph.D.
Dean of the College of Agriculture and Natural Resources

Approved: _____
Conrado M. Gempesaw II, Ph.D.
Vice Provost for Academic and International Programs

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ABSTRACT

Foreign direct investment (FDI) plays an important role in economic growth and development. In line with the rapid growth in FDI in the agro-food sector, more and more attention has been placed on the discussion of the determinants of FDI. There has not been a consensus on the determinants of FDI. Some of the most frequently analyzed factors affecting FDI includes: market size, relative labor costs, interest rates, import protection, exchange rates, export orientation, market structure, geographical distance, political stability, and cultural similarity. This thesis applies the knowledge-capital model to the food-processing sector by examining the determinants of U.S. outbound FDI in the food-processing sector. The results suggest a positive relationship between joint market size and U.S. FDI presence. Relative skill endowment affects FDI level negatively, which conforms to the findings in previous empirical works on all industries that skill convergence encourages U.S. outbound FDI. Exchange rate is also found to have a negative effect on FDI sales.

Chapter 1

INTRODUCTION

1.1 Introduction

According to the definition given by the Bureau of Economic Analysis, Foreign direct investment (FDI) is the investment in which a resident of one country obtains a lasting interest in, and a degree of influence over, the management of a business enterprise in another country. U.S. direct investment abroad is the ownership or control, directly or indirectly, by one U.S. person, or entity, of 10 percent or more of the voting securities of an incorporated foreign business enterprise or an equivalent interest in an unincorporated foreign business enterprise.

Multinational enterprises (MNEs) have been growing fast during the last decade, and have become one of the most important economic links between countries. MNEs play a central role in organizing the international protection process by setting up affiliates in different locations to combine production activities and internalize international transactions. Currently, a total of more than 61,000 MNEs world-wide have more than 900,000 foreign affiliates, accounting for one-third of world export, and one tenth of the total world GDP. (World Investment Report 2004)

Foreign direct investment (FDI) has become the leading means for U.S. processed food companies to participate in international markets. As a more efficient way to generate revenue and reach foreign markets, FDI is very important to the processed food industry. By using FDI, firms in the home country can enter markets

where exports are restricted. For example, Canada's high trade barrier for dairy products induced more FDI into this sector. For countries with lower labor costs, FDI is more economical relative to export. Another important benefit is that the products are more adapted to local taste and can better serve the needs of the local market.

The majority of U.S. FDI in the food sector goes to developed economies with Western Europe as the leading destination, accounting for over 40 percent of the total. The United Kingdom, France, and the Netherlands together account for more than half of U.S. FDI in Europe. As many developing countries are reforming their business and investment policies with a desire to attract foreign investment, especially since the 1990s, the market potential in developing countries for U.S. food companies have greatly expanded. As a result, the share of U.S. FDI flows to developing countries has been increasing to Latin American nations (e.g. Brazil and Argentina), and Asian nations (e.g. China).

Parallel to the increased FDI activity, several studies have been done on the determinants of FDI in the food processing sector. The decision to invest in the foreign country may be affected by a lot of factors. Basically, multinational enterprises (MNEs) choose FDI either to enter the foreign markets or to decrease costs. The most common factors considered are market size, relative labor costs, interest rates, import protection, exchange rates, export orientation, market structure, geographical distance, political stability, and cultural similarity.

1.2 Overview of Previous Research on FDI

The surge in world FDI flows in the last decade has made FDI a more important factor for international economic integration, and its importance has encouraged the theoretical and empirical studies of multinational activities. Different

approaches based on either macro or micro economic theory have been taken to investigate the choice and behavior of multinational enterprises.

Early literature on MNEs were dominated by macroeconomic approaches, which began with the capitalization rate theory. This theory stated that the return on capital differs among different countries, and this difference motivates FDI to move from countries with strong currencies to countries with relatively low rates of capitalization. Since this theory did poorly in predicting international investment flows, alternative international trade theories were developed to explain the patterns of trade with comparative advantages in different countries.

The theory of comparative advantages was formulated by Ricardo and developed by Heckscher and Ohlin. Ricardo explained trade patterns among countries with the factor endowments differences. According to Ricardo, each country should specialize in producing the good with lower opportunity cost than the other country, and this specialization forms the basis of trade. In Heckscher-Ohlin model the differences in comparative advantages among nations are derived from different relative costs of the separate factors of production. International trade between different countries is realized by exporting products that employ large portions of relatively abundant factors and importing those that use relatively scarce factors of production.

The concept of comparative advantage in international trade economics can be borrowed to explain flows of capital among nations, for example, the factor proportion theory of capital movements and the theory of product cycle. The 'factor proportion theory of capital movements' based on Heckscher-Ohlin model explains that if the difference between the marginal product in different countries exceeds the

transportation cost, factors of production would move from high cost country to low cost country. Theories of the product cycle proposed by Vernon (1966) incorporate the dynamics of technological change into the Hechsher Ohlin model to explain international division of labor. The product cycle can be divided into different stages, and in different stages the location of production may change based on relative factor cost consideration. While in the early stages, the uncertainty and low price elasticity keep production in the high wage country, as the products mature the firm tends to transfer production to low-cost locations as technology becomes more difficult to protect and price elasticity increases.

FDI can be of two types, horizontal and vertical. Horizontal multinationals are multi-plant firms that produce similar goods and services in different locations, with their headquarters located in one of the locations. Vertical multinationals are single-plant firms that separate headquarters and plants in different countries, with headquarter located where labor skill level is much higher than the other locations, thus geographical fragmenting the production process by stages. MNEs in developed countries are typically vertical firms, and horizontal firms are the prevalent form of FDI around the world. Along the development of trade theory, the growing dominance of MNEs in the industry led to the inclusion of MNE activities in the new trade theory. The early models considered only one type of investment, either horizontal or vertical. Helpman (1984) and Helpman and Krugman (1985) constructed a vertical model of multinationals that explained FDI with differences in the relative factor endowments. The firm engage in two kinds of activities, corporate and production sector, which can be separated without additional costs. As the two activities require different capital intensity, the firm would locate them in different locations to take advantage of factor

endowment difference. The weakness of this model is that no FDI would appear between countries with similar endowments, which conflicts with the real world MNE situation. Markusen (1984), and Markusen and Venables (1998) constructed the early horizontal models. The horizontal models assume firm-level economies of scale, and with the presence of trade costs, multinationals would tend to move production abroad as the trade costs rise. In this case multinational activity tend to occur among countries with similar factor proportions.

How to incorporate both types of MNEs into a theoretical model has been a problem. Due to the prevalence of horizontal firms, previous theoretical work has focused primarily on horizontal models. These models assumed either no difference in the use of factors of production for different production stages, or only one factor of production used, thus eliminating the factor-price motive for vertically fragmenting production across nations. On the other hand, vertical models assume no trade cost, which would exclude horizontal MNEs under plant-level scale economies.

The theoretical attempts to integrate both types of FDI into one integrated framework have only appeared recently under the name of knowledge-capital model (KK model), which was developed by Carr, Markusen and Maskus (1997, 2001) based on the general-equilibrium trade theory. By including trade costs and different factor intensities across activities, KK model accounts for both vertical and horizontal investment. This thesis will follow the KK framework for the empirical analysis of FDI determinants in the food sector.

In the case of the food processing industry, Bhuyan, et al. (1997) and Kim, et al. (1987), Wann, et al. (1992), Huang, et al. (1996), and Alston, et al. (1997)) have investigated FDI activity as a firm's choice under an oligopoly or oligopsony. In a

Study of the processed foods sector by Bolling, Neff, and Handy (1998), they found a complementary relationship between trade and FDI. Gopinath, Pick and Vasavada (1999) analyzed the choices for a multinational firm between exports and overseas production by investigating foreign activities of the U.S. processed food industry in ten developed countries for the time period 1982-94. The results indicate that foreign sales and exports are substitutes in the U.S. processed food industry, and that host country producer protection increased foreign sales. Marchant, Cornell and Koo (2002) found a complementary relationship between FDI and exports, and that interest rates, exchange rates, gross domestic product (GDP), and compensation rates are important variables that influence U.S. FDI into East Asian countries.

1.3 Objectives

The purpose of this thesis is to contribute to the discussion of the determinants of U.S. outflow of FDI by applying the knowledge-capital model to panel data on the U.S. outgoing FDI in the food processing sector for 19 developed countries over the period of 1984 – 2002 and 20 developing countries covering 1990-2002. Fixed effect model will be employed to analyze the effect of factors on FDI activity.

1.4 Outline of the Thesis

The remainder of this thesis is organized as follows. Chapter 2 will provide introduction to the distribution and composition of U.S. FDI in the food-processing sector. The global FDI in the food processing sector will also be introduced. Chapter 3 will provide the theoretical background of the Knowledge-Capital model and chapter 4 gives literature review on the determinants of FDI. Chapter 5 will

describe the data and explain the empirical methodology. Chapter 6 gives the empirical results, and conclusions will be presented in Chapter 7.

Chapter 2

OVERVIEW OF FDI IN THE FOOD-PROCESSING SECTOR

This chapter first presents an overview of the global FDI situation and its importance. Then an introduction to the global as well as U.S. food-processing sector FDI is given. Barriers to the international trade of processed food are also discussed.

2.1 Global FDI Situation

Foreign direct investment (FDI) is a kind of capital movement across national frontiers that gives the investor control over the acquired foreign asset. More specifically, FDI in the U.S. is ownership or control, direct and indirect, by one foreign person, of 10 percent or more of the voting securities of a U.S. business enterprise (Bureau of Economic Analysis, 2001). U.S. Firms that meet this standard are known as multinational enterprises (MNE), and oversea plants of a U.S. MNE are known as its foreign affiliates.

Foreign direct investment (FDI) plays an important role in economic growth and development. It links the global market by providing goods and services to foreign markets. In 2001, foreign affiliates accounted for one tenth of world GDP and one third of world exports. FDI also integrates the global production systems both on the vertical and horizontal level, and by doing so, leading to a lasting effect of capital, technology, know-how and skill. FDI is particularly beneficial to developing countries for it can enhance domestic production and hence stimulate employment and long-term economic growth. During the last decade, annual flow of global FDI has

increased greatly from about \$60 billion in 1980s to \$1.3 trillion in 2000 (World Investment Report 2001 & 2002).

The distribution of FDI flow in recent years has two features. First, the majority of FDI flow is between developed countries (see figure 2.1). Most merging and procurements took place between companies from U.S. and EU. Second, although the size of FDI flows to developing and transition economies is relatively small, it has been growing in the past decade. Historically, various restrictions had deterred FDI flows into developing countries. In the 1970s, out of fears that introducing multinational corporations may lead to a loss of sovereignty, many developing countries financed their development projects with bank loans. The debt crisis of the 1980s and the following export-oriented development strategies in the 1990s changed those countries' attitude towards FDI.

Compared to the last decade, the total stock of inward FDI to developing countries have grown more than five times (United Nations Conference on Trade and Development). FDI flows into the developing countries are highly concentrated in certain countries and regions, mostly large developing countries, led by China, Brazil, and Mexico. Between 1990 and 2000, 10 countries received 76 percent of the total FDI flowing into developing countries (see table 2.1). Even though compared with the world's total they are a small part, FDI inflows to developing countries may comprise a large part of total national investment or GDP in a particular country. Between 1996 and 1999, for example, FDI comprised about 10 percent of GDP in Bolivia, 26 percent in Lesotho, and 26 percent in Thailand. In the case of Africa, FDI mostly goes to few nations with rich natural resources, like South Africa and Nigeria. While development of FDI has been fast in some Asia Pacific and African nations, the world poorest

countries have failed to attract FDI. On the whole, among the total FDI flow to developing countries, 20 developing countries received 90 percent, while the other less developed countries received only 10 percent (World Investment Report 2002-04).

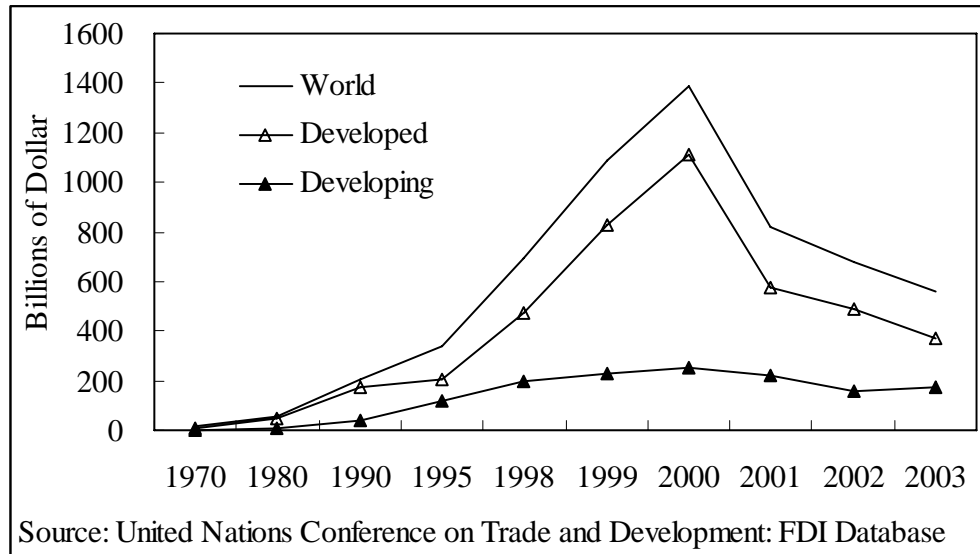


Figure 2.1 Global FDI Inflow

2.2 U.S. Food-Processing Sector FDI

2.2.1 U.S. FDI Flow in the Food-Processing Sector

The U.S. is one of the major sources as well as recipients of FDI. As of 2003, total stock of the U.S. outward FDI was \$US 1.79 trillion, and U.S.-owned assets abroad increased to \$7,202.7 billion. The share of the outgoing FDI has been larger than the incoming FDI since 1986, and the difference has been increasing greatly especially after 1997. The net international investment position of the U.S.

valued at current cost was estimated at -\$2,430.7 billion, an increase of \$197.7 billion from 2002. (U.S. Bureau of Economic Analysis online data service). As demonstrated in table 2.1 and 2.2, the U.S. outgoing FDI to the developing countries concentrates in certain countries and regions, similar to the case of U.S. FDI to developed countries. Table 2.1 gives the list of ten largest developing country recipients of U.S. outgoing FDI, and table 2.2 lists the ten largest developing country recipients in food processing sector.¹

Processed food products refer to products that have been transformed from raw forms either to extend shelf-life—such as the freezing or dehydration of fruits and vegetables—or to improve consumer palatability of raw commodities—such as transforming grain and animal products into bakery and meat products (ERS Glossary). The U.S. is among the largest investors in foreign food processing industries, accounting for 60 percent of the world's largest multinationals in food processing sector. As the living standard of nations around the world has risen, there has been a growing demand for high-value processed food products, which in turn generated higher degree of FDI activity for the U.S. food multinationals. From 1982 to 2000, the U.S. FDI in food processing sector had been increasing steadily from \$9 billion to \$36 billion. Similar to other parts of the multinational manufacturing sectors, the U.S. FDI in the food processing sector has created sales value higher than export. Also from 1982 to 2000, sales generated by FDI in U.S. food processing sector increased about 280 percent to around \$150 billion, almost five times as high as the value of the U.S. processed food exports (see figure 2.2).

¹ Table 2.2 figures are compiled from majority-owned foreign affiliate sales with data points missing or being withheld.

Table 2.1 Ten Largest Developing Country Recipients of FDI inflows

(Unit: Million US Dollars)

Country	1992-2002 (average)	Country	2002
China	43,428	China	69,680
Brazil	12,000	Mexico	24,731
Mexico	10,149	Brazil	22,457
Argentina	7,181	Bermuda	9,859
Singapore	7,058	Poland	8,830
Malaysia	4,722	Singapore	8,609
Bermuda	4,722	Chile	5,508
Poland	3,705	Czech Republic	4,916
Chile	3,307	Taiwan	4,109
South Korea	3,188	Thailand	3,759
Top 10 total:	99,460		162,458
Developing Total :	130,868		200,891
% of Developing	76%		81%

Source: UNCTAD, World Investment Report 2002

Table 2.2 Ten Largest Developing Country Recipients of Food Sector US FDI

(Unit: Million US Dollars)

Country	1998-2002 (average)	Country	2002
Brazil	6,057	Mexico	6,660
Mexico	5,674	Brazil	6,001
Argentina	3,295	Argentina	3,290
Poland	1,401	Poland	1,656
Venezuela	1,368	Venezuela	1,577
Colombia	702	China	727
Philippines	613	Philippines	666
China	567	Colombia	653
Thailand	509	Thailand	535
Hungary	268	Hungary	232
Top 10 total:	20,454		21,997
Developing	21,686		23,295
% of Developing	94.3%		94.4

Source: U.S. Department of Commerce, Bureau of Economic Analysis

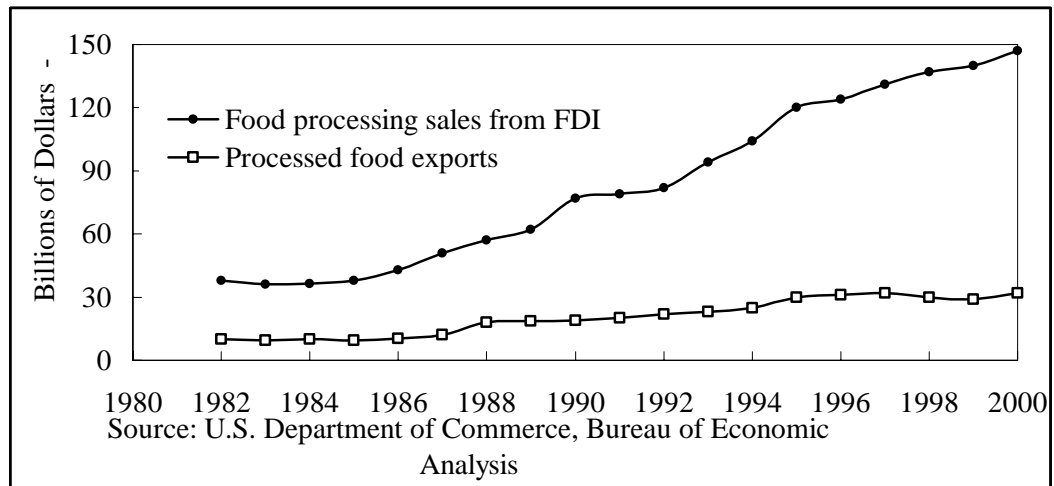


Figure 2.2 Processed Food Sales From U.S. FDI Exceed U.S. Food Exports

The composition of the U.S. outgoing FDI has changed over the years. Before the 1990s the investments in host countries were focused on export-oriented products or relatively low level of processing as flour mills or vegetable oil refineries. As the income levels in the host countries increased, the focus of investment shifted to other more highly processed consumer products for consumption in the host country. Beverage has been the fastest growing industry in attracting U.S. FDI. The largest share of U.S. FDI in food manufacturing goes to the beverage industry powered by its brand strength such as Coca Cola and Pepsi, accounting for nearly 50 percent of the total in 2003. In second place are grain and oilseed milling, accounting for nearly 12 percent. Though dairy sector has been one of the largest food sectors in the United States, it only accounts for 2 percent of U.S. FDI in food manufacturing. (see table 2.3).

Table 2.3 U.S FDI in food manufacturing by Sector and Industry

(Unit: Million U.S. dollars)

Sector and industry	2000	2001	2002	2003
Beverages	11,446	11,571	17,664	20,775
Grain and oilseed milling	4,621	4,889	5,306	5,814
Other food products	8,243	5,883	3,282	5,386
Fruit and vegetable preserving & specialty foods	3,520	3,312	2,691	3,393
Sugar and confectionery products	2,319	2,594	2,369	2,595
Bakeries and tortillas	1,300	2,000	2,049	1,787
Animal foods	1,410	1,238	1,124	1,697
Animal slaughtering and processing	1,595	860	783	937
Dairy products	452	469	650	934
Seafood product preparation and	38	89	87	173
Total food manufacturing	34,943	32,905	36,004	43,492

Source: U.S. Department of Commerce, Bureau of Economic Analysis

2.2.2 Barriers to the U.S. Processed Food Export

Market Access Obstacles for High-Value Foods

Globally, processed foods are still faced with all kinds of obstacles to access foreign markets. Countries use either tariff or non-tariff barriers to control the entrance of processed food products. The adoption of the Agreement on Agriculture (AoA) by the World Trade Organization put agricultural trade under stronger international disciplines. The three main measures of restriction: tariffs, SPS (sanitary and phytosanitary) restrictions, and contingency protective measures have different impacts on market access for high-value foods.

Tariff Protection of High-Value Food Trade

Though the negotiations have resulted in a reduction in the level of agricultural tariffs, the average level is still ten times that of the industrial tariffs, and remain the major distortion to international trade. Many countries set a large proportion of their agricultural tariffs at low or duty-free levels, however, tariff level for import-sensitive products have been maintained at a very high level.

In the Uruguay Round AoA, countries reached agreement on transforming the agricultural barriers through tariffication – a process that converts the non-tariff barriers to tariffs. According the agreement, developed countries will reduce agricultural tariffs by a total of 36 percent, while for each tariff there is a minimum cut of 15 percent. This tariff reduction agenda left countries with considerable flexibility in choosing the level of reduction for different products. Countries can meet their overall tariff-cutting requirement while maintaining the tariff level on sensitive commodities. For example, OECD member countries chose smaller tariff cuts for fully processed products than semi-processed or bulk commodities. For the imports of fully processed products, in Switzerland the cut was 25 percent lower than the average cut on semi-processed products, while in New Zealand, the average cut was 38 percentage points below that on bulk commodities. (USDA, Agricultural Economic Report, 2005).

Tariff escalation is another measure for controlling import, in which tariffs increase with the level of processing. The measure encourages imports of relatively unprocessed agricultural commodities and thus can protect domestic processing industries and capture value added locally. Major importers of food products generally have higher average tariffs on fully processed products than tariffs on bulk commodities and semi-processed products, ranging from 1 percent of the United States to more than 40 percent of Turkey. Tariff escalation was a significant problem

in agricultural trade, particularly for vegetable oils, beef, eggs, cereal products, and tobacco products. (USDA, Agricultural Economic Report, 2005).

WTO Sanitary and Phytosanitary Measures

Aside from tariffs, many other trade restriction measures are available to WTO member countries. Technical measures like SPS restrictions are the most notable instruments. These measures may restrict agricultural trade by preventing the entrance of the goods that may threaten the health of plants, animals, and humans.

For specific imports, while SPS mainly target live animals and animal products, emergency measures are aimed at bulk commodities from countries that have experienced outbreaks of animal diseases like mad cow disease or foot-and-mouth disease. From 1995 to 2003, the animal sector accounted for 74 percent of all emergency measure cases during this period. The next most frequently targeted products were fruits and vegetables, accounting for 12 percent. (USDA, Agricultural Economic Report, 2005).

It is difficult to assess the extent of restrictions of these measures on the trade of agricultural high-value products as many measures target broad categories of goods, the common belief is that it can be significant. Some SPS measures are considered unnecessarily trade restrictive as the higher level of protection is not justified. Processed food has been the industry that is targeted the most, accounting for 87 percent in total. The most frequently targeted countries are the EU, the U.S. and Australia.

WTO Trade Remedy Measures

Three basic trade remedies are employed by industrialized countries as

defense measures to protect domestic industries: antidumping duties (AD), countervailing duties (CVD), and safeguards. AD and CVD aim at unfair trade practices like dumping goods or subsidizing, and are required to show proof before imposing the duties. Safeguards is designed to protect industries from being damaged by trade liberalization practice and are not required to show proof.

For all the investigations under remedy measures, agricultural imports accounted for about 5 percent of all AD investigations, 25 percent of all CVD investigations, and 35 percent of all safeguards investigations from 1995 to 2003. Fully processed items are the primary targets of remedy measures placed on agricultural sector, accounting for 55 percent of the AD total and 73 percent of the CVD total in 2003. (USDA, Agricultural Economic Report, 2005).

Special safeguard (SSG) is a measure for protecting domestic agricultural products subject to ratification, under which member countries can temporarily provide a domestic industry with time to adjust to increased competition from imports by imposing an additional, time-limited duty on an imported product if either the quantity or the price of the imports exceed a pre-set level. High-value agricultural products are a main target for SSG measures. Three categories: animals and animal products category, fruits and vegetables, and dairy products, together accounted for almost one-half of potential SSGs. (USDA, Agricultural Economic Report, 2005).

2.2.3 Incentives to U.S. FDI in the Food Processing Sector

To take advantage of the proximity to markets, lower production costs, and avoidance of tariffs and trade barriers, many large U.S. multinational companies in the food processing sector choose to supply foreign markets through foreign operations or affiliates.

Protective Measures Taken by Major U.S. Trading Partners

U.S. trading partners impose high tariffs on processed food products. For example, the EU imposes a tariff of 18 percent on breaded frozen shrimp from the United States to protect the processing facilities in Europe's former colonial possessions. Similar barriers can also be found in North America. For example, in Canada, a quota on poultry set a 250 percent tariff. For some goods a Goods and Services tax is charged and though the tax is subsequently refunded to U.S. companies, it adds to the cost. In Mexico, despite the decrease in tariff rate, they are still at very high level and prohibit the entry of many frozen food products. Frozen pizzas, for example, had a 50 percent tariff.

Similar barriers are also present in South America. For example, Brazil, Ecuador and Peru have strict certification requirements for food products that discourage U.S. companies from marketing their products. Asia with its fast growing middle class provides great market opportunities for U.S. processed food products, but there are also barriers to increased trade. For example, Japan set 40 percent tariffs on processed products with meat, and Taiwan imposed quotas and tariffs on chicken.

In Australia and New Zealand, a barrier to trade is an internal heating temperature requirement for poultry. Already taken in the EU, Korea, and Thailand and under consideration in Australia and New Zealand, percentage ingredients labeling requirements for frozen food products are also barriers to trade. (United States International Trade Commission Publication, 2000)

Free Trade Agreements

Free trade agreements integrate regional market with common trade rules and improve degree of economic stability, and hence lead to increase economic activities. For

example North America Free Trade Area (NAFTA) have also led to increased investment. For example, the U.S. investment in Mexico from 1995 to 2003 has almost doubled from \$2.98 billion to \$5.67 billion. Common Market of the South (MERCOSUR) which includes Brazil, Argentina, Uruguay, and Paraguay, has brought about new growth in U.S. investment in the region. From 1995 to 2003, U.S. FDI in Brazil increased from \$25 billion to \$33.26 billion, and in Argentina increased from \$7.66 billion to \$11.62 billion. In addition, many countries have liberalized investment rules to attract more FDI. The Uruguay Round of GATT and WTO negotiations and talks have reached agreement on tariff reduction and liberalization of investment rules.²

2.3 Global and U.S. Food-Processing Sector FDI Situation

2.3.1 Global Food-Processing Sector FDI Situation

Manufacturers in the food processing sector have invested in many host countries. The decision between FDI and imports depends on many factors like the nature of the product, trade and domestic policy issues, and other factors may influence transaction costs.

Food trade can be categorized into four types based on the level of processing: 1) traditional bulk commodities such as wheat, rice, and corn; 2) horticultural products such as fresh fruits and vegetables; 3) semi-processed products such as flour and oils; and 4) processed food products such as pasta and prepared meats. Among which horticultural, semi-processed, and processed products are high-

² Source: US Department of Commerce: Bureau of Economic Analysis

value products. High-value products are generally more perishable than primary products and consequently subject to greater quality and safety controls. Because of such quality concerns, food suppliers are willing to supply foreign consumers through locally processed food products rather than through exported food. Investing abroad can also avoid the domestic and trade policies that prohibit trade in high-value products.

Global economic growth has led to an increase of FDI activity in agro-food sector, which together with the increased FDI in manufacturing sector, has generated increased FDI activity in food processing. As incomes have risen in many countries during the past few decades, consumers purchasing habit for food products have changed from staples like rice and wheat to more high-value food items such as meat, dairy, pasta, and frozen vegetables. The production, marketing, and distribution of processed food are increasingly dominated by large multinational enterprises. Total stock of world inward FDI in Food, beverages and tobacco has increased more than two times from 1990 to 2000 (UNCTAD, 2002).

FDI in processed food sector accounts for about 10 percent of the world FDI inflow, and in 2000 reached US\$12.4 billion. Foreign affiliate sales account for about 60 percent of total international commerce in processed food products, while exports only account for about 30 percent. Sales through licenses and joint ventures account for the remaining 10 percent.³ As a result of the competition for the global food markets, trade in high-value products has slowed as more high-value products are produced locally. World trade in high-value food grew 4 percent from 1994 to 2002,

³ Charles R. Handy and John A. Bamford: Foreign Investment, Competitiveness And Trade

amounting to 79 percent of world agricultural trade in 2002.⁴

Among the world's top 100 food processing firms in 1998, 36 are European, 33 are headquartered in the United States, 17 are Japanese, 4 are Brazilian, and 3 each are Canadian and Mexican.⁵

2.3.2 U.S. FDI in the Food Processing Sector

Major Destinations for U.S. FDI in the Food Processing Sector

Europe has been the leading destination of U.S. FDI, accounting for more than 40 percent since the early 80s, and in 2004 accounted for more than half of the total U.S. FDI in the food processing sector. Other important destinations are Canada, Mexico, and Asia and Pacific area. Recent increase in U.S. FDI to Europe is mainly in the form of acquiring European-based food companies. In the past U.S. investments directed towards developing countries were aimed at taking advantage of lower costs, and finished products were mainly exported to be consumed in other countries with higher income and demand for processed products. As the living standards in developing countries rise and consumer demands grow, currently a large share of U.S. FDI to developing economies is motivated by market expansion. For majority-owned foreign affiliates of U.S. MNEs in food processing sector, in 1983 developing countries accounted for 19.9 percent of total affiliate sales, and in 2002 the share increased to 28 percent (see figure 2.3).⁶

⁴ Data source: United States Department of Agriculture Electronic Report from the Economic Research Service Agricultural Economic Report Number 840.

⁵ Data source: United States Department of Agriculture Electronic Report from the Economic Research Service Agricultural Economic Report Number 840.

⁶ A majority-owned non-bank affiliate (MOFA) is a foreign affiliate in which the

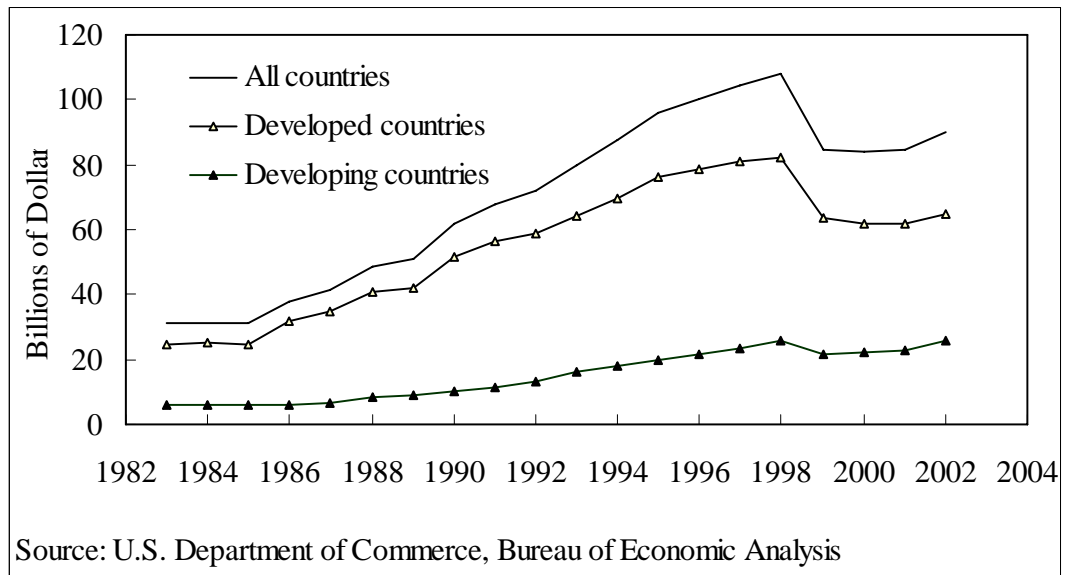


Figure 2.3 Sales by US affiliates in Food Processing Sector

European Union

the European Union (EU) has been a major destination of FDI with its high level of income and tariffs. High tariffs on many processed products make it more profitable to have processing plants within the EU than to export. U.S. FDI to the EU food industry has maintained at very high level for more than a decade. The share of U.S. FDI in the EU surged in the 1980s, accounting for 57 percent of total U.S. FDI in food industry in 1988. Afterwards the share has maintained above 40 percent (except in 2002 which was 35 percent). Acquisition of European food processing companies and the inclusion of 10 new members to the EU has brought the share to 51 percent in 2004.

combined direct and indirect ownership interest of all US parents exceeds 50 percent.

Canada

Canada is one of the top destination for U.S. FDI in processed food, accounting for 15 percent of the U.S. total in 2003. Canadian food purchasing habits are very similar to that of the United States, especially for frozen and prepared foods which often have same brand names. Canadian consumer demand has been driven by income growth, and about 10 percent of their incomes are spent on food. The Canada-U.S. Free Trade Agreement (CUSTA, 1989) and the NAFTA (1994) have created a regionalized food industries between the U.S. and Canadian. The U.S. investment in Canada's food industry increased by more than double from \$1.7 billion to \$4.5 billion between 1985 and 1995. In 2003 sales of processed food by U.S. affiliates to Canada amounted to \$11.2 billion, accounting for 15 percent of total U.S. FDI in the food processing sector, and nearly two times that of U.S. exports, which was \$5.56 billion.⁷ The primary investment is in grain milling and beverages. U.S. companies, such as Cargill, have invested in Canada for decades. The largest sales from U.S. investments in Canada are from flour milling, soft drinks, and brewing.

Mexico

Mexico received increased flows of foreign direct investment since the mid 1980s after its success in the debt-equity conversion program and inflation reduction that boost investor's confidence in the country's growth potential. Before signing of the NAFTA, Mexico's government changed its investment laws considerably to attract foreign direct investment. From 1985 to 1995, U.S. direct

⁷ Source: Data on export from U.S. Department of Commerce, Bureau of the Census, data on foreign affiliate sales from U.S. Department of Commerce, Bureau of Economic Analysis.

investment in Mexico's food industry rose from \$0.4 billion to \$2.9 billion. In 2003, U.S. invested \$2.15 billion into Mexico's food processing industry, accounting for more than 9 percent of the total. Sales from affiliates of U.S. companies was \$6.81 billion, 1.5 times that of processed food exports which was \$4.04 billion. Many U.S. food manufacturing companies, such as Campbell Soup, General Mills, Ralston Purina, and PepsiCo, have invested in Mexico for decades. U.S. invest in nearly all sectors of Mexico's food industry, but mostly on candies, soft drinks, livestock feed, frozen fruits and vegetables, vegetable oils, and seafood processing.⁸

Argentina

Direct investment inflows accelerated after 1988, mainly as a result of the government's debt-equity conversion program. The Convertibility Plan started in 1991 curbed inflation and stabilized the economy. Joining the MERCOSUR also helps Argentina to bring in more investment. U.S. direct investment quadrupled from \$0.25 billion in 1985 to \$1.01 billion in 1995, with the majority of investments on cereal and oil processing, breweries, ice cream, cookies and biscuits, and popcorn. U.S. direct investment comprises 32 percent of total FDI in Argentina's processed food industry. Sales of affiliates of U.S. companies in Argentina are more than 36 times the level of U.S. processed food exports to Argentina. Sales from U.S. affiliates are mostly processed beef products, oilseed products, soft drinks, grain products, animal feeds and pet foods, ice cream and cream cheese, and cookies and crackers.

⁸ Data source: export data from U.S. Department of Commerce, Bureau of the Census, FDI data from Source: U.S. Department of Commerce, Bureau of the Economic Analysis. 1985-1995 data from U.S. Department of Agriculture. Agricultural Economic Report No. 760.

Coca-Cola and Philip Morris have the largest sales (over \$1 billion), followed by Cargill (\$962 million). Some companies have a large market share for certain products, for example, CPC International has a 35 percent of Argentina's corn refining capacity and 45 percent of the mayonnaise market, and Nabisco is ranked second in cookie production in Argentina and is the leader in dessert mix and pasta sales. In 2002, U.S. invested \$0.76 billion into Argentina's food processing industry, accounting for 4 percent of the total U.S. FDI in the food processing sector.⁹

Brazil

The liberalization of Brazil's investment laws and the recent stabilization of Brazil's economy from the Real Plan (1994) have created new opportunities for foreign direct investment. The concept of MERCOSUR as a regional market also renewed interest in investment in Brazil.

U.S. investment in Brazil's food industry tripled from \$0.71 billion in 1985 to \$2.86 billion in 1995, with a broad range of products. Some U.S. multinationals have considerable market share in certain sectors. For example, CPC has its largest foreign affiliate in Brazil and is the largest producer of most corn products. RJR Nabisco is the second largest producer of cookies and the leading producer of baking powder and yeast (80 percent of sales), dessert mixes (50 percent), and fruit juices (45 percent). Sales of affiliates of U.S. companies are more than 12 times the level of U.S. processed food exports to Brazil. The majority of U.S. investment goes to cookies and

⁹ Data source: 1985-1995 data from U.S. Department of Agriculture. Agricultural Economic Report No. 760. 2003 export data from U.S. Department of Commerce, Bureau of the Census, 2002 FDI data from U.S. Department of Commerce, Bureau of the Economic Analysis.

biscuits, orange juice, soft drinks, canned and frozen fruits and vegetables, oilseed products, breakfast cereals and other grain products, and beer. In 2003, U.S. investment to Brazil's food processing sector amounted to \$0.71 billion, accounting for 3 percent of the total.¹⁰

2.4 Chapter Summary

From 1982 to 2000, the U.S. FDI stock in food processing sector grew from \$9 billion to \$36 billion. Foreign direct investment (FDI) has become the leading means for U.S. processed food companies to participate in international markets.

This chapter first presented an overview of the global FDI situation and its importance. Then an introduction to the global as well as U.S. food-processing sector FDI is given with a focus on barriers to the international trade of processed food, which have made foreign direct investment a more preferable means to access foreign markets relative to export.

¹⁰ Data source: 1985-1995 data from U.S. Department of Agriculture. Agricultural Economic Report No. 760. 2003 export data from U.S. Department of Commerce, Bureau of the Census, 2002 FDI data from Bureau of the Economic Analysis.

Table 2.4 U.S. FDI in food manufacturing, by region and country

	Unit: Million U.S. dollars		
Region and country	2001	2002	2003
North America	4,671	4,333	5,924
Canada	3,421	3,404	4,253
Mexico	1,250	929	1,671
Europe	10,846	9,145	11,321
United Kingdom	4,756	2,805	3,029
France	720	1,314	1,545
Netherlands	771	880	1,298
Germany	918	781	1,173
Italy	734	804	1,081
Spain	567	401	541
Belgium	332	366	411
Poland	490	414	386
Denmark	232	N.A.	273
Russia	266	238	236
Switzerland	190	160	210
Latin America & other Western Hemisphere	4,210	3,055	3,806
South America	2,627	1,891	1,896
Argentina	911	739	685
Venezuela	366	504	489
Brazil	651	322	357
Other	396	65	103
Colombia	188	112	74
Peru	38	49	67
Ecuador	32	65	66
Chile	44	36	55
Central America	1,442	1,139	1,889
Costa Rica	90	97	97
Honduras	34	29	20
Africa	177	158	209
Middle East	115	80	90
Asia and Pacific	2,564	2,497	3,038
Australia	1,264	947	1,159
South Korea	368	466	552
China	329	425	531
Philippines	168	229	259
Japan	168	190	197
Taiwan	90	92	105
India	43	36	37
World	21,334	18,340	22,717

Source: www.ers.usda.gov/Briefing/globalfoodmarkets/Data/USFDIregions.xls

Chapter 3

LITERATURE REVIEW

This chapter contains a brief review of the literature on the determinants of FDI. The first section discusses the previous empirical studies on key factors affecting FDI decisions. Next, previous empirical studies of FDI in the food sector are examined, and the effects of the main factors are compared with other sectors.

3.1 Key determinants of FDI

A MNE's FDI decision involves two level of choice. Firstly, the decision of whether to manufacture abroad based on market size, trade barriers, and relative production costs. If the choice is to produce abroad, then the next decision is what form of production to take, whether to license, rent, or sell firm-specific advantages to local firms, or whether to internalize them, depending on firm-specific advantages such as knowledge and reputation, experience, cultural distance, and political stability. There have been extensive discussions on the determinants of FDI flows from differing perspectives and using diverse methodologies, and as a result reached controversial results. The diversity in the empirical results demonstrates the wide differences existing in the determinants of FDI flow, but it may also reflect data or modeling problems, such as lack of precise data or too general grouping of countries with different characteristics. Subsequent section provide brief discussion of each of the key determinant of FDI in the theoretical and empirical literature on MNEs.

Market Size

Among the several widely tested determinants of FDI, market size has gained the most acceptance. The market size hypothesis holds that a large market is a prerequisite for resources to be efficiently utilized and economies of scale realized. There is vast evidence in support of the market-size hypothesis across a variety of countries, periods, and model specifications.

Bandera and White (1968) using aggregate pooled data on U.S. manufacturing FDI in 7 European economies over the period 1958-1962, found market size to be a significant determinant of U.S. FDI. Scaperlanda and Mauer (1969) suggest that after market size increases to a certain level, FDI flow increases as the market size increases. Kravis and Lipsey (1982) found that host country's market size have a positive effect on location choice for U.S. multinationals in the 1960s. An economy's size not only affects FDI in current time, it is more likely it works as a lagged effect. Schmitz and Bieri (1972) studied U.S. direct investment in the EEC over the period 1952-1966 and found that a one-period-lag of GNP has significant effect. Lunn (1980) studied the case of U.S. direct investment in EEC, and also found that the coefficient on a one-period-lagged GNP variable is statistically significant. More recently, Aristotelous and Fountas (1996) studied the determinants of U.S. and Japanese FDI in the EU following the Single European Act of 1987 using annual data from the 1980s and early 1990s. They found that expectation of a larger market size leads to an increase in FDI inflow. Filippaios, Papanastassiou and Pearce (2003) examined the locational determinants of U.S. FDI in Australia, New Zealand, Japan, and Korea for 1982-1997, and found market size exert a significant impact on both the timing and the location choice of U.S. investors in the region. Bevan and Estrin (2004)

used a panel dataset of bilateral flows of FDI to study the determinants of FDI from EU and EEC, and found market size to be one of the most important influences.

Milner, Reed and Talerngsri (2004) tested the vertical model of FDI using firm level information on Japanese multinational activity in Thailand over the period from 1985 to 1995, and found a positive influence for host market size.

For developing countries, similar results are also found in empirical studies. Wheeler and Mody (1992) found market size play a more significant role in the developing economies than in the industrial economies. Sader (1993) suggested a strong correlation between FDI and market size for developing economies. Liu, Song, Wei and Romilly (1997) developed an error-components model on FDI in China using panel data for 1983-1994 and results indicate that relative real changes in market size is an important determinants of pledged FDI but not for realized FDI. Tuman and Emmert (1999) explained the variation in Japanese FDI in Latin America between 1979-1992 using multivariate regression model to test political and economic determinants. Tuman and Emmert (2004) examined the political and economic determinants of U.S. FDI in Latin America for the period of 1979 to 1996, and find a significant effect for market size.

Wages

Unlike market size, the effect of wages on FDI has been the most controversial of all the potential determinants. Theoretically, cheaper labor cost should encourage "efficiency-seeking" FDI flows. However, empirical studies on host wages have given conflicting results, where higher host nation wages are associated with negative, insignificant, or even a positive association.

The extensive empirical studies on industrialized countries have mostly found wage a significant determinant for FDI inflow. Swedenborg (1979), and Nankani (1979) obtained a positive association between inbound FDI and the real wage. Yang, Groenewold and Tcha (2000) studied determinants of FDI in Australia since mid-1980 and found wage changes are an important determinant. However, Owen (1982) analyzed the inter-industry determinants of foreign direct investment in Canadian manufacturing industries, and found labor cost differences between Canada and the U.S. have no significant impact. Gupta (1983) also found that wages of production workers in Canada relative to those in the United States was not a significant determinant.

A lot of recent studies on developing countries have reported a significant effect for relative wage rate. Flamm (1984), Schneider and Frey (1985), Lucas (1993), and Wheeler and Mody (1992) found that wage plays a significantly positive role on FDI in the electronics industry. While Culem(1988), Sader(1993) and Shamsuddin (1994) suggested that higher wage has a negative effect on attracting FDI, Tsai (1994) obtained a strong support for the cheap-labor hypothesis over the period 1983-1986 but only weak support over 1975-1978. Tso (1998) attributed the dominance of FDI from NIEs in China to their greater sensitivity to the relatively low Chinese labor among other factors such as land costs, geographic proximity, and the rise in per capita income. Ismail and Yussof (2003) investigate the role of labor market competitiveness on the inflows of FDI into the ASEAN economies, and found that it differs between countries.

Exchange rate

The exchange rate is another common variable involved in the analysis of the determinants of FDI. The currency area hypothesis suggests that there is an opposite movement between a country's currency strength and the possibility of receiving foreign investment. However empirical studies have also resulted in mixed and conflicting results with respect to its role in determining FDI.

Some theoretical and empirical studies showed that the level and volatility of exchange rates can have negative effects on foreign direct investment (FDI). Froot and Stein (1991) and Blonigen (1995) both observed strong negative correlations between a country's exchange rate and FDI. Lin (1996) developed a composite model to investigate the determinants of Japanese FDI in 11 types of U.S. manufacturing industries for the time period of 1976-1990, and found that an expected depreciation of the real exchange rate and/or low exchange rate induces a larger amount of direct investment. Quere, Fontagne, and Revil (2001) modeled the trade-off between price competitiveness and a stable nominal exchange rate, and found that exchange-rate volatility is detrimental to FDI.

On the other hand, Edwards (1990) reported a significantly positive effect of exchange rate on FDI. Tuman and Emmert (1999) observed that the exchange rate has an insignificant effect on FDI in a share regression model but a significantly negative effect in a per-capita regression model. Firoozi (1997) found that when the exchange rate fluctuation is the source of cost uncertainty, risk-averse exporters tend to rearrange their production allocation and shift part of the production to the export target countries to reduce the risk, thus increasing FDI.

Some empirical works also found the role of exchange rate on FDI flows to be little or ambiguous. Lucas (1993) argued that the exchange rate have only a

residual role with respect to exchange rate risk. Pain and Welsum (2003) found the impact of exchange rates ambiguous, varying between different countries and types of investment as well as time. Uusivuori and Craig (2001) studied the short-term and long-term effects of exchange rate movements and exchange rate variation on FDI in forest industries with U.S., Finnish, and Swedish data, and found that FDI by the U.S. forest industries are unaffected by dollar variability. Chakrabarti and Scholnick (2002) used panel data techniques to study the relationship between exchange rate movements and FDI flows from the U.S. to twenty OECD countries, and found skewness of devaluations has a robust positive impact on FDI flows while average devaluation and its volatility do not.

Trade Openness

Openness to trade is usually measured by the ratio of exports plus imports to GDP. The degree of openness is related to the investment possibility and economic environment, as most investment projects are directed towards the tradable sector. Previous empirical studies also reported mixed evidence on the effect of openness on FDI. Kravis and Lipsey (1982), Edwards (1990) and Culem (1988) reported a strong positive effect of openness on FDI. Dees (1998) found that trade openness to the rest of the world has a significantly positive impact on China's inward FDI. Yang, Groenewold and Tcha (2000) studied determinants of aggregate FDI inflows into Australia since the mid-1980 and found that openness of the economy is an important determinant of FDI inflow into Australia. Janicki and Wunnava (2004) examined bilateral FDI between EU members and Central and Eastern European Countries (CEEC) economies in transition using cross-section data for 1997. The study revealed

that openness to trade is a key determinant of FDI inflows to CEECs. Some studies have found less significant links between domestic openness and inward FDI. Wheeler and Mody (1992) observed strong support for the hypothesis in the manufacturing sector but a weak negative link in the electronics sector. Schmitz and Bieri (1972) obtained a weak positive link between openness and FDI.

Trade barriers

The effect of trade barriers on FDI has also been widely debated. Mundell (1957) proposed the tariff discrimination hypothesis arguing that FDI will be encouraged when there are obstacles to trade like import tariff, which makes it difficult to export. Hence trade liberalization is expected to reduce the amount of FDI as goods can move more freely across countries. According to this view, trade barrier has a positive effect on FDI.

Schmitz and Bieri (1972) and Lunn (1980) observed a significantly positive effect of trade barriers on FDI. Hennart and Park (1994) did a study of the determinants of FDI at the product and firm-level by examining the impact of location and policy factors on a Japanese firm's tendency to manufacture in the U. S, and found trade barriers encourage Japanese FDI in the U.S.. Barrell and Pain (1999) analyzed the determining factors of Japanese FDI to EC and U.S. over the 1980 using pooled cross-section time-series annual data, and the results suggest that investment was significantly influenced by trade protection measures. Bang (1999) observed increased FDI flows after tariff and non-tariff trade barriers are removed as Vietnam become a member of ASEAN Free Trade Area (AFTA), and from trade reform in general.

Like discussions on other FDI determinants, conflicting results can also be

found for trade barrier. Culem (1988) reported a significantly negative correlation between trade barriers and FDI. Blonigen and Feenstra (1996) found that trade barriers play an insignificant role in attracting FDI.

Investment costs

The effect of investment cost in the host country on FDI is less controversial. Studies that included investment cost as one of the determinants have mostly found that it has a negative impact on attracting FDI. Brainard (1997) explained the choice between FDI and export by examining the effect of transport costs, trade and investment barriers, production scale economies, and firm-specific advantages and found that lower level of investment barriers is connected to an increase in the share of total affiliate sales. Markusen and Maskus (2002) examined the role of country characteristics, trade and investment cost in foreign affiliate production, and found that investment costs negatively affect affiliate production. Some studies have also found investment cost to play an insignificant role. Waldkirch (2004) investigated the determinants of Mexican inward FDI, and found that the influence of investment climate is not statistically significant.

Political instability

Political instability in host country tends to discourage the inflow of FDI. Uncertainties might induce investors to diversify or shift their production location. However, empirical evidence on political factors have also given mixed results. Schneider and Frey (1985), Edwards (1990), Aizenman (2003) found that political instability has a negative impact on FDI inflow. Aizenman and Marion (2004) found

that the effect of volatility and sovereign risk on vertical and horizontal FDI differs, with a greater negative impact on vertical FDI. However, Hausmann and Fernandez-Arias (2000) found political instability has no significant effect on FDI. Bandelj (2002) studied FDI determinants in CEEC nations and concluded that the effect of political volatility in post-socialist Central and East European countries is not uniformly negative. Bevan and Estrin (2004) studied the flow of FDI from the EU to Central and Eastern European nations, and found host country risk not a significant determinant.

Corruption

Similar to political instability, corruption is regarded as a negative influence on business environment and consequently an impediment to investment. However, the empirical evidence on the effect of corruption on FDI has been inconclusive. Smarzynska and Wei (2000) found that corruption negatively affects foreign investment. Wheeler and Mody (1992) examined capital expenditure of U.S. companies' foreign affiliates and found that corruption has no significant effect on the expenditure level. Contrary to conventional wisdom, Henisz (2000) found that in certain cases, the level of domestic corruption could increase the likelihood of FDI. Henisz reasoned that if a country has political hazards, the multinationals threatened by government expropriation may choose to partner with host-country firms to protect themselves against this hazard.

3.2 Empirical Works on the Food Sector

On the food processing industry, McCorriston and Sheldon (1998) compared determinants of FDI in various industries in the U.S. manufacturing sector, and found that for the whole manufacturing sector the exchange rate and relative stock

price index offer some explanatory power. However, these factors that could explain cross-border acquisition for the whole manufacturing sector do not apply to the food industry possibly due to some industry-specific factors or data inadequacy.

Burnham and Epperson (1998) analyzed survey data for 1994-1995 period to examine the incentives for the U.S. fruit and vegetable industry to invest abroad. They found a negative relationship between U.S. tariffs on fruits and vegetables and U.S. FDI in Latin America, and suggested the reason is that fruit and vegetable products produced in foreign affiliates are mostly exported to the U.S.

Gopinath (1999) found that for U.S. food processing industry, per capita income of the host country has a very important positive effect on U.S. outward FDI, while input price only has a small negative effect.

Walkenhorst (2001) analyzed determinants of foreign direct investment (FDI) in the Polish food industry with cumulative FDI flows into the 12 food industry branches from 1991 to 1997. The results indicate that firm size, privatization speed, value-added, and import share are important determinants of food industry FDI in Poland.

Giulietti, McCorriston and Osborne (2004) studied the UK food sector, which is a leading sector in the UK inbound FDI. They found that ownership factors and market structure are relevant in explaining UK food sector FDI. Proprietary intangible asset variables have positive influence, especially advertising intensity and managerial skills. Macroeconomic factors are less important than ownership and industry in explaining inflow of FDI to UK food industry.

Skripnitchenko and Koo (2005) examined the determinants of U.S. foreign direct investment in the food processing industries of Latin American

countries using a dynamic investment model. They found that higher wages and interest rates have a negative effect, while demand has a positive effect. Openness, the exchange rate, and overall tax levels also have a positive effect on U.S. FDI in food processing industries.

3.3 Horizontal and Vertical FDI

FDI can be horizontal (same goods or services produced in different locations) or vertical (production stages fragmented geographically by stages). Early models on MNEs only accounted for one form of FDI. Helpman (1984) introduced a vertical model to explain one-way investment flow usually between countries with significant difference in factor endowment. Markusen (1984) constructed a horizontal model to explain the large volume of multinational investment between similar countries. Markusen (1997, 2002) proposed a unified model where both horizontal and vertical FDI arise endogenously depending on country characteristics, such as differences in relative skilled labor endowments and country size differences, and on the level of trade costs.

For either vertical or horizontal models, supports can be found in empirical estimates result. Zhang and Markusen (1999) tried to find explanations for the very low level of vertical FDI into the small LDCs by looking into what country characteristics, particularly, market size and labor-force composition, attract inward investment. The model they developed suggested the existence of a development trap for small, skilled-labor-scarce countries. Yeaple (2003) constructed a three-country model to analyze why firms might choose complex integration, taking horizontal form in some countries and vertical form in other countries. The result showed that complex integration strategies create complementarities between potential host countries.

Braconier, Norback and Urban (2005) explored the effect of wage costs on affiliate activities and found support for vertical FDI in that countries with relatively cheaper less-skilled labor attracts more FDI.

Knowledge-Capital model has been tested and widely adopted in recent years. Barrios, Gorg and Strobl (2003) used model developed by Markusen and Venables (1998) as a theoretical framework to test the 'convergence hypothesis', which states that multinational companies tend to displace national firms and trade as total market size increases and as countries converge in relative size, factor endowments, and production costs. The results provided some empirical support for the convergence hypothesis. Aizenman and Marion (2004) examined the impact of uncertainty on the form of FDI, and the results suggest that uncertainty caused by predatory actions of the host country is more costly to the multinational under vertical than under the horizontal mode. Milner, Reed and Talerngsri (2004) tested the ability of the vertical FDI model to explain Japanese direct investment in manufacturing industries in Thailand. They found that industry variation in skill intensity and market size have a positive influence, and transport costs have a negative effect on the amount of FDI. These results provide evidence of vertical integration of production across the countries. Amiti and Wakelin (2003) estimates the cross-price elasticity of exports with respect to investment costs for bilateral relations, and found that the effect of reducing foreign direct investment costs on exports depends on country characteristics and trade costs, which supports the Markusen (1997, 2002) model. Egger and Pfaffermayr (2004) adopted knowledge capital model of multinationals to evaluate the impact of bilateral investment treaties, and found that that investment treaties exert a significant positive effect on outward FDI, if they actually are implemented.

3.4 Chapter Summary

This chapter presented a review of the past literature on the determinants of FDI. Main factors that affects FDI level are discussed, income level is generally found to have a positive effect on attracting FDI, while for other major variables such as skill difference, and trade and investment barrier, the effects are varied. Then previous works on food-processing sector are presented. While some empirical studies confirmed that the main factors affect the food industry FDI in similar manner as other sectors, some have found that factors affect FDI in the whole manufacturing industry may work differently on food industry FDI .

Chapter 4

THEORETICAL FRAMEWORK

This chapter first introduces major theories on FDI activity, then explains the theoretical framework underlying the Knowledge-Capital model which is subsequently used for the empirical analysis in this thesis.

4.1 Early approaches on FDI

Many scholars have followed either microeconomic or macroeconomic approaches in explaining FDI activities. Early attempts using the microeconomic approach (Hymer 1976; Caves 1974) attempts to find out why firms can be successful in penetrating into other markets while the macroeconomic approach (Buckley and Casson 1976) tries to explain the reasons why firms seek international expansion. Multinational enterprises have several options in the form of accessing foreign markets. They can either directly export products, or license their technology, product, or service, or alternatively use FDI in the foreign countries. These decisions are jointly determined and depend on a combination of factors regarding local markets and regulations.

Motivated by different incentives, FDI can take either horizontal or vertical form. Horizontal FDI is used by MNEs whose foreign affiliates produces products and services that are similar to those produced at home. The aim of production is mainly to serve the local market instead of exporting back to the host country. This is the form that employed mostly for investment among industrialized

nations with relatively large market size. With vertical FDI international production is fragmented across border, and foreign affiliates engage in production activities that are less skill intensive. Vertical FDI is mostly directed towards developing economies where labor cost is relatively cheap, and the products are more likely to be exported either to the host country or a third country.

Compared with local firms in the host country, MNEs face disadvantages originated from international management, such as language and cultural barriers, jurisdiction-specific tax treatments, distance from headquarters, and monitoring local operations. To overcome these disadvantages MNEs must possess some efficiency advantages.

4.1.1 Theories of Internalization

In Coase's (1937) firm theory, the intra-firm and market mechanisms exhibit different efficiency levels in executing different transaction types, firms and markets are two alternative forms of organizing production. The firm will internalize those activities when the transaction costs exceed organization costs of the same activities inside the firm. Internalization theory developed by Buckley and Casson (1976) explain imperfect markets as a 'natural monopoly' such as knowledge, which a firm should preserve to maximize rents through price discrimination, and that the best way for a firm to preserve the knowledge monopoly is to internalize it by setting up foreign manufacturing affiliates. Hennart (1977, 1982) incorporates property rights theory, transaction costs economics, and market failure to explain the choice between FDI and market mechanism like licensing or franchising with market transaction costs and internal organization costs. Teece (1981, 1986) examined the relative efficiency properties of both horizontal and vertical FDI. He explained the choice of FDI as a

response by a firm with unique assets that are able to generate value when faced with high transaction costs. Three necessary factors for FDI are identified as strategic advantage, location, and transaction costs. For a MNE, it faces choice of different mechanisms such as export or FDI, and if costs associated with internalization (such as communication costs, administrative costs, etc) are smaller than the cost associated with export or to other forms of entry, the MNE will internalize its activities in a foreign country through FDI.

4.1.2 Dunning's (1981) eclectic theory

Dunning's (1981) eclectic theory attribute FDI to three different types of advantages: ownership, internalization, and location advantages (p13). Ownership advantages address the question of why firms choose to maintain production plants abroad. They are the specific assets or qualification that enable the MNEs to compete with home firms. Compared with local firms in the host country, MNEs face disadvantages due to international management issues, such as language and cultural barriers, tax treatments and monitoring local operations. The ownership advantages are often in the form of firm-specific intangible assets such as technology and management expertise, which can be transferred within the multinational enterprise at low cost. Since ownership advantages can either generate higher returns or lower costs, they can compensate the costs of operating in a foreign location (p86). The location advantages address the question of where should the production be located. They refer to the specific features such as market potential, cultural distance, production cost and investment risk that make the foreign locations attractive to MNEs. The motive behind moving abroad is to increase the firm's profit potentials through the use of firm-specific assets in conjunction with factors in a foreign country to make profit.

Location advantages can be measured in terms of cultural similarities, market infrastructures and the availability of lower production costs (p. 91). The Internalization advantages address the question of how direct investment occurs. By replacing imperfect external markets with internal hierarchies, internalization enables firms to maintain control over key sources of competitiveness and to minimize transaction costs. Firms might choose to service foreign markets through direct investment over exports or licensing agreements if there are internalization advantages in the context of imperfect markets or market. Firms will engage in FDI when all three advantages are present, that is, if ownership advantages enables a firm to operate abroad at a location favored by location specific advantages, and it is in the interest of the firms possessing ownership advantages to internalize production internationally (p. 96). Thus internalization theory address the question of under what condition firms will choose direct investment over licensing or exports, which was left out in the Industrial organization and location theory.

4.2 Development of FDI theory toward an integrated approach

The assumptions of the HO model (perfect competition, identical patterns of demand and production function, constant returns to scale and no transport costs) cannot account for the great volumes of trade of similar products among countries with similar endowments. The industrial organization approach to international trade began to model national firms based on increasing returns, imperfect competition and product differentiation. However, industries characterized by these features are usually dominated by MNEs, so its absence weakens the validity of industrial organization approach and attempts were made to include MNEs into trade models.

According to the industrial organization approach (Hymer, 1976),

operating in a foreign country involves some initial disadvantages such as inferior market knowledge. Structural market imperfections give some firms advantages (such as brand name, patents, superior technology, organizational know-how and managerial skills), with which firms would be able to generate additional rents after compensating the costs of initial disadvantages. Making use of the imperfect market structure, MNEs can obtain monopoly and oligopoly powers. This hypothesis has its weakness in that it can not explain various types of FDI. For example, why firms would choose to obtain rents by employing FDI when cheaper forms of expansion like exporting are available.

Industrial organization approach divided the firms' activities in two categories: firm specific and plant specific activities. Firm-specific activities are activities at the firm or headquarter level such as research and development, advertising, marketing, distribution, administration services, etc, and can generate firm specific fixed costs. Plant-specific activities are related to the production process and generate plant specific fixed costs. Since the firm-specific activities can be utilized by multiple facilities, they can be viewed as public goods (Markusen 1984). Thus firm level scale economies are assumed to exist in industrial organization approach models.

FDI can be of two types, horizontal and vertical. Horizontal FDI consist of the production of the similar goods and services in different locations while vertical FDI consist of the geographical fragmentation of the production process by stages. Empirically, vertical FDI are more important in explaining one-way investment flows among countries with significant factor endowments differences. This form of FDI is typical of investments by developed countries' firms in developing countries. Horizontal MNEs are more important in explaining intra-industry investment flows among similarly endowed developed countries. However in the early general

equilibrium models, only one type of investment was present. The literature has primarily focused on horizontal FDI since the horizontal FDI seem to be the prevalent type. The knowledge-Capital models that integrate both types of investments (horizontal and vertical) only appeared recently.

4.2.1 Vertical models of FDI

An example of vertical FDI model was constructed by Helpman (1984) and Helpman and Krugman (1985). The model has two countries, two goods (one homogeneous, one differentiated) and two internationally immobile production factors that differ in factor intensities. The differentiated good sector is characterized by monopolistic competition and subject to increasing returns to scale, and conducts two activities - a headquarter activity and a production activity. Since the two activities demand different capital intensity and can be geographically separated without additional costs, the firm would locate different stages of production in different countries according to factor price differences. The model ignores trade costs, and products serve both the domestic and foreign markets. As the result of production segmentation, FDI only appears in one direction between countries with sufficiently different factor endowments, but not between countries with similar endowments. The model of vertical FDI is consistent of the HO trade model of factor endowment.

In contrast to Helpman (1984), Markusen (1984) developed a vertical model assuming identical factor endowments between countries. Another difference is that the firm-specific activities do not have the public good quality, but a centralized quality. MNEs tend to focus the headquarter-specific activities in one location, while spreading the production activities geographically dispersed locations. The model also assumes multi-plant economies so that the MNE chooses to engage in at least one

activity in different countries.

4.2.2 Horizontal models of FDI

Since vertical FDI models cannot account for the prevalence of multinational investment between similar countries, an alternative approach is horizontal model. Horstmann and Markusen (1992) and Brainard (1993) made attempts at developing models of horizontal approach. Multinationals in the vertical and horizontal models differ in their firm structure. In vertical models a multinational is a single plant firm with headquarter separated from the production facilities, and in horizontal models a multinational firm carry out production in multiple locations, in one of which the headquarter is located. Each production facility supplies the local market.

In Horstman and Markusen's (1992) work, the key assumptions that motivate the multinational production is the presence of firm-level economies of scale, which gives multinational firms advantageous edge over domestic firm. Under such condition, the level of trade costs and plant-level economies together decides whether multinational production will occur. These models assume two identical countries with similar size, factor endowments and technology, so trade occurring between the two countries are not resulted from the comparative advantages. They also assume the existence of transport costs among countries that increase with distance. Under zero trade cost there is no motive for the firm to carry out production abroad, for it can take advantage of the firm level economies of scale to produce domestically and export to the foreign market. When trade costs is present and increases beyond the level of plant-level economies of scale, locating the production abroad would be advantageous to the multinational firm.

While the vertical model predict FDI between countries with quite different factor endowment, multinational activities in horizontal models tend to arise among countries with similar factor proportions, as too high cost in one country would make it too expensive to produce. At a given level of trade costs (moderate to high), multinational activity will arise in countries of similar sizes. The reason is that domestic firm in the larger country would be better off to serve the smaller country through trade, as compared to the high fixed costs of producing in two locations.

Brainard's (1993, 1997) model assume differentiated products and reached results that are similar to that of Horstman and Markusen (1995) under the assumption of homogeneous products. Markusen and Venables (1998) extends the horizontal models of Horstman and Markusen (1992) and Brainard (1993), including the condition of asymmetries among countries. They conclude that similar to the case of symmetric country characteristics, MNEs tends to arise in equilibrium when the firm level scale economies and transport costs are high relative to the plant level scale economies. They also conclude that the more similar the two countries are in terms of size and factor endowment, the more important MNEs become relative to national firms. The convergence of country characteristics leads to an increase of the trade volume followed by a reduction as MNEs replaces the national firms. The "new trade theory" had concentrated on the competition between national enterprises (NEs) of similar countries, while according to Markusen and Venables (1998) MNEs are the dominant type of production between similar countries.

4.2.3 Knowledge-Capital Model

How to incorporate both types of MNEs into a theoretical model has been

a challenge. Due to the prevalence of horizontal firms, previous theoretical works have focused primarily on horizontal models. These models assumed either no difference in the use of factors of production for different production stages, or only one factor of production used, thus eliminating the factor-price motive for vertically fragmenting production across nations. On the other hand, vertical models of FDI assume no trade cost, which would exclude horizontal MNEs under plant-level scale economies. Carr, Markusen and Maskus (CMM, 2001) and Markusen and Maskus (2001, 2002) developed and estimated a Knowledge-Capital (K-K) model of FDI based on the general-equilibrium trade theory. By including trade costs and different factor intensities across activities, the K-K model accounts for both vertical and horizontal investment. Firms in this model can choose to operate multiple plants or separate the headquarter and a single plant geographically. The simulation lead to predictions about the relationship between MNE activity and country characteristics, which can be used to construct an empirical model of FDI.

Three primary assumptions on knowledge-based assets and services provide motives for both vertical and horizontal FDI: (1) they can be fragmented from production location at low cost; (2) they are more skilled-labor intensive than final production; and (3) they can be jointly used by multiple production facilities at the same time. Further assumption on skilled-labor intensity states that headquarter services are more skilled-labor intensive than plant level activities. With both firm-level and plant-level economies exist, the assumptions on fragmentation of knowledge-based assets and skilled-labor intensity encourage vertical FDI, and the joint-input assumption encourages horizontal FDI. Other assumptions concerning fixed costs are that both jointness and fragmentation exist and horizontal firm has

higher fixed costs than a vertical firm.

The model assumes the existence of two homogeneous goods (X and Y), two countries (i and j) where the source country of FDI is referred to as home country and the recipient country of FDI is referred to as host country. Two homogeneous factors, unskilled labor (L) and skilled labor (S), which are mobile between industry but internationally immobile. Good Y is unskilled-labor-intensive and produced under constant returns to scale in production in a competitive industry. Good X is skilled-labor-intensive with increasing returns to scale, and is subject to Cournot competition with free entry and exit. The above hypothesis give rise to six possible types of firm in the model as listed below:

Type $d_{i(j)}$: national firms that maintain a single plant and headquarters in country i (j), may or may not export to country j (i).

Type $h_{i(j)}$: horizontal multinationals which maintain plants in both countries, with headquarters located in country i (j).

Type $v_{i(j)}$: vertical multinationals with headquarter in the city i (j) that maintain a single plant in country j (i), and may or may not export to country i (j).

Production function of Y in both countries (i and j) is a CES function:

$$Y_i = (aL_{iy}^\alpha + (1-a)S_{iy}^\alpha)^{1/\alpha} \quad (4.1)$$

where L_{iy} and S_{iy} stand for unskilled and skilled labor used in the Y sector in country i respectively. Good X is skilled-labor-intensive with increasing returns to scale, and is subject to Cournot competition with free entry and exit. Both firm-level and plant-level economies exist. The assumptions of fragmentation, skilled-labor intensity and jointness of input mean that both horizontal and vertical firms can coexist in the model.

Assume that both marginal costs, transport costs in X are fixed-coefficient technologies, and that functions are the same for all firm types and countries. The marginal costs for good X in country i (c_i) is the sum of marginal cost of unskilled labor $w_i c_w$ (w_i is the wage of unskilled labor in country i, and c_w the unit of unskilled labor used in producing one more unit of good X) and skilled labor $z_i c_z$ (z_i is the wage of skilled labor in country i, and c_z is the unit of skilled labor used in producing one more unit of good X). Marginal transport cost for X (t_i) then will be the sum of the marginal cost of skilled labor ($w_i \tau_w$) and unskilled labor ($z_i \tau_z$) used in the transport., where τ is a constant of proportionality between trade costs and marginal production costs, since fixed coefficient is assumed for marginal costs, transport costs, and fixed costs in X.

$$c_i(w_i, z_i) = w_i c_w + z_i c_z \quad t_i(w_i, z_i) = w_i \tau_w + z_i \tau_z = \tau_i(w_i, z_i) \quad (4.2)$$

Let F denotes fixed costs incurred in units of skilled labor which varies among different firm types; and G denotes fixed costs incurred in units of unskilled labor, which is the same for every plant. For firms with headquarter in country i, functions (4.3) – (4.5) give fixed marginal cost for national firms, type-h multinational firms, and type-v multinational firms respectively.

$$fc_i^d(w_i, z_i) = z_i F_i^d + w_i G \quad (4.3)$$

$$fc_i^h(w_i, z_i, w_j, z_j) = z_i F_i^h + w_i G + z_j F_j^h + w_j G \quad (4.4)$$

$$fc_i^v(z_i, w_j, z_j) = z_i F_i^v + w_j G + z_j F_j^v \quad (4.5)$$

Assume that for countries based in country i, skilled labor requirement satisfies function (4.6)

$$2F_i^d > F_i^h + F_j^h > F_i^d < F_i^h \quad (4.6)$$

In equilibrium the X sector makes no profits, so country i income (M_i) is

the total cost of labor. Let L_i denote the total endowment of unskilled labor in country i , and S_i denote the total endowment of skilled labor in country i , the total cost will be the sum of unskilled labor cost ($w_i L_i$) and skilled labor cost ($z_i S_i$), thus we have:

$$M_i = w_i L_i + z_i S_i, \quad i = 1, 2 \quad (4.7)$$

Utility of the representative consumer in each country is Cobb-Douglas:

$$U_i = X_{ic}^\beta Y_{ic}^{1-\beta}, \quad X_{ic} \equiv N_i^d X_{ii}^d + N_j^d X_{ji}^d + N_i^h X_{ii}^h + N_j^h X_{ji}^h + N_i^v X_{ii}^v + N_j^v X_{ji}^v \quad (4.8)$$

giving demands:

$$X_{ic} = \beta M_i / p_i, \quad Y_{ic} = (1 - \beta) M_i \quad (4.9)$$

Equilibrium in the X sector is the solution to a complementarity problem, which is a set of inequalities each associated with a non-negative variable. Inequalities hold as equalities if the associated variables have positive value, or as strict inequalities if the associated variables are zero. Proportional markups of price over marginal cost are denoted by m_{ij}^k ($k = d, h, v$). Firms headquartered in country i have (marginal revenue)-(marginal cost) inequalities, where left side is marginal revenue, and right side is marginal cost. The quantity produced by each type of firm (X_{ij}^k) is the complementary variable associated with these inequalities, where first subscript on X is the headquarters country, and the second is the country of sale. (4.10) is an example a national firm in country i , quantity X_{ii}^d will be produced and sold domestically when the inequality holds.

$$p_i(1 - m_{ii}^d) \leq c_i(w_i, z_i) \quad (X_{ii}^d) \quad (4.10)$$

Optimal markup for a firm in a Cournot model with homogenous products is the ratio of market share of the firm over the Marshallian price elasticity of demand. Since in a Cobb-Douglas demand function, price elasticity of demand equals to one,

the optimal markup has the following form:

$$m_{ij}^k = \frac{X_{ij}^k}{X_{jc}} = \frac{p_j X_{ij}^k}{\beta M_j} \quad k = d, h, v \quad i, j = 1, 2 \quad (4.11)$$

Zero profit requirement can be expressed by markup revenues equaling fixed costs, with the number of firms as the associated complementary variable. (4.12)

is an example of a national firm in country i. The firm produces and sells quantity X_{ii}^d domestically, and produces X_{ij}^d domestically then sell to country j. The markup revenue is the sum of markup revenue of these two parts $p_i m_{ii}^d X_{ii}^d + p_j m_{ij}^d X_{ij}^d$, and the fixed cost are domestic skilled and unskilled labor in (4.3). When the above condition is satisfied, the number of domestic firm in country i will be N_i^d .

$$p_i m_{ii}^d X_{ii}^d + p_j m_{ij}^d X_{ij}^d \leq fc_i^d(w_i, z_i) (N_i^d) \quad (4.12)$$

Substituting markups into MR=MC as in (4.10), inequalities results in outputs for X produced in country i, we get the quantity requirement for different firm types as demonstrated in (4.13).

$$X \geq \beta M_i \frac{p_i - c_i(w_i, z_i)}{p_i^2} \quad \text{for } X_{ii}^d, X_{ii}^k, X_{ji}^k, X_{ji}^v \quad (4.13)$$

Eventually, the profit of type-k firm headquartered in country i (Π_i^k) can be obtained. For example, the profit of a domestic firm (Π_i^d):

$$\Pi_i^d = a_i M_i + b_j M_j - d_i \leq 0 \quad (4.14)$$

Assuming the initial conditions are the same for both countries i and j, the changes in factors such as income would lead to changes in the firm profit. We can develop some intuition of multinational activities by discussing the effect of these changes. For example, when total income in both countries increases by the same amount in the same direction ($dM_i = dM_j > 0$), the changes in profit for different types of firms have the relation $d\Pi_i^h = d\Pi_j^h > d\Pi_i^v = d\Pi_j^v = d\Pi_i^d = d\Pi_j^d > 0$. The

higher profit of type-h firm is due to the fact that type-v and type-d firms need to pay transport costs. Similarly, a change in total income of the same amount in different direction ($dM_i = -dM_j > 0$) will result in the changes in profit

$d\Pi_i^d = d\Pi_i^v > d\Pi_i^h = d\Pi_j^h = 0 > d\Pi_i^v = d\Pi_j^d$. The changes are unfavorable to type-d_j and type-v_i firms for their primary market is country j, which is the smaller one in the equilibrium. Similar handling can be applied to changes in cost.

In this models, different combinations of vertical MNEs, horizontal MNEs, and NEs can arise endogenously as a function of the parameters values such as relative endowment trade difference, trade costs, investment barriers. Using simulation, the dominant types of multinationals in equilibrium can be shown. Horizontal firms are dominant when the countries are relatively similar in size and in relative factor endowment, with high transport costs. This result can be explained intuitively. If transport costs are low, export is preferable relative to multinational production. While if the two countries differ too much in their endowments, vertically fragmenting the production would be a more economical choice, as each country can benefit from their comparative advantages. In the case of different country size, setting up production abroad would be too costly for the larger country, and it would prefer to take the form of national firms. From the above discussion, national firms would be the prevalent type if two countries with similar factor endowments are very different in size. Vertical firms would be dominant when the countries similar in size have very different factor endowment.

Thus the KK model based on the simulation results can be used to explain the volume of FDI (demonstrated by production of the MNEs foreign affiliates) from the origin country (where the headquarters is located) as a function of the

characteristics of both the origin and host (where the affiliates are located) countries.

4.3 Chapter Summary

This chapter discusses the empirical methodology on the analysis of FDI. First, alternative approaches such as internalization and eclectic theories are introduced. Then the development of industrial organization approach towards an integrated model on foreign affiliates is reviewed. Combining both horizontal and vertical motivation into one theoretical framework, the knowledge-capital model has been empirically tested and gained support. The formulation of the K-K model is then introduced and the main variables in the analysis are derived from simulation results.

Chapter 5

DATA AND EMPIRICAL METHODOLOGY

This chapter first discusses the features of panel data and fixed-effect model. The data description and source is given and the basic statistics of the data is presented. Then the empirical model and methodology is described.

5.1 Data

5.1.1 Panel Data

Panel data refers to the pooling of observations on a cross-section of households, countries, firms etc. Benefits of using panel data include: (1) Control for individual heterogeneity; (2) Give more informative data, more variability, less collinearity among the variables, more degrees of freedom and more efficiency; (3) better able to study the dynamics; (4) better able to identify and measure effects that are simply not detectable in pure cross-section or pure time-series data; (5) allow us to construct and test more complicated behavioral models than purely cross-section or time-series data; and (6) Usually gathered on micro units and can measure variables more accurately. (Baltagi 2001 chapter 1).

Panel data could be balanced or unbalanced. In a balanced panel the individuals are observed over the entire sample period, and an unbalanced panel have some units with missing observations. If data are randomly missing, a common practice is to use the subset of individuals that have the complete time-series

observations. Two types of specification can be employed: fixed effects and random effects specifications (Hsiao 2002 p. 283).

5.1.2 Fixed-Effect vs. Random Effect Model

In panel data analysis, the unobservable effect specific to individual cross-sectional units or time can be captured by using fixed effects or random effects method. The one-way error component regression model considers only the individual specific effect, and the two-way error component regression model considers both the individual and time effect. (Baltagi 2001 p11)

Fixed-effect models assume the individual or time specific effect to be fixed and employ dummy variables to account for the effect. The major drawback for the fixed effects models is they often have too many dummy variables in the specification, which causes the loss of degrees of freedom. Multicollinearity may also be aggravated by adding the dummies. The problem caused by too many dummies in fixed-effect models can be avoided if the unobservable effects can be assumed random. (Baltagi 2001 chapter 2)

The choice between fixed or random effect model should consider the time span (T) and number of cross-sectional units (N). As T goes to infinity, the FE estimator is consistent. But if T is fixed and N goes to infinity, the FE estimators of the individual effect are no longer consistent, and random-effect model is an appropriate specification (Baltagi 2001 p14). Hausman (1978) proposed a specification based on the difference between fixed and random effects estimators, in which a rejection is interpreted as an adoption of fixed effect model (Baltagi 2001 p20).

In this thesis, fixed-effect is more preferable because the fundamental

assumptions of random effect do not hold. First, random error in the intercept is presumed to be a random drawing from a very large population, while in this case the limited numbers of countries are chosen because they have foreign affiliates of U.S. multinational firm. Second, the error term in the intercept must be uncorrelated with other explanatory variables, while the unaccounted country-specific effects are very likely related to the main variables in the thesis such as GDP and skill level.

5.1.3 Description of Data

Due to data availability, we have an unbalanced panel of 19 developed countries over the period of 1984 – 2002 and 20 developing countries covering 1990-2002. All the variables except labor skill and distance variables use annual data in the empirical analysis. Table 5.1 and 5.2 give descriptive statistics for developed and developing countries respectively.

FDI level can be denoted by three measures, FDI stock, FDI flow or level of affiliate sales. This thesis use the real volume of foreign affiliate sales by the majority-owned U.S. multinationals in the host country. FDI stock or flow are not taken for this variable as there are too many observations missing. The volume of sales are taken from Bureau of Economic Analysis (BEA) and converted into millions of 1995 U.S. dollars using the consumer price index. Following Blonigen, labor skill variable was measured as educational attainment assessed by the average years of schooling for people aged 25 or more. The data is obtained from the Barro-Lee dataset on educational attainment. As the data is only available every five years, linear interpolation is used to annualize the data.

GDP is in constant 1995 U.S. dollars and was obtained from the World Bank's World Development Indicator disk (2002). Trade cost was constructed by 100

minus the GDP share of the sum of imports and exports, which are also obtained from World Bank (WDI 2002). Investment cost is constructed from the investment profile index obtained from the Political Risk Service Group. The investment profile index ranges from 1 to 12, with higher number denoting better investment environment. The investment cost is simply 13 minus the investment profile index, thus we have a measurement of cost with higher number indicating higher investment cost. The exchange rates are measured as the host country currency price of one unit of the home country currency (U.S.) and are taken from International Monetary Fund. Distance between the host and home countries is a constant for each country denoted by the distance between the two capital cities and provided by Bali Online Corporation (<http://www.indo.com>). A full list of data description and source is in appendix C.

5.2 Empirical Analysis

5.2.1 Empirical Model

The K-K model specification allows for both horizontal and vertical MNE for FDI and considers trade costs. Some variations are made to incorporate features on food sector. FDI from country i to country j is denoted by:

$$FDI_{ij} = f(SUMGDP_{ij}, DIFFGDPS_{ij}, SKDIFF_{ij}, GDPSKDIF_{ij}, TCOST_i, INVEST_j, TRSKDIFFS, TCOST_{US}, DIST_{ij}) \quad (5.1)$$

FDI_{ij} : production by the majority-owned manufacturing affiliates of home country

$SUMGDP_{ij}$: sum of GDP of home and host country

$DIFFGDPS_{ij}$: squared difference in GDP between home and host country

$SKDIFF_{ij}$: skill difference between home and host country

$GDPSKDIF_{ij}$: interaction between skill difference and GDP difference

TCOST_i : trade cost in host country

INVEST_j : investment costs in the host country

TRSKDIFFS : interaction between trade cost and squared skill difference

TCOST_US : trade cost in home country (U.S.)

DIST_{ij} : distance between the capital of home and host countries

Table 5.1 Statistical Description of Panel Data for Developed Countries

	Mean	Median	Maximum	Minimum	Std. Dev.
SALE	3453.51	2458.50	14020.00	0.10	3436.49
SUMGDP	7812.88	7494.50	14700.00	5039.10	1814.99
DIFFGDPS	41028155.00	38987552.00	79299025.00	1960000.00	17735129.00
SKDIFF	3.52	3.30	8.34	0.32	1.69
GDPSKDIFF	21895.41	20539.93	65193.88	1699.17	12032.43
INVEST	5.03	5.00	9.00	1.00	1.94
TCOST	34.27	37.50	84.08	0.10	24.20
TRSKDIFFS	561.74	230.72	2575.54	0.73	712.85
TCOST_US	78.66	79.07	82.75	75.50	2.51
ER	131.67	5.98	1909.44	0.06	381.12
DIST	4467.72	3872.00	9908.00	455.00	2013.08

Table 5.2 Statistical Description of Panel Data for Developing Countries

	Mean	Median	Maximum	Minimum	Std. Dev.
SALE	867.04	248.50	6020.00	0.10	1374.04
SUMGDP	7929.37	7946.40	10050.00	6493.44	942.13
DIFFGDPS	57796690.00	56582741.00	81097950.00	34562641.00	13471261.00
SKDIFF	6.02	6.04	8.70	2.31	1.52
GDPSKDIFF	45046.04	43424.18	73574.44	19788.69	11405.22
INVEST	6.16	6.17	10.58	1.25	1.80
TCOST	43.85	44.80	86.24	0.10	25.84
TRSKDIFFS	1781.58	1434.86	5760.43	1.12	1481.45
TCOST_US	77.07	76.28	79.38	75.50	1.51
ER	844.50	8.88	25000.00	0.00	3215.07
DIST	5216.69	4993.00	10163.00	1820.00	2772.21

Dependent variable in the model is the real volume of sales (FDI_{ij}) in each host country by the majority-owned manufacturing affiliates of home country. Independent variables in CMM model are sum of GDP of both home and host countries, squared difference of GDP between the two countries, skill difference between home and host countries, trade cost of both the home and host country, investing cost in the host country, and the interaction between host trade costs and squared skill difference between home and host countries, the distance between countries.

The variables on GDP are used to test for the effect of country size on FDI when there are trade cost. When trade cost exist, if the two countries are large and similar in size, the most common type of MNEs is horizontal. While for large countries, the higher fixed costs for setting up production across countries should not

be a deterrence to FDI relative to exporting, for countries with smaller market size the additional cost of setting up the production facilities in foreign locations might deter FDI activity. Thus the greater the sum of GDP in both countries (SUMGDP), the higher the FDI level. SUMGDP is expected to be positively related to FDI. On the other hand, the greater the difference in GDP, the less profitable for multinationals to produce abroad relative to export, thus squared difference in GDP (GDPDIFSQ) is expected to be negatively related to FDI.

Relative skill endowment is chosen because greater difference in skill differences (proxied here by education level) tend to encourage vertical MNEs behavior in search of lower production cost, especially lower wages. Two variables are used to capture this effect. The first is labor skill difference (SKDIFF) between the home and host country. Carr, Markusen and Maskus (2001) explains that higher skill level in the home country means higher wage, and consequently higher production cost compared to countries with lower skill level. To take advantage of the difference in costs, multinationals would choose more affiliate production. Since FDI flows from skill-intensive countries to countries with low skill intensity, vertical FDI will be encouraged. Thus the higher labor skill difference (SKDIFF), the greater is FDI activity. SKDIFF is expected to have a positive sign.

However, skill difference could also affect sales negatively. Carr, Markusen and Maskus (2001, 2003) looked into both inbound and outbound FDI, and the net volume of affiliate sales rise as the U.S. skill level becomes consistently more skill-abundant relative to host countries, either in the case of a positive or negative skill difference. Especially the partial derivative result for U.S. outbound FDI show that when the U.S. is parent, an increase in host-country skilled-labor abundance leads

to increase in the U.S. affiliate production in the host country. In this case, the convergence of skill difference between the host and home countries increases FDI level, displaying a negative relationship between labor skill difference and the U.S. FDI outflow. Blonigen, Davies and Head (2003) and Blonigen (2004) also suggested that, in the case of FDI flows between developed countries, the convergence in skill difference encourages the FDI activity. Hence we predict labor skill difference variable will have a negative sign. The second is the interaction between skill difference and GDP difference (GDPSKDIF). As skill difference encourages vertical FDI and GDP difference discourages horizontal FDI, their interaction should have opposite effect and hence GDPSKDIF is predicted to have a negative sign.

The effects of trade and investment costs are captured by four independent variables. When trade costs in the host country increases, exporting back to the home country becomes more costly, and vertical FDI will be encouraged relative to export. Trade costs in the host country ($TCOST_j$) are expected to be positively related to FDI. On the other hand, for vertical FDI, high trade costs in the home country ($TCOST_{US}$) would make it more costly for affiliate goods to be shipped back to home country, thus $TCOST_{US}$ is expected to be negatively related to FDI. Relatively high investment cost in the host country ($INVEST_j$) add to the production costs and should discourage FDI, thus for $INVEST_j$ a negative sign is expected. When high trade costs exist horizontal investment is preferred relative to vertical investment, whereas greater skill difference favors vertical investment. Thus an interaction between host trade costs and squared skill difference ($TRSKDIFFS$) is expected to negatively affect FDI flow.

Distance between host and home countries ($DIST$) is essentially

uncorrelated with investment or trade costs in the model, as they are captured by level of perceived investment cost and import protection respectively. Longer distances make trade more difficult as they lead to increased transportation costs, making FDI more preferable. On the other hand, distance poses challenge for control of overseas investment, as the cultural background and management concepts differ greatly, which discourage FDI. As a result, the resulting effect of distance is ambiguous. After estimating the original K-K specification, Exchange rate (ER) is included in the analysis of alternative specification, which is expected to have a negative sign. The higher is the exchange rate (denoted by U.S. dollar against the host country currency), the higher the cost of capital for the U.S. investors, hence they are less willing to invest abroad.

The above discussion leads to our central equation as follows:

$$FDI_{ij} = f(SUMGDP_{ij}, DIFFGDPS_{ij}, SKDIFF_{ij}, GDPSKDIFF_{ij}, TCOST_j, INVEST_j, TRSKDIFF_{ij}, TCOST_{US}, ER_j) \quad (5.2)$$

5.2.2 Empirical Methodological Issues

The analysis is first done on the K-K original specification with OLS and WLS method following Markusen. The OLS result show that most of the key variables come out as not significant. Also heteroskedasticity is found. A WLS is then employed to correct the problem, and the results improved both in the R-squared and estimate significance. As suggested by Markusen, fixed-effect model is used to include country dummies. Since economic theory has not specified a form for the model, we follow Blonigen to take the log form of the fixed effect model to give it a better interpretation as elasticity. After taking the log, we have the same

multicollinearity problem with the interaction terms on skill difference as Blonigen encountered. Following his practice, these two interactions are dropped from the model estimation. The model further improved with higher R-squared and most of the key variables are significant with the expected signs. In next chapter the result from both the initial and alternative specifications are presented.

5.3 Chapter Summary

The first part of this chapter discusses the advantages and possible concerns of panel data. In following two alternative approaches to handle panel data - fixed-effect and random-effect models are introduced, and the choice of fixed-effect model is justified. The data employed do not satisfy random-effect assumptions, while a fixed-effect model will give unbiased and efficient estimates.

After describing the data, the empirical methodology is explained and the central equation for the analysis is developed. The results of estimation are presented in the next chapter.

Chapter 6

EMPIRICAL RESULTS

This chapter presents the results of the models discussed in previous chapter.¹¹ First, ordinary least squares (OLS)¹² and fixed-effect results are presented. Then the results for different period and country groups are discussed and compared.

6.1 Fixed Effect Results

As the countries included in the model estimation are chosen based on their ranking of foreign affiliate sales, they may differ a lot in their social, political and economic status. The results from OLS estimation may be affected by these country-specific heterogeneity and thus be unreliable. To control for the cross-sectional variation, fixed-effect or random-effect model can be employed. As our data do not satisfy the random-effect model's assumptions, fixed-effect model is a more suitable choice as it can produce efficient and consistent estimates. While investigating FDI activities, usually country-specific heterogeneity exists and inclusion of fixed-effect dummies is necessary. Carr, Markusen and Maskus (2001, 2003) and Blonigen (2003) employed fixed-effect specification to test the knowledge-capital model. Blonigen's (2004) article on the effects of bilateral tax treaties on U.S. FDI also used fixed-effect model. Recent works by Hanson, Mataloni and Slaughter (2005) also considered

¹¹ Tests are done in SAS and Eviews (Version 5.0).

¹² OLS estimates are provided in appendix A.

country-specific effect, while Albuquerque, Loayza and Serven (2005) considered industry-specific effect.

6.1.1 Results for All Countries

The analysis is done on different country groups covering different periods. First the analysis is done on both developed and developing countries for the period of 1990 – 2002. Then we break down the country into two groups: developed and developing to check whether these factors behave differently for different country groups. The developed country data covers longer time because of data availability. As Blonigen (2004) pointed out, the linear model proposed by Carr, Markusen and Maskus is not derived from economic theory, and other functional form can be taken. To better interpret the analysis result, this thesis takes a Log-log functional form of the model, thus estimates can be explained in terms of elasticity. Logging the data can also reduce the skewness in data.

Table 6.1 gives the results for all countries for the period of 1990 – 2002. In column (2) is the result with exchange rate included. All the estimates are significant and generally conform to our expected sign except for the investment cost variable. The joint market size has a positive effect on the FDI activity significant at 1% level. A one percent increase in the sum of GDP of the home (U.S.) and host country will lead to 3.86 percent increase in the outflow of U.S. FDI in the food processing sector. The difference in market size has a negative effect of about 1.76 percent.

Skill difference has a negative sign significant at 1% level, indicating that labor skill similarity encourages the FDI activity. The sign conforms to the partial derivative result in CMM (2001), where an increase in the host country skilled-labor

abundance increases FDI in the host country when the U.S. is the parent. Blonigen (2003, 2004) also found a negative relationship between labor skill difference and FDI in the case of U.S. outbound FDI. The effect of skill difference is much smaller than market size, as skill difference decreases by one percent, the increase in the U.S. outflow of FDI is 0.83 percent. The results on market size and skill difference confirm that U.S. MNEs activity increase as the host country becomes more similar in size and factor endowments to the U.S.

Both trade costs have the expected signs significant at 5 percent level. According to FDI theory, the two trade costs should have opposite effects on FDI. The host country trade costs makes FDI more preferable relative to exporting, while the home country trade costs add to the cost of re-exporting the goods back to the U.S. and thus discourage U.S. FDI. The host country trade cost has a positive effect of 0.02 percent, which is very small compared to the home country trade cost of a negative effect of 5.6 percent. While a significant positive effect of host country trade cost means that the target market is likely the host country, the large negative sign of the home country trade cost indicates that the U.S. market is more important, as re-exporting costs to the U.S. has a greater impact on FDI activity.

For exchange rate, the result has the expected negative sign significant at 1% level. A stronger U.S dollar against the host currency will discourage the U.S. outflow of FDI to that country by 0.92 percent for a one percent increase in the exchange rate.

The sign for the investment cost, however, is not as expected. According to the results, for a one percent increase in the investment cost in the host country, there is actually an increase of 0.17 percent in the U.S. outflow of FDI into the country.

Past empirical works have mostly found a negative effect, or in some cases (Waldkirch 2004), insignificant effect for investment costs. As the productivity in U.S. food manufacturing has been growing slower than the overall level of U.S. manufacturing productivity, a possible explanation for the positive effect of investment cost maybe that the food processing sector requires less advanced production technology as in other manufacturing sectors, thus the investment cost in setting up production in the host countries are not as high, and even when the investment cost increases the FDI is still preferred when the market size is large enough and labor skill difference are not too drastic.

The results reported are from estimating data that combined both developed and developing countries. Based on different motivations, FDI can take either horizontal or vertical form. Horizontal FDI mostly adopted between and among developed countries, and vertical FDI mostly from developed to developing countries.

Table 6.1 Estimates of Fixed-effect Regression for All Countries

Variable	All Countries (1)	All Countries (2)
LSUMGDP	0.18 (0.37)	3.86*** (4.99)
LDIFFGDPS	-1.27*** (-4.50)	-1.76*** (-6.64)
LSKDIFF	-1.03*** (-5.63)	-0.83*** (-4.20)
LINVEST	0.06 (1.62)	0.17** (3.31)
LTCOST	0.06*** (6.26)	0.02** (2.27)
LTCOST_US	-9.98*** (-7.80)	-5.60** (-2.32)
LER		-0.92*** (-26.25)
C	72.20*** (9.51)	30.70* (1.84)
Adjusted R-squared	0.996	0.998

Note: * significant at 10%, ** significant at 5%, *** significant at 1%

Table 6.2 Estimates of Fixed-effect Regression: Developed vs. Developing Countries

Variable	Developed (1)	Developed (2)	Developing (3)	Developing (4)
LSUMGDP	2.65*** (4.44)	2.40*** (3.43)	32.64*** (18.72)	28.19*** (19.92)
LDIFFGDPS	-1.40*** (-5.02)	-1.42*** (-4.47)	-18.44*** (-19.67)	-14.99*** (-19.67)
LSKDIFF	-0.95*** (-5.03)	-0.89*** (-5.84)	-4.78*** (-4.50)	-5.50*** (-5.28)
LINVEST	0.26*** (5.29)	0.18*** (3.69)	-0.01 (-0.08)	0.11* (1.86)
LTCOST	0.54*** (4.16)	0.30** (2.11)	-0.007 (-0.53)	-0.01 (0.83)
LTCOST_US	-8.79*** (-4.05)	-8.12*** (-4.17)	-5.95*** (-4.6)	-5.80*** (-2.87)
LER		-0.51*** (-5.14)		-0.77*** (-7.83)
C	45.63*** (3.25)	46.90*** (3.60)	76.22*** (12.73)	57.59*** (4.78)
Adjusted R-squared	0.998	0.997	0.99	0.99
Obs	203	203	212	212

Note: * significant at 10%, ** significant at 5%, *** significant at 1%

Thus, it is necessary to do tests on developed and developing countries separately to differentiate the effects of host country characteristics on attracting U.S. FDI flow.

6.1.2 Fixed Effect Results: Developed vs. Developing Countries

Results for developed and developing countries are given in table 6.2. column (1) and (2) give the result for developed country covering the period of 1983 – 2002, and Columns (3) and (4) give the result for developing countries for the period of 1990 – 2002.

Column (2) contains the result for developed countries with exchange rate included in the model. All the estimates are significant and signs are the same as in the case with all countries. The joint market size has a positive effect of 2.4 percent on the developed country FDI inflow, which is smaller than the case with all countries. The difference in market size has a negative effect of about 1.42 percent, similar to the effect on all countries. Skill difference also has a similar negative effect as the whole countries case, which is 0.89, indicating that the skill convergence encourages the U.S. outbound FDI into the developed countries. Both trade costs have greater effect on FDI than in the case with all countries, especially the U.S. trade cost has a negative effect of more than 8 percent. The investment cost has a positive effect of 0.18 percent, also similar to the case of all countries.

Column (4) contains the result for developing countries with exchange rate included in the model. Most of the variables have the expected signs, but the impact of the main variables are much larger compared to that of developed countries. When exchange rate is included, joint market size has a positive effect of 28 percent, while skill difference has a negative effect of 5.5 percent. The elasticity of the market size suggests that 1 percent increase in joint market size leads to 28 percent increase in FDI inflow. This positive effect of market size corresponds to the fact that FDI is elastic to world income since the 1970s. This result is also consistent with the result reported by Carr, Markusen, and Maskus (2001) for their partial derivative of

elasticity of affiliate sales with respect to the joint market size. As demonstrated by Markusen (2001), market size is more important for local sales, while skill difference is more important for export. This result indicates that the investments in developing countries are more market seeking. As the developing countries experience economic development, the structure of food consumption has changed greatly towards processed food, while in developed countries the changes are much smaller. This change, combined with the usually large population in the developing countries may explain the greater effect of SUMGDP.

Like in the case for all countries and developed countries, skill difference has a negative sign significant at 1% level, indicating that for the developing countries, higher skill level encourages U.S. FDI. If labor skill difference increase by 1 percent, then the foreign affiliate sales of U.S. firms will decrease by 5.5 percent. This effect is about 5 times that of the developed countries, indicating that the skill convergence plays a more important role for developing countries to attract the U.S. FDI. This is reasonable because developed countries have similar skill levels as the U.S., and generally can meet labor skill requirement for setting up multinationals. However developing countries have much lower skill levels, and some may not be able to meet labor skill prerequisite. What is more, as mentioned above the U.S. food manufacturing productivity has been growing slower than the overall level of U.S. manufacturing productivity. Labor skill difference in the food processing sector between the U.S. and other countries therefore is less than that of the whole manufacturing sectors. Since the food processing sector involves a large degree of materials-intensive production, where labor skill level is already very low compared to other manufacturing sectors, developing countries with much lower skill level are not

fit for setting up multinationals.

Investment costs has a small positive effect on the developing countries, possibly due to the overwhelming effect of joint market size. When the market size is large enough, these costs can be negligible relative to the possible revenue generated. As for the trade cost, host country trade costs have the correct sign, but not significant. Host country trade costs have negative effect of about 5.8 percent, which is smaller than the developed countries case. The exchange rate has been consistently negative for all three cases, and for developing countries the effect is -0.77 percent, indicating stronger U.S dollar discourages the U.S. FDI.

6.3 Chapter Summary

This chapter presents and compares the fixed-effect results for both developed and developing countries. Results are generally consistent with the K-K theory, and the effects on different country groups are comparable. For developing countries the joint market size and skill difference have greater effect on FDI than in developed countries.

Chapter 7

CONCLUSIONS

Foreign direct investment plays a very important role in global economic development. It links the world market and integrates the world production systems, and its ability to generate lasting effect of capital, technological, know-how and skill is particularly beneficial to developing countries. Historically the exchange of investment has been primarily between and among developed countries. However, the past decade has witnessed a rapid growth in foreign direct investment in the developing countries. Accompanying the changes in FDI activity, theories on multinational enterprise behavior have also evolved from the earlier views that explained FDI flows as a kind of capital flow from capital-rich to capital-scarce nations in seeking of higher returns, to the modern theories that focused on knowledge-based firm-specific assets of MNEs. As the main motives for investing abroad are lowering production costs and increasing market share, two main factors generally considered in the discussion of FDI activity are market size and labor skill level.

Different approaches have been taken to analyze the motivations for FDI flows. But before the appearance of K-K model, proposed by Carr, Markusen and Maskus (2001) only one kind of FDI could be explained (horizontal or vertical). As the K-K model combines both forms of FDI into one theoretical framework, it has received much attention and found support in empirical testing. The knowledge-capital model assumes two countries, two factors and two goods. Three types of firms

can arise: horizontal firms with plants in both countries and headquarters in home country, vertical firms with a plant in foreign country and headquarters in the home country, and national firms with plant and headquarters in one country. Firm-level and plant-level scale economies are assumed for the more skilled labor-intensive good. Different country characteristics represented by relative endowment and country size favor different firm types. Thus CMM (2001) provide a unified framework for analyzing FDI activities. This thesis applied the knowledge-capital model to the food-processing sector. An unbalanced panel with 19 developed countries over the period of 1984 – 2002 and 20 developing countries covering 1990-2002 was used to estimate the determinants of the U.S. outbound FDI in the food-processing sector. Many studies have focused on the U.S. FDI activity, as it is one of the major sources as well as recipients of FDI. The U.S. is among the largest investors in foreign food processing industries. The results suggest that for both developed and developing countries joint market size is positively related to the U.S. outbound FDI level, which conforms to the previous studies that the U.S. investment are attracted to foreign countries in seeking greater market expansion. Though the direction of the effect is the same, the impact is much greater for developing countries than for developed countries. Developing countries have been viewed mostly as production basis for serving high-income developed countries.

However, with the fast development occurring in developing countries, their markets have shown great potential and the nature of FDI has also changed from primarily cost saving towards market seeking. Labor skill difference has a negative effect for both developing and developed country groups. Since the U.S. skill level is higher than that of host countries, this result indicates that higher host labor skill level

leads to greater U.S. FDI in the host country's food-processing sector. This effect is more obvious for developing countries, where 1 percent decrease in skill difference leads to 5.5 percent increase in FDI level. For developed countries, the effect is less than 1 percent. Since labor skill level for developing countries are generally much lower than that of the developed countries, a decrease by same amount in the host country's skill level has greater impact on developing countries' FDI activity. This might imply that the possible returns to FDI may be greater in developing countries than developed countries.

Contrary to the expected negative sign, investment costs have a small positive effect on FDI in both developing and developed countries. Host trade costs countries also have a small positive effect on the U.S. FDI in developed countries, while in developing countries no significant relationship is found. Home trade costs do have a strong positive effect on FDI in both developing and developed countries. Home country trade costs should only matter when the affiliate products are exported back to the home country. The positive relationship between market size and FDI level suggests that the U.S. investment is aimed at entering the host market, meaning re-exported part should only be a small share of total affiliate production, and as a result the home trade costs should not have such great effect on FDI level. One possible explanation is that the home trade costs may reflect some economic factors or a business environment that hinder FDI activity. In addition, exchange rate is found to be negatively connected to FDI level, indicating that weaker home currency encourages U.S. FDI. This is consistent predictions made in previous studies by Froot and Stein (1991) and Blonigen (1995), where a strong negative correlations between a country's exchange rate and FDI is observed.

This study has important implications for both home and host countries. For the home country, it can adjust its investment strategies based on the impact of market size and skill level. According to the difference between developing and developed countries, the home country should develop differentiated measures for investment decision. In the case of a large developing country with low skill level, the investment decision can not be made solely based on the market potential in disregard of the necessary skill requirement. For the host country, it can take measures to foster the market if the aim of attracting FDI is for serving local market, or to develop export strategies if the focus of affiliate production is to increase the country's export. In the case of developing countries, labor skill difference plays a less important role on the inflow of FDI, as more and more MNEs aim at expanding their market share in the fast growing developing world. As indicated by results in this thesis, as well as in the analysis of Markusen (2001), Blonigen (2004), skill convergence contributes to the increase in foreign affiliate sales of U.S. firms. Thus for the developing countries to take advantage of the lasting benefit of FDI, measures should be taken to raise labor skill level to meet the basic requirement.

The main limitations of this study is that it only discusses the case of the U.S. outbound FDI, further studies need to incorporate the inbound FDI into the U.S. food processing sector, as the model explains both inbound and outbound FDI flows. Data availability limitation precludes use of needed instrument variables for a two-stage least square analysis for addressing the simultaneity problem.

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Appendix A

OLS Results

As this thesis applies K-K model to investigate the determinants of U.S. outbound FDI in the food processing sector, tests employed also follow the practice of Carr, Markusen and Maskus (2001). By doing so, we can not only draw analogy from their testing procedures and analysis, but could also make comparison with the results, as their tests are done on all the non-bank manufacturing sectors.

To make comparison of the effects of country characteristics on the FDI activity between different country groups, separate tests are done on developed and developing countries. Table A1 presents the OLS regression result for equation (5.2) for developing countries for the period 1990 to 2002 using affiliate sales as the dependent variable. Breusch-Pagan test statistics shows that heteroskedasticity is present, though the result for coefficients is still unbiased, the variance of the estimated parameters is inefficient and estimated coefficients may be unreliable. To correct for heteroskedasticity, a weighted-least square (WLS) regression is employed. Columns (1) and (3) contain the OLS model without correction for heteroskedasticity. All variables except for the host trade cost have the correct sign. The market size is statistically significant at 1 percent level, and host trade cost is significant at 5 percent level. Columns (2) and (4) contain the results after heteroskedasticity correction, which is generally similar to the uncorrected results. Table A2 presents the OLS regression result for developed countries for the period 1983 to 2002. In the uncorrected models joint market has the wrong sign, while in the corrected model the sign is as expected but only significant after including exchange rate. In the corrected model, all variables except for investment cost and the interaction between the trade

and skill difference have the expected sign. The results for the heteroskedasticity corrected model generally agree with the results presented by Carr, Markusen and Maskus (2001). As there may be unobserved characteristics not controlled for by the independent variables, a country fixed-effect model is employed to filter out the time-invariant country specific heterogeneity following Carr, Markusen and Maskus (2001) and Blonigen and Davies (2004).

Table A1 Estimates of OLS Regression for Developing Countries: 1990-2002

Variable	OLS	WLS	OLS	WLS
SUMGDP	1.53*** (6.43)	1.20*** (5.27)	1.53*** (6.39)	1.19*** (5.07)
DIFFGDPS	-0.00*** (-3.94)	-0.00*** (-5.64)	-0.00*** (-3.83)	-0.00*** (-5.37)
SKDIFF	-29.07 (-0.05)	-52.57 (-0.20)	-25.24 (-0.05)	-34.03 (-0.13)
GDPSKDIFF	-0.001 (-0.02)	-0.01 (-0.34)	-0.001 (-0.02)	-0.01 (-0.44)
INVEST	-39.94 (-0.76)	-16.48** (-2.44)	-34.61 (-0.62)	-13.87** (-2.08)
TCOST	15.26* (1.96)	2.02 (0.31)	15.28* (1.96)	1.82 (0.28)
TRSKDIFFS	-0.21 (-1.18)	-0.03 (-0.26)	-0.21 (-1.18)	-0.03 (-0.22)
TCOST_US	54.06 (0.47)	28.59 (1.43)	56.82 (0.49)	28.23 (1.40)
DIST	-0.19*** (-6.14)	-0.15*** (-2.61)	-0.19*** (-6.11)	-0.15*** (-2.62)
ER			-0.008 (-0.33)	0.000 (0.05)
C	-7879 (-0.79)	-4312** (-2.03)	-8184 (-0.82)	-4321* (-1.99)
Adjusted R-squared	0.35	0.35	0.32	0.29
Obs	212	212	212	212

Note: * significant at 10%, ** significant at 5%, *** significant at 1%

Table A2 Estimates of OLS Regression for Developed Countries: 1983-2002

Variable	OLS	WLS	OLS	WLS
SUMGDP	-0.44* (-1.80)	0.17 (1.43)	-0.42* (-1.74)	0.21* (1.84)
DIFFGDPS	-0.000* (-1.70)	-0.000** (-2.21)	-0.000* (-1.73)	-0.000** (-2.52)
SKDIFF	164.8 (0.20)	-38.7 (-0.27)	106.9 (0.13)	-70.8 (-0.49)
GDPSKDIFF	-0.12 (-1.34)	-0.12*** (-7.42)	-0.12 (-1.32)	-0.125*** (-7.54)
INVEST	-59.0 (-0.56)	71.2* (1.69)	-59.6 (-0.57)	72.1* (1.79)
TCOST	30.7* (1.69)	17.5*** (2.66)	28.1 (1.52)	14.99** (2.25)
TRSKDIFFS	-0.10 (-0.11)	0.652** (2.22)	0.16 (0.16)	0.82*** (2.64)
TCOST_US	-955*** (-4.33)	-468.3*** (-10.01)	-955*** (-4.33)	-469*** (-10.48)
DIST	-0.82*** (-8.99)	-0.83*** (-24.36)	-0.81*** (-8.83)	-0.82*** (-24.80)
ER			-0.44 (-0.86)	-0.25** (-2.32)
C	89434*** (4.50)	44784*** (10.04)	89529*** (4.51)	44829*** (10.47)
Adjusted R-squared	0.38	0.74	0.39	0.75
Obs	289	289	289	289

Note: * significant at 10%, ** significant at 5%, *** significant at 1%

Appendix B: Data Description and Source

Variable Name	Description	Source
SALE	foreign affiliate sales	US Dept of Commerce, BEA http://www.bea.gov/bea/di/di1usdop.htm
SUMGDP	sum of GDP	World Bank (WDI 2002)
DIFFGDPS	squared GDP difference	World Bank (WDI 2002)
SKDIFF	skill difference	Barro-Lee dataset http://www.cid.harvard.edu/cidwp/042.htm
GDPSKDIFF	Interaction between GDP and skill difference	GDP from WDI 2002 Skill difference from Barro-Lee data
INVEST	investment cost	Political Risk Service Group http://www.prsgroup.com/
TCOST	host trade cost	World Bank (WDI 2002)
TRSKDIFFS	interaction of trade cost & skill difference squared	Trade cost from WDI 2002 Skill difference from Barro-Lee data
TCOST_US	home trade cost	World Bank (WDI 2002)
ER	exchange rate against home country currency	International Monetary Fund (online International Financial Service) http://ifs.apdi.net/imf/
Dist	distance between host & home country capital cities	Bali Online Corporation. http://www.indo.com

Appendix B

Developing Countries Data

COUNTRY	YEAR	SALE	SUMGDP	DIFFGDP	SKDIFF	GDPKDIFF	INVEST	TCOST	TRSKDIFF	TCOST_US	ER	DIST
Argentina	1990		6708	40094224	4.23	26784.36	8.25	85.01	1521.08	79.38	0.49	5176
Argentina	1991	2290	6702	39413284	4.20	26367.60	7.33	86.24	1521.27	79.36	0.95	5176
Argentina	1992	2420	6927	41641209	4.16	26844.48	6.17	85.27	1475.65	79.20	0.99	5176
Argentina	1993	2640	7121	43811161	4.13	27336.47	6.92	83.72	1428.00	79.07	1.00	5176
Argentina	1994	2970	7416	47389456	4.09	28155.56	6.25	81.84	1369.03	78.02	1.00	5176
Argentina	1995	3140	7598	50154724	4.06	28752.92	7.00	80.23	1322.48	76.54	1.00	5176
Argentina	1996	3850	7872	53699584	4.00	29312.00	7.00	78.49	1255.84	76.28	1.00	5176
Argentina	1997	3580	8234	58461316	3.94	30125.24	6.17	76.71	1190.82	75.50	1.00	5176
Argentina	1998	3350	8596	63744256	3.88	30977.92	5.00	76.69	1154.52	76.13	1.00	5176
Argentina	1999	3120	8945	69806025	3.82	31916.10	5.83	78.71	1148.57	75.81	1.00	5176
Argentina	2000	3260	9304	75968656	3.76	32772.16	6.17	77.80	1099.91	75.81	1.00	5176
Argentina	2001	3390	8948	69755904	3.70	30902.40	5.46	77.73	1064.12	75.91	1.00	5176
Argentina	2002	3290	9066	71808676	3.64	30845.36	8.42	78.07	1034.40	75.84	3.06	5176
Brazil	1990		7123	35010889	8.24	48756.08	6.75	84.84	5760.43	79.38	0.00	4212
Brazil	1991		7101	34562641	8.20	48207.80	8.08	83.41	5608.49	79.36	0.00	4212
Brazil	1992		7298	36990724	8.15	49568.30	6.33	80.74	5362.95	79.20	0.00	4212
Brazil	1993		7508	38837824	8.10	50479.20	7.67	80.40	5275.04	79.07	0.03	4212
Brazil	1994		7826	41912676	8.05	52115.70	7.33	81.33	5270.39	78.02	0.64	4212
Brazil	1995	4720	8044	44036496	8.01	53154.36	7.83	82.78	5311.17	76.54	0.92	4212

Brazil	1996	4610	8323	47293129	7.94	54603.38	8.00	83.70	5276.75	76.28	1.01	4212
Brazil	1997	4920	8687	51739249	7.88	56680.84	7.00	82.34	5112.85	75.50	1.08	4212
Brazil	1998	5350	9038	56881764	7.82	58978.44	5.67	82.74	5059.75	76.13	1.16	4212
Brazil	1999	4190	9404	62346816	7.76	61272.96	7.92	77.69	4678.31	75.81	1.81	4212
Brazil	2000	4070	9798	67601284	7.69	63227.18	7.17	76.99	4552.89	75.81	1.83	4212
Brazil	2001	4440	9413	62204769	7.62	60098.94	4.83	79.14	4595.22	75.91	2.36	4212
Brazil	2002	4370	9538	64032004	7.56	60495.12	5.08	77.94	4454.55	75.84	2.92	4212
Chile	1990	113	6563	41951529	4.86	31478.22	5.58	34.03	803.78	79.38	305.00	4993
Chile	1991	115	6536.4	41519981	4.82	31058.15	5.42	38.16	886.55	79.36	349.00	4993
Chile	1992	156	6742.1	44061716	4.77	31662.78	5.00	40.07	911.71	79.20	363.00	4993
Chile	1993	140	6925.8	46433322	4.74	32299.31	5.00	42.55	956.00	79.07	404.00	4993
Chile	1994	232	7209	50282281	4.69	33256.79	6.00	42.71	939.45	78.02	420.00	4993
Chile	1995	290	7405.2	52922715	4.65	33827.82	6.00	40.72	880.47	76.54	397.00	4993
Chile	1996	280	7670	56700900	4.59	34562.70	5.17	40.36	850.31	76.28	412.00	4993
Chile	1997	290	8015.2	61855079	4.54	35706.19	3.17	41.02	845.49	75.50	419.00	4993
Chile	1998	309	8368.2	67433659	4.47	36706.75	2.50	42.28	844.79	76.13	460.00	4993
Chile	1999	178	8727.3	73491185	4.42	37891.33	4.92	43.83	856.28	75.81	509.00	4993
Chile	2000	156	9091.4	79719898	4.36	38928.70	4.50	37.36	710.20	75.81	540.00	4993
Chile	2001	131	8729	73462041	4.30	36855.30	2.67	41.16	761.05	75.91	635.00	4993
Chile	2002	139	8849.2	75530005	4.25	36935.90	2.50	40.78	736.59	75.84	689.00	4993
China	1990	34.8	6916	37503376	6.77	41459.48	8.00	68.15	3123.51	79.38	4.78	6941
China	1991	61.9	6923	36687249	6.76	40945.32	7.67	64.48	2946.58	79.36	5.32	6941
China	1992	79.9	7185	38378025	6.74	41754.30	6.17	62.54	2841.04	79.20	5.51	6941
China	1993	131	7431	39803481	6.73	42459.57	6.50	64.32	2913.24	79.07	5.76	6941

China	1994	123	7784	42458256	6.71	43722.36	7.25	51.23	2306.59	78.02	8.62	6941
China	1995	94	8040	44089600	6.70	44488.00	7.67	54.32	2438.43	76.54	8.35	6941
China	1996	166	8367	46689889	6.66	45507.78	5.50	60.09	2665.33	76.28	8.31	6941
China	1997	382	8775	50481025	6.63	47106.15	5.42	58.63	2577.19	75.50	8.29	6941
China	1998	442	9190	54612100	6.58	48626.20	6.83	60.79	2631.99	76.13	8.28	6941
China	1999	379	9614	59074596	6.55	50343.30	6.75	58.81	2523.10	75.81	8.28	6941
China	2000	501	10050	63520900	6.51	51884.70	4.58	50.90	2157.15	75.81	8.28	6941
China	2001	603	9618	59013124	6.47	49702.54	4.67	56.84	2379.37	75.91	8.28	6941
China	2002	666	9761	60512841	6.44	50096.76	5.50	55.51	2302.20	75.84	8.28	6941
Colombia	1990	1100	6594.1	41549627	7.63	49182.22	7.50	64.61	3761.39	79.38	502.00	2366
Colombia	1991	845	6565.9	41140679	7.61	48811.30	6.00	64.75	3749.81	79.36	633.00	2366
Colombia	1992	803	6768.8	43707965	7.58	50112.90	5.83	66.53	3822.57	79.20	759.00	2366
Colombia	1993	700	6953.1	46062012	7.55	51241.10	7.00	64.81	3694.33	79.07	863.00	2366
Colombia	1994	843	7237.9	49873256	7.52	53106.99	7.00	63.87	3611.87	78.02	845.00	2366
Colombia	1995	891	7432.5	52526256	7.50	54356.25	7.00	64.27	3615.19	76.54	913.00	2366
Colombia	1996	729	7694.4	56334031	7.44	55841.66	7.00	63.95	3539.86	76.28	1040.00	2366
Colombia	1997	689	8037.6	61503238	7.40	58033.76	7.33	64.40	3526.54	75.50	1140.00	2366
Colombia	1998	554	8388.2	67105587	7.34	60127.81	7.42	63.88	3441.57	76.13	1430.00	2366
Colombia	1999	366	8744.2	73201714	7.30	62457.34	10.00	62.78	3345.55	75.81	1760.00	2366
Colombia	2000	330	9106.9	79443352	7.24	64530.84	10.00	57.73	3026.07	75.81	2090.00	2366
Colombia	2001	269	8746.4	73164073	7.18	61414.85	5.12	61.46	3168.41	75.91	2300.00	2366
Colombia	2002	331	8865.8	75241746	7.14	61933.79	3.58	60.66	3092.42	75.84	2500.00	2366
Ecuador	1990	428	6535.1	42313724	6.06	39419.69	7.42	39.89	1464.90	79.38	768.00	2688
Ecuador	1991	298	6505.9	41913971	6.04	39103.56	7.17	38.89	1418.77	79.36	1050.00	2688

Ecuador	1992	204	6706.5	44535602	6.01	40107.74	7.50	40.78	1472.98	79.20	1530.00	2688
Ecuador	1993	124	6886.8	46966350	5.98	40982.14	7.00	48.29	1726.87	79.07	1920.00	2688
Ecuador	1994	179	7167.5	50872556	5.95	42438.38	8.00	49.57	1754.90	78.02	2200.00	2688
Ecuador	1995	125	7357.9	53613148	5.93	43420.05	8.08	41.68	1465.67	76.54	2560.00	2688
Ecuador	1996	118	7618.3	57482175	5.89	44656.21	9.00	46.09	1598.96	76.28	3190.00	2688
Ecuador	1997	98.5	7958.9	62743825	5.85	46338.44	7.25	40.99	1402.78	75.50	4000.00	2688
Ecuador	1998	49.3	8309	68409441	5.81	48054.51	5.83	42.71	1441.72	76.13	5450.00	2688
Ecuador	1999	30.3	8667.6	74518330	5.77	49808.95	6.75	37.10	1235.17	75.81	11800.00	2688
Ecuador	2000	17.4	9028	80856064	5.73	51524.16	9.50	26.77	878.94	75.81	25000.00	2688
Ecuador	2001	41.1	8688.2	74507971	5.69	49114.94	6.08	35.53	1150.32	75.91	25000.00	2688
Ecuador	2002	45.1	8787.9	76599254	5.65	49449.37	6.25	33.14	1057.91	75.84	25000.00	2688
Egypt	1990	36.3	6570.9	41849255	8.43	54534.51	10.58	47.24	3357.11	79.38	1.55	5824
Egypt	1991	40.9	6541.5	41454282	8.34	53697.09	8.83	36.38	2530.43	79.36	3.14	5824
Egypt	1992	54.7	6743.7	44040478	8.23	54616.75	6.67	39.13	2650.39	79.20	3.32	5824
Egypt	1993	62.6	6925.3	46440136	8.14	55471.66	6.00	41.60	2756.40	79.07	3.35	5824
Egypt	1994	56.7	7207.5	50303556	8.03	56952.78	6.00	48.92	3154.41	78.02	3.39	5824
Egypt	1995	58	7400.2	52995488	7.94	57801.61	6.00	50.05	3155.33	76.54	3.39	5824
Egypt	1996	61.6	7663.2	56803354	7.79	58711.67	6.00	53.86	3268.45	76.28	3.39	5824
Egypt	2000	61.5	9088.4	79773479	7.20	64307.52	3.00	61.13	3168.98	75.81	3.47	5824
Egypt	2001	73.1	8724.5	73539200	7.05	60457.28	4.04	59.89	2976.68	75.91	3.97	5824
Egypt	2002	68.3	8845.8	75689114	6.91	60076.92	6.00	60.73	2899.74	75.84	4.50	5824
Honduras	1990	659	6523.33	42466988	8.31	54153.53	7.50	23.87	1648.37	79.38	4.11	1820
Honduras	1991	408	6493.44	42075461	8.31	53903.31	7.00	29.30	2023.34	79.36	5.32	1820
Honduras	1992	480	6693.63	44707544	8.30	55496.87	7.00	33.41	2301.62	79.20	5.50	1820

Honduras	1993	463	6873.86	47143879	8.30	56988.96	7.00	25.79	1776.67	79.07	6.47	1820
Honduras	1994	401	7153.8	51068174	8.29	59242.00	7.25	17.85	1226.73	78.02	8.41	1820
Honduras	1995	312	7343.96	53817483	8.29	60815.77	8.00	7.88	541.55	76.54	9.47	1820
Honduras	1996	271	7604.1	57697697	8.26	62742.13	8.00	0.89	60.72	76.28	11.70	1820
Honduras	1997	265	7944.31	62975176	8.24	65390.09	5.92	2.05	139.19	75.50	13.00	1820
Honduras	1998	175	8294.44	68650505	8.22	68107.30	3.17	0.10	6.76	76.13	13.40	1820
Honduras	1999	82	8654.35	74747264	8.20	70894.33	5.00	1.04	69.93	75.81	14.20	1820
Honduras	2000	105	9014.56	81097950	8.17	73574.44	5.00	1.29	86.11	75.81	14.80	1820
Honduras	2001	106	8654.45	74745535	8.14	70374.78	4.42	0.71	47.04	75.91	15.50	1820
Honduras	2002	114	8774.46	76834691	8.12	71176.18	4.92	1.02	67.25	75.84	16.40	1820
Hungary	1999	199	8701.7	73930763	3.49	30008.07	3.00	0.10	1.22	75.81	237.00	4579
Hungary	2000	88.4	9064.4	80202771	3.44	30807.26	3.83	0.10	1.18	75.81	282.00	4579
Hungary	2001	161	8701.9	73927324	3.39	29147.56	2.25	0.10	1.15	75.91	286.00	4579
Hungary	2002	122	8822.7	75991319	3.35	29202.96	1.25	0.10	1.12	75.84	258.00	4579
India	1990	0.1	6794	39012516	8.32	51966.72	8.17	82.79	5730.92	79.38	17.50	7480
India	1991	0.1	6766	38613796	8.26	51327.64	8.92	81.92	5589.21	79.36	22.70	7480
India	1994	67.2	7478	46539684	8.08	55121.76	7.50	76.86	5017.91	78.02	31.40	7480
India	1995	133	7693	48818169	8.02	56035.74	7.00	74.27	4777.08	76.54	32.40	7480
India	1996	169	7979	52142841	7.91	57118.11	7.00	74.63	4669.46	76.28	35.40	7480
India	1997	176	8336	56911936	7.81	58918.64	5.83	74.52	4545.43	75.50	36.30	7480
India	1998	169	8709	61952641	7.69	60527.99	7.08	74.39	4399.13	76.13	41.30	7480
India	1999	101	9099	67256401	7.59	62245.59	8.00	72.98	4204.24	75.81	43.10	7480
India	2000	109	9477	72982849	7.48	63901.64	8.00	69.49	3887.99	75.81	44.90	7480
India	2001	101	9095	67322025	7.37	60470.85	5.33	72.29	3926.57	75.91	47.20	7480

India	2002	87	9224	69155856	7.27	60457.32	5.04	71.59	3783.74	75.84	48.60	7480
Indonesia	1990	47.5	6658	40729924	8.70	55523.40	4.67	50.94	3855.65	79.38	1840.00	10163
Indonesia	1994	78.8	7336	48497296	8.26	57522.64	6.67	48.12	3283.11	78.02	2160.00	10163
Indonesia	1995	90	7542	50951044	8.15	58174.70	7.00	46.04	3058.09	76.54	2250.00	10163
Indonesia	1996	110	7818	54499924	8.02	59203.64	5.58	47.73	3070.01	76.28	2340.00	10163
Indonesia	1997	121	8168	59474944	7.91	61001.92	5.25	44.00	2753.00	75.50	2910.00	10163
Indonesia	1998	44.6	8488	65480464	7.78	62955.76	9.00	3.81	230.61	76.13	10000.00	10163
Indonesia	1999	36.5	8850	71402500	7.67	64811.50	8.17	37.63	2213.73	75.81	7860.00	10163
Indonesia	2000	12.8	9219	77457601	7.54	66359.54	8.00	30.75	1748.19	75.81	8420.00	10163
Indonesia	2001	74.1	8852	71368704	7.41	62599.68	7.87	24.07	1321.64	75.91	10300.00	10163
Indonesia	2002	77.8	8974	73376356	7.30	62531.80	8.50	30.82	1642.40	75.84	9310.00	10163
Malaysia	1990		6576.5	41776832	6.46	41754.21	5.67	0.10	4.17	79.38	2.70	9537
Malaysia	1991		6551.9	41320470	6.08	39082.85	3.58	0.10	3.70	79.36	2.75	9537
Malaysia	1992		6757.4	43858831	5.69	37682.59	4.75	0.10	3.24	79.20	2.55	9537
Malaysia	1993		6944.1	46184257	5.30	36018.27	5.75	0.10	2.81	79.07	2.57	9537
Malaysia	1994		7230.9	49972175	4.91	34709.28	6.00	0.10	2.41	78.02	2.62	9537
Malaysia	1995		7428.8	52579901	4.53	32847.94	6.00	0.10	2.05	76.54	2.50	9537
Malaysia	1996		7697.7	56284505	4.49	33685.33	5.83	0.10	2.02	76.28	2.52	9537
Malaysia	1997		8045	61387225	4.47	35022.45	4.92	0.10	2.00	75.50	2.81	9537
Malaysia	1998		8387.2	67121972	4.43	36294.10	6.50	0.10	1.96	76.13	3.92	9537
Malaysia	1999		8753	73051209	4.41	37692.27	6.17	0.10	1.94	75.81	3.80	9537
Malaysia	2000		9122	79174404	4.37	38884.26	5.83	0.10	1.91	75.81	3.80	9537
Malaysia	2001		8754	73034116	4.33	37004.18	4.58	0.10	1.87	75.91	3.80	9537
Malaysia	2002		8876	75064896	4.31	37341.84	4.87	0.10	1.86	75.84	3.80	9537

Mexico	1990	4210	6785	39125025	6.13	38343.15	5.00	61.69	2318.12	79.38	2.81	1882
Mexico	1991	5330	6766	38613796	6.07	37718.98	5.00	64.36	2371.34	79.36	3.02	1882
Mexico	1992	5640	6976	41011216	6.00	38424.00	5.58	64.49	2321.64	79.20	3.09	1882
Mexico	1993	6020	7162	43270084	5.94	39073.32	6.00	65.58	2313.90	79.07	3.12	1882
Mexico	1994	6000	7455	46854025	5.87	40180.15	6.00	61.52	2119.79	78.02	3.38	1882
Mexico	1995	3210	7626	49758916	5.81	40983.74	8.42	41.82	1411.68	76.54	6.42	1882
Mexico	1996	2500	7901	53275401	5.75	41969.25	7.25	37.74	1247.78	76.28	7.60	1882
Mexico	1997	2460	8261	58049161	5.70	43428.30	5.42	39.21	1273.93	75.50	7.92	1882
Mexico	1998	3280	8627	63250209	5.63	44775.39	4.83	36.48	1156.30	76.13	9.14	1882
Mexico	1999	2150	9000	68890000	5.58	46314.00	4.00	36.70	1142.71	75.81	9.56	1882
Mexico	2000	2150	9384	74580496	5.52	47670.72	4.00	35.37	1077.74	75.81	9.46	1882
Mexico	2001	2630	9004	68823616	5.46	45296.16	2.54	36.19	1078.88	75.91	9.34	1882
Mexico	2002	2960	9129	70744921	5.41	45503.51	1.75	36.09	1056.29	75.84	9.66	1882
Panama	1990	55.1	6526.05	42431545	4.69	30550.43	8.67	27.76	610.61	79.38	1.00	2059
Panama	1991	56.5	6496.62	42034216	4.65	30147.72	8.42	27.11	586.19	79.36	1.00	2059
Panama	1992	117	6697.16	44660350	4.60	30741.06	8.00	26.61	563.07	79.20	1.00	2059
Panama	1993	127	6877.55	47093220	4.57	31361.40	8.00	26.64	556.37	79.07	1.00	2059
Panama	1994	37.4	7157.77	51011449	4.52	32282.88	8.00	23.25	475.01	78.02	1.00	2059
Panama	1995	35	7347.91	53759544	4.48	32847.76	8.00	23.95	480.69	76.54	1.00	2059
Panama	1996	37.5	7608.13	57636490	4.45	33783.82	8.00	20.92	414.27	76.28	1.00	2059
Panama	1997	37.1	7948.49	62908851	4.43	35136.59	5.92	17.08	335.19	75.50	1.00	2059
Panama	1998	38.8	8298.86	68577280	4.40	36437.02	3.00	24.96	483.23	76.13	1.00	2059
Panama	1999	33.5	8659.12	74664807	4.38	37847.05	3.00	25.44	488.05	75.81	1.00	2059
Panama	2000	25.5	9019.37	81011340	4.35	39152.74	3.00	27.92	528.32	75.81	1.00	2059

Panama	2001	27.7	8659.12	74664807	4.32	37328.60	3.04	26.10	487.09	75.91	1.00	2059
Panama	2002	29.5	8779.2	76751617	4.30	37671.44	3.50	26.49	489.80	75.84	1.00	2059
Peru	1990	831	6561.1	41976145	6.08	39391.71	8.33	70.41	2602.80	79.38	0.19	3508
Peru	1991	135	6532	41576704	5.92	38172.16	7.75	73.31	2569.25	79.36	0.77	3508
Peru	1992	85.8	6731.8	44198563	5.75	38227.15	8.33	72.01	2380.83	79.20	1.25	3508
Peru	1993	66	6913.8	46597006	5.59	38158.46	9.00	71.22	2225.49	79.07	1.99	3508
Peru	1994	119	7199.4	50418520	5.42	38485.25	8.17	71.08	2088.08	78.02	2.20	3508
Peru	1995	125	7393.6	53091625	5.26	38326.46	6.83	69.29	1917.09	76.54	2.25	3508
Peru	1996	169	7655	56927025	5.19	39158.55	5.00	68.79	1852.93	76.28	2.45	3508
Peru	1997	190	7998.7	62114890	5.13	40431.07	4.42	67.26	1770.08	75.50	2.66	3508
Peru	1998	167	8348.4	67759239	5.05	41569.58	4.00	68.11	1736.98	76.13	2.93	3508
Peru	1999	137	8708.9	73806999	4.99	42869.59	4.33	68.08	1695.20	75.81	3.38	3508
Peru	2000	66	9070.8	80088181	4.92	44030.06	6.00	66.16	1601.50	75.81	3.49	3508
Peru	2001	79.5	8709.4	73798408	4.85	41664.41	4.92	67.45	1586.59	75.91	3.51	3508
Peru	2002	80.1	8829.7	75869326	4.79	41722.34	4.67	67.24	1542.76	75.84	3.52	3508
Philippines	1990	803	6586.6	41646372	4.93	31815.26	9.75	39.20	952.75	79.38	24.30	8570
Philippines	1991	750	6556.2	41265206	4.92	31605.10	8.83	37.81	915.24	79.36	27.50	8570
Philippines	1992	776	6756.4	43872077	4.90	32455.64	7.42	36.84	884.53	79.20	25.50	8570
Philippines	1993	795	6937.8	46269925	4.88	33194.74	8.00	28.83	686.57	79.07	27.10	8570
Philippines	1994	702	7220.8	50115073	4.86	34404.91	7.75	26.04	615.05	78.02	26.40	8570
Philippines	1995	909	7414.1	52793303	4.85	35239.62	7.00	19.46	457.75	76.54	25.70	8570
Philippines	1996	776	7678.5	56572962	4.80	36103.20	7.00	10.19	234.78	76.28	26.20	8570
Philippines	1997	728	8022.5	61740306	4.76	37401.70	5.00	0.10	2.27	75.50	29.50	8570
Philippines	1998	581	8372	67371264	4.72	38741.76	5.00	0.10	2.23	76.13	40.90	8570

Philippines	1999	421	8734.8	73362651	4.68	40085.14	5.00	0.10	2.19	75.81	39.10	8570
Philippines	2000	435	9098.2	79598515	4.63	41307.93	5.00	0.10	2.14	75.81	44.20	8570
Philippines	2001	358	8735	73359225	4.58	39227.70	3.08	0.10	2.10	75.91	51.00	8570
Philippines	2002	487	8856	75411856	4.54	39425.36	3.00	0.10	2.06	75.84	51.60	8570
Poland	1999	598	8807	72131049	2.37	20128.41	2.00	41.36	232.32	75.81	3.97	4461
Poland	2000	777	9173	78269409	2.35	20790.45	3.33	38.20	210.96	75.81	4.35	4461
Poland	2001	924	8807	72131049	2.33	19788.69	2.62	39.33	213.52	75.91	4.09	4461
Poland	2002	966	8929	74149321	2.31	19891.41	2.37	39.63	211.47	75.84	4.08	4461
South Africa	1990	152	6665	40640625	6.86	43732.50	6.00	56.95	2680.04	79.38	2.59	7889
South Africa	1991	143	6633	40284409	6.31	40049.57	6.00	60.07	2391.75	79.36	2.76	7889
South Africa	1992	143	6830	42902500	5.76	37728.00	6.50	61.37	2036.11	79.20	2.85	7889
South Africa	1993	131	7012	45265984	5.21	35052.88	7.00	60.69	1647.38	79.07	3.27	7889
South Africa	1994	533	7297	49042009	4.66	32633.98	7.00	57.98	1259.07	78.02	3.55	7889
South Africa	1995	588	7491	51681721	4.11	29546.79	6.75	54.95	928.22	76.54	3.63	7889
South Africa	1996	527	7757	55398249	4.16	30962.88	6.00	52.27	904.56	76.28	4.30	7889
South Africa	1997	129	8101	60512841	4.22	32827.38	4.75	51.86	923.54	75.50	4.61	7889
South Africa	1998	62.6	8452	66064384	4.27	34706.56	3.08	49.42	901.07	76.13	5.53	7889
South Africa	1999	96.4	8815	71995225	4.33	36740.05	4.75	50.99	956.01	75.81	6.11	7889
South Africa	2000	109	9181	78127921	4.38	38714.82	5.92	44.86	860.61	75.81	6.94	7889
South Africa	2001	149	8816	71978256	4.43	37584.12	3.08	48.43	950.43	75.91	8.61	7889
South Africa	2002	150	8937	74011609	4.49	38627.47	2.42	48.09	969.50	75.84	10.50	7889
Thailand	1990	128	6631	41075281	6.65	42619.85	5.42	24.22	1071.07	79.38	25.60	8799
Thailand	1991	153	6611	40564161	6.61	42099.09	6.92	21.53	940.69	79.36	25.50	8799
Thailand	1992	165	6820	43033600	6.57	43099.20	7.00	22.05	951.79	79.20	25.40	8799

Thailand	1993	223	7011	45279441	6.53	43940.37	7.00	20.62	879.26	79.07	25.30	8799
Thailand	1994	344	7304	48944016	6.49	45404.04	7.00	17.64	743.00	78.02	25.20	8799
Thailand	1995	373	7508	51437584	6.45	46259.40	7.00	9.84	409.37	76.54	24.90	8799
Thailand	1996	389	7778	55086084	6.39	47426.58	6.33	15.55	634.94	76.28	25.30	8799
Thailand	1997	481	8116	60279696	6.33	49146.12	5.58	5.81	232.80	75.50	31.40	8799
Thailand	1998	423	8447	66145689	6.27	50993.91	8.00	0.10	3.93	76.13	41.40	8799
Thailand	1999	457	8813	72029169	6.21	52704.27	7.42	0.10	3.86	75.81	37.80	8799
Thailand	2000	372	9180	78145600	6.15	54366.00	4.33	0.10	3.78	75.81	40.10	8799
Thailand	2001	399	8813	72029169	6.09	51685.83	3.87	0.10	3.71	75.91	44.40	8799
Thailand	2002	439	8935	74046025	6.03	51888.15	4.50	0.10	3.64	75.84	43.00	8799
Venezuela	1990	3360	6585.3	41663152	7.11	45892.92	6.17	40.37	2040.79	79.38	46.90	2052
Venezuela	1991	2830	6561.7	41194575	7.06	45313.20	5.00	42.41	2113.87	79.36	56.80	2052
Venezuela	1992	2880	6766	43744996	7.00	46298.00	6.33	44.74	2192.26	79.20	68.40	2052
Venezuela	1993	2440	6946.2	46155718	6.94	47148.97	7.58	45.88	2209.75	79.07	90.80	2052
Venezuela	1994	1590	7224.4	50064115	6.88	48680.13	8.25	46.82	2216.20	78.02	149.00	2052
Venezuela	1995	1290	7417.4	52745359	6.83	49603.56	9.00	51.07	2382.36	76.54	177.00	2052
Venezuela	1996	664	7677.2	56592520	6.79	51079.81	8.83	42.16	1943.75	76.28	417.00	2052
Venezuela	1997	456	8022.2	61745021	6.76	53118.73	7.50	49.85	2278.03	75.50	489.00	2052
Venezuela	1998	367	8372.3	67366339	6.71	55073.67	7.58	58.99	2655.97	76.13	548.00	2052
Venezuela	1999	282	8727.3	73491185	6.68	57265.64	9.08	62.00	2766.59	75.81	606.00	2052
Venezuela	2000		9089.8	79748472	6.64	59296.53	9.00	53.59	2362.76	75.81	680.00	2052
Venezuela	2001		8729.8	73448328	6.60	56563.32	6.33	58.20	2535.19	75.91	724.00	2052
Venezuela	2002		8848.9	75535219	6.57	57100.53	6.54	57.93	2500.54	75.84	1160.00	2052

Developed Countries Data

COUNTRY	YEAR	SALE	SUMGDP	DIFFGDPS	SKDIFF	GDPSKDIFF	INVEST	TCOST	TRSKDIFFS	TCOST_US	ER	DIST
Australia	1983	2590	5249	22572001	1.75	8295.25		69.85	212.93	82.70	1.11	9908
Australia	1984	2617	5622	25989604	1.70	8656.40	4.00	65.90	189.99	81.82	1.14	9908
Australia	1989	4205	6729	37100281	1.83	11170.89	8.00	66.25	222.85	79.80	1.27	9908
Australia	1990	4321	6838	38464804	1.88	11659.76	9.00	66.42	234.75	79.38	1.28	9908
Australia	1991	3486	6809	38081241	1.88	11589.14	8.17	65.67	231.62	79.36	1.28	9908
Australia	1992	3874	7021	40436881	1.88	11929.48	7.83	63.45	223.30	79.20	1.36	9908
Australia	1993	3747	7215	42575625	1.87	12227.85	8.00	62.53	219.58	79.07	1.47	9908
Australia	1994	4537	7510	46104100	1.87	12710.88	7.50	60.85	213.26	78.01	1.37	9908
Australia	1995	4062	7716	48497296	1.87	13022.88	6.67	60.52	211.62	76.54	1.35	9908
Australia	1996	4748	7989	51998521	1.83	13210.55	7.00	60.77	203.97	76.29	1.28	9908
Australia	1997	4566	8348	56731024	1.79	13512.41	5.42	58.87	189.48	75.50	1.35	9908
Australia	1998	4317	8720	61779600	1.76	13802.16	5.00	59.98	184.94	76.13	1.59	9908
Australia	1999	4738	9099	67256401	1.72	14089.32	3.00	57.78	170.55	75.81	1.55	9908
Australia	2000	4394	9467	73153809	1.68	14369.04	3.00	58.88	166.18	75.81	1.73	9908
Australia	2001	4402	9095	67322025	1.64	13472.61	2.83	58.88	158.75	75.92	1.93	9908
Australia	2002	4584	9220	69222400	1.60	13345.28	2.75	58.51	150.55	75.85	1.84	9908
Austria	1983	155	5177	23261329	3.47	16716.52		29.61	355.66	82.70	17.96	4436
Austria	1984	144	5537	28863489	3.46	17922.81	2.83	24.64	294.58	81.82	20.01	4436
Austria	1985	132	5741	28933641	3.45	18557.55	4.00	21.09	251.01	82.75	20.69	4436
Austria	1986	267	5936	30958096	3.52	19563.02	4.00	29.21	361.15	82.49	15.27	4436
Austria	1987	335	6129	33074001	3.58	20600.08	4.00	30.50	391.38	81.41	12.64	4436
Austria	1988	343	6385	35940025	3.65	21869.76	4.50	25.21	335.52	80.24	12.35	4436
Austria	1989	249	6613	38526849	3.71	23052.80	4.25	21.98	303.24	79.80	13.23	4436
Austria	1990	236	6732	39790864	3.78	23844.24	4.42	22.00	314.33	79.38	11.37	4436

Austria	1993	583	7096	44142736	3.76	24954.86	4.58	28.52	402.33	79.07	11.63	4436
Austria	1994	857	7381	47872561	3.75	25932.41	6.83	26.60	373.62	78.01	11.42	4436
Austria	1995	905	7575	50481025	3.74	26572.70	7.00	22.96	321.11	76.54	10.08	4436
Austria	1996	907	7840	54169600	3.68	27099.52	5.83	19.70	267.12	76.29	10.59	4436
Austria	1997	889	8183	59243809	3.62	27893.93	4.58	12.98	170.41	75.50	12.20	4436
Austria	1998	849	8541	64625521	3.57	28667.07	4.00	12.38	157.39	76.13	12.38	4436
Austria	1999	781	8908	70425664	3.51	29439.14	4.00	9.34	114.89	75.81	11.72	4436
Austria	2000	644	9276	76457536	3.45	30166.80	3.83	11.56	137.63	75.81	12.10	4436
Austria	2001	717	8908	70425664	3.39	28465.66	1.50	11.09	127.62	75.92	12.07	4436
Austria	2002	787	9031	72403081	3.33	28369.01	1.00	10.66	118.54	75.85	11.97	4436
Belgium	1983	934	5210	22944100	3.75	17981.66		0.10	1.41	82.70	51.13	3872
Belgium	1984	1045	5576	26460736	3.65	18785.89	3.08	0.10	1.33	81.82	57.78	3872
Belgium	1985	1027	5780	28515600	3.55	18957.00	4.00	0.10	1.26	82.75	59.38	3872
Belgium	1986	1722	5974	30536676	3.55	19639.40	3.25	0.10	1.26	82.49	44.67	3872
Belgium	1987	1981	6170	32604100	3.56	20316.18	3.58	0.10	1.27	81.41	37.33	3872
Belgium	1988	1780	6431	35390601	3.56	21190.34	4.92	0.10	1.27	80.24	36.77	3872
Belgium	1989	1784	6659	37957921	3.57	21970.13	5.42	0.10	1.27	79.80	39.40	3872
Belgium	1990	1816	6776	39237696	3.57	22362.48	5.50	0.10	1.27	79.38	33.42	3872
Belgium	1991	1996	6751	38800441	3.58	22312.28	5.75	0.10	1.28	79.36	34.15	3872
Belgium	1992	2271	6955	41280625	3.59	23091.45	6.50	0.10	1.29	79.20	32.15	3872
Belgium	1993	2174	7131	43678881	3.61	23832.05	7.08	0.10	1.30	79.07	34.60	3872
Belgium	1994	2936	7419	47348161	3.62	24895.46	7.75	0.10	1.31	78.01	33.46	3872
Belgium	1995	3762	7616	49900096	3.63	25642.32	6.33	0.10	1.32	76.54	29.48	3872
Belgium	1996	3442	7879	53597041	3.61	26414.17	5.50	0.10	1.30	76.29	30.96	3872
Belgium	1997	2914	8229	58537801	3.59	27436.49	4.58	0.10	1.29	75.50	35.77	3872
Belgium	1998	3295	8586	63904036	3.56	28490.62	4.00	0.10	1.27	76.13	36.30	3872

Belgium	2002	3017	9078	71605444	3.48	29413.91	1.46	0.10	1.21	75.85	35.06	3872
Canada	1983	8239	5415	21022225	1.46	6684.93		51.98	110.49	82.70	1.23	455
Canada	1984	8197	5799	24216241	1.38	6810.66	3.17	45.81	87.74	81.82	1.30	455
Canada	1985	7977	6022	25989604	1.31	6678.38	4.33	45.26	77.66	82.75	1.37	455
Canada	1986	7495	6224	27836176	1.35	7112.05	5.92	44.70	81.23	82.49	1.39	455
Canada	1987	6945	6434	29658916	1.39	7548.16	6.00	46.98	90.25	81.41	1.33	455
Canada	1988	7688	6708	32171584	1.42	8076.93	5.92	46.65	94.60	80.24	1.23	455
Canada	1989	8051	6940	34574400	1.46	8596.56	4.33	48.04	102.69	79.80	1.18	455
Canada	1990	8056	7052	35856144	1.50	8982.00	4.25	47.85	107.66	79.38	1.17	455
Canada	1991	8041	7011	35628961	1.40	8356.60	5.92	48.49	95.05	79.36	1.15	455
Canada	1992	8218	7216	37994896	1.30	8013.20	6.25	44.68	75.51	79.20	1.21	455
Canada	1993	8673	7408	40094224	1.20	7598.40	7.00	38.69	55.71	79.07	1.29	455
Canada	1994	7645	7714	43375396	1.10	7244.60	7.00	32.09	38.83	78.01	1.37	455
Canada	1995	8179	7919	45711121	1.00	6761.00	7.00	27.42	27.42	76.54	1.37	455
Canada	1996	8579	8188	49168144	0.96	6759.57	7.00	26.05	24.20	76.29	1.36	455
Canada	1997	10918	8554	53670276	0.93	6798.53	5.42	21.82	18.79	75.50	1.39	455
Canada	1998	12770	8924	58614336	0.89	6829.15	4.00	17.68	14.06	76.13	1.48	455
Canada	1999	10066	9313	63792169	0.86	6836.87	4.00	15.51	11.36	75.81	1.49	455
Canada	2000	10624	9703	69172489	0.82	6819.94	3.00	18.33	12.33	75.81	1.49	455
Canada	2001	12455	9313	63792169	0.78	6261.81	1.50	17.17	10.56	75.92	1.55	455
Canada	2002	13553	9443	65561409	0.75	6056.56	1.00	17.01	9.51	75.85	1.57	455
Denmark	1983	455	5143	23690449	2.47	12016.22		30.35	185.76	82.70	9.15	4050
Denmark	1984	455	5508	27164944	2.38	12414.98	4.25	28.50	161.71	81.82	10.36	4050
Denmark	1985	466	5714	29224836	2.29	12379.74	4.50	27.52	144.29	82.75	10.60	4050
Denmark	1986	594	5910	31248100	2.21	12331.54	5.08	35.58	173.15	82.49	8.09	4050
Denmark	1987	670	6100	33408400	2.12	12265.16	5.58	39.29	176.90	81.41	6.84	4050

Denmark	1991	708	6655	40006625	1.96	12397.00	5.25	31.47	120.89	79.36	6.40	4050
Denmark	1992	723	6856	42562576	2.05	13374.20	6.33	33.57	141.07	79.20	6.04	4050
Denmark	1993	868	7036	44943616	2.14	14346.56	7.08	36.02	164.98	79.07	6.48	4050
Denmark	1994	805	7325	48650625	2.23	15554.25	7.33	34.39	171.00	78.01	6.36	4050
Denmark	1995	808	7520	51265600	2.32	16611.20	6.75	33.29	179.19	76.54	5.60	4050
Denmark	1998	641	8486	65512836	2.22	18001.06	5.00	31.24	154.51	76.13	6.70	4050
Denmark	1999	655	8850	71402500	2.19	18522.40	5.00	29.92	143.75	75.81	6.98	4050
Finland	1983	0.1	5107	23941449	3.69	18045.38		40.16	546.28	82.70	5.57	4315
Finland	1984	0.1	5470	27562500	3.72	19551.00	2.67	41.25	572.01	81.82	6.01	4315
Finland	1985	0.1	5674	29658916	3.76	20476.96	3.00	42.47	600.47	82.75	6.20	4315
Finland	1986	0.1	5866	31741956	3.51	19786.61	3.42	48.48	597.90	82.49	5.07	4315
Finland	1987	0.1	6061	33860761	3.26	18993.22	3.17	49.33	525.51	81.41	4.40	4315
Finland	1988	0.1	6317	36759969	3.02	18286.01	4.50	50.61	460.38	80.24	4.18	4315
Finland	1992	26	6811	43151761	2.46	16133.46	7.67	48.12	290.23	79.20	4.48	4315
Finland	1993	24	6990	45562500	2.42	16362.00	8.00	39.97	234.85	79.07	5.71	4315
Finland	1995	27	7469	51998521	2.36	17017.96	6.50	33.84	188.46	76.54	4.37	4315
Finland	1996	28	7734	55741156	2.31	17246.46	6.75	32.49	173.39	76.29	4.59	4315
Finland	1997	27	8083	60793209	2.26	17621.22	4.92	30.02	153.31	75.50	5.19	4315
Finland	1998	27	8441	66243321	2.21	17987.19	3.00	31.24	152.58	76.13	5.34	4315
Finland	2000	33	9176	78216336	2.11	18660.84	3.83	25.17	112.05	75.81	5.19	4315
Finland	2001	33	8808	72114064	2.06	17493.52	1.83	29.88	126.78	75.92	5.19	4315
Finland	2002	35	8930	74132100	2.01	17306.10	1.00	29.42	118.87	75.85	5.14	4315
France	1983	3350	6220	14288400	4.70	17750.88		55.72	1228.83	82.70	7.62	3839
France	1984	2999	6600	16974400	4.55	18737.76	6.33	53.05	1097.28	81.82	8.74	3839
France	1985	2566	6810	18576100	4.40	18964.00	4.75	53.20	1029.95	82.75	8.99	3839
France	1986	2847	7030	19980900	4.41	19703.76	4.83	59.10	1148.36	82.49	6.93	3839

France	1990	5064	7990	25502500	4.44	22422.00	4.67	56.54	1114.55	79.38	5.45	3839
France	1991	5291	7980	25000000	4.40	22000.00	5.58	56.53	1094.36	79.36	5.64	3839
France	1992	6016	8200	26632400	4.36	22584.80	6.33	57.52	1093.43	79.20	5.29	3839
France	1993	6956	8370	28836900	4.32	23198.40	7.67	60.04	1120.40	79.07	5.66	3839
France	1994	6748	8680	31584400	4.28	24053.60	7.83	58.37	1069.26	78.01	5.55	3839
France	1995	6944	8890	33524100	4.24	24549.60	6.50	56.36	1013.25	76.54	4.99	3839
France	1996	6073	9170	36360900	4.17	25133.04	6.08	55.50	964.19	76.29	5.12	3839
France	1997	6603	9540	40195600	4.10	25968.64	4.67	51.98	872.13	75.50	5.84	3839
France	1998	6125	9940	44089600	4.02	26719.36	3.92	50.42	816.49	76.13	5.90	3839
France	1999	4296	10350	48302500	3.95	27466.40	4.00	50.31	785.82	75.81	5.62	3839
France	2000	4098	10770	52562500	3.88	28130.00	3.33	44.10	663.85	75.81	5.78	3839
France	2001	4370	10350	48302500	3.81	26465.60	2.17	48.28	700.07	75.92	5.77	3839
France	2002	4343	10490	49702500	3.74	26338.80	1.00	47.56	663.87	75.85	5.72	3839
Germany	1990	8291	8790	18062500	2.52	10710.00		45.73	290.42	79.38	1.62	4177
Germany	1991	8895	8820	17305600	2.54	10558.08	5.42	47.15	303.71	79.36	1.66	4177
Germany	1992	8952	9080	18490000	2.56	10990.80	6.67	50.68	331.12	79.20	1.56	4177
Germany	1993	9939	9230	20340100	2.57	11608.74	8.42	54.64	362.00	79.07	1.65	4177
Germany	1994	11596	9570	22372900	2.59	12260.16	8.25	53.16	357.16	78.01	1.62	4177
Germany	1995	11245	9800	23814400	2.61	12736.80	6.75	51.68	352.02	76.54	1.43	4177
Germany	1996	10830	10080	26214400	2.59	13250.56	6.42	50.44	337.80	76.29	1.51	4177
Germany	1997	8837	10450	29484900	2.57	13933.38	5.17	45.67	300.70	75.50	1.73	4177
Germany	1998	8614	10850	32832900	2.54	14577.12	4.00	43.79	283.39	76.13	1.76	4177
Germany	1999	8366	11250	36602500	2.52	15258.10	4.00	42.08	267.65	75.81	1.67	4177
Germany	2000	6992	11690	40068900	2.50	15825.00	3.42	33.68	210.47	75.81	1.72	4177
Germany	2001	7059	11260	36481600	2.48	14967.12	1.96	39.85	244.69	75.92	1.72	4177
Germany	2002	7176	11400	37699600	2.46	15079.84	1.00	38.54	232.44	75.85	1.70	4177

Hong Kong	1996	114	7745	55577025	2.84	21142.38	6.33	0.10	0.80	76.29	7.73	8186
Hong Kong	1997	108	8093	60637369	2.82	21974.91	4.92	0.10	0.80	75.50	7.74	8186
Hong Kong	1998	77	8435	66341025	2.81	22871.16	5.92	0.10	0.79	76.13	7.75	8186
Hong Kong	1999	22	8799	72267001	2.79	23751.79	5.75	0.10	0.78	75.81	7.76	8186
Hong Kong	2000	23	9175	78234025	2.78	24589.10	5.00	0.10	0.77	75.81	7.79	8186
Hong Kong	2001	22	8803	72199009	2.77	23502.70	2.37	0.10	0.77	75.92	7.80	8186
Hong Kong	2002	35	8926	74200996	2.75	23705.73	1.50	0.10	0.76	75.85	7.80	8186
Ireland	1983	743	5039.1	24610529	4.03	19982.51		0.10	1.62	82.70	0.81	3389
Ireland	1984	632	5400.8	28293889	3.93	20925.73	4.67	0.10	1.55	81.82	0.92	3389
Ireland	1985	727	5602	30448324	3.84	21189.12	5.00	0.10	1.47	82.75	0.95	3389
Ireland	1986	828	5791.8	32583547	3.77	21531.33	5.00	0.10	1.42	82.49	0.74	3389
Ireland	1987	1344	5983.8	34765174	3.70	21839.52	5.00	0.10	1.37	81.41	0.67	3389
Ireland	1988	1486	6236.1	37747507	3.64	22339.22	5.00	0.10	1.32	80.24	0.66	3389
Ireland	1989	1349	6458.8	40464865	3.57	22696.76	5.08	0.10	1.27	79.80	0.71	3389
Ireland	1990	1394	6572.9	41823382	3.50	22634.85	6.25	0.10	1.23	79.38	0.61	3389
Ireland	1991	1514	6543.9	41423383	3.48	22384.76	6.42	0.10	1.21	79.36	0.62	3389
Ireland	1992	1770	6745.7	44013936	3.46	22928.14	7.25	0.10	1.19	79.20	0.59	3389
Ireland	1993	1555	6927.2	46414244	3.43	23395.16	8.00	0.10	1.18	79.07	0.68	3389
Ireland	1994	1779	7210.5	50261010	3.41	24189.37	7.08	0.10	1.16	78.01	0.67	3389
Ireland	1995	3162	7406.4	52905257	3.39	24657.50	6.33	0.10	1.15	76.54	0.62	3389
Ireland	1996	3185	7671.5	56678312	3.36	25280.70	5.17	0.10	1.13	76.29	0.63	3389
Ireland	1997	3332	8019.2	61792177	3.33	26145.02	3.17	0.10	1.11	75.50	0.66	3389
Ireland	1998	3622	8375.9	67307257	3.29	27024.31	2.17	0.10	1.09	76.13	0.70	3389
Ireland	1999	465	8744.4	73198291	3.26	27908.37	3.00	0.10	1.06	75.81	0.66	3389
Ireland	2000	452	9115	79299025	3.23	28763.15	5.00	0.10	1.04	75.81	0.68	3389
Ireland	2001	697	8745.1	73186314	3.20	27358.57	2.25	0.10	1.02	75.92	0.68	3389

Israel	1985	0.1	5612	30338064	2.70	14871.60	7.83	0.10	0.73	82.75	1.18	5887
Israel	1986	0.1	5804.5	32438720	2.75	15685.41	6.83	8.19	62.15	82.49	1.49	5887
Israel	1987	0.1	5998.4	34593219	2.81	16515.53	6.25	3.70	29.14	81.41	1.60	5887
Israel	1988	0.1	6249.6	37581804	2.86	17545.20	7.17	16.74	137.10	80.24	1.60	5887
Israel	1992	159	6763	43784689	3.03	20049.51	6.00	25.03	229.81	79.20	2.46	5887
Israel	1993	292	6947.1	46143490	3.06	20786.27	6.00	18.99	177.80	79.07	2.83	5887
Israel	1994	275	7232.5	49949556	3.09	21838.58	6.00	19.42	185.41	78.01	3.01	5887
Italy	1983	2409	5845	17264025	6.21	25785.93		57.17	2201.79	82.70	1518.85	4501
Italy	1984	2149	6229	20169081	6.08	27296.30	4.50	54.91	2028.31	81.82	1756.96	4501
Italy	1985	2128	6455	21762225	5.95	27756.75	5.25	54.58	1932.20	82.75	1909.44	4501
Italy	1986	2808	6667	23357889	5.93	28650.02	5.33	61.62	2165.47	82.49	1490.81	4501
Italy	1987	3280	6885	24950025	5.91	29500.47	4.50	62.15	2167.77	81.41	1296.07	4501
Italy	1988	3305	7172	27123264	5.88	30643.87	5.58	62.56	2165.88	80.24	1301.63	4501
Italy	1989	2852	7420	29160000	5.86	31654.80	5.00	60.46	2077.73	79.80	1372.09	4501
Italy	1990	4101	7550	30140100	5.84	32061.60	5.50	60.56	2065.27	79.38	1198.10	4501
Italy	1991	4141	7530	29702500	5.79	31544.60	7.92	62.89	2106.87	79.36	1240.61	4501
Italy	1992	4237	7740	31809600	5.74	32351.04	8.25	61.81	2033.59	79.20	1232.41	4501
Italy	1993	3798	7910	33988900	5.68	33137.72	9.00	58.74	1897.67	79.07	1573.67	4501
Italy	1994	3456	8220	36966400	5.63	34242.56	8.08	55.78	1769.15	78.01	1612.44	4501
Italy	1995	3380	8440	38937600	5.58	34819.20	7.67	50.00	1556.82	76.54	1628.93	4501
Italy	1996	3305	8710	42120100	5.51	35785.86	6.33	53.30	1620.42	76.29	1542.95	4501
Italy	1997	3211	9070	46376100	5.45	37100.88	4.75	51.30	1522.65	75.50	1703.10	4501
Italy	1998	2097	9440	50979600	5.38	38427.48	4.00	50.64	1466.92	76.13	1736.21	4501
Italy	1999	1783	9820	55950400	5.32	39763.68	4.67	50.98	1440.55	75.81	1660.75	4501
Italy	2000	1645	10210	60996100	5.25	41002.50	4.83	44.41	1224.05	75.81	1700.02	4501
Italy	2001	1408	9820	55950400	5.18	38776.32	2.08	48.68	1308.11	75.92	1699.00	4501

Japan	1989	1936	11100	2958400	2.86	4926.08	3.00	80.88	663.43	79.80	137.96	6790
Japan	1990	2239	11460	2496400	2.78	4392.40	4.17	80.19	619.72	79.38	144.79	6790
Japan	1991	2448	11580	1960000	2.77	3880.80	6.33	81.72	627.91	79.36	134.71	6790
Japan	1992	2764	11830	2402500	2.76	4284.20	7.75	82.52	630.44	79.20	126.65	6790
Japan	1993	4036	12030	2924100	2.76	4712.76	8.00	84.08	638.64	79.07	111.20	6790
Japan	1994	4682	12360	3763600	2.75	5331.12	7.58	84.01	634.38	78.01	102.21	6790
Japan	1995	5348	12630	4202500	2.74	5617.00	7.00	83.22	624.81	76.54	94.06	6790
Japan	1996	4909	13080	4494400	2.70	5719.76	6.42	81.09	590.29	76.29	108.78	6790
Japan	1997	4951	13510	5616900	2.66	6294.72	4.83	79.61	561.62	75.50	120.99	6790
Japan	1998	4741	13800	7728400	2.61	7266.92	6.83	80.49	549.97	76.13	130.91	6790
Japan	1999	770	14200	9610000	2.57	7973.20	6.92	81.58	539.68	75.81	113.91	6790
Japan	2000	851	14700	11022400	2.53	8399.60	5.83	80.56	515.66	75.81	107.77	6790
Japan	2001	647	14230	9424900	2.49	7638.16	2.21	80.88	500.64	75.92	121.53	6790
Japan	2002	551	14380	9985600	2.45	7729.36	1.46	81.01	484.66	75.85	125.39	6790
Netherlands	1983	3389	5301	22080601	3.60	16925.80		0.10	1.30	82.70	2.85	3855
Netherlands	1984	3684	5671	25492401	3.50	17651.30	3.58	0.10	1.22	81.82	3.21	3855
Netherlands	1985	3383	5881	27447121	3.39	17760.21	4.00	0.10	1.15	82.75	3.32	3855
Netherlands	1986	3793	6080	29376400	3.39	18373.80	4.42	0.10	1.15	82.49	2.45	3855
Netherlands	1987	4340	6274	31427236	3.39	19004.34	5.00	0.10	1.15	81.41	2.03	3855
Netherlands	1988	5594	6533	34187409	3.39	19821.33	5.00	0.10	1.15	80.24	1.98	3855
Netherlands	1989	5815	6769	36614601	3.39	20512.89	5.00	0.10	1.15	79.80	2.12	3855
Netherlands	1990	5827	6894	37773316	3.39	20834.94	5.00	0.10	1.15	79.38	1.82	3855
Netherlands	1991	6856	6872	37307664	3.36	20498.45	5.00	0.10	1.13	79.36	1.87	3855
Netherlands	1992	7608	7080	39690000	3.32	20928.60	5.83	0.10	1.10	79.20	1.76	3855
Netherlands	1993	8104	7263	41951529	3.29	21296.38	7.00	0.10	1.08	79.07	1.86	3855
Netherlands	1994	8020	7556	45481536	3.25	21944.98	7.00	0.10	1.06	78.01	1.82	3855

Netherlands	1998	8348	8750	61308900	3.09	24226.02	3.00	0.10	0.96	76.13	1.98	3855
Netherlands	1999	7149	9126	66814276	3.05	24947.05	3.00	0.10	0.93	75.81	1.87	3855
Netherlands	2000	6499	9503	72539289	3.01	25636.17	1.83	0.10	0.91	75.81	1.94	3855
Netherlands	2001	6259	9126	66814276	2.97	24260.43	1.21	0.10	0.88	75.92	1.93	3855
Netherlands	2002	6738	9252	68690944	2.93	24250.69	1.00	0.10	0.86	75.85	1.91	3855
New Zealand	1983	199	5047.7	24525275	0.36	1782.83		38.09	4.94	82.70	1.50	8746
New Zealand	1984	186	5410.1	28195038	0.32	1699.17	4.25	29.43	3.01	81.82	1.76	8746
New Zealand	1989	208	6462	40424164	0.71	4526.90	4.58	46.18	23.41	79.80	1.67	8746
New Zealand	1990	55	6571.7	41838905	0.82	5304.01	6.33	45.46	30.57	79.38	1.68	8746
New Zealand	1991	61	6541	41460721	0.83	5344.37	8.00	43.57	30.02	79.36	1.73	8746
New Zealand	1992	43	6741.6	44068355	0.84	5576.26	7.25	38.86	27.42	79.20	1.86	8746
Portugal	1983	340	5074.6	24259565	8.34	41077.84		33.53	2332.48	82.70	110.78	3575
Portugal	1984	309	5433.2	27950254	8.24	43563.23	6.75	27.27	1851.84	81.82	146.39	3575
Portugal	1985	334	5635.3	30081934	8.14	44645.46	8.08	30.50	2020.98	82.75	170.40	3575
Portugal	1986	403	5828.4	32167047	8.05	45633.69	7.00	38.96	2522.20	82.49	149.59	3575
Portugal	1987	489	6023.4	34299764	7.95	46571.68	7.00	32.72	2069.28	81.41	140.88	3575
Portugal	1988	629	6279.6	37214880	7.86	47936.94	5.58	28.68	1770.63	80.24	143.95	3575
Portugal	1989	640	6504.2	39889330	7.76	49035.87	6.67	27.09	1633.04	79.80	157.46	3575
Portugal	1990	674	6618.4	41236947	7.67	49253.67	7.08	26.96	1586.26	79.38	142.56	3575
Portugal	1991	728	6591	40819321	7.66	48965.30	8.00	32.09	1884.98	79.36	144.48	3575
Portugal	1992	638	6793	43388569	7.66	50443.25	8.00	36.73	2153.80	79.20	135.00	3575
Portugal	1993	713	6972	45805824	7.65	51788.74	7.17	39.34	2303.60	79.07	160.80	3575
Portugal	1994	778	7254	49646116	7.65	53873.72	7.67	36.27	2120.51	78.01	165.99	3575
Portugal	1995	821	7447	52316289	7.64	55260.12	6.83	33.38	1948.49	76.54	151.11	3575
Portugal	1996	815	7711	56085121	7.58	56766.62	6.00	33.93	1949.38	76.29	154.24	3575
Portugal	1997	803	8056	61214976	7.52	58836.48	4.25	31.43	1777.61	75.50	175.31	3575

Portugal	2001	402	8774	72692676	7.28	62069.28	2.12	28.10	1489.36	75.92	175.03	3575
Portugal	2002	417	8895	74736025	7.22	62416.90	1.08	27.71	1444.27	75.85	173.34	3575
Spain	1983	1340	5425	20930625	6.54	29911.35		60.25	2575.54	82.70	143.43	3791
Spain	1984	1160	5791	24295041	6.46	31861.06	4.00	58.80	2456.73	81.82	160.76	3791
Spain	1985	1394	5999	26224641	6.39	32723.19	3.83	58.75	2398.72	82.75	170.04	3791
Spain	1986	2449	6203	28058209	6.29	33339.32	3.25	64.36	2549.74	82.49	140.05	3791
Spain	1987	3158	6418	29833444	6.20	33853.48	3.00	63.44	2436.95	81.41	123.48	3791
Spain	1988	3498	6693	32341969	6.10	34702.07	3.00	63.15	2351.28	80.24	116.49	3791
Spain	1989	3264	6937	34609689	6.01	35333.30	4.83	62.55	2256.45	79.80	118.38	3791
Spain	1990	3509	7067	35676729	5.91	35300.43	5.58	64.40	2249.47	79.38	101.93	3791
Spain	1991	3561	7049	35176761	5.84	34637.04	7.00	64.50	2199.64	79.36	103.91	3791
Spain	1992	2836	7253	37540129	5.77	35352.79	7.00	63.90	2127.32	79.20	102.38	3791
Spain	1993	3149	7426	39866596	5.70	35989.80	7.83	62.61	2034.23	79.07	127.26	3791
Spain	1994	3216	7719	43309561	5.63	37051.03	8.00	57.89	1834.78	78.01	133.96	3791
Spain	1995	3620	7924	45643536	5.56	37563.36	7.00	54.61	1688.04	76.54	124.69	3791
Spain	1996	3834	8198	49028004	5.45	38146.90	6.42	52.74	1565.27	76.29	126.66	3791
Spain	1997	3412	8562	53553124	5.34	39048.85	4.25	47.43	1350.36	75.50	146.41	3791
Spain	1998	3253	8939	58384881	5.22	39916.58	2.00	45.36	1237.96	76.13	149.40	3791
Spain	2000	1990	9712	69022864	5.00	41540.00	2.00	37.85	946.25	75.81	145.54	3791
Spain	2001	1985	9325	63600625	4.89	38981.80	1.58	42.41	1013.21	75.92	145.25	3791
Spain	2002	1838	9454	65383396	4.78	38618.74	1.00	41.42	944.84	75.85	143.87	3791
Sweden	1986	372	5962	30669444	2.48	13723.16	5.58	37.83	232.27	82.49	7.12	4130
Sweden	1987	339	6159	32729841	2.47	14107.99	4.50	37.30	226.80	81.41	6.34	4130
Sweden	1988	350	6415	35581225	2.45	14638.11	4.00	37.70	227.01	80.24	6.13	4130
Sweden	1989	360	6641	38180041	2.44	15089.12	4.00	37.19	221.79	79.80	6.45	4130
Sweden	1990	348	6753	39526369	2.43	15277.41	5.75	40.76	240.67	79.38	5.92	4130

UK	1984	7701	6212	20322064	3.36	15164.91	4.50	43.21	488.99	81.82	0.75	3674
UK	1985	7453	6445	21855625	3.27	15287.25	5.00	43.54	465.52	82.75	0.78	3674
UK	1986	11316	6672	23309584	3.27	15777.90	5.00	47.97	512.28	82.49	0.68	3674
UK	1987	9114	6903	24770529	3.27	16254.88	4.08	48.06	512.59	81.41	0.61	3674
UK	1988	10676	7200	26832400	3.26	16907.52	3.33	50.38	536.75	80.24	0.56	3674
UK	1989	8784	7440	28944400	3.26	17549.56	5.50	48.45	515.58	79.80	0.61	3674
UK	1990	10268	7560	30030400	3.26	17864.80	5.92	49.35	524.51	79.38	0.56	3674
UK	1991	10059	7520	29811600	3.24	17679.48	6.92	52.70	552.54	79.36	0.57	3674
UK	1992	10081	7720	32035600	3.22	18202.56	6.92	51.67	534.35	79.20	0.57	3674
UK	1993	9482	7920	33872400	3.19	18589.08	7.33	48.25	492.26	79.07	0.67	3674
UK	1994	10005	8250	36602500	3.17	19190.60	7.00	46.56	468.48	78.01	0.65	3674
UK	1995	10161	8470	38564100	3.15	19561.50	6.58	42.91	425.74	76.54	0.63	3674
UK	1996	11108	8760	41473600	3.10	19964.00	4.75	41.17	395.64	76.29	0.64	3674
UK	1997	12455	9140	45427600	3.05	20557.00	3.42	43.12	401.09	75.50	0.61	3674
UK	1998	14020	9520	49843600	3.00	21180.00	3.33	46.12	415.04	76.13	0.60	3674
UK	1999	10314	9910	54612100	2.95	21800.50	2.00	46.47	404.41	75.81	0.62	3674
UK	2000	10846	10300	59598400	2.90	22388.00	2.00	43.68	367.35	75.81	0.66	3674
UK	2001	9588	9910	54612100	2.85	21061.50	1.25	45.42	368.94	75.92	0.70	3674
UK	2002	9576	10040	56250000	2.80	21000.00	1.00	45.19	354.29	75.85	0.67	3674