The Hong Kong Polytechnic University
Institute of Textiles and Clothing

ANALYSIS OF THE GLOBAL TEXTILE AND CLOTHING TRADE: AN EMPIRICAL APPROACH

CHAN MAN HIN EVE

A thesis submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy

June 2009

CERTICICATE OF ORIGINALITY

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it reproduces no material previously published or written, nor material that has been accepted for the award of any other degree or diploma, except where due acknowledgement has been made in the text.

Signature: _____

Name: Chan Man Hin Eve

Abstract

This dissertation employs the gravity trade model to analyze the development of textile & clothing (T & C) trade patterns among countries. Until recently, most studies reported in literature have applied the gravity trade model to aggregated data, particularly with cross-sectional or time-series data estimation techniques for analyzing trading statistics. However, in this dissertation, the conventional gravity trade model is revised for analyzing T & C products separately. Also, the panel data estimation approach is utilized to determine the factors affecting global T & C trade flows.

Results of regression analysis show that the modified gravity trade model can be adopted to identify the markets for T & C products. More importantly, this modified gravity model supports the attributes of the conventional one. Based on this standpoint, the study first analyses and characterizes the development of global T & C trade flows since the 1950s. The illustrated scenario is a ‘shift of gravity’ for T & C exporters to divert from North America and Western Europe to Japan in the 1950s and early 1960s. The second shift is from Japan to the Asian Big Three, namely Hong Kong, Taiwan and South Korea, which dominated global T & C exports in the 1970s and early 1980s. In the late 1980s and entering

the 1990s, there was a third migration from the Asian Big Three to other Asian developing economies. In the 1980s, production was not only relocated predominantly to mainland China, but also to several other Southeast Asian countries, including Indonesia, Thailand, Malaysia, the Philippines and Sri Lanka. In the 1990s, new suppliers included South Asian and Latin American countries.

Secondly, the impacts of country-specific, social and political determinants as well as economic indicators and cultural factors that related to T & C trade flows are investigated from 3 stepwise levels. These 3 include: (1) national level; Hong Kong T & C exports and her top ten trading partners from 1990 to 2008 (2) regional level; Asian exporters and the EU-15, US and Japan T & C markets from 2000-2008, and (3) global level; top fifteen T & C exporters/importers and their top 10 trading partners from 1980 to 2008. The gravity trade model is applied to explain the variations in the T & C trade flows with the three levels. The results reveal that the impacts of ascribed factors on T & C trade have the expected signs and are statistically significant. Since past gravity model studies were only centered on regional investigations and general commodities but were not T & C specific. It is hoped that the present research has made a significant contribution in filling this knowledge gap and offered a valuable insight into the

principal determinants that have stimulated the national, regional and global level on T & C trade flow.

The model is then subject to panel data analysis to investigate the fixed effects over time for each scenario in order to provide an exhaustive analysis and obtain a conscientious study of T & C trade. It can delineate explores the dynamics of change over time and enlarges the quality and quantity of data manipulation in techniques that would be impossible simply by cross sectional or time series estimation alone. Moreover, a panel data approach makes it possible to capture the relevant relationships among variables over a longer time and enable monitoring of the possible unobservable trading-partner-pair individual effects. The study reveals that the fixed effect model is more plausible and provides more robust results than the random effects based on the Hausman test.

Finally, the endogeneity of Chinese T & C exports are explained by applying instrumental variables with country fixed effects in the gravity trade model in order to examine the possibilities and ways that the performance and growth of China's T & C exports had displaced that of the other selected Asian economies over the period of 1990 to 2008. It is identified that the negative impact of

China’s emergence in T & C trade on other selected Asian countries is significant. Furthermore, the result shows that the displacement effect varies across Asian countries and is more pronounced in the low-income compared with the high-income Asian countries. Therefore, it can be concluded that the export performances of China’s neighboring Asian countries are basically affected by the surge of China’s T & C exports.

PUBLICATIONS

Journal Paper

CHAN, M.H., Eve and AU, K.F. Determinants of China's Textiles Export: An analysis by gravity model. Journal of Textile Institute. vol.98, no.5, pp.463-469 (2007)

CHAN, M.H., Eve; AU, K.F. and SARKAR, M.K. Antecedents to India's Textile Exports: 1985-2005. International Journal of Indian Culture and Business Management, vol.1, no.3, pp.265-276 (2008)

AU, K.F. and CHAN, M. H., Eve. Economic, Social and Policy Determinants of EU-5 and American Apparel Imports: A Gravity Model Analysis. International Journal of Information Systems and Supply Chain Management, vol.1, no.3, pp.33-48 (2008)

CHAN, M. H., Eve, AU, K.F. and YIP, T.L. Assessing the displacement effect of exports with gravity model: China's textile and clothing case. (Submitted to China Economics Review, 9th February 2009)

Conference Paper

CHAN, M.H., Eve and AU, K.F. Impacts of Trade Protectionism and Determinants of China's Textiles and Clothing Exports: An Gravity Model Analysis. Proceedings. 85th Textile Institute World Conference, Sri Lanka, 1-3 March 2007

AU, K.F. and CHAN, M.H., Eve. The Effects of Determinants on EU-5 and USA Apparel Imports: A Gravity Model Analysis Approach. Proceedings. Global Business Conference, Japan, 8-11 August, 2007

CHAN, M. H., Eve, AU, K. F. and CHOI, K. F. Forecasting Apparel Exports of Selected East Asian Countries after Quota Phase Out. Proceedings. Global Management & Information Technology Research Conference, USA, 22-24 May, 2008

Chan, M. H., Eve and AU, K. F. The Impact of China's Apparel exports on other Asian Suppliers. Proceedings. 86th Textile Institute World Conference, Hong Kong, 18-21 November, 2008

Chan M. H., Eve and AU K. F. Gravity Trade Model: An Empirical Analysis of Apparel Exports for Hong Kong. Proceedings. 86th Textile Institute World Conference in Hong Kong, 18-21 November, 2008

AU, K.F. and CHAN, M. H., Eve. The Impact of China's Clothing Exports on South Asian Countries. Proceedings.11th Annual Conference for the International Foundation of Fashion Technology Institutes (IFFTI), UK, 2-3 April, 2009

AU, K.F. and CHAN, M.H., Eve. Asian Textiles: Rebirth after MFA. Proceedings.10th Asian Textile Conference in Japan, 7-9 September, 2009

Book Chapter

AU, K. F and CHAN M.H. Eve, The Impact of Social, Economic variables and Logistics Performance on Asian Apparel Exporting Countries. *(Scheduled to be published in Innovations in Supply Chain Management for Information Systems: Novel Approaches, Advances in Information Systems & Supply Chain Management series, October, 2009)*

ACKNOWLEDGMENTS

Writing my dissertation has been an experience of a lifetime; such a process can not be fully planned as it included moments of enlightenment and moments of disillusionment. Generating new ideas and insights from readings and my research has been one of the most rewarding experiences. Completing my PhD has been a great intellectual and personal challenge, and I would like to take this opportunity to express my immense gratitude to all those who have contributed to the completion of this dissertation.

My thanks and sincere gratitude to my chief supervisor, Dr. K. F. Au for persevering with me as my supervisor throughout all these years not only for his initial source of inspiration, exceptional guidance and valuable suggestions but also for the numerous discussion, and for his constant encouragement and abundant patience. His courtesy, professionalism and patience made working with him very rewarding and gratifying. My deeply appreciation also goes to the dissertation committee for their constructive suggestions that greatly enhanced the quality of my research.

I also remember how important the excellent research facilities and the collegial atmosphere at the Institute of Textiles and Clothing, Hong Kong Polytechnic University and the help from my professors have been, and would like to thank especially Dr. T. L. Yip and Dr. Steven Wei in Business School, for teaching me various econometric estimation methods and steering me in the statistical analysis. Moreover, I could not have completed this dissertation in such a focused and timely way without the financial support, the generous grants from the Hong Kong Polytechnic University.

I must also thank all my friends who have been by my side and continuously support me for all these years. Thanks go to Jonny Nwaogu, Manny Ching, Janise Lee, Emily Chan, Jodith Leung, Yang Huan, Leo Liu, Ru Lv, Dragon Yeung, Manas Sarkar and Phillix Leung for adding color and spice to my life, especial thanks for their warm encouragement and confidence.

From the first day that I began my post graduate studies until the day they are completed, my ambition of using my knowledge in the best way possible to contribute to society has never changed. I am deeply grateful to the almighty God for blessing me with an abundance of opportunities in my life on this earth,

surrounding me with a wonderful family, including grandmothers, parents and an elder brother who gave their wholehearted support, faith and understanding. I could not have succeeded without their unfailing love, endless patience and encouragement. Also thanks for the prayers from my brothers and sisters in church throughout my years of graduate studies. Finally, thanks to God for giving me the spirit of perseverance and courage.

Without the countless generosity from all of you, this adventure would not have even been possible.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

APEC	Asian Pacific Economic Cooperation
ATC	Agreement on Textiles and Clothing
CACM	Central American Common Market
CEEC	Central and Eastern European countries
CES	Constant Elasticity of Substitution
CET	Constant Elasticity of Transformation
C.I.F.	Costs, Insurance, and Freight
CGE	Computable general equilibrium
CMEA	Council for Mutual Economic Assistance
COMTRADE	Commodity Trade Statistics Database
CS	Cross sectional
ECOWAS	Economic Community of West African States
EDI	Electronic Data Interchange
EEC	European Economic Community
EFTA	European Free Trade Association
EU	European Union
FTA	Free Trade Agreement
F.O.B.	Free On Board
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GSP	Generalized System of Preferences
H-O	Heckscher-Ohlin's factor proportions theory
IFS	International Financial Statistics
ILO	International Labor Organization
IMF	International Monetary Fund
IRS	Increasing Return to Scale
IPLC	International Product Life Cycle
IT	Information Technology
LAFTA	Latin American Free Trade Area
LPI	Logistics Performance Index
LTA	Long Term Arrangement
MFA	Multi-Fiber Arrangement
NAFTA	North America Free Trade Agreement
NIC	Newly Industrializing Countries
ODM	Original Design Manufacturer
OEM	Original Equipment Manufacturer

OLS	Ordinary Least Square
OPA	Outward Processing Arrangements
PCS	Pool Cross Sectional
R&D	Research and Development
RTA	Regional Trade Agreement
SCM	Supply Chain Management
STA	Short Term Agreement on Cotton Textiles
T & C	Textiles and Clothing
TSLS	Two Stage Least Squares
US	United States
UK	United Kingdom
VER	Voluntary Export Restraint
WTO	World Trade Organization

CHAPTER 1 INTRODUCTION

1.1 Background of the Research

Global textile and clothing (T & C) trade has been characterized by large-scale variations over the past fifty years. Many changes in T & C trading could be driven by market factors, such as the fluctuation of supply and demand influenced by changing policy and economic conditions. In particular, from 1974 to 1994, T & C trading was regulated by the Multi-Fiber Arrangement (MFA); it was used by the US, Canada and some European countries to impose quantitative limits and quotas on imports on a wide variety of T & C products. In 1995, the MFA was replaced by the WTO Agreement on Textiles and Clothing (ATC). The ATC, based on a 10-year transitional programme for the gradual elimination of quantitative restrictions on 1 January 2005, has an enormous impact on the T & C industry. Other factors, such as globalization trends, international competition from exporting countries and the rapid development of regional trade agreements (RTAs), also have a crucial effect on global T & C trade.

In the last five decades, international trade in T & C products has been expanding in volume, value, and number of exporting and importing countries. In this

context, globalization has become a question of access. Several factors that have influenced the international T & C trade are the relative competitiveness of different countries, and regions endowed with cheaper resources and lower labor costs. In many cases, such factors can have important results for both the exporting and importing countries. The global T & C industry now faces new competitive challenges from developing countries, especially from Asian, Eastern European, Central American countries. Moreover, trade agreements play a role in ensuring fair trade and market access between trading partners, which have influenced both international trade levels and the pattern of trade. The influence of trade agreements can be emphasized even further on international borders with consideration of the increase in the amounts of T & C products being traded among the trading bloc.

According to World Trade Organization (WTO) trade statistics 2008, world textiles exports were worth US$ 238 billion, which is equivalent to 2% of the total merchandise trade. World export values of clothing were higher than that of textiles, occupying a 2.5% share in global merchandise trade (US$ 345 billion). The growth rates of T & C trade were 333% and 750% respectively between 1980 and 2008; and have been increasing at an average rate of 5.6% and 8.3%

per annum respectively over these three decades. The tremendous growth of T & C trade is the motivation behind the analysis in this study, since these industries have been responsible for creating millions of jobs and contributing to economic growth and have played an especially important role in the export-oriented development of the developing countries. More importantly, there has been a long history of protection of T & C sectors in the industrial countries; namely, the European countries (EU) and United States (US). Various protective measures have diverged T & C trade from the normal trade regime, and therefore, trade patterns of these two special industries deserve further and more comprehensive investigation. Discriminatory protection was first institutionalized in the 1950s, with the introduction of the Voluntary Export Restraints (VERs). It was followed by the Short Term Agreement on Cotton Textiles (STA), Long Term Agreement (LTA) and Multi-Fibre Arrangement (MFA). Trade restrictions on T & C have lasted for over forty years until the ATC came into force with the establishment of the WTO in 1995. Under the ATC, WTO members committed themselves to removing quotas and releasing T & C trade restrictions in four integration stages as stipulated in the ATC rules. After 2005, basically, all WTO member countries would enjoy free T & C trading.

The complete phase-out of T & C quotas was heralded as a new beginning for trade in one of the most dynamic sectors of the global economy. It was envisaged that the complete phase-out of quotas would create major structural dislocation in the developing countries. Since the period of the MFA, many developing countries that are considered competitive in the T & C sector were slapped with quantitative restrictions by the developed countries, thereby limiting their T & C exports. This dissertation examines the overall trends of T & C trade in national, regional and global levels from 1980 to 2008 through the application of an extended gravity trade model in search of the major determinants underpinning world T & C trade flows. Additionally, the standard gravity trade model is augmented with a number of variables to test whether they are relevant in explaining trade. These variables are country-specific, and comprise of economic factors, logistic performance as well as socio-political and cultural factors that have shaped T & C trade patterns during the trade restriction era and the dynamic situation of global T & C trade.

Past research has mostly focused on total merchandise trade. Only a limited number of studies have applied the gravity trade model on a particular industry. At the present, there is no representative research conducted on the analysis of

global T & C industries employing the gravity trade model, thus constituting a research gap. If this is the case, then why is the gravity trade model preferable over other previous trade theories?

1.2 Statement of Problem

Previously, the focus was on total merchandise trade, which can be traced back to the period from 1500 to 1800, when economists tried to explain international business by mercantilism. Due to the rapid changes in world trade, scholars endeavoured to establish different trade theories at various stages in order to adapt to the environmental situations. These comprised of the theory of absolute advantage, Ricardo's (1817) theory of comparative advantage and Heckscher-Ohlin's (1919) (H-O) factor proportions theory, which was regarded as having the ability to explain the direction of trade flow from countries that are privileged in the endowments of certain production inputs. To complement the weakness of the inelastic nature of the previous trade paradigms, two economists; Vernon and Wells (1966), developed the international product life cycle combined with the concept of technological innovation and market expansion. In the 1990s, the neo-classical trade theory was supported by Michael Porter's (1998) competitiveness model in his National Diamond Framework, which considers national strategies

together with government policies to enhance a country's export potential.

The classical and neo-classical trade theories are imperfect because they basically rely on production and competitive factors. It is questionable whether these trade theories can cope with the complications of prevailing trading policies and trading situations in the dynamic world. In particular, their capability to explain the global T & C trade which has been under certain restrictions for the past three decades is challenged.

In addition, one of the basic foundations of the absolute advantage theory stem from the labor cost advantage. This was criticized because differences in wages largely reflect the differences in labor productivity and are not a form of unfair competition. The comparative advantage theory was also considered as building on a narrow economic base, but has not mentioned why geographical differences in trade and production occur. Ricardo's (1817) assumption may not be valid when including a country's taxation level and trade regulations.

H-O's (1919) factor proportions theory was condemned because the factors of production that subsequently led to trading are based on the same technology and

preferences which are not true reflections of the present date situation. The model was also criticized for its two-goods, two-country and two-factor assumptions.

Amongst the debates of existing trade theories, the new international trade theory should have rational modifications that can adapt in a state of disequilibrium and requires vigorous empirical investigation and validation. Taking the shortcomings on which various assumptions of existing trade theories rest, the demand for an econometric estimation approach was suggested. Therefore, the gravity trade model is taken as an essential part of this dissertation for analyzing T & C products separately at the national, regional and global levels. Its success over other trade theories stems from its empirical robustness. As well, its results can be interpreted in light of theoretical developments reported in the economics literature. Recent empirical literature suggests that the application of the gravity trade model to a single commodity market provides more precise considerations on a variety of factors that undermine the bilateral trade phenomena.

Tinbergen (1962), Poyhonen (1963), but mostly Linneman (1966), tried to formulate a gravity trade model to explain the factors affecting the size of the trade flows between individual trading countries. Linneman's (1966) approach

was to use econometric methods to find a quantitative explanation of the trade flows between different country pairings. His analysis started as an empirical exercise and included leading variables, such as national income, population and unknown variables, such as geographical distances, preferential trade arrangements, and types of regional integration schemes. There are numerous empirical applications of the gravity trade model in the literature on international trade, which have contributed to enhancing the implementation of the trade model. Cheng and Wall (1999), Egger (2000) and Carrere (2006) have all improved the econometric specification of the gravity trade model while Berstrand (1985), Helpman (1987), Soloaga and Winter (2000) and Martinez-Zarzoso et al. (2006) have contributed to the refinement of the variables considered in the analysis and added new explanatory variables.

Hence, in this study, it makes sense to use an extended gravity trade model, and one is formulated for analyzing T & C industries at the national, regional and global levels. This is done so by refining conventional explanatory variables and including determinants, which aid or prevent T & C trade between trading countries.

1.3 Research Objectives

The primary goal of this research is to examine the trade pattern of T & C industries, and evaluate the underlying determinants that influence the industries in question, with the aim of developing an extended gravity trade model for analyzing and explaining major determinants regarding T & C trade at the national, regional and global levels. The specific objectives of the research are:

1. To critically review the literature on gravity trade models that will explain and determine bilateral trade across countries,

2. To examine, analyze and characterize the T & C export and import patterns of major T & C exporters and importers since the 1950s,

3. To devise a generic gravity trade model for estimating the determinants of global T & C exports and imports,

4. To use the devised model to identify the major factors underpinning T & C trade at the national, regional and global levels, and their trade partners from 1980-2008,

5. To validate the suitability and appropriateness of the devised gravity model for explaining global T & C trade under restricted trading regimes and liberalized trading environments, and

6. To examine the ways that the growth of China's T & C exports have displaced that of the other selected Asian economies over the period of 1990 to 2008 by applying instrumental variables in the gravity trade model.

1.4 Justification for Conducting the Research

The illustrated scenarios of global T & C trade flow are the 'shift of gravity' for T & C exporters, from North America and Western Europe to Japan in the 1950s and early 1960s, Japan to the Asian Big Three; namely, Hong Kong, Taiwan and South Korea, in the 1970s and early 1980s. the Asian Big Three to other Asian developing economies in the 1990s; predominantly to mainland China, but also several South and Southeast Asian countries, and finally, in 2000, the Philippines, Bangladesh, Sri Lanka, Vietnam and Cambodia. Since there have been substantial and rapid changes to the trade pattern of global T & C industries during last five decades, it is considered appropriate to analyze the development of global T & C trade flow from the 1950s to present.

Up to now, previous research that analyzed T & C industries with the gravity trade model covered a narrow range of the investigation period and a limited number of countries. Therefore, in order to strengthen the explanatory power and

comprehensiveness of the gravity trade model, this research explores additional determinants and thoroughly analyzes their impacts based on historical trade data at the national, regional and global levels from 1980-2008. The national level includes: Hong Kong T & C exports and her top ten trading partners. Determinants that are considered include various key macroeconomic, distance, social and comparative advantages in production factors that affect T & C industries. The regional level includes: Asian exporters and the EU-15, US and Japan T & C markets. Determinants that are focused upon are logistics performance in additional to various key macroeconomic factors as control variables that influence T & C trade. The global level includes: the top fifteen T & C exporters/importers and their top ten trading partners. Determinants that are considered include the impact of free trade agreement, countries' production efficiency and cultural factors in addition to various key macroeconomic, social and distance factors. Consequently, the use of the gravity trade model is enriched, light is shed on the interrelations among different determinants, and a complete picture is depicted on the actual T & C situation in the world. From past records, these countries together generally account for about 90% of the global T & C trade and therefore, considered as representative of global T & C trading volume. Thus, the project potentially has significant value in the area of research and in

implications for global T & C trade flow.

Since panel data estimation approach is used in this study to investigate the effects over time for each scenario in order to provide an exhaustive analysis and obtain a conscientious study of T & C trade, it is necessary to distinguish between the fixed and random effects models, which play an important role in panel data analysis. The study reveals that the fixed effects model is more plausible and provides more robust results than the random effects model based on the Hausman test. Furthermore, the regression results of ordinary least squares (OLS) will be compared with the panel data technique with fixed effects model in order to examine which model fits the data best. In the econometrics literature, panel data analysis has become one of the most rapidly growing topics. According to Greence (2003), “this is because panel data provide such a rich environment of estimation techniques and theoretical results.” Baltagi (2002) also described some benefits of using panel data; “controlling for individual heterogeneity and panel data give more informative data, more variability, less collinearity among the variables, more degree of freedom and more efficiency.”

This study is the first to explain the endogeneity of Chinese T & C exports by

applying instrumental variables with country fixed effects in the gravity trade model to examine the possibilities that the growth of China's T & C exports have displaced that of the other selected Asian economies over the period of 1990 to 2008. It was identified that the negative impact of China's emergence in T & C trade on other selected Asian countries is significant. Furthermore, the result shows that the displacement effect varies across Asian countries and is more pronounced in the low-income compared to the high-income Asian countries. Finally, the sensitivity analysis is conducted so as to provide an opportunity to examine the robustness of the results with respect to the changes in the underlying parameters. These findings can be applied to other new emerging T & C exporters in Eastern Europe, Africa and Central America.

1.5 Significance of the Present Study

Until now, only a few empirical analyses have applied the gravity trade model to trade flows of a single commodity, specifically in T & C sectors and most previous researches reported in literature have applied the model with cross-sectional or time-series data estimation techniques for analyzing trading statistics. The results of this study both reinforce and further expand on such past conclusions. This study uses an unconventional view and approach to establish

the outcomes with the usage of a modified gravity trade model for a sectoral-level analysis, the T & C industry separately, and additional variables; namely, industry-specific and logistics performance variables as well as socio-political and cultural factors, such as common language, border, and membership in the free trade agreement. Also, the panel data estimation approach with fixed effects is utilized to determine the factors affecting national, regional and global T & C trade flows. Moreover, past gravity model studies only centered on regional investigations and general commodities, but were not T & C specific. The present research has made a significant contribution in filling this knowledge gap and offers valuable insight into the principal determinants that have stimulated three different levels on T & C trade flow.

The significance of this study is to challenge the theoretical deficiencies underpinning existing trade theories. The empirical evidence as demonstrated in the modified gravity trade models further reveals the rationale behind the national, regional and global T & C trading directions and analysis of the development of T & C trade patterns among countries. Specific attention should also be drawn to the consideration of T & C trading under restrictive trading

regimes during the past three decades and which departed from the normal trading environment compared with other commodities in global trade.

This research is primarily intended to provide information and analysis for the academic profession, but also sheds light on the T & C industries. The findings have a clinical implication for formulating future trade agreements within the T & C sector with both developed and developing countries, as it shows the impacts of the T & C industry in the most prominent free trade agreements in the world. It can also aid agreements to cover loopholes within established agreements. Hopefully, it will offer established blocs a understanding of the before and after effects of implementing agreements, enabling the selection of the most appropriate preventive measures with emerging competitors and the methods that harness trade relations.

The current study develops a more complete and comprehensive dataset on T & C sectors than was previously available. The database contains information of national, regional and global levels that cover a time period of twenty eight years, from 1980 to 2008. Therefore, this study also uses more recent data than other studies. The information is valuable for the analysis and development of a better

understanding of the peculiarities and conditions affecting global T & C trade flow. The empirical analysis helps in the identification of the extent of determinants which have contributed to T & C trading at the national, regional and global levels. The trade database develops a specific gravity trade model for different levels and further analyzes factors for enhancing the competitive status of T & C exports. This research also adds valuable knowledge to increase our understanding of the factors which affect global competitiveness and trade.

1.6 Outline of the Thesis

The content of this research is divided into eight parts and organized as follows.

Chapter 1	Introduction and the current chapter
Chapter 2	Literature review. This chapter presents a review of literature on the leading trade theories
Chapter 3	Overview of global T & C industry. This chapter presents a review of the development of T & C trade from the 1950s to present
Chapter 4	Theoretical foundation of the gravity trade model. This chapter presents a history of the theoretical foundation of the gravity trade model and provides empirical

applications of the gravity trade model by reviewing the literature

Chapter 5 Development of econometric models. This chapter describes the specification and properties of empirical gravity trade models to characterize the key determinants of T & C trade at the national, regional and global levels, and presents the data sources used in this study

Chapter 6 Econometric analysis and discussions. This chapter focuses on the empirical results of the key determinants and offers supporting evidence and explanations to the research findings

Chapter 7 Analysis of the displacement effect of China's T & C exports. This chapter applies instrumental variables in the gravity trade model to explain the endogeneity of Chinese T & C exports in order to examine the possibilities that the performance and growth of China's T & C exports have displaced that of the other selected Asian economies

Chapter 8 Conclusions. This chapter concludes the whole dissertation. It summarizes the major findings and

implications of the present study, a discussion of some of the suggestions for possible future research.

CHAPTER 2 SUMMARY AND SYNTHESIS OF THEORIES OF INTERNATIONAL TRADE

Introduction

This chapter presents a review of the literature on the related international trade theories. The content is divided in four major sections in this literature review chapter. The first includes existing trade theories and deficiencies. The second addresses the classical theories consisting of absolute advantage and comparative advantage. The third describes the neo-classical trade theory. Subsequently, the post-neo-classical trade theory includes technology gap trade; the product life cycle and modern trade theories are presented. The purpose of this review is to provide a broader understanding of the existing trade theories, as well as the rationale for choosing the gravity trade model in the present study.

2.1 Existing Trade Theories and Deficiencies

International trade theories generally attempt to explain the underlying causes of world trade patterns based on certain assumptions that characterize such patterns. Theoretically, it is determined by the optimal utilization of production factors structured according to comparative advantage (Greenaway, 1988). These include the theory of absolute advantage, Ricardo's (1817) theory of comparative

advantage and H-O's (1919) factor proportions theory. To supplement the drawback of the time-static nature of the previous trade theories, Michael Posner (1961) developed the technology gap theory and Vernon & Wells (1966) proposed the international product life cycle (IPLC), incorporating technological innovation and market expansion concepts. In the 1990s, a branch of the neo-classical trade theory was advocated by Michael Porter's (1998) competitiveness model in his National Diamond Framework that combines national and corporate strategies together with government policies to enhance a country's export potential.

However, these classical and neo-classical trade theories are only based on production and competitive factors, there have been increasing queries on whether they can adapt to the dynamic trading policies and trading situations in the world. Particularly, the ability of illustrating the global T & C trade statistics for 2000-2008 indicated that developed economies, such as Hong Kong in Asia; countries such as Italy, France, Germany, Netherlands, UK and Spain in Europe; and the US in North America, were among the top fifteen leading exporters of clothing in the world. This also includes two Asian countries, South Korea and Japan, in the textile sector. Simply based on labor cost, these developed countries

are comparatively disadvantaged by their high labor costs to justify T & C productions. An introductory review on the related international trade theories is presented before shifting attention to the gravity trade model and its increasing popularity.

2.2 Classical Trade Theories

2.2.1 Absolute advantage

According to Adam Smith's (1776), *The Wealth of Nations: An Inquiry into the Nature and Causes*, international trade is essential for achieving economic efficiency. The gains from trade are a principal source of wealth as a nation can extend the market for its goods beyond its borders, thereby allowing greater specialization in production, enhanced efficiency in the use of scarce resources, and greater growth of national income. Growth results from the accumulation of capital and other productive resources. The relationship between trade and growth primarily works via the links between trade and efficiency, efficiency and income, income and investment, and investment and growth. This continues to remain a basic building block of the classical theoretical view (Daniels and Radebaugh, 1986).

However, one of the basic foundations of the absolute advantage theory stems from the labor cost advantage. This was criticized by Golub (1999) in that differences in wages largely reflect the differences in labor productivity and are not a form of unfair competition.

2.2.2 Comparative advantage

In 1817, David Ricardo supplemented Smith's concept of absolute advantage by the concept of comparative advantage, thereby, arguing that the flow of trade will be determined by relative and not absolute cost advantage. Countries will specialize in the production of commodities whose costs of production are comparatively lower and export those goods and services that it can produce relatively disadvantage. Ricardo also maintained that a nation's real income would always be higher with free trade (Becker, 1995). The concept of comparative advantage is also central to the neoclassical analysis of international trade and has long served as a guiding principle of multilateral trade policy. In addition, the concept of comparative advantage has also been extended to the context of any economic organization aspiring to a rational allocation of resources (Gibb and Michalak, 1994).

Nevertheless, this model is considered as building up on a narrow economic base because it accounts for only one factor; labor. It also never sought to explain why one country can have a labor productivity advantage or comparative costs in the production of certain goods over another country. The other main inherent weakness is that price is determined only by relative labor productivity and Ricardo had not mentioned demand and the reasons that geographical differences in trade and production occur. On the other hand, Ricardo's assumption may not be valid for the inclusion of the country's taxation level and trade regulations, such as tariffs and quota in T & C industries.

2.3 Neo-classical Trade Theory

Heckscher-Ohlin Trade Theory

Approximately a century later, two economists, Eli Heckscher and Bertil Ohlin developed the idea that " a country will export goods that are intensive in production in its abundant factors and import goods intensive in its relative scarce factors" (Heckscher and Ohlin, 1919). This is known as H-O Theory, which is also the so-called, the factor-endowments trade theory. It is frequently used to explain international flow, which is valued as a descriptive theory, i.e. national differences in endowments of productive factors form the basis for trade.

According to this theory, capital-abundant countries will export products that use a great deal of capital in their production while importing labor-intensive products. To link with this logic, developed countries, usually well endowed with advanced technology, will specialize in technology-intensive industries and dominate the world market. However, this theory does not relate to the real world, as most of the top fifteen T & C exporters are developed economies that include Hong Kong, Italy, France, Germany, etc. Moreover, this model is often criticized because of its two-good, two-country and two-factor assumption and the same production technology among countries. By doing this, the influence of technological changes on trade and specialization is largely ignored (Grimeade, 2000). It is assumed that any technological innovations developed in one country are quickly available to all other countries. This simplified exposition may have difficulties in empirically validating the model's predictions.

In summary, the classical trade theories had several weaknesses, costs were primarily dependent on labor costs, transportation costs were ignored, and factors of production were assumed to be not mobile. The neoclassical trade theory included costs of transportation, permitted greater mobility of factors of production, and most importantly, considered other factor endowments. The

neoclassical formulation derived from the H-O theorem paid attention to additional factor endowments such as capital, resources, technology and management as determinants of international trade. Ohlin, expanding on the work of Heckscher claimed that: (a) countries differ in their production of factors (factor endowments), and (b) commodities differ in the combination of factors they require in their production (factor intensity). Leontief (1956) pointed out some weaknesses in the H-O model such as the assumption that the relative factor intensity of a good is the same everywhere and that this relationship is unchanging. H-O formulation maintains that comparative advantage is determined by the relative advantage of a country in its factor endowments in the context of perfect competition and constant returns to scale.

2.4 Post-neo-classical Trade Theories

In order to reinforce the shortcoming of the time-static nature of the previous trade theories, post-neo-classical trade economists, namely Michael Posner (1961) and Vernon & Wells (1966) realized the importance of technology and developed new trade theories incorporating this idea.

2.4.1 Technology gap theory

Michael Posner (1961) proposed the technology gap theory of international trade in order to explain the influence of technology on trade flows and present an explanation of trade in manufactured goods between advanced countries that share very similar general economic conditions. Technical gaps result from international differences in research and development (R&D). The innovating countries have special advantages in terms of comparative cost differences, producing a new product and affecting trade patterns. As mentioned previously, empirical studies of the H-O trade theory showed that most trade takes place between countries with similar factor proportions, completely opposite of the predictions made by the H-O theory.

Posner (1961) believed that the rejection of technology as a major factor of trade flows is very impractical. He explained how even though new commodities are developed through time, this development does not occur simultaneously in all countries. Trade, therefore, could be caused by the existence of some technical know-how in one country not available elsewhere, even though there may be no international differences in relative advantages or factor proportions. However, technology can only give a short- term competitive advantage and not a

long-term advantage. In his study, “International trade and technical change”, described two different types of time lags: reaction and imitation. The reaction lag is the time that it takes consumers to discover and accept a new product on the market. The imitation lag, which is directly related to the degree of competition in the industry, is the time that it takes for competitors to develop similar or substitute products. The imitation lag is broken down into domestic and foreign. This theory has a set of the usual assumptions. For example, he explained that even though a country may have a temporary competitive advantage due to a technological innovation, this advantage is temporary because competitors from other countries will soon be able to copy or imitate the product. This leads to the conclusion that high wage countries will tend to be net exporters of new products. Therefore, once other producers have copied the technology, production in the initial country will fall and may disappear altogether. However, the conceptual problems of assuming equal proportions in factor endowments and factor price equalization made this theory become unrealistic.

2.4.2 Product life cycle trade theory

Another economist of the same period, Raymond Vernon (1966) complemented and extended Posner’s technological gap theory in his ‘product life cycle model’

of international trade by putting more emphasis on the life of the actual product, whereas Posner puts more emphasis on the life of the technology used to make the product. Vernon did address the fact that countries with high wage rates, such as Germany, have more of an incentive for technological innovations. First, companies would want to increase productivity per worker, thereby in hopes of decreasing overall costs. A German invention in the T & C industries that has resulted is the ultrasonic machine. Secondly, countries with high wage rates have more leisure time and disposable income. Therefore, products that either saves time, such as the laser cut machine, functional T & C items, such as coating fabrics and seamless garments, are more likely to be developed in these countries.

Moreover, Vernon pointed out the ways that comparative advantage and trade patterns change dynamically between countries in terms of an innovating country and imitating country. The innovating country has an inherent advantage in producing a new product, but the imitating country cannot duplicate the same product immediately because of an imitation lag. Vernon's theory differs from classical and neo-classical trade theories because "it puts less emphasis upon comparative cost doctrine and more upon the timing of innovation, the effects of

scale economics, and the roles of ignorance and uncertainty in influencing trade patterns" (Venon, 1966, p.190). In his manscript, "International investment and international trade in the product life cycle", Vernon (1966) determined that there are three stages in a product life.

The first stage is the "new product". During this stage, the product is introduced into the market, and producers are concerned with a number of factors, such as the product may be unstandardized for a time, cost of inputs, ability to change the product; i.e. flexibility, and need for quick and effective communication between the producer and the customer, suppliers, and even competitors.

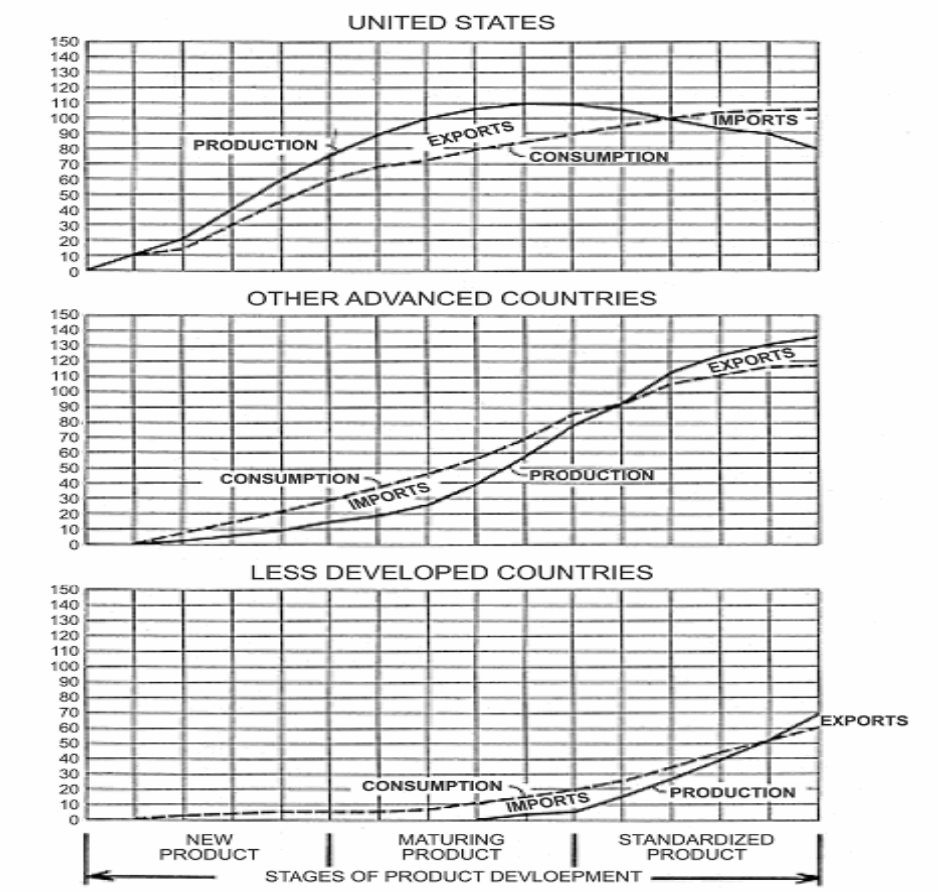
The second stage is "maturing product". During this stage, certain occurrences will have taken place; this means that there has been a certain degree of standardization, decline in the need for flexibility, increase in the concern about production costs, increase in exports, increase in competition, and increase in demand.

Because of the increasing in the concern about production costs, producers will begin looking for ways to decrease costs. This may mean setting up factories

abroad in order to service the foreign markets, thereby eliminating transportation costs and getting by any tariff or non-tariff barrier. Because of this, exports of the product from the innovating country begin to decline (Grimwade, 2000).

The final stage is “standardized product”. During this stage, less-developed countries may offer competitive advantages as production locations, the product has an easily accessible international market, and price becomes the basis for competition.

Figure 2.1 Vernon's product life cycle trade model



Source: Vernon, R. (1966) "International investment and international trade in the product life cycle", *Quarterly Journal of Economics*, Vol. 80, No. 2, pp.190-207.

This theory leads to the conclusion that developed countries will specialize in and export new T & C products. Developing countries, for example, China and India, will specialize and export those products, which are more standardized. This is especially true when specialization is related to economies of scale. One of the main advantages of the product life cycle theory is that Vernon does not

apply standard assumptions of the previous theories. This makes it much easier to apply to actual trade flows, and there are many examples of T & C products which have passed through this particular life cycle, such as laser cut machines, coating fabrics and seamless garments.

2.4.3 Modern trade theory

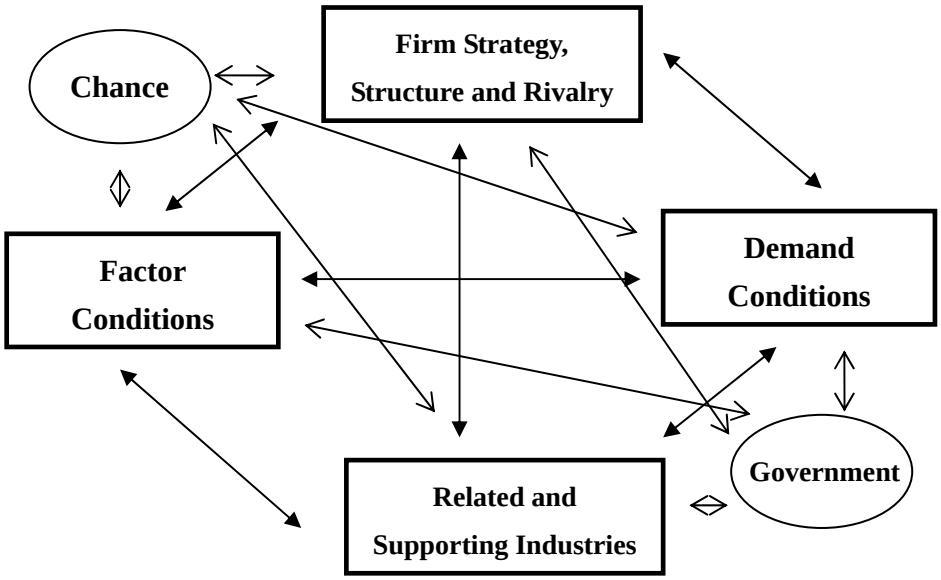
In previous theories, economists have tried to uncover the factors that influence trade flows between countries and factors that determine patterns of specialization for these particular countries. However, these theories are inadequate for describing actual competition between countries. Some of the reasons for this have already been pointed out, such as the fact that most trade takes place between countries with similar factor endowments. Also, domestic factor endowments are not nearly as important as they once were due to the rise of multinational corporations. In 1990, Michael Porter published his view of factors that determine trade flows and patterns of specialization in *The Competitive Advantage of Nations*. In this book, he gives a critique of orthodox trade theory. Porter (1998, p.12) provided examples of countries proficient in certain industries that do not have a "factor comparative advantage". For example:

Korea, having virtually no capital after the Korean War, was still able eventually to achieve substantial exports in a wide range of relatively capital-intensive industries such as steel, shipbuilding, and automobiles. Conversely, US, with skilled labor, preeminent scientists, and ample capital, has seen eroding export market share in industries where one would least expect it, such as machine tools semiconductors, and sophisticated electronic equipments.

In order to account for these discrepancies, Porter introduced the importance of the firm to the theory of international trade. It is important to note that Porter's competitive Advantage of Nations is more of a management model, whereas the previous theories have been economic models. However, Porter argued that it is not comparative advantage, factor proportions, or technology that determines the competitiveness of countries in certain industries compared to other countries. It is a combination of these conditions and others that lead nations to become dominant exporters of certain products. With his model, Porter (1998) sought to answer the following two questions: (1) Why does a nation become the home base for successful international competitors in an industry? (2) Or more specifically, why are firms based in a particular nation able to create and sustain competitive advantage against the world's best competitors in a particular field?

Porter developed his "diamond of national competitive advantage" in order to answer these questions. This is shown below:

Figure 2.2 Porter's diamond of national competitive advantage



Source: Porter M.E. (1990), *Competitive Strategy*, The Free Press, New York, NY.

Porter determined that there are four main determinants of national competitive advantage. These are factor conditions, demand conditions, firm strategy, structure and rivalry, related and supporting industries. He also noted the importance of government and chances on the success of a particular industry within a country.

The determinant of “factor conditions” includes not only the labor supply and infrastructure of a country, but also how effectively these factors are used within the country. Porter stated that the factor conditions that are most vital to productivity growth are “not inherited but are created within a nation” (Porter, 1998, p.74). The “demand conditions” affects a country’s industry when domestic demand is high and buyers encourage manufacturers to innovate and improve their product. In other words, domestic demand sets the framework for the industry. The “related and supporting industries” means that when an industry is located in the same country as internationally competitive suppliers and related industries, there is an advantage for that industry in that country. Lastly, the “firm strategy, structure, and rivalry” is “the conditions in the nation governing how companies are created, organized, and managed, and the nature of domestic rivalry” (Porter, 1998, p.71). This means that the competitive advantage can come from within the company, such as the work ethics of the employees and by the way that the industry/company is operated. Also, strong domestic rivalry forces companies to innovate and continuously improve their products, which also makes the industry more competitive internationally.

Porter’s Competitive Advantage of Nations model (1998) differs from the

previous theories. Instead of attempting to predict what countries will specialize in or where they will be located, Porter provides a model for determining why certain industries in certain countries are successful and continue to be so. One of his main critiques of the orthodox trade theory is the unrealistic assumptions. Porter (1998, pp.12-13) stated “the theory of factor comparative advantage is also frustrating for firms because its assumptions bear so little resemblance to actual competition”. Nevertheless, it is almost impossible to have a “theory” that is used to predict what will happen in the future without some sort of normalization of the circumstances. This is what the assumptions of the previous theories have aimed to do. Porter developed a model as a guide where there is no need for broad assumptions and can be individualized for each different situation.

However, with the complex dynamics of the T & C industry, the application of Porter’s model is not as straightforward as it looks. While Porter’s model comes closer than the others to explaining specialization, Jones (2001) pointed out that the model only describes why a country becomes the home base for a certain industry. Nonetheless, because the T & C industry typically participates in outsourcing, Porter’s model may take on a different dimension due to the nature of the industry. In summary, there exists a voice for the rational reconstruction of

international trade theories. The polyglot of theories has aroused many academic inquiries. Specifically, the basic core of the trade theory can be modified to take into account the increased international mobility of inputs and production factors.

Amongst the debates of existing trade theories, Perdikis and Kerr (1998) indicated that the existing trade theory is in a state of disequilibrium and stressed that international trade theories should have rational modifications that can adapt in a state of international mobility and require vigorous empirical investigation and validation. Taking the shortcomings on which various assumptions of existing trade theories rest, the gravity model will be applied in this dissertation to analyze the global T & C products separately. The gravity trade model's success stems from its empirical robustness and its results can be interpreted in light of recent theoretical developments reported in the economics literature. Recent empirical literature suggests the application of the gravity trade model to a single commodity market and provides more precise considerations on a variety of factors that undermine the bilateral trade phenomena. To further elaborate the theoretical background, the gravity trade model and its increasing popularity for trade analysis is discussed in Chapter 4.

2.5 Summary of the chapter

This chapter reviews and presents a broader understanding on related international trade theories, as well as rationalizes the choice of the gravity trade model adopted in the present study. Ricardo's trade theory of comparative advantage (1817) claims that international trade flows are based on relative labor productivity. H-O's trade theory of factor proportions (1919) contends that international trade flows are based on factor abundance. Trade theories from Poster (1961) and Vernon (1966) argue that the cycles associated with technological development will shape international trade flows. Porter's competitive advantage of national model (1998) indicates that it is not just one factor that affects an industry's success in certain countries and thereby trade flows, but a combination of factors. Since these classical and neo-classical trade theories are unable to address the complications of trading phenomenon in today's business world, there is a need for a modified theory of international business. Hence, the gravity trade model, which encompasses a set of relevant variables, will be applied in this dissertation to analyze dynamic global T & C trade separately.

CHAPTER 3 OVERVIEW OF GLOBAL T &C INDUSTRY

Introduction

When analyzing a particular industry, the gravity trade model usually requires adjustments due to different characteristics. For that reason, it is necessary to take in adequate information and understand the overview of T & C sectors thoroughly before a detailed investigation can take place.

3.1 Background of T & C trade protection

Restrictions have subsisted for over four decades on T & C imports into developed countries; notably the US and Europe. During the early phases, quantitative limitations were imposed capriciously by importing countries, lacking a certain kind of formal structure or explicit multinational coordination.

The foremost T & C restriction scheme was institutionalized in the 1950s, with the introduction of the VERs initially by Japan on exports to the US and by Hong Kong, India and Pakistan on their exports to the UK. A STA was negotiated in 1961 in order to allow developed countries to control the import of cotton textiles from countries such as Japan, that were deemed to be actual or potential sources of market disruption. The definition of "market disruption" adopted by the Contracting Parties in 1960 entailed the possibility of selecting imports of particular products from particular countries as the disrupting source. The STA aimed at an orderly opening of restricted markets to avoid adverse market

disruptions in the importing countries. This opened the door for a series of bilaterally negotiated quota restrictions that became the rule in the following LTA in 1962 which covered T & C products made predominantly of cotton. Controls can be placed on imports when markets are disrupted, and quotas can be either imposed unilaterally or negotiated bilaterally.

The LTA was later replaced by the MFA in 1974. The MFA, as the name suggests, extended restrictions to all T & C of wool and synthetic fibers in addition to cotton. The MFA constituted the formal basis for quantitative restrictions by developed countries against T & C imports from developing countries. Quotas were determined annually and applied differentially between countries and product categories. Consequently, some countries faced substantial restrictions while others remained mostly unaffected. The MFA signaled a marked departure of the principle of non-discrimination between trade partners being promoted by the General Agreement on Tariffs and Trade (GATT) (WTO, 1994). T & C industries became the only sectors where quantitative restrictions were permitted in such an extensive manner.

At the early stages of the MFA, industrialized countries still accounted for a substantial share of global T & C exports, but there was an obvious indication of developing countries gaining a strong foothold in the global market. Indeed, by the late 1980s, the shares of T & C exports by developing countries began

exceeding those of industrialized countries. A decade later, developing countries were responsible for over half of the global textile exports, and nearly three-quarters of global clothing exports (Diao and Somwaru, 2001). The growing competitiveness by some of the less developed countries began to pose a serious threat for the profitability and indeed viability of some long-established segments of the T & C sectors in developed countries.

Naumann (2005) offered a plausible explanation for the development of global T & C trade over the MFA era. He stated that while quotas remained firmly in place, T & C exports continued to move into the US and European markets. Further expansion of the sectors took place predominantly in developing countries, as low production costs became an increasingly essential basis for competitive advantage. Quotas continued to provide a practical incentive for the T & C sector development in industrial countries, especially in higher value-added categories. However, quotas also led to a much wider diffusion of textile and especially clothing manufacturing capacity in some developing countries that were not directly constrained by quotas. Prime examples include Pakistan and Bangladesh, both of which benefited from preferential and quota unconstrained access to the European market under the Generalized System of Preferences (GSP). This scheme is specifically designed to benefit certain developing countries and integrate them into the world economy.

More than two decades after the implementation of the MFA, the ATC emerged from the Uruguay Round and came into force with the establishment of the WTO in 1995, replacing the MFA. The expiration of the MFA did not mean an instant end of the quota system on T & C exports from developing countries. The ATC was an agreement with the explicit mission of progressively eliminating the quantitative restriction of T & C. Under the Agreement, WTO members committed themselves to removing quotas in four steps and fully integrating the sector into GATT rules by 2005. According to the ATC schedule displayed in Table 3.1, the first three stages of quota removal would see 16%, 17% and 18% of the imports of developed countries being freed from quota restrictions respectively. The largest proportion of imports, namely 49%, was to be integrated on 1 January 2005. It was witnessed that the quota removal was heavily back-weighted, and the Agreement only started to remove effective quotas in the later stages of the 10-year period.

Table 3.1 Integration procedure of T & C under the ATC

Stage	Date	Products integrated (%)	Cumulative product integrated (%)
1	1 Jan 1995	16	16
2	1 Jan 1998	17	33
3	1 Jan 2002	18	51
4	1 Jan 2005	49	100

Source: Compiled from WTO website

3.2 Overview of global T & C trade

Many researchers believe that the ATC most likely caused substantial shifts in both trade and production within the sector. This subsection gives a succinct description on global T & C trade of some significant exporters and importers in developing and developed countries from the past fifty years to the present.

The world T & C industry has undergone several production migrations since the 1950s, all involving Asia. The first was from North America and Western Europe to Japan in the 1950s and early 1960s, when western T & C production was displaced by a sharp rise in imports from Japan. The second shift was from Japan to Hong Kong, Taiwan and South Korea, which dominated global T & C exports in the 1970s and early 1980s. In the late 1980s and 1990s, there was a third migration from the Asian Big Three; namely, Hong Kong, Taiwan and South Korea, to other developing economies. They embrace Malaysia in Southeast Asia joined them, as had India and Pakistan in South Asian and Tunisia in North Africa. In the 1980s, production moved principally to mainland China, but also to several Southeast Asian countries, including Indonesia, Thailand, Malaysia, the Philippines and Sri Lanka. In the 1990s, new suppliers involved South Asian and Latin American T & C exporters. The largest newcomer in 1990 was Turkey, of which $3.4 billion in clothing exports placed it as fifth in world ranking, behind the four Northeast Asian economies. In 2000, new emerging exporters included the Philippines and Vietnam in Southeast Asia, Bangladesh and Sri

Lanka in South Asia, Morocco and Mauritius in Africa, and four East European countries; namely, the Czech Republic, Romania, Poland and Hungary. Mexico had a meteoric rise, with clothing exports soaring from $0.1 billion in 1990 to $9.3 billion a decade later. The average top fifteen textile exporters for past 28 years were China, Hong Kong, South Korea, Japan, India and Pakistan in Asia, Italy, Germany, Belgium, France, Turkey, UK, Netherlands and Spain in Europe, and US in North America. For the average top fifteen clothing exporters from 1980 to 2008, the list included China, Hong Kong, India, Indonesia and Bangladesh in Asia, Italy, Germany, Turkey, France, Belgium, UK, Romania and Spain in Europe, US and Mexico in North America. Altogether, these countries which account for about 91% and 87% of world market share of T &C trade respectivel and thus considered as the representative of global T &C trading volume. The trade patterns of the average top fifteen T & C exporters/importers and their top ten trading partners (See Appendix 1) from 1980 to 2008 will be examined in Chapter 5.

3.2.1 Developing countries

As mentioned before, the majority of large clothing exporters are located in Asia. Many have shown significant export growth over the past decade, with notable expansion recorded foremost by China, and also by other Asian countries; namely, India, Indonesia and Bangladesh. The situation is similar among textile exporting countries, with China likewise as the dominant player. China has

been the leading T & C exporter since the 1990s and also subjected to the most quota restraints accordingly. In 2001, nearly 60% of China T & C exports faced quotas on exports to the US. By contrast, the average was 53% for Asia overall (Nathan, 2002). Having been the most quota-restricted country in terms of access to the EU and US, China finally became a member of the WTO in December 2001 and enjoys similar trade privileges as other members. These benefits include the gradual elimination of quota stipulated in the ATC and the anticipated total quota phase out in 2005. Since China's accession to the WTO, its T & C has grown by nearly 34%. Figure 3.1 displays the growth of China's world export share of T & C from 1980 to 2006.

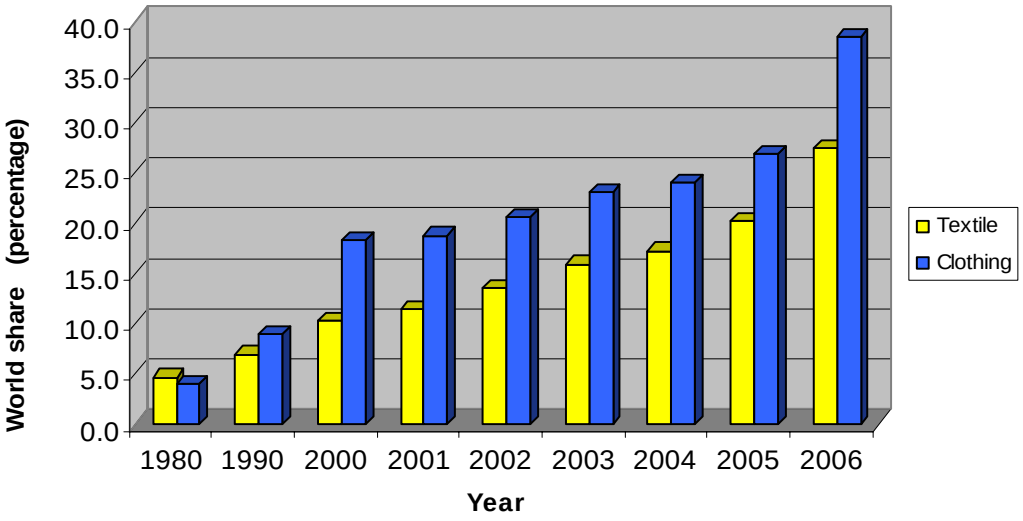


Figure 3.1 China's world export share of Textiles and Clothing. 1980, 1990, and 2000-2006

Source: Complied from *WTO International Trade Statistics*

As shown in the above diagram, China's world share of T & C exports increased dramatically from 1980 to 1990 and further in 2000. Its annual growth of T & C

export shares increased steadily from 2000 to 2005. In 2006, there was a significant expansion in China's textile and in particular, clothing export shares (Textiles: 20.2% in 2005 and 27.4% in 2006; Clothing: 26.9% in 2005 and 38.5% in 2006). This may be an effect of the complete elimination of quotas under the ATC. It is expected that the country's share of global sector exports will increase even further, with its relatively low-cost and productive manufacturing base (Yang and Zhong, 1998).

3.2.2 Developed countries

According to Hildegunn (2004), the share of the ATC countries (EU, US and Canada) in world imports of textiles increased from 35% in 1995 to 43.5% in 2002. The main source of import increase occurred in the US while the shares of the EU and Canada remained fairly stable. Turning to clothing, the ATC countries' combined share of world imports increased marginally from 62 to 67% during the same period. The EU and US are moving in opposite directions. The EU's share declined slightly while the US increased by a greater extent. The increase in Canada's share was negligible between 1995 and 2002. It can be seen that the ATC countries are relatively more important markets for exporters of clothing than for exporters of textiles. Furthermore, it can be observed that the increase in T & C imports was principally concentrated in the US.

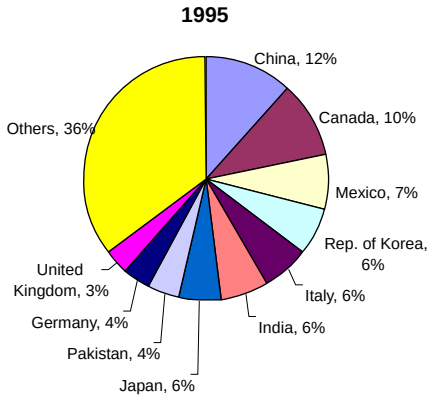


Figure 3.2a

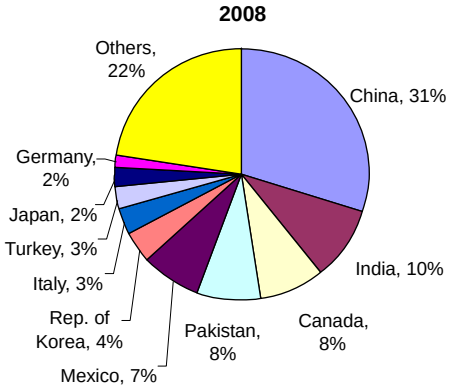


Figure 3.2b

Figures 3a & b Top ten textiles suppliers to the US in 1995 and 2008
Source: Complied from *WTO International Trade Statistics*

Individually, growth in imports of textiles to the US between 1995 and 2008 was around 9 % annually. The graphs displayed in Figures 3.2a & b show the ten largest US textile suppliers in 1995 and 2008 respectively. According to the trade figures, China is by far the biggest US textile importer. Its textiles import shares in the US increased by nearly three times (from 12% in 1995 to 31% in 2008) within thirteen years. In 1995, the two NAFTA members ranked right after China and situated within the top three positions as the US textile suppliers. After a decade, low-cost Asian countries, such as India and Pakistan, have climbed in the

major rankings at the expense of the higher-income suppliers, such as Italy and Korea. Since 2006, the US textile market shares of India even go beyond those of the NAFTA countries.

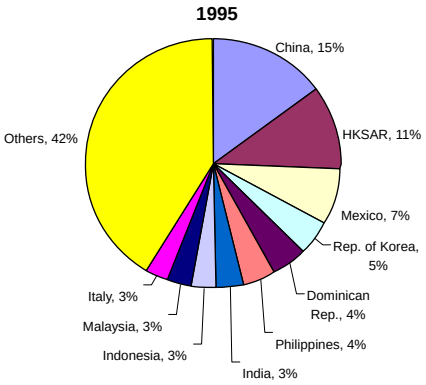


Figure 3.3a

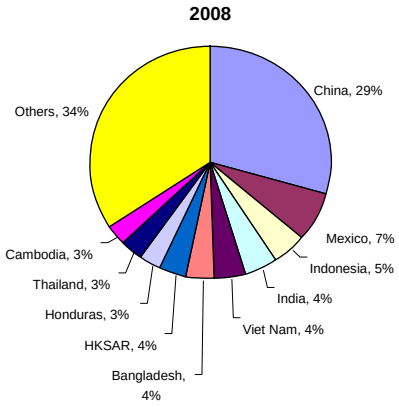


Figure 3.3b

Figures 3.3a & b Top ten clothing suppliers to the US in 1995 and 2008
Source: Complied from *WTO International Trade Statistics*

The total imports of clothing grew moderately, but less than textiles, at an annual rate of about 5.5%. As shown in Figures 3.3a & b, China is again the dominating US importer of clothing. The percentage increase in clothing imports from China (from 15% in 1995 to 29% in 2008) is marginally less than that of textiles

between 1995 and 2008. Mexico occupied a significant position in US clothing imports and demonstrated a stable market share in the two years. The graphs further show that US clothing import shares from Vietnam and Bangladesh demonstrate a substantial expansion, from negligible in 1995 to 4% in 2008. Asian developing countries; namely, India and Indonesia emerged as the top five US clothing importers since 2006.

Regarding the EU, imports of T & C grew annually by 3% and 2.5% respectively during 1995 to 2008. Behind this modest growth lies a substantial shift from intra-EU trade to imports from lower cost external suppliers. In fact, intra-EU trade declined from 61% to 50% of total trade during this period. China was the dominant supplier in both T & C industries, and its market share increased substantially. A regional dimension is clear when comparing the EU and US sources of imports. Of the 10 largest exporters to the EU in the T & C sector, China, India, Indonesia, Hong Kong, Pakistan and Korea all faced quotas while others were excluded. (European Commission, SIGl, 2003).

It is evident that globally, the many facets of T & C have had important and long standing influences on various economies. In the following, its regional implications will be discussed; specifically in Asia. Following that, the aspects of T & C will be further detailed at the national level; with a particular focus on Hong Kong.

3.3 The Development of T & C Exports from Asia

T & C industries have played an especially important role in the export-oriented development of Asia; initially in Hong Kong, South Korea and Taiwan, and more recently, China, as mentioned in the previous section. These sectors have been responsible for creating millions of jobs, increasing income levels and contributing to economic growth in Asian nations. There is cross-national statistical evidence that average incomes in a country are higher when these sectors are healthy (Diao and Somwaru, 2001).

Global T & C exports amounted to US$ 562 billion in 2008. Approximately 130 countries produced T & C for exports; many are highly dependent on this export for employment and foreign exchange (Kearney, 2003). Although some 30 nations are importers of T & C, in reality, T & C suppliers are dependent on three principal import markets; the EU, US and Japan by virtue of high purchasing powers and strong demands for high quality T & C products at a reasonable price. The EU accounts for about 16% and 56% of worldwide T & C imports respectively, and is the largest importer of T & C in the world, surpassing the US by 4% and 28% in 2008 due to its enlargement to 27 member countries.

In 2008, the value of the world's T & C exports to the EU-27, US and Japan amounted to US$76 billion and US$ 135 billion, US$21 million and US$ 83 billion, US$6 billion and US$ 24 billion respectively, which together represented

48% and 78% of the world's total T & C exports respectively. Specifically, T & C imports of the EU-15 amounted to US$70 billion and US$128 billion, accounting for 92% and 95% of the region's total T & C imports. In this case, the value of Asian T & C exports to the EU-15, US and Japan amount to US$50 billion and US$55 billion, US$15 billion and US$54 billion, US$5 billion and US$22 billion respectively, which represent 72% and 43%, 71% and 65%, 83% and 90% of the region in question accordingly. Still, it is important to note that a substantial amount of T & C trade in the world today remains within the industrial core. With an extensive globalization of T & C production, distribution and complexity involved in the design of supply chains, these sectors have created a significant contribution in employment and economic growth, and in particular, the Asian developing countries since their T & C exports has shown the trajectory of successful growth in past decades. Therefore, the trade patterns of these two industries between Asian countries, the EU-15, USA and Japan deserve further and more comprehensive investigation, which will be implemented in Chapter 5.

3.4 The Changes in T & C Sourcing from Asia

During the period of 1980 to 2000, the number of leading global T & C exporting countries increased sharply. Countries whose T & C exports exceeded US$1 billion in 1980 included only the East Asian economies, namely Hong Kong, Taiwan and South Korea, along with China and the US. A decade later, the list

also included Indonesia, Thailand, Malaysia, India and Pakistan. By 2000, the Philippines, Vietnam, Bangladesh, Sri Lanka and Cambodia became the new late comers. Yet, there remains a substantial variation in the degree to which T & C are principal export items among the world's 25 largest T & C exporters. As Gereffi and Memedovic (2003) noted: "*In Northeast and Southeast Asia, [T & C exports] have declined in importance, except in China where it remains the top export item, and in Indonesia and Vietnam where apparel has climbed to third place*." (p.22) Asian economies are dependent on T & C exports, which often account for a significant share of their total industrial export earnings.

Although Asian suppliers remain the key source of T & C to the EU and US, changes in their relative importance have been observed. The northeast Asian countries, including Taiwan and South Korea, are declining in importance, South and Southeast Asia; namely, India, Pakistan, Bangladesh and Sri Lanka, have stabilized while China has climbed to the first rank. The countries that have been most successful in exporting to the US are those that have developed or are developing their full-package production capabilities with Hong Kong, South Korea and Taiwan in the first instance and China in the latter. EU's T & C imports from Asia show a similar pattern, with China and Hong Kong playing the leading role among the eastern exporters.

On the other hand, Japan's pattern of imports is quite distinct from those of the

EU and US. It is overwhelmingly dominated by China, whose share of Japanese imports grew from 31% in 1990 to 82% in 2008. The reason for this sheds some light on the probable consequences of quota elimination, since Japan, despite being a member of the MFA, never chose to use quotas. While China's dominance in Japanese T & C imports may be in part due to geographical proximity, it may also "be showing the rest of the world what the future will look like when the MFA is phased out" (Gereffi and Memedovic, 2003).

The impact of China's T & C export growth is likely to be felt most intensely by its Asian neighbors, given their similarities in stages of economic development and factor endowments. Thus, China's emergence may intensify the competitive pressure felt by other Asian suppliers and challenge the growth of their T & C exports. This vicious scenario is the motivator behind the analysis in this study which will be investigated in Chapter 7. The extent to which China's T & C exports affect the delivery of other selected Asian suppliers to the EU-15, US and Japan (See Appendix 1) over the period of 1990 to 2008 and the resulting impacts will be explored by using the gravity trade model and an identification strategy that explicitly acknowledge the potential endogeneity of Chinese exports.

3.5 Hong Kong's T & C Exports - A National Level Perspective

It is evident that T & C has had a remarkable and tumultuous history in Asia. In the following, the focus narrows into a national perspective, specifically on Hong Kong where T & C industries have had a dominant economic presence.

Hong Kong is used to represent the 'National' analysis in the dissertation due to its outstanding T & C trade performance which its exports quantity is up to the other country's exports quantity. In addition, under the World Trade organization (WTO), Hong Kong is one of the member countries which is implied that as a special administrative region of the People's Republic of China (PRC), Hong Kong has a high degree of autonomy, in light of the "One Country, Two Systems" policy. The Hong Kong Government, financially independent from the Central People's Government (CPG), oversees the affairs of Hong Kong.

Hong Kong plays a leading role among the eastern and global T & C exporters and T & C has been the major manufacturing sectors since the 1960s. In the 1980s, the majority of manufacturers set up offshore production facilities in an attempt to reduce operation costs, resulting in a steady decline in number. Yet nowadays, the clothing industry still maintains its position as the second largest manufacturing employer in Hong Kong, with 1,607 establishments employing 23,976 workers (tdctrade).

T & C export trading has dominated Hong Kong's total exports and formed one of the largest groups involved in import-export trade. Hong Kong is not only a leading production centre, but also a hub for global T & C sourcing. With solid experience in fabric procurement, sales and marketing, quality control, logistic arrangements, designs as well as its adherence to international and national rules and regulations of apparel trading companies, Hong Kong has reinforced its role as the largest textile supplier and second largest clothing supplier to world markets. Hong Kong is well versed with the capability of providing one-stop services and provision of high quality products. In fact, its T & C industries have undergone a stable increase in exports since the 1980s, with a value of US$1.7 billion and US$4 billion respectively in 1980; ranking tenth and first among the global T & C exporters. In 1990, T & C export values continued to grow to a value of US$8 billion and US$15 billion respectively, allowing Hong Kong to improving its position as the world's third major exporter in textile industry and maintaining its position as the world's largest clothing exporter. In 2000, the export values of T & C products were recorded at US$13 billion and US$24 billion respectively, boosted its position to the world's second biggest textile exporter but dropped to second position after mainland China in clothing sector. However, in a bid to sidestep the safeguard quotas imposed by the EU and US on mainland China, many Hong Kong manufacturers relocated their production back to Hong Kong after the expiry of the quota regime under the ATC in 2005, and devised intricate outward processing arrangements (OPAs) with mainland

China to maximize quota utilization. Most recently, the trade value of Hong Kong's T & C exports to the world amount to US$14 billion and US$28 billion, which represents 7% and 10% of the total world T & C exports respectively, maintain its status as the world's fourth and second largest exporter of T & C respectively. The average annual growth of Hong Kong's T & C export increased 7.8% and 7.2% respectively from 1980 to 2008. Hong Kong's T & C exports to the world were observed to rise continuously during the entire period and have become the fourth and second largest T & C exporter respectively since 2000.

The tremendous growth of Hong Kong's T & C exports at a national level is the motivation behind the analysis in this research study. It is deemed desirable to explore the determinants of trade flow between Hong Kong and its top ten T & C trading partners (See Appendix 1) during 1990-2008. A detailed explanation of the model development is presented in Chapter 5.

CHAPTER4 THEORETICAL FOUNDATION FOR THE GRAVITY MODEL OF TRADE

Introduction

This chapter presents a history of the theoretical foundation behind the gravity trade model, providing grounds to empirically apply the model for studying international trade flows through a literature review. In the extant of literature, the use of gravity trade model has been implemented in two ways. Some authors seek to derive the estimating equation from an explicit theoretical model of international trade in the presence of distance to proxy transactions costs. This approach yields a restrictive specification that can be used to test assumptions of the particular model, which will be explained in section 4.1. More commonly, authors appeal to the empirical robustness of the gravity trade model and employ it as a general framework for analyzing the role of a wide variety of different determinants in international trade, which is shown in section 4.2. It has become obvious that the gravity trade model, more so than previous international trade pattern theories, is supported by empirical international trade flows.

4.1 The Theoretical Background

Basically, two types of economic models are commonly used to analyze the impact of a wide range of possible policy changes based on different scenarios in international trade flow. They are ex-ante 'computable general-equilibrium' (CGE) simulation studies and ex-post econometric analyses using the 'gravity trade model'.

The ex-ante studies try to model the economies of participating countries explicitly and typically attempt to project future trade effects on a set of economic variables of interest. This approach answers 'what if' type of questions.

However, CGE models are stylized simplifications of the world economy and based on assumptions which fashion their outputs. For instance, since T & C export growth is often assumed to be exogenous, these models fail to capture the dynamic impacts of the exporter's rise on other regions and hence, underestimate the full effects. Moreover, there are uncertainties over the estimated trade elasticities as most models fail to take into account the key aspects of the exporter's WTO membership, such as liberalization of services and policies to attract foreign investment (IMF, 2004).

Ex-post econometric studies using gravity trade models try to assess the actual impact of policy changes on trade flows between countries based on historical data. In reality, the determinants of trade between countries are obviously more complicated. Gravity trade models generally control for other potential influences on trade flows, such as population and physical distance, and the other focus of this research, the presence of common membership and policy changes. If trade flow is 'regressed' against a collection of variables and the presence of the trade deal has a statistically significant effect, the presumption is that the deal has in fact, altered trade flows. Since one of the objectives is to delineate the trade T & C patterns of policy changes in exporting/importing countries based on historical data, ex-post econometric studies employing the gravity trade model are adopted in this study.

The gravity trade model is one of the most commonly used empirical frameworks for the study of trade. It has been frequently and successfully used for nearly four decades to analyze bilateral trade flows across countries. The name of the gravity trade model originates from Newton's law of universal gravitation, which proposed that gravitation between two objects is directly related to their size and inversely related to the distance between them. Urban sociologists adapted and attempted to apply this law to social phenomena in order to empirically explain spatial interaction behavior of human populations, including migration or flows between two entities or sources (Zipf, 1946, Stewart, 1948; Isard, 1990; Sen and Smith, 1995). This law has also been applied in economics, where the gravity model is expressed in terms of two objects *i* and *j* by borrowing from a simple and concise presentation of the gravity trade model given by Head (2000). Head also explained the origins and economic uses of the gravity trade model, from its basic concept to a form that has been specially adopted for trade flows by adding more explanatory variables. The following is a basic form of the gravity equation:

$$F_{ij}=G\ (M_iM_j/D_{ij}^2)\text{----------(4.1)}$$

where:

F_{ij} indicates the gravity force,

M_i and M_j are the masses or sizes of the two objects,

D_{ij} is the distance between the two objects, and

G is the gravitational constant depending on the units of measurement.

In 1962, Tinbergen was the first scholar to propose that roughly the same functional form can be applied to international trade flows:

$$\ln F_{ij} = \alpha \ln M_i + \beta \ln M_j - \theta \ln D_{ij} + \varepsilon_{ij} \quad (4.2)$$

where:

F_{ij} is the flow from origin *i* to destination *j*,

M_i and M_j are the relevant economic sizes for the two locations, and

D_{ij} is the distance between the locations (usually measured center to center).

The economic explanation for this model is that M_i and M_j represent the amount supplied by country *i* (the source) and the amount demanded by country *j* (the destination).

The formal theoretical foundations for the gravity trade model were discussed by Tinbergen (1962). He applied the gravity equation in studying international flows. Since then, this model has become a popular method of analysis in literature due to its parsimony and robustness. Tinbergen noted that an econometric model could be formulated to describe international trade flows and concluded that "the value of total exports from one country to another is explained by a small number of variables. The explanatory variables that play a preponderant role are: (i) the Gross National Product (GNP) of the exporting country; (ii) the GNP of the importing country; and (iii) the distance between the two countries." He proposed that

transportation cost is roughly approximated by distance and has a negative impact on trade flows. He also indicated some additional explanatory variables, special trade arrangements and adjacent countries, incorporating them as dummy variable determinants of trade volumes.

Poyhonen (1963) introduced a static version of the model that encompassed a multilateral approach to investigate international trade. The model was used to analyze the exchange of goods in 1958 between ten European countries, including Belgium, Denmark, Finland, Germany, Italy, Netherlands, Norway, Portugal, Sweden and the UK. He suggested that the volume of trade could be estimated as an increasing function of the national incomes of the trading partners and a decreasing function of the distance between them, where again distance is substituted for the cost of transport functions. Linnemann (1966) extended this model by introducing additional variables, such as population size, which denoted the "share of domestic demand in total national product." He attempted to explain the international trade flows in the theoretical bases of the gravity equations in terms of a Walrasian general equilibrium system, which "determines total foreign supply and total foreign demand of a country." However, the Walrasian model tends to include too many explanatory variables for each trade flow to be easily reduced to a gravity equation.

Savage and Deutsch (1960) pioneered and then followed by Leamer and Stern (1970) derived the gravity trade model from a probability model for transactions. Aitken (1973) applied the same functional form and specification as that in Linnemann's

model with cross-sectional data, including exporter and importer populations. He estimated the impact of the European Economic Community (EEC) and European Free Trade Association (EFTA) on European member trade. As his modification took into account trade preference statements, gravity models of international trade flows have been used more successfully for the trade flows of preferential trading arrangements. Leamer (1974) used both the gravity equation and H-O model to prompt explanatory variables in a regression analysis of trade flows, but he did not integrate the two approaches theoretically.

In the search for the theoretical background of the gravity trade model, Anderson (1979) introduced significant improvements in terms of constant elasticity of substitution (CES) preferences and distinguished goods by country of origin. First, Anderson showed that the gravity model could be derived from the pure expenditure system model by assuming that "products are differentiated by place of origin." According to Anderson, the differentiation of products indicated that in the production process "each country was completely specialized in the production of its own good." He also stated that the gravity trade model should be fully consistent with the generalized trade-share expenditure system model, including an interpretation of distance in the model and noted that "trade shares should increase with income per capita and decrease with size (population)." He concluded that it was appropriate to use and refine the gravity trade model.

Bergstrand (1985) proposed a manifest theoretical foundation of bilateral trade for the gravity trade model, which could be derived from the assumption of monopolistic competition and product differentiation[1]. Each country's trade demand could be obtained from maximizing a utility function subject to budget constraint. In contrast, trade supply could be obtained from firm profit maximization with resource allocations determined by the constant elasticity of transformation. Then, the gravity trade equation could be obtained at market equilibrium involving price level and income as explanatory variables (Caruso, 2003). He also showed that if goods are not perfectly substitutable internationally in production and consumption, the gravity trade model which is usually estimated, omits some relevant price variables, implying a misspecification of the model. In addition, Bergstrand (1989) applied the microeconomic foundations for the gravity equation to the hybrid model of the perfectly competitive H-O model and one-sector monopolistic competition of Krugman (1979). It included the factor endowment variables, exporter and importer income and per capita incomes as exogenous variables with the assumption of perfect substitutability of products across countries. He emphasized the importance of per capita incomes in bilateral trade flows, pointing out that exporter and importer per capita income has largely been ignored, even though Anderson (1979), Bergstrand (1985), and Helpman and Krugman (1985) estimated bilateral trade flows in terms of exporter and importer incomes.

[1] Anderson (1979) present general equilibrium foundations of gravity models under very limiting conditions (e.g., product homogeneity, identical preferences and production functions in both countries).

Helpman and Krugman (1985) used a differentiated product framework with increasing return to scale (IRS) to justify the gravity model in inter-industry and intra-industry trade volumes. They also argued that, “generally, economies of scale lead to more specialization than would occur in a constant returns world, thus gravity equations will tend to fit the trade pattern better, the more important are increasing returns.” Helpman (1987) applied the gravity equation to trade among the OECD countries, where most would agree that monopolistic competition is plausibly present. Helpman interpreted the close fit of the gravity trade model with bilateral data on trade as supportive empirical evidence for the monopolistic competition model. Hummels and Levinsohn (1995) performed some negative tests of the same proposition by looking for the same relationship in trade among a wider variety of countries, including ones where monopolistic competition is a less plausible factor. They found that the test works just as well for that group of countries, thus leading one to suspect that the relationship represented by the gravity trade model is not unique to the monopolistic competition model.

A great deal of confusion has arisen concerning the theoretical foundation of the gravity model, and this has led Frankel (1997) to note that “the main point is that it seems possible to derive the gravity model from a variety of leading theories. The equation has thus apparently gone from an embarrassing poverty of theoretical foundations to an embarrassment of riches!” Frankel and Wei (1998) took into account, geographical locations relative to all other countries when mapping out current patterns of regionalism and assessing the impacts of currency links within

some major groupings on intra-group trade using the gravity equation. Feenstra et al. (1998) further derived a gravity model from a reciprocal dumping model of trade with homogenous goods. This shows another type of product differentiation model that comes from factor endowment differences.

Deardorff (1998) gauged the gap in the theoretical foundation of the gravity trade model by deriving two totally different gravity equations for bilateral trade based on the frictionless and impeded trades of the H-O model and showing that bilateral export volume is influenced not only by the geographical distance between the trade partners, but also by their relative distance to all other countries. Deardoff showed that the H-O model, at least in some of the equilibrium that it permits, easily admits interpretations that accord readily with the gravity equation and also argued that "it is certainly no longer true that the gravity equation is without a theoretical basis, since several of the same scholars who noted its absence went on to provide one." Deardoff (1998) came to the conclusion that "bilateral trade should be positively related to the two countries' incomes and negatively related to the distance between them." Due to the development of this theoretical foundation, it is generally accepted that a number of trade models are consistent with the empirical success of the gravity equation.

Evenett and Keller (1998 & 2002) showed that the gravity trade model can be derived from the H-O model under both perfect and imperfect product specialization. They argued that the IRS model rather than the perfect specialization version of the

H-O model is applicable for explaining the success of the gravity equation, since little production is perfectly specialized due to factor endowment differences. In addition, they found that IRS is an important case for perfect production specialization in the gravity equation, especially among industrialized countries. They showed that models based on increasing returns and product differentiation are more suitable for explaining intra-industry trade, while trade in homogeneous goods is better explained by factor endowment differences or differentiation of goods by country of origin.

In 2002, Harrigan conducted an extensive review of the gravity trade model with reference to various major trade models, including Armington, monopolistic competition and general equilibrium. He provided a theoretical underpinning for resistance and masses as the two key drivers of bilateral trade in gravity trade models. All of these approaches yield restrictive specifications that can be used to test the assumptions of the particular theoretical model.

In this context, it is certain that the gravity trade model is supported by a firm theoretical foundation with regards to international trade flows of aggregated or disaggregated products. On the other hand, scholars appeal to the empirical robustness of the gravity trade model and employ it as a general framework for analyzing the role of a wide variety of different determinants in international trade, from the impact of trade unions to monetary unions rather than as an effort to capture and test a particular trade-theoretic model.

4.2 Empirical Tests of the Gravity Trade Model

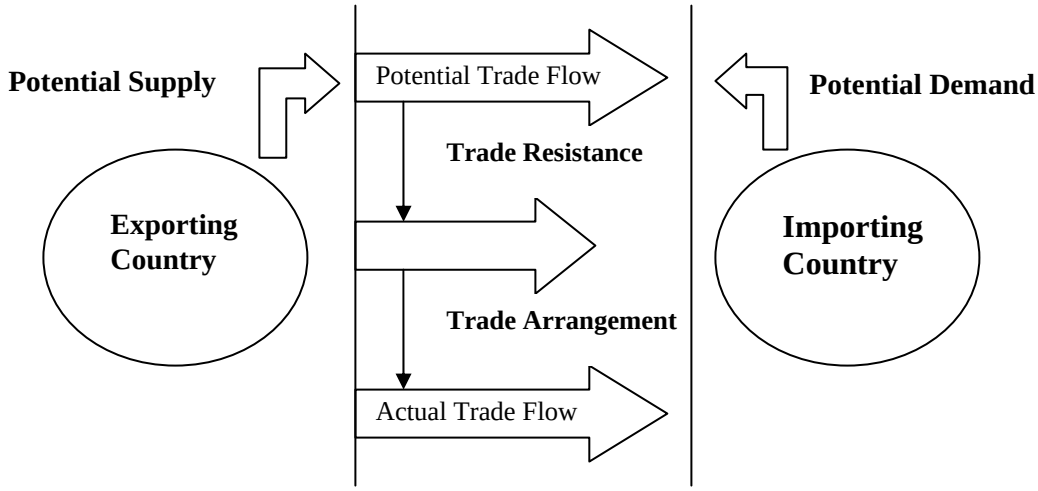
The gravity trade model has been widely used in empirical studies of international trade (Havrylyshin and Pritchett, 1991; Bayoumi and Eichengreen, 1995). According to Brulhart and Kelly (1999), typical gravity models include the following three variables as determinants of trade: (1) export supply, captured by economic factors (national output or output per capita) affecting trade flows in exporting countries, (2) import demand, captured by economic factors (income or income per capita) affecting trade flows in the importing countries, and (3) transportation cost, captured by geographical distance and other variables representing policy and cultural barriers to trade. It is stated that the value of trade between two countries is positively related to their incomes and negatively to the distance between them (Hufbauer et al., 1997). The idea is that countries with a larger economy tend to trade more in absolute terms, while distance[2] (a proxy for transportation costs) would depress bilateral trade (Dell'Ariccia, 1999).

An alternative explanation of the gravity trade model can be presented in a diagram using a simply supply and demand framework. According to Polder (2000), exporting and importing countries are the main objects in the gravity trade model. As shown in Figure 4.1, the force driving the gravity trade model comes "from the size of the economics of the exporting country and import country that creates, respectively, a potential supply and a potential demand." Furthermore, the diagram presents the ways that potential supply and demand can lead to potential trade flows,

[2] In the literature, it is common practice to adopt the distance between the economic centres or the national capitals of trade-pair countries to proxy for the transport costs and other obstacles to trade flows because data on these variables are difficult to measure (Leamer and Levinsohn 1995).

which depend upon certain trade resistance factors and trade arrangements. The GDP of the exporting and importing countries, and the distance between the trading partners, can be presented as economic size and trade barriers respectively. Eventually, the actual trade flows can be expressed as shown in the following figure.

Figure 4.1 Schematic Representative of the Gravity Trade Model



Source: Polder (2000).

The gravity trade model has been successfully applied for nearly forty years to explain trade flows in empirical literature. Thus, using the gravity trade model, the magnitude of trade flows can be estimated among trading countries. The gravity equation can be expressed in two forms. One of them is a standard gravity model with just size when taking into consideration, the economies and their distance. The other is an augmented gravity equation formed by adding more variables into the

standard gravity model. A number of variables are found to be important determinants of bilateral trade flows.

4.3 Standard Gravity Trade Model

The standard gravity model states that bilateral trade flows are determined by four sets of variables: (1) variables indicating the total potential demand of the importing country *j*; (2) variables indicating the total potential supply of the exporting country *i*; (3) the geographical distance between the capital of the countries (or economic centers); and (4) variables aiding or hindering trade between the importing and exporting countries.

The standard form of the gravity trade model is an equation that is linear in logarithmic form, which explains bilateral trade flows based on the masses of the two economies, the distance between them, and a set of other variables:

$$\ln X_{ij} = \alpha_0 + \alpha_1 \ln Y_i + \alpha_2 \ln Y_j + \alpha_3 \ln L_i + \alpha_4 \ln L_j + \alpha_5 \ln D_{ij} + \alpha_6 A_{ij} + \varepsilon_{ij} \text{----------(4.3)}$$

where X_{ij} is the value of exports from countries *i* to *j*,

Y_i and Y_j are value of incomes for countries *i* and *j*,

L_i and L_j are the populations of countries *i* and *j*, and

D_{ij} is the distance between countries *i* and *j*.

A_{ij} represents any other factors aiding or preventing trade between the pairs of countries.

ε_{ij} is a random error term, usually taken to be normally distributed.

Sanso et al. (1993)[3] denoted that the purpose of using the gravity trade model for international trade flows is to determine its microeconomic foundations. In addition, they proposed that "one of the characteristics of the equation is its general validity, since it is equally applicable to any pair of countries. It is also symmetric because it provides the trade flows in both directions by changing the country *i* variables for the country *j*." They also questioned whether the log linearity of the gravity trade model as a general functional form could be used to estimate international bilateral trade flows and concluded that the " log linear form is a fair and ready approximation to the optimal form."

An alternative formulation of (4.3) can be constructed by using GDP per capita instead of population variables. Thus, the specification of another form of the standard gravity model is:

$$\ln X_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln y_i + \beta_4 \ln y_j + \beta_5 \ln D_{ij} + \beta_6 A_{ij} + \varepsilon_{ij} \text{ ----------(4.4)}$$

where y_i and y_j are the exporter (importer) GDP per capita variables. The second specification of the gravity trade model could be used when applied to estimate bilateral trade for a specific commodity, while the specification of (4.2) can be used to estimate aggregate trade flows. Bergstrand (1989) noted that if we distinguish aggregate trade flows into industries and goods, then the coefficient of an exporter's GDP per capita income indicates whether the industry or commodity under study is

[3] They questioned whether the loglinearity of the gravity equation as a general functional form could be used to estimate international bilateral trade flows and concluded that the "loglinear form is a fair and ready approximation to the optimal form."

labor or capital intensive in production. In addition, the coefficient of an importer's GDP per capita indicates whether the products are a luxury or necessity in consumption. Consequently, this study will use the second form of the gravity trade model because it will examine the trade pattern of the commodities of global T & C products separately.

4.4 Augmented Gravity Trade Model

In the augmented model, more variables are added to the standard gravity trade model. These variables include the real exchange rate and dummy variables to take into account the effect of a common language and the implementation free trade agreement to make explicit the direction of trade between countries i and j. Therefore, for estimation purposes, equation (4.5) can be expressed in a log-linear form as follows:

$$\ln X_{ij} = \alpha_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 \ln y_i + \beta_4 \ln y_j + \beta_5 \ln D_{ij} + \beta_6 E_{ij} + \beta_7 G_{ij} + \beta_8 B_{ij} + \beta_9 F_{ij} + \varepsilon_{ij} \text{ ----------} (4.5)$$

Where E_{ij} denotes the real exchange rates and G_{ij} is the dummy variable for language. If trading partners use the same language then it is equal to 1, otherwise it is equal to 0. B_{ij} is the dummy variable for common border; F_{ij} is the dummy variable for the implementation of free trade arrangement, which is equal to 1 if they are with common membership.

Table 4.1 shows the expected sign and explanation of variables based on Junius (1999). All variables in equation (4.5), except the distance, GDP and per capita GDP of exporting and importing countries are expected to have a positive impact on the trading partners.

Table 4.1 Expected Signs and Explanation of Variables

Variables	Sign	Explanation
Exporter GDP	+	Potential export supply
Importer GDP	+	Economically larger countries import more
Exporter per capita GDP	+/-	A higher output per person indicates a potential for higher exports, but a larger population may both increase and decrease trade
Importer per capita GDP	+/-	A higher per person income indicates a higher import demand, but a larger population may both increase and decrease trade
Distance	-	Transportation costs
Real Exchange Rates	+/-	An appreciation of the import country's currency promotes exports and hinders imports
Common Languages	+	Countries with common languages are likely to trade more with each other
Common Borders	+	Countries with common borders will enhance trade between those countries
Common Membership	+	Countries with common trade agreements will enhance trade between those countries

Source: Junius (1999).

Rose (2004:99) wrote: “For those unfamiliar with the gravity model, it is a completely conventional device used to estimate the effects of a variety of phenomena on international trade. Unusually for economics, it is also a successful model, in two senses. First, the estimated effects of distance and output (the traditional gravity effects) are sensible, economically and statistically significant,

and reasonably consistent across studies. Second, the gravity model explains most of the variation in international trade. That is, the model seems reliable and to fit the data well."

Rose and other authors have thus added a host of ancillary variables to the "traditional gravity effects" as a way of estimating their impact on bilateral trade flows. According to Ricart et al. (2004), the gravity trade model is the most systematic and successful class of attempts for integrating multiple dimensions of cross-border economic activity. Fitted relationships of the determinants explain one-half or even two-thirds of the variation in aggregate bilateral trade between country pairs. As a result, fitted gravity models have been described as supplying 'some of the clearest and most robust empirical findings in economics' (Leamer and Levinsohn, 1995).

In conclusion, the literature has ample justification for a gravity-type equation in a variety of models for international trade flows. In some respect, this empirical framework may be most appropriate for explaining international trade flows when observing different trade theories. However, the gravity equation can be employed for testing the determinants of trade flows, given its considerable explanatory power and robustness with regards to international trade.

4.5 Related Literature and the Commodity-Specific Gravity Trade Model

The gravity trade model plays a role in evaluating bilateral trade flows not only for aggregated commodity trade, but also for disaggregated commodity trade between pairs of countries. However, there have been only a few papers that applied the gravity trade model to a single commodity. Furthermore, there have been a few reports that use a panel data estimation approach, such as the one developed in this research. In my dissertation, a panel data technique with fixed and random effects of the gravity trade model with a single commodity; T & C products, is employed separately.

Another modified gravity model was proposed by Gunawardana and Hewarathna (2000) who analyzed the determinants of Australia-East Asia trade flows by assessing the impact of the East Asian economic crisis. They reported the results of Australia's one way merchandise exports to and imports from nine East Asian countries from 1979 to 1998. The estimated coefficients were consistent and plausible with the literature. In addition, their paper presented the possibility of a potential trade expansion between Australia and East Asian countries, provided that they can achieve higher rates of growth in real GDP.

Brulhart and Kelly (1999) also applied a gravity model to estimate Ireland's potential trade pattern with five Central and Eastern European countries (CEEC) to assess the impact of their possible accession to the EU. They found that "Irish export

volumes are close to their normal level, but that Irish imports from the CEECs were still less than half of their normal size in 1994."

The modified single commodity gravity model has adopted the methods indicated in the literature. According to Linnemann (1966) and Bergstrand (1985, 1989), the gravity trade model is a reduced form equation of a partial equilibrium in import demand and export supply. The general equilibrium model for world trade can be derived from utility and profit maximizing behavior. Koo et al. (1994) suggested that:

"The demand equation for the specific commodity can be derived from maximizing the CES utility function subject to income constraint. The supply equation is derived from the firm's profit maximization procedure in exporting countries with resource inputs allocated according to the constant elasticity of transformation (CET) during the production process."

The single commodity gravity model under market equilibrium conditions of demand and supply can be derived as follows. The GDP of an exporting country can be translated as its production capacity, whereas the GDP of an importing country means its purchasing power. In the end, it is anticipated that the GDPs of a pair of exporting and importing countries will be positively related to the trade flows between them.

In this context, short-hand representation of supply and demand forces of gravity trade model can be accomplished in international trade. If country i is the origin of exports, then Y_i represents the potential of the exporting country to supply a product, while Y_j represents the potential of the importing country's demand for that product. In the present dissertation, the typical gravity trade model for aggregate goods is re-specified to analyze trade flows of a single commodity, which are T & C products separately. In order to fully understand global T & C trade flow, it is necessary for us to recognize that T & C trade flow should be modeled as a function of the economic masses of the two trading partners and distance between two trading countries, along with other determinants that affect global T & C trade flows, which will be discussed in Chapter 5.

4.6 Literature Review of Empirical Gravity Model Studies

In the economic literature, there exists a large body of work that analyses the composition of trade in different regions with gravity trade model. This literature includes Brada and Mendez (1985), and Thoumi (1989) studies on Latin America and the Carribean; Hamilton and Winters (1992), Frankel and Wei (1993) and Chua (1997) studies on Asia; McCallum (1995) and Krueger (1999) study on North America; and Balassa (1967), Aitken (1973), Hewett (1976), Pelzman (1977) and Bergstrand (1985) studies on Europe.

Aitken (1973) study used the gravity model to isolate empirically the major forces that shaped European trade relations over the 1951-1967 time periods. Dummy

variables were incorporated into the gravity trade model to capture the influence of the EEC and the EFTA. For each year of the integration period 1959-1967, a cross-section equation was estimated and used to test for the impact of the EEC and the EFTA on member trade.

The cross-section equation was also calculated for the eight-year period prior to integration in 1957 to determine the forces at work prior to the formation of the EEC. A base year equation was chosen and used to make projection estimates of the gross trade creation and trade diversion effects of the EEC and the EFTA. The results showed that both communities experienced cumulative growth in gross trade creation over their respective integration periods. The gross trade creation of the EEC was substantially greater than that of the EFTA. The EEC was found to have a net trade creation effect on the EFTA between 1965-1967. The results suggested 1958 as the last year for which It could be safely assumed that European trade was unaffected by the formation of the EEC.

Brada and Mendez (1985) study applied the gravity equation to provide a rigorous assessment of the impact of integration on bilateral trade in developing regions. In the 1980s, there was increased interest by third-world leaders in using regional economic cooperation to counter developed country protectionism and to promote export oriented development strategies. Previous studies (Aitkin, 1973) showed the success of the EEC and EFTA in increasing inter-member trade, but little was known about the relative importance of the numerous factors contributing to that

success. The objective of Brada and Mendez study was to determine the extent to which the success of the EEC and the EFTA could be attributed to the type of inter-member trade liberalization measures undertaken, and the extent to which success was due to the high level of development of the integrating countries. The trade enhancing effects of three developing country integration schemes were estimated and the results were compared to the estimated trade enhancing effects of three developed country schemes. The three developing country schemes were the Central American Common Market (CACM), the Latin American Free Trade Area (LAFTA) and the Andean Pact. The three developed country integration schemes were the EEC, EFTA and the Council for Mutual Economic Assistance (CMEA).

For Brada and Mendez (1985) sample of developed and developing countries, the effect of integration on inter-member trade is hypothesized to be influenced by the following factors: environmental factors, the economic system of the integrating countries, and policy factors. Environmental factors refer to the physical and economic characteristics of the integrating countries. Two environmental factors are included in the model: distance and level of development. Distance is expected to have a negative impact on the effects of integration on trade. An integration scheme with relatively small distances among members is expected to stimulate more inter-member trade, *ceteris paribus*, than an integration scheme with countries located far from each other. The level of development is expected to have a positive impact on the effects of integration on trade. The results of their showed environmental factors caused the greatest variation in ability to promote inter-member trade. The

distance between member countries was the most important environmental factor. The findings also indicated that effective integration is possible for both developed and developing countries.

Concerning the trade flow of developing countries, Oguledo (1996) used a modified gravity trade model to empirically investigate the effect of the Economic Community of West African States (ECOWAS) on trade flows. His results indicated that income has a significant effect on trade flows and suggested that economic growth in the ECOWAS region could increase trade flows among member countries. The ECOWAS integration scheme and the common language variable also have significant effects on trade flows.

McCallum (1995) presented a case study on the impact of the Canada-US border on continental trade patterns. The results showed that the Canada-US border has a decisive effect on trade patterns across the continent. The model predicts more North-South trade and less East-West trade in the absence of a Canadian-US border. Krueger (1999) also used the gravity equation to assess the impacts of preferential arrangements on international trade flows between the US, Canada and Mexico under NAFTA. She argued that ”an alternative means of attempting to estimate the effects of NAFTA or other preferential trading arrangements is by means of gravity equations and these models perform well empirically and can be useful for estimating changes in the trading relationships among countries.”

Other econometric studies successfully used the gravity trade model to evaluate policy issues empirically. For example, the impact of phasing out quotas on EU clothing imports (Milgram, 2005), trade union rights and democracy (Kucera and Sarna, 2006), calculation of trade potential (Egger, 2002), regional trading agreements (Sharma and Chua, 2000; Soloaga and Winters, 1999), trade impacts of currency unions (Nitsch, 2002, Rose, 2002), multilateral agreements (Subramanian and Wei, 2003), implications of WTO accession for current non-members (Lissovolik and Lissovolik, 2004, Eremenko, Dean et al., 2003), national borders (McCallum, 1995; Helliwell, 1996, 1998), calculation of trade potential (Nilsson, 2000; Egger, 2002), cross-border investment (Egger and Pfaffermayr, 2004), China's trade displacement effect (Eichengreen et al., 2007, Greenaway et al., 2008) and the impact of China on direct foreign investment flows (Eichengreen et al., 2006, Garcia-Herrero and Santabarbara, 2007).

However, past gravity trade model research (Batra, 2004; Athukorala, 2007; Ranjan and Tobias, 2007) had only centered on regional investigations and general trading scenarios, and were not T & C specific. T & C sectors are examined in this study due to its extensive globalization of production and distribution, and the complexity involved in the design of supply chains. More importantly, these sectors have created millions of jobs and contributed to the economic growth of many countries; in particular, the developing countries. Therefore, this study will make a significant contribution to existing literature by filling this gap, extending a broader and comprehensive analysis on T & C trade flows separately at the national, regional and

global levels from 1980 to 2008. Furthermore, this study will explore the possibilities that the growth of China's T & C exports is displacing exports of other selected Asian countries to third markets by accounting for the endogeneity of Chinese exports. Accounting for endogeneity is done so by applying instrumental variables with country fixed effects in the gravity trade model.

CHAPTER 5 THE SPECIFICATION OF THE GRAVITY TRADE MODEL

Introduction

After reviewing the literature for the gravity trade model, this chapter introduces the methodology employed in this study. It first provides the specifications of the generic gravity trade model with standard determinants. Modifications of the model for T & C trade at national, regional and global levels and additional political, social, logistics performance and cultural variables are further explained. Instruments that are utilized, analytical methods and their advantages are also described in this Chapter.

5.1 Research Perspective

This research aims to examine determinants and thoroughly analyzes their impacts on T & C trade based on historical trade data at the national, regional and global levels from 1980-2008 with the gravity trade model. The national level includes: Hong Kong T & C exports and her top ten trading partners. The regional level includes: Asian exporters and the EU-15, US and Japan T & C markets. The global level includes: the top fifteen T & C exporters/importers and

their top ten trading partners. Determinants that are considered include the basic determinants in additional to political, institutional, social, countries' production efficiency, logistics performance and cultural factors in different levels. Furthermore, this current study will explain the endogeneity of Chinese T & C exports by applying instrumental variables with country fixed-effects in the gravity trade model to examine the ways that the increase of China's T & C exports has had a displacement effect on other selected Asian countries over the period of 1990-2008, which is explained in Chapter 7.

Since panel data are used in this study to investigate the effects over time for each scenario in order to provide an exhaustive analysis and obtain a conscientious study of T & C trade, it is necessary to distinguish between fixed and random effects models, which play an important role in panel data analysis. The study will apply the Hausman test. Furthermore, the regression results of OLS will be compared with the fixed effects model in order to determine the model that best fits the panel data.

5.2 Basic Gravity Trade Model

This section presents the developments of the gravity trade model and assesses the applications of standard determinants and additional variables for three different levels. It further proposes modifications to the model for enhancing the validity of this research.

The conventional variables in the generic gravity trade model are first introduced. After that, the model is modified by adding political, social, logistics performance and cultural determinants for different levels of analysis. A detailed description of the possible results of the explanatory variables is also provided.

The standard gravity trade model is written as follows:

$$\ln X_{ij}=\alpha_0+\alpha_1 \ln Y_i+\alpha_2 \ln Y_j+\alpha_3 \ln L_i+\alpha_4 \ln L_j+\alpha_5 \ln D_{ij}+ \varepsilon_{ij} \quad (5.1)$$

where X_{ij} is the value of exports from country *i* to *j*, Y_i and Y_j are the value of incomes for countries *i* and *j*, L_i and L_j are the populations of countries *i* and *j*, and D_{ij} is the distance between countries *i* and *j*. ε_{ij} is an error term.

5.3 Modified Gravity Trade Model for Sectoral-level Analysis

The standard gravity trade model is prevalently used for interpreting the effects of total merchandise trade among nations. The basic explanatory variables in the generic gravity equation include country data of an economy as a whole. In this study, the trade effect of a particular industry; namely, textile and clothing, will be investigated. A standard gravity trade model is inadequate for this kind of sectional-analysis. Aside from the fundamental variables in the standard gravity trade model, the determinants of industry-specific factors, political, social, logistics performance and cultural variables are added to the equation to capture the industry features of T & C sectors in order to examine whether they exert significant impacts on bilateral trade at the sectoral level.

For an explanation of the comprehensive scenario of T & C trade flows, it is necessary to recognize that import/export trade flows are modeled at different levels. In this dissertation, the gravity trade model includes basic determinants and additional variables to examine three levels; namely, the national, regional and global levels from 1980-2008. The main components of the gravity trade model comprise of gross domestic production (GDP), per capita GDP and geographical distance, which represent the cost of trading. Thus, this study will

examine the impacts of these variables on T & C trade with other trading partners. In addition, the study adds other relevant variables to examine whether they have a crucial impact on the three levels of T & C trade. In order to test for differences in the levels and also the effects of time, six different models are estimated and explained below.

5.3.1 National Level

First of all, we will discuss the national level which includes Hong Kong T & C exports/imports and her top ten trading partners[1] from 1990-2008. Determinants that are considered consist of standard macroeconomic factors, distance, social and comparative advantages in production factors that affect T & C industries.

The specifications of national T & C trade; the value of exports between Hong Kong and her top ten trading partners from 1990-2008, become a function of standard macroeconomic factors consisting of their GDP, per capita GDP, basic variables that include distance, real exchange rates and population. The additional determinants are value added factors and labor cost. After taking the natural logarithms on all variables except for real exchange rates, the modified

[1] Australia, China, Canada, France, Germany, Italy, Japan, Netherlands, UK and USA

gravity trade model for T & C exports from Hong Kong to her trading partners is specified as:

$$\text{Ln}\,(EX_{ij})_t = \alpha + \beta_1 \ln(GDP_i)_t + \beta_2 \ln(PCGDP_i)_t + \beta_3 \ln(GPD_j)_t + \beta_4 \ln(PCGDP_j)_t + \beta_5 \ln(D_{ij}) + \beta_6 \ln(POP_{it}) + \beta_7 \ln(POP_{jt}) + \beta_8 (E_{ij})_t + \beta_9 \text{In}(VA_i)_t + \beta_{10} \text{In}(LC_i)_t + U_{ijt} \quad (5.3)$$

where t (t = 1…19) from 1990 to 2008, representing the time when trading transactions took place;

$\ln(EX_{ij})_t$	Log of export value of T & C in millions of US dollars from Hong Kong to trading partners, *i* denotes Hong Kong's variables, *j* represents the trading partners of Hong Kong;
α	Unobserved or fixed effects which do not change over time, and capture all unobserved time-constant factors that affect $EX_{ij;}$
β	Slope parameter, also known as the partial regression coefficient. It represents the expected increase in the outcome variable for a unit increase in the predictor variable. In this case, the slope coefficient β_1 measures the change in the conditional mean of the dependent variable (exported T/C value) per one unit change in independent variable X_1 (GDP), holding the values of the other independent variables $X_2 \ldots X_{10}$ constant.
$\ln(GDP_i)_t$	GDP log of exporter, Hong Kong, in millions of US dollars;
$\ln(PCGDP_i)_t$	Per capita GDP log of exporter in millions of US dollars;
$\ln(GDP_j)_t$	GDP log of importing countries in millions of US dollars;
$\ln(PCGDP_j)_t$	Per capita GDP log of importing countries in millions of US dollars;
$\ln(D_{ij})$	Physical distance (in km) log between the individual capital of importing countries and Hong Kong;
$\ln(POP_{it})$	the population size log of Hong Kong;
$\ln(POP_{jt})$	the population size log of importing countries;
$(E_{ij})_t$	the real exchange rate of foreign currency per unit in US dollars;
$\text{In}(VA_i)_t$	Log of the value added amount in T & C industry of Hong Kong;
$\text{In}(LC_i)_t$	Log of Hong Kong's labor cost in millions of US dollars;

U_t	other omitted influences on exports

The T & C trade is analyzed separately at the national levels using the above empirical equations. T & C represents the sets of textiles and clothing data which are used in two individual equations respectively.

In the export model, two additional industry-specific variables are included; namely, value added factors and labor cost to capture the impact of the industry features of T & C exports. The following hypotheses are tested in relation to the export model.

- The GDP coefficient of Hong Kong is positively related to Hong Kong T & C exports to importing partners.
- The GDP coefficient of importing countries is positively related to Hong Kong T & C exports.
- The per capita GDP coefficient of Hong Kong depends on whether the commodity is a capital or labor-intensive commodity in the exporter's production and the coefficient of the importing countries' per capita GDP depends on whether the commodity is a necessity or luxury in consumption.

- The distance between Hong Kong and importing countries are negatively related to Hong Kong exports to those countries.
- The appreciation of real exchange rate of importing countries is positively related to Hong Kong exports.
- The population of Hong Kong is positively related to T & C exports.
- The population of importing countries is positively related to Hong Kong T & C exports.
- The value added amount of exporting country is positively related to Hong Kong T & C exports.
- The labor cost of exporting country is negatively related to Hong Kong T & C exports.

On the other hand, by rearranging and taking natural logarithms on all variables except for real exchange rates, the modified gravity trade model for T & C imports to Hong Kong from her trading partners is specified as:

$$Ln(IM_{ijt}) = \alpha + \beta_1 ln(GDP_i)_t + \beta_2 ln(PCGDP_i)_t + \beta_3 ln(GPD_j)_t + \beta_4 ln(PCGDP_j)_t + \beta_5 ln(D_{ij}) + \beta_6 ln(POP_{it}) + \beta_7 ln(POP_{jt}) + \beta_8 (E_{ij})_t + \beta_9 In(VA_i)_t + \beta_{10} In(LC_i)_t + U_{ijt} \text{----------} (5.2)$$

where t (t = 1…19) from 1990 to 2008, representing the time when trading transactions took place;

$\ln(IM_{ij})_t$	Log of Hong Kong T & C import value in millions of US dollars from exporting countries, *i* denotes Hong Kong's variables, *j* represents the trading partners of Hong Kong;
α	Unobserved effects or fixed effects which do not change over time, and capture all unobserved time-constant factors that affect $IM_{ij;}$
β	Slope parameter, also known as the partial regression coefficient. It represents the expected increase in the outcome variable for a unit increase in the predictor variable. In this case, the slope coefficient β_1 measures the change in the conditional mean of the dependent variable (imported T & C value) per one unit change in independent variable X_1 (GDP), holding the values of the other independent variables $X_2 \ldots X_{10}$ constant.
$\ln(GDP_i)_t$	GDP log of Hong Kong in millions of US dollars;
$\ln(PCGDP_i)_t$	Per capita GDP log of Hong Kong in millions of US dollars;
$\ln(GDP_j)_t$	GDP log of trading partners in millions of US dollars;
$\ln(PCGDP_j)_t$	Per capita GDP log of trading partners in millions of US dollars;
$\ln(D_{ij})$	Geographical distance (in km) log between the individual capital of Hong Kong and trading partners;
$\ln(POP_{it})$	the population size log of Hong Kong;
$\ln(POP_{jt})$	the population size log of trading partnerss;
$(E_{ij})_t$	the real exchange rate of foreign currency per unit in US dollars;
$In(VA_i)_t$	Log of the value added amount in T & C industry of trading partners;
$In(LC_i)_t$	Log of trading partner's labor cost in millions of US dollars;
U_t	other omitted influences on exports

In the import model, the following hypotheses are tested:

- The GDP of Hong Kong is positively related to T & C imports.

- The GDP of exporting countries is positively related to Hong Kong T & C imports.
- The effect of per capita GDP of Hong Kong depends on whether the commodity has necessity or luxury properties for Hong Kong consumption, and the coefficient of the per capita GDP of the exporting country depends on whether the commodity is capital or labor intensive during production in the exporting countries.
- The distance between Hong Kong and the exporting countries is negatively related to imports from them.
- The population of Hong Kong is positively related to T & C imports.
- The population of exporting countries is positively related to Hong Kong T & C imports.
- The appreciation of real exchange rate of exporting countries is negatively related to Hong Kong T & C imports.
- The value added amount of exporting countries is positively related to Hong Kong T & C imports.
- The labor cost of exporting countries is negatively related to Hong Kong T & C imports.

5.3.2 Regional Level

Secondly, the modified specifications of regional T & C trade is discussed; the value of imports between fourteen Asian countries and EU-15, the US and Japan T & C markets[2] from 2000-2008. Additional focused determinants at this level include logistics performance and the number of females in the workforce of suppliers with basic variables, and various key macroeconomic and industry-specific factors (same as the national level) as control variables that influence T & C trade. In order to avoid repeating the explanation of determinants as provided at the national level, we will just concentrate on discussing the additional variables.

In this equation, all variables, except for real exchange rates and logistics performance, are in real terms. By rearranging and taking natural logarithms, the modified gravity trade model for T & C exports in regional trade becomes is written as:

[2] Thirteen Asian countries: Bangladesh, Cambodia, Hong Kong, India, Indonesia, Malaysia, Pakistan, Philippines, South Korea, Sri Lanka, Taiwan, Thailand and Vietnam
Seventeen trading partners: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK, USA and Japan

$Ln(EX_{ijt})=\alpha+\beta_1 ln(GDP_i)_t+\beta_2 ln(PCGDP_i)_t+\beta_3 ln(GPD_j)_t+\beta_4 ln(PCGDP_j)_t+\beta_5 ln(D_{ij})+$

$\beta_6 ln(POP_{it})+\beta_7 ln(POP_{jt})+\beta_8(E_{ij})_t+\beta_9 In(VA_j)_t+\beta_{10} In(LC_j)_t+\beta_{11} In(FEMALE_i)_t+$

$\beta_{12}(LPI_i)_t+U_{ijt}$ ----------(5.3)

where t (t = 1…9) is from 2000 to 2008, representing the time when trading transactions took place;

$ln(EX_{ij})_t$	Log of Asian suppliers T/C export value in millions of US dollars to EU-15, the USA and Japan, *i* denotes exporters' variables, *j* represents the importing countries;
$In(FEMALE_i)_t$	Log of the number of women in the work force of exporting countries;
$(LPI_i)_t$	The LPI of exporting countries.

In the export model, two variables are added; namely, female workforce and logistic performance index to examine the impact of these determinants of T & C imports. The following hypotheses are tested in relation to the export model.

- The number of females in the workforce of Asian suppliers is positively related to EU-15, the USA and Japan T & C exports.
- The LPI of Asian suppliers is positively related to EU-15, the USA and Japan T & C exports.

On the other hand, the modified gravity trade model for T & C imports in regional trade is written as:

$$Ln(IM_{ijt})=\alpha+\beta_1 ln(GDP_i)_t+\beta_2 ln(PCGDP_i)_t+\beta_3 ln(GPD_j)_t+\beta_4 ln(PCGDP_j)_t+\beta_5 ln(D_{ij})+\beta_6 ln(POP_{it})+\beta_7 ln(POP_{jt})+\beta_8(E_{ij})_t+\beta_9 In(VA_j)_t+\beta_{10} In(LC_i)_t+\beta_{11} In(FEMALE_i)_t+\beta_{12}(LPI_j)_t+U_{ijt}$$ ----------(5.4)

where t (t = 1…9) is from 2000 to 2008, representing the time when trading transactions took place;

$ln(IM_{ij})_t$	Log of EU-15, the USA and Japan T/C import values in millions of US dollars from exporting Asian countries, *i* denotes importers' variables, *j* represents the exporting countries;
$In(FEMALE_i)_t$	Log of the number of women in the work force of Asian suppliers;
$(LPI_i)_t$	The Logistics Performance Index of Asian suppliers.

In the import model, two factors are added; namely, female workforce and LPI to capture the influence of the additional determinants of T & C imports. The following hypotheses are tested in relation to the import model.

- The number of females in the workforce of Asian suppliers is positively related to EU-15, the USA and Japan T & C imports.
- The Logistic Performance Index (LPI) of Asian suppliers is positively related to EU-15, the USA and Japan T & C imports.

5.3.3 Global Level

Lastly, the modified specifications of global T & C trade are discussed; the value of imports between the top fifteen importing countries and their top ten trading partners [3] (See Appendix 1) from 1980-2008. The gravity trade model is enhanced by adding a few dummy variables expressing special trade relationships between countries which belong to a common trading bloc or region, sharing a common membership, border, language and time dummy to capture the effects of the gradual quotas phase out in T & C trade after 1995. The basic variables, and various key macroeconomic and industry-specific factors (same as the national and regional levels), are also included as control variables

[3] Top Fifteen Textile Exporters are China, Hong Kong, India, Japan, Pakistan, South Korea, Belgium, France, Germany, Italy, Netherlands, Spain, Turkey, UK and USA. Top Fifteen Textiles Importers are China, Hong Kong, South Korea, Belgium, France, Germany, Italy, Poland, Spain, Turkey, UK, Canada, Mexico and USA

Top Fifteen Clothing Exporters are Bangladesh, China, Hong Kong, India, Indonesia, Belgium, France, Germany, Italy, Romania, Spain, Turkey, UK, Mexico and USA. Top Fifteen Clothing Importers are Hong Kong, Japan, South Korea, Austria, Belgium, Denmark, France, Italy, Germany, Netherlands, Spain, Switzerland, UK, Canada and USA

that influence T & C trade. In order to avoid repeating the explanation of determinants as provided in the national and regional levels, we will just concentrate on discussing the additional variables.

In this equation, all variables except for real exchange rates and dummy variables are in real terms. By rearranging and taking natural logarithms, the modified gravity trade model for T & C export in global trade becomes as follows:

$$Ln(EX_{ijt})=\alpha+\beta_1 ln(GDP_i)_t+\beta_2 ln(PCGDP_i)_t+\beta_3 ln(GPD_j)_t+\beta_4 ln(PCGDP_j)_t+\beta_5 ln(D_{ij})+$$
$$\beta_6 ln(POP_{it})+\beta_7 ln(POP_{jt})+\beta_8(E_{ij})_t+\beta_9 In(VA_i)_t+\beta_{10} In(LC_i)_t+\beta_{11} In(FEMALE_i)_t+$$
$$+\beta_{12}(CL_{ij})+\beta_{13}(CB_{ij})+\beta_{14}(APEC_{ij})+\beta_{15}(EU_{ij})+\beta_{16}(NAFTA_{ij})+\beta_{17}(WTO_{ij})+$$
$$\beta_{18}(TIME\_95_{ij})U_{ijt} \text{ ----------} (5.5)$$

where t (t = 1…29) is from 1980 to 2008, representing the time when trading transactions took place;

$\ln(EX_{ij})_t$	= Log of top fifteen exporting countries' T & C export value in millions of US dollars to their top ten trading partners, *i* denotes importers' variables, *j* represents the exporting countries;
(CL_{ij})	= a language dummy variable taking the value of 1 if countries *i* and *j* share a common language; 0 otherwise;
(CB_{ij})	= a common border dummy variable taking the value of 1 if countries *i* and *j* share a common border; 0 otherwise;
$(APEC_{ij})$	= A dummy variable with a value of 1 if countries *i* and *j* are members of Association of Southeast Asian Nations, 0 otherwise;
(EU_{ij})	= A dummy variable with a value of 1 if countries *i* and *j* are members of European Union, 0 otherwise;
$(NAFTA_{ij})$	=A dummy variable with a value of 1 if countries *i* and *j* are members of North American Free Trade Area, 0 otherwise;
(WTO_{ij})	= A dummy variable with a value of 1 if countries *i* and *j* are the members of World Trade Organization, 0 otherwise.
$(TIME\_95_{ij})$	= An intercept dummy variable to capture the effects of the gradually quota phase out which is taken place after 1995.

In the export model, several dummy variables are added, namely common border, language and membership to capture the impact of the additional dummy variables of T & C exports. The following hypotheses are tested in relation to the export model.

- The language dummy variable is positively related to the level of exporters' T & C exports.
- The common border dummy variable is positively related to T & C exports to their top ten trading countries.
- The common membership dummy variables, namely ($APEC_{ij}$), (EU_{ij}), ($NAFTA_{ij}$) and (WTO_{ij}) are positively related to T & C exports.
- The time dummy variable, (TIME_95) is expected to have a positive sign and stimulate T & C exports between member countries.

On the other hand, the modified gravity trade model for T & C imports for the top fifteen importers and their top ten trading partners is specified as:

$$Ln(IM_{ijt})=\alpha+\beta_1 ln(GDP_i)_t+\beta_2 ln(PCGDP_i)_t+\beta_3 ln(GPD_j)_t+\beta_4 ln(PCGDP_j)_t+\beta_5 ln(D_{ij})+$$
$$\beta_6 ln(POP_{it})+\beta_7 ln(POP_{jt})+\beta_8(E_{ij})_t+\beta_9 In(VA_i)_t+\beta_{10} In(LC_i)_t+\beta_{11} In(FEMALE_i)_t+$$
$$+\beta_{12}(CL_{ij})+\beta_{13}(CB_{ij})+\beta_{14}(APEC_{ij})+\beta_{15}(EU_{ij})+\beta_{16}(NAFTA_{ij})+\beta_{17}(WTO_{ij})+$$
$$\beta_{18}(TIME\_95_{ij})+U_{ijt} \quad \text{----------(5.6)}$$

where t (t = 1…29) is from 1980 to 2008, representing the time when trading transactions took place;

$\ln(IM_{ij})_t$	Log of top fifteen importing countries' T & C import value in millions of US dollars from their top ten trading partners, *i* denotes importers' variables, *j* represents the exporting countries;
(CL_{ij})	A language dummy variable taking the value of 1 if countries *i* and *j* share a common language; 0 otherwise;
(CB_{ij})	A common border dummy variable taking the value of 1 if countries *i* and *j* share a common border; 0 otherwise;
$(APEC_{ij})$	A dummy variable with a value of 1 if countries *i* and *j* are members of Association of Southeast Asian Nations, 0 otherwise;
(EU_{ij})	A dummy variable with a value of 1 if countries *i* and *j* are members of European Union, 0 otherwise;
$(NAFTA_{ij})$	A dummy variable with a value of 1 if countries *i* and *j* are members of North American Free Trade Area, 0 otherwise;
(WTO_{ij})	A dummy variable with a value of 1 if countries *i* and *j* are members of World Trade Organization, 0 otherwise;
$(TIME\_95_{ij})$	An intercept dummy variable to capture the effects of the gradually quota phase out which is taken place after 1995.

In the import model, several additional dummy variables are included; namely, common border, language and membership to examine the significance of these dummy variables of T & C imports. The following hypotheses are tested in relation to the import model:

- The language dummy variable is positively related to T & C imports from the top ten exporting countries.

- The common border dummy variable is positively related to T & C imports from the top ten exporting countries.
- The common membership dummy variables; namely, ($APEC_{ij}$), (EU_{ij}), ($NAFTA_{ij}$) and (WTO_{ij}) are positively related to T & C imports.
- The time dummy variable, (TIME_95) is expected to have a positive sign and stimulate T & C imports between member countries.

5.4 Assessment of Basic Determinants for the Standard Gravity Model

The following part provides the detailed description of possible result of the conventional variables in the gravity trade model.

(a) Gross domestic product of exporter (GDP_i) and importer (GDP_j)

In this study, purchasing power refers to the variation in purchasing power of importers/exporters and their trading partners. A country's purchasing power can be measured in a number of ways (Yeates, 1968). In this study, GDP is used as an indicator of a country's available disposable income and one of the ways for measuring the size of an economy. It is defined as the market value of all final goods and services produced within a country in a given period of time. A higher GDP of the exporting country would create a larger supply for exports and higher

GDP of the importing country would have a greater demand for imports (Tinbergen, 1962 and Poyhonen, 1963). It is expected that T & C trade between two countries increases directly with the size of their economies.

(b) Per capita GDP of exporter ($PCGDP_i$) and importer ($PCGDP_j$)

Bergstrand (1989) noted that many studies disregarded exporter and importer per capita GDP and presented a theoretical foundation for exporter and importer incomes that relay to conventional trade theories. The exporter‘s per capita GDP is used as a proxy for the exporter’s capital-labor intensive industries in production and the importer’s GDP is interpreted as a necessity or luxury in consumption (Bergstrand, 1989 & Eaton and Tamura, 1994). In addition, the Linder hypothesis is based on the assumption that “relative demands change with per capita income” Linder (1961), Gros and Gonciarz (1996) argued that “per capita output is used to take into account the idea that as income increases, the share of tradable in overall income might increase, i.e., for a given overall income, a country with a higher income per capita would trade more intensively (have more exports and imports) than a poorer country.” Moreover, GDP has to be counterbalanced by GDP per capita since some countries which have a large purchasing power in the aggregate, may have a low GDP per capita. In this

context, most econometric studies expect there to be a positive relationship between countries with a high level of per capita GDP. Thus, per capita GDP is expected to have a positive impact on T & C product exports and imports.

(c) Physical distance between the exporter and importer (D_{ij})

Transportation cost is one of the essential trade cost between the exporting and importing country. However, we are unable to determine the transport cost of exports directly as there are different means of transport and they incur different costs. We can only use the physical distance between two countries, which is a fixed factor, as one of the independent variables. It is assumed that the value of bilateral trade increases if the two countries are geographically closer to each other. The reason is that long distance is likely to incur higher transportation costs which will increase product prices and reduce their competitiveness. Therefore, it is considered that distance has a negative influence on trade values.

Distance reflects the costs of trading and has a significant effect on the relative price difference of a trading commodity. According to Frankel (1997), Linnemann (1966) presented three different kinds of costs of doing business in relation to distance. First, there are physical shipping costs, which can be

measured by subtracting the pre-export price from costs, insurance, and freight (c.i.f) or the ratio of c.i.f. value to free on board (f.o.b) value. Linnemann called this an objective resistance.

Secondly, the cost of doing business at a distance is time, which increases over distance. The cost of time in transportation includes “interest rate charges, perishability, and the loss from adapting to changing conditions.” Thirdly, the costs of doing business at a distance are due to the degree of cultural unfamiliarity. Linnemann called this cost a psychic distance or economic horizon (Frankel, 1997). Thus distance, as a proxy of natural resistance for trade, can be expected to have a negative impact on T & C product trade.

According to Wang et al. (1998), it is expected that there will be reduction in the effects of distance on trade flows over time because of the development of new transportation technologies, and this will reduce the cost of transportation and communication. In this context, the measurement of the effects of distance on trade flows can be distance elasticity, which is the variation in trade with respect to distance. Thus, larger distance elasticity will imply a greater impact with the assumption of *ceteris paribus*. However, they found that the elasticity of distance

has a negative sign and reached the conclusion that there is no evidence of a decline in the effect of distance on bilateral trade. Frankel (1999) also argued that he could not identify any statistical evidence of a decreasing effect of distance on trade. This is the major reason why he emphasized the role of geographical distance in international trade flows. With regard to distance, a number of previous studies have shown that trade flow decreases with distance between bilateral trades (Aitken, 1973; Bergstrand, 1985, 1988; Thursby and Thursby, 1987; Frankel and Rose, 2002).

Moreover, Isard and Freutel (1954) suggested that the friction against interaction caused by distance is not so much a function of the intervening physical space, but rather a function of the cost of traversing this space. Therefore, they used a measure of “effective” or “economic” distance, in which physical distance is modified by transport cost. Since it is very difficult to obtain transport costs for international trade, particularly when many different modes of transportation may be used, Beckerman (1956) defined the concept of “economic” distance in international trade by taking the difference between the f.o.b. value of a commodity when it leaves an area and its c.i.f. value when it enters another region. Beckerman (1956) recognized two problems with this method. One is

that "economic" distance pertains to a commodity when thousand of commodities are involved. Therefore, the average "economic" distance for a number of commodities would have to be obtained. The other problem is related to the fact that the available international trade statistics reveal so many inconsistencies that the variations within the data make their use highly suspicious. Another measurement of distance used is the great-circle distance between the capital cities of countries (Wall, 1999).

In this study, the direct-line distances between capital cities are used. This measurement of distance is obtained from Fitzpatrick and Modlin (1986). The direct-line distance takes into account the flattening of the earth at the poles and is more precise than the great-circle distance since the latter is based on the assumption that the earth is a true sphere. The direct-line distance is computed along the earth's surface and not from a mathematically defined figure which approximates the shape of the earth.

(d) Population of exporter (POP_i) and importer (POP_j)

The coefficient estimate for POP_i may be positively or negatively correlated with trade flow (Oguledo et al., 1994), depending on the different mix of commodities

supplied and demanded by each country. According to Bergstrand (1989), a negative sign for the coefficient of POP_i indicates that exports tend to be capital intensive. That means a country with a lower population tends to export capital intensive products, such as textiles. Textile production nowadays is more capital and technology intensive which requires sophisticated machineries and less number of workers. Another possible explanation for the negative sign of the POP_i and POP_j variables is that large domestic markets tend to be self-fulfilling rather than relying on import or export of goods (Liu et al., 2006). On the other hand, Chan et al. (2008) suggested that POP_j should be positive because population is typically interpreted as market size which has a positive relationship with consumption of manufactured commodities. According to the latter argument, the expected sign of coefficient on population is positive.

(e) Real exchange rate $(E_{ij})_t$

Real exchange rates are one of the most crucial components affecting trade flows. An increase in dollar value of an importing country's currency implies a depreciation of the US dollar and is expected to have a positive impact on T & C exports and a negative impact on T & C imports. Moreover, exchange rate uncertainty is found to have a volatility effect on international trade (Dell'Ariccia

1999).

5.5 Assessment of Additional Determinants for the Modified Gravity Model

In addition to the standard variables mentioned above, the model includes additional factors, such as industry-specific variables, logistics performance and dummy variables for common membership, border, and language to estimate their impact on T & C imports and exports.

(a) Value Added Factor $(VA_i)_t$

Value added factors refer to the additional value created at a particular stage of the manufacturing process. In modern macroeconomics, this implies adverts which contribute to the factors of production, such as land, labor and capital goods. These enhance the value of a product and correspond to the incomes received by the owners. The factors of production provide "services" which increase the unit price of a product relative to the cost per unit of intermediate inputs used in production. Therefore, the value added factor to the apparel supplier is utilized to examine whether the additional value of materials and supplies for apparel production contributes to the exports.

(b) Labor cost of the exporting country (LC_i)

Instead of price index, labor costs (LC_i) of T & C industries in the exporting countries are adopted in the regression model. This contributes one of the essential sources of cost of production which alters T & C prices in the market. LC_i is calculated by dividing the total salaries (including all payments in cash or in kind paid to employees in relation to work done) by the number of employees involved in the T & C industry in the exporting country during the reference year. In other words, it is the average wage per worker who had worked in the T & C sector in a year. A country with higher labor costs is expected to have lower attractiveness as a supplier of T & C products. Hence, the labor cost variable should have a negative impact on T & C exports. This interpretation is appropriate for describing the labor-intensive clothing sector since a large amount of manual handling is required for garment manufacturing, but may not be applicable to the capital-intensive textile sector as labor cost may not be a significant factor for determining the choice of textile suppliers. Moreover, since trade liberalization has progressed after the completion of the ATC in 2005, price competition among clothing suppliers have become more intense. Therefore, labor cost by the supplier is one of the crucial deciding factors in the entire clothing trade flow.

(c) Female Workforce ($FEMALE_i$)

Nearly three quarters of the workers in the global T & C production industry are women. The participation rate of the female labor force in developing countries is even higher. As more female workers provide higher production capacity for T & C exports, a positive estimated coefficient is expected.

(d) Logistics Performance Index (LPI_i)

Greater consumer demand for new products and more product variety has reduced product life sharply. This is particularly evident for T & C trade. T & C retailers need to respond quickly to the latest trend and consumer demand by offering new products in the shortest possible time. Equally, facing a growing competitive market, retailers that offer basic or staple items for the mass market also need to maintain their operations as efficient as possible in order to stay profitable. In response to these demands, T & C companies have increasingly employed lean, agile, or a combination of both approaches to manage their supply chains (Bruce, et al., 2004; Warburton and Stratton, 2002).

From a global commodity/value chains perspective (Gereffi, 1999), T & C industry is a prototypical buyer-driven commodity chain because large buyers such as retailers, marketers and manufacturers of upscale brand name items in

developed countries have dominated the chain by controlling the access to major resources (e.g., product design, brand names and consumer demand), and engaged in aggressive global sourcing which taps to two contrasting production systems in developing and newly industrializing countries (NICs). According to Gereffi (1999), the first one is the assembly model. It is a form of industrial subcontracting in which large manufacturers supply intermediate inputs (cut fabric, thread, buttons, and other trim) to low-cost suppliers located in neighboring countries with bilateral trade agreements that a tariff is charged only on the value added by foreign labor when the goods assembled offshore are re-imported. In this arrangement, the origin status of manufacture remains unchanged. The second model is the full-package supply or OEM (Original Equipment Manufacturer) model. It is a form of commercial subcontracting in which foreign lead suppliers provide buyers with one-stop sourcing services, such as coordinating product development, sourcing fabrics and accessories, organizing production, further subcontracting parts of the orders, performing quality control, and arranging trade logistics for delivery of finished product to buyers.

In an effort to develop global lean and agile supply chains, large T & C retailers, marketers and manufacturers in the developed countries, namely EU, USA and Japan have to reexamined to what extent their current outsourcing practices can achieve the expected level of agility and leanness. Discrepancy between the current and anticipated performance may trigger redesign of their supply chains. Clearly, low-cost T & C suppliers operating under the simple assembly model in the Asian developing countries seek to develop their capabilities of providing full-package supply in order to establish a link with lead buyers and thus move away from their less profitable, periphery position and integrate deeper into global T & C supply chains. This change reflects industrial upgrade, which is the process of improving an economy's capability to move to more profitable and/or technologically sophisticated capital- and skill-intensive economic niches (Gereffi, 1999). Equally, established full-package suppliers will keep enhancing their services and further develop a multilayered regional sourcing hierarchy so as to secure their strong link with big buyers and core position in the ongoing restructuring of global T & C supply chains.

In order to develop the full-package supply capability for Asian T & C suppliers, one important institutional factor is the logistics performance of exporting

country which determines trade costs in both financial and time aspects. Recent studies of country logistics performance show large between-country and between-region performance variations. For example, Djankov et al. (2006) reported that it takes on average 32 days in South Asia (including Bangladesh, India, Pakistan and Sri Lanka), and only 23 days and 6 days in ASEAN and Singapore respectively to move a 20-foot container of an identical good from a factory in the largest business city to a ship in the most accessible port. This shows that neither having well-established physical infrastructure (e.g., road, terminal and port) and good transport services nor being close to the market per se can guarantee quick delivery, as the time required to fulfill customs, administrative, and port requirements to load the cargo onto a ship could be much longer than the time of inland carriage and handling. Nordas et al. (2006) in a case study of Bulgaria's and the Dominican Republic's T & C exports found that buyers are willing to source from producers with higher costs if they can guarantee shorter lead times. Also, improvements in transport, logistics and customs procedures are essential for suppliers to stay competitive in supplying high-value apparel to markets of close proximity with a short lead time, while reducing the cost disadvantage as compared to remote low-cost suppliers. It is likely that long lead time and high variability in lead time which stem from poor

logistics performance will erect a non-tariff trade barrier for suppliers, especially those in developing countries, to be integrated in global supply chains.

Recently, the World Bank has conducted a survey study on logistics performance of 150 countries and developed the LPI and its seven indicators are (Arvis, at al., 2007):

1. Efficiency of the clearance process by customs and other border agencies.
2. Quality of transport and information technology (IT) infrastructure for logistics.
3. Ease and affordability of arranging international shipments.
4. Competence of the local logistics industry.
5. Ability to track and trace international shipments.
6. Domestic logistics costs.
7. Timeliness of shipments in reaching destination.

Each country's performance in different dimensions was recorded on a 1 to 5 scale (lowest to highest performance). The LPI was aggregated as a weighted average of various logistics performance indicators using the Principal Component Analysis method. The World Bank's survey results showed that high income countries were top performers; however, there were huge differences

between countries at other income levels. See Table 5.1 for the LPI score and rank of fourteen Asian countries. Also, positive associations between logistics performance and trade performance including growth and competitiveness, export diversification, and trade expansion were found.

Table 5.1 LPI Score and Rank of fourteen Asian Exporting Countries

Country	The world LPI Rank	The LPI score
Hong Kong	8	4.00
Taiwan	21	3.64
South Korea	25	3.52
Malaysia	27	3.48
China	30	3.32
Thailand	31	3.31
India	39	3.07
Indonesia	43	3.01
Vietnam	53	2.89
Philippines	65	2.69
Pakistan	68	2.62
Cambodia	81	2.50
Bangladesh	87	2.47
Sri Lanka	92	2.40

Source: The World Bank (Arvis et al., 2007)

In addition to the above macroeconomic and industry-specific factors, the LPI is added as a key independent variable in the modified gravity trade model. Countries sharing similar factor endowments may differ in their logistics performance in terms of customs clearance efficiency, transport and IT infrastructure quality, ease of arranging international shipments, the ability to

track and trace shipments, domestic logistics cost, timeliness in reaching destination, and competence of the domestic logistics industry. It is anticipated that the logistics performance of exporting countries contributes to their T & C exports. Thus, the estimated coefficient of LPI should be positive.

Dummy variables are included to indicate special relations between the two trading countries, such as common membership in a trade agreement, common border and cultural affinities, and namely, a common language (Frankel, 1997; Glick and Rose, 2002).

(e) Common Language

This study employs a measure of language difference as a proxy (Wei, 1996; Limao and Venables, 2001) in an attempt to capture the effects of cultural differences between two trading partners. Theoretically, language proximity measure captures a more general cultural similarity, which would make transactions easier since people would understand each other better. For more complex T & C products, that understanding is more valuable since there is more to know about the product. Thus, if the exporting/importing country speaks the same language as their trading countries, the communication cost should decline

and stimulate trade. It is expected that countries with similar languages and cultures will do relatively more business with each other. Thus it can be expected to have a positive coefficient.

(f) Common Border

Neighboring countries trade with each other, which is believed to reduce the transaction costs of T & C trade and enhance trade volume between two trading economies. It is expected that two countries which are sharing a common border will have a positive coefficient.

(g) Common membership

Trade agreements, whether bilateral, regional, or worldwide, are assumed to eliminate trade barriers, open foreign and domestic markets to trade, decrease trade costs, and therefore lead to an increase in trade. Dummy variables are used for common membership under a free trade agreement or membership of a trade organization, including APEC, the EU, NAFTA and WTO, to evaluate the effect of special preferences for trade membership and the possible detriment of non-membership on T & C trade. We expect that a common membership would have a positive effect on trade volume and vice versa which is often reported in

the literature. These four trading blocs are selected because they are the most well-known preferential trading groups and would test the common and non-membership influence on T & C trade flow. The brief description of the selected four trading blocs is presented as below.

APEC

The Asian Pacific Economic Cooperation (APEC) was established in 1989 to enhance economic growth and prosperity for the region and strengthen the Asia-Pacific community by the following countries: Australia, Brunei, Canada, Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, the Philippines, Singapore, Thailand, and the US. Since then, nine countries have joined this group: China, Taiwan, and Hong Kong in 1991, Mexico and Papua New Guinea in 1993, Chile in 1994, and Peru, Russia and Vietnam in 1998. Up to now, . APEC has 21 members (See Appendix 2). APEC imposes no treaty obligations on its members, and the only intergovernmental coalition in the world operating on the basis of nonbinding commitments decisions that are reached by consensus and voluntary commitments.

Many Asian countries have experienced rapid economic growth in recently years causing those countries to increase their demand for T & C products. Japan, Republic of Korea and Hong Kong are major importers of clothing. These also include China in the textile sector, whereas China, Japan, Hong Kong and Republic Korea are major exporters of textile and include Indonesia as the major exporter of clothing products.

The EU

The process of European integration was launched in 1965, after France proposed the first concrete foundation of a European federation. In 1965, the six original member countries signed and in 1973 Denmark, Ireland, and UK joined. In 1981, Greece also joined, followed by Spain and Portugal in 1986, and later Austria, Finland, and Sweden in 1995. Within forty years the EU has grown to 27 member states (See Appendix 2).

The EU, due largely to a similarity in cultural, political and economic systems, is the real success story of regional trading blocs. The creation of arguably the world's largest trading bloc, and the imposition of measure affecting economic and budgetary performance which form the basis for EU membership, has resulted in a dynamic and quickly growing bloc.

T & C sectors are an important part of European manufacturing. About 75 per cent of the EU T & C production is concentrated in four countries. In 2000, Italy was the largest producer of T & C products, followed by France, Germany and the UK. From the EU periphery, Spain was also an important T & C producer, ranking behind the UK. Portugal was somewhat less important, while the production volumes of Greece and Ireland were very small due to their overall small size. However, looking at the role of the sector with the individual countries, Portugal, Greece and Spain show a very strong specialization on the T & C sectors (Wei, 2004).

During the past decade, T & C sectors in the EU performed disappointingly, with production and employment falling considerably as a share of total manufacturing. The downsizing of T & C sectors in the EU region was due to the ongoing changes in the international division of labor, globalization and liberalization of trade. Because of the high labor content of clothing, growing labor costs in the EU have led to ever decreasing cost competitiveness to low-wage countries, particularly in Asia. Spinanger (1992) claims that the low capital and skill requirement make relocation to those countries very easy and convenient, this explained for the sector's growing concentration in the Asian

developing countries. Although protected by trade restrictions, the EU market faced growing import competition during 1990s, together with a saturation of the clothing market. The sector underwent significant restructuring and modernization efforts during the past two decades. These included the adoption of new technologies the turn to higher value-added products, and the outsourcing of labor-intensive processes to Central and Eastern European or Mediterranean countries.

According to the previous literature, Bayoumi and Eichengreen (1997) observed the strong intra-bloc effect of the EU in the 1980s, but it had been dissipated by the early 1990s. Soloaga and Winters (2001) conclude that EU has fostered neither overall trade nor intra-bloc trade after the early 1990s, as would ordinarily be expected, but they found convincing evidence of trade diversion. Their conclusion is in parallel with that of Sapir (1997), who insists that increased integration within the EU induced negative impact on EU imports from non-member countries and strengthened the consolidation of the union. On the other hand, Clarete et al. (2002) demonstrated that trade has expanded among the EU members but was not at the expense of the non-member countries.

NAFTA

In 1989, a Free Trade Agreement (FTA) between Canada and the US was signed. The FTA provided for the gradual elimination tariffs and a reduction in the non-tariff trade barriers on goods. In this regard, all tariffs on T & C goods of Canadian and US origin were to be eliminated by 1998. In 1994 the FTA was incorporated into the NAFTA. One of the main changes is that NAFTA expanded the free trade area to include Mexico and added free trade in other important sectors, such as investment, trade in services, intellectual property, the cross-border movement of business people, and government procurement. As a result, under NAFTA, all non-tariff barriers, like import licenses for T & C trade between the US and Mexico, were eliminated. (See Appendix 2)

T & C were declining industries in the US, despite efforts under the ongoing MFA to restrict imports from developing countries (Hufbauer and Schott, 1992) at the time of the NAFTA debate.. Employment declined in textiles as the industry adopted productivity enhancing innovations, becoming more capital intensive. The apparel sector, which is heavily dependent on low-skilled labor, was not internationally competitive. Since the passage of NAFTA, US textile production has increased sharply. NAFTA actually preserved US jobs in the T &

C industries, contrary to pre-NAFTA fears that jobs would be lost to Mexico. NAFTA included strong rules of origin, particularly T & C goods had to be produced from yarn made in a NAFTA country to receive NAFTA preferences. US import quotas were removed immediately for goods meeting this "yarn forward" ROO, and gradually for other Mexican goods (Burfisher et al., 2001). According to the US Trade Representative (1997), two-thirds of the value of US T & C imported from Mexico was comprised of originally US content.

NAFTA is considered by some economists as a defensive "survival strategy" intended to protect the North American market against a flood of Asian imports. Before NAFTA, most US clothing imports came from Asia. Since NAFTA went into effect in 1994, most tariffs on T & C had been phased out over five years, with a small number of tariffs to be eliminated over ten years. By that time, Mexico has overtaken China as the top US supplier of clothing, and most US clothing comes from the Americas, like Mexico, the Caribbean and Canada, whose countries use US yarn and fabric for manufacturing clothing (Gereffi et al., 2002). James and Umemoto (1999) demonstrated a similar pattern of trade diversion of US T & C imports from East Asian countries to NAFTA partners.

A recent study has been conducted to analyze the trade impacts of NAFTA, Tang (2005) applied a modified gravity model, he discovered that the NAFTA implementation has substantially boosted trade among the US, Canada and Mexico. Moreover, on the basis of fitting some gravity equations, Krueger (1999, 2000) also noted that the trade flow among the NAFTA countries intensified considerably and concludes that NAFTA was almost certainly trade creating rather than trade diverting.

WTO

The World Trade Organization (WTO), the only global international organization that deals with the rules of trade among nations, aims at helping producers of goods and services, exporters and importers, conduct business in a tranquil environment through agreements that are negotiated and signed by the bulk of the world's trading nations (See Appendix 3).

(h) Time dummy variable

The time dummy variable is added to the gravity trade model to capture the effects of the gradual quota phase out on T & C trade of the post-quota implementation. It is also expected to have a positive sign, which would imply

that without quotas, trade will be stimulated between member countries.

5.6 Analytical Method

The above gravity regression incorporates with standard and additional variables were estimated by the econometric estimation approach using EViews 5 software. Detailed explanation of panel data analysis with fixed and random effects and their advantages are provided in the following sectors.

5.6.1 Panel Data Estimation Approach

Cross sectional (CS) or pool cross sectional (PCS) by ordinary least square (OLS) is often used in the gravity trade equation. As stated in Hufbauer et al. (1997), the main advantage of OLS analysis is that it can be used to estimate the independent effect of each factor while holding constant, the effects of the other variables. However, Cheng and Wall (1999) showed that the estimation of either CS or PCS of the gravity trade model by OLS produces biased estimates. Since there is no heterogeneity allowed in the error term for the standard CS regression equations, the gravity trade model yields biased estimates of the volume of bilateral trade. In addition, they showed that the estimation of PCS of the gravity trade model by OLS also produces biased estimates. First, if the PCS estimation

is unbiased, there would be no detectable pattern in a residual plot because the expected average residual for each country pair would be zero. However, the residuals of each country pair are always the same sign, which means that the PCS model consistently estimates incorrectly the volume of trade for the country pairs. Secondly, PCS tends to overestimate trade between low-trade countries and underestimate it between high-trade countries (Cheng and Wall, 1999). When individual effects are omitted, the intercepts of equation are the same for all country pairs, which cause heterogeneity bias and should be accounted for in the model.

5.6.2 Advantages of Using Panel Data Estimation Approach

In this study, the data is collected from both cross-sectional units and over time. This type of data is known as panel data or cross-sectional time=series data. Applying a panel methodology in the current study can follow variations in the characteristics of countries over time, allowing the researcher to examine more complex issues than otherwise possible with either cross-section or time-series data alone since the use of panel data can enlarge the quality and quantity of data in technique (Gujarati, 2003, Yaffee, 2003). Moreover, the detail provided by panel data helps in the identification of economic models and allows the

researcher to better control for individual country effect. An additional advantage of panel data, compared to time series data, is the reduction in collinearity among explanatory variables and hence, an increase in efficiency of the econometric estimation (Baltagi and Raj, 1992).

Most empirical literature on gravity trade models in the last decade have been done with CS methodology, but panel methodology has several advantages over cross-section analysis. First, a panel approach makes it possible to capture the relevant relationships among variables over a longer time. Secondly, panel data allows disentangling the time invariant country-specific effect (Egger, 2000). Finally, panel data allows one to monitor the possible unobservable trading-partner-pair individual effects (Martinez-Zarzoso and Nowak-Lehmann, 2003).

5.6.3 Fixed-Effects Model

There are two types of panel data methods. The essential structure for most of these models is an “effects” model in which variations across countries or time are captured in simple shifts of the regression function; that is, in changes in the intercepts. There are two types of “effects” models; fixed and random. The fixed-

effects model assumes a group specific constant term (slopes) in the regression model, but the intercepts differ based on the cross-sectional group unit, for example, country or time or both. There are significant differences among countries although no significant temporal effects in the model. Intercepts may or may not differ over time, even if the intercept is cross-section (group) specific. Fixed-effects estimators are often referred as within-groups estimators, since they depend only on deviations from their group means (Davidson and MacKinnon, 1993). Furthermore, the most extensively discussed and used fixed-effects estimator is the within estimator (Johnston, 1997). The between-group estimator ignores deviations within groups by transforming the data into group means, thus estimating the cross-section-data regression on group means. The between estimator gives a consistent and unbiased estimator if regressors are truly exogenous, and coefficients of the regressors change randomly and independently. On the other hand, the within-group estimator will be efficient if the fixed effects are correlated with the dependent variables (Davidson and MacKinnon, 1993).

5.6.4 Random-Effects Model

The random-effects model is a regression with a random constant term (Greene, 2003). It assumes a group-specific disturbance, with the exception that for each group, there is a single draw that enters the regression identically in each period. The random-effects model can be derived from the fixed-effects model by assuming that the intercept term includes the mean effects of the random time series and cross-section variable. The random deviations regarding the mean are associated with the time series and cross section error terms. However, the random effects model requires the assumption that the error term must be uncorrelated with the explanatory variables if this is to be modeled. The random-effects model, for panel study, allows the researchers to describe the deviation on the basis of measurement and the rate of change over time. Furthermore, the random-effects model allows the researcher to explain trends over time, even taking into account, the correlation between successive measurements.

5.6.5 Advantages of Using Fixed-Effects Model

There are two reasons to argue that the fixed-effects model has a special advantage over the random-effects model. In the case of the gravity trade model

with import or export factors, for example, tariffs, non-tariff barriers, and export-driving or hindering variables, or other historical, political, and geographical facts are present. These factors are not random, but deterministically associated with specific characteristics of countries (Egger, 2000). Furthermore, the random-effects model assumes that individual effects are uncorrelated with other dependent variables. However, there is no justification for this assumption and therefore, the model may suffer from inconsistency due to omitted variables (Chamberlain, 1985, Hausman and Taylor, 1981).

The random-effects estimation is not commonly used since most gravity trade studies are more focused on specific dummy variables, such as free trade area, regional trading blocs and currency union, which give policy implications and can be estimated by the fixed-effects model. Furthermore, the random-effects model of the time-variant variables, for example, GDP and population, are usually rejected by the Hausman test. In contrast, the random-effects model is more efficient than the fixed-effects model if there is no correlation between an independent variable and unobservable effect, since the random-effects model mutually utilizes the within- and between-groups information.

In order to properly address potential correlations between individual specific variables and unobserved individual effects, in the current study, one test is applied to determine whether preference should be given to the fixed-effects model over the random-effects model. The Hausman (1981) test is employed as the econometric procedure which has been extensively used in the literature to test (Serlenga et al., 2005), the null hypothesis that the fixed-effects model is appropriate versus the alternative hypothesis that the random-effects model is the appropriate model for application. Details and results of the Hausman Test are showed in Chapter 6.

5.7 Instruments and Subjects

Econometrical estimation is achieved by using panel data estimation approach of three stepwise levels; namely, national, regional and global. At the national level, the data consist of 190 observations of Hong Kong and her top ten T & C trading partners during 1990-2008. At the regional level includes the country sample consists of 2,124 observations of fourteen Asian suppliers and the EU-15, US and Japan in 2000-2008. At the global level, a panel data set consisting of 4,350 observations of the top fifteen T & C exporters/importers and their top ten trading partners covering the period of 1980-2008 is collected and analyzed to determine the relevant variables which have measurable impacts on T & C trade patterns. In order to improve the credibility and explore the displacement effect of China's T & C exports growth on the other selected Asian economies to

EU-15, USA and Japan over the period of 1990 to 2008, T & C largest exporter, China is added into the sample countries and examined the detailed investigation in Chapter 7. The panel data consist of 4,199 observations for seventeen importing countries and thirteen Asian exporting countries are included in the study. These countries are selected based on their contribution on T & C trade regionally and internationally (Please refer to Chapter 3). Altogether, these countries which account for about 91% and 87% of the global T & C trade respectively and therefore, considered as representative of global T & C trading volume. Appendix 1 presents the sample countries at national, regional and global level in this study.

The period under investigation (1990-2008) at the national level and China's displacement effect on other selected Asian economies in Chapter 7 covers the quota elimination schedule under the ATC from 1995 to 2005 since trade patterns are likely to be affected by the quota phase-out mechanism. This enables the evaluation of T & C trade pattern before and after the quota elimination. The regional level is studied during the period of 2000 to 2008 due to the unavailability of data of a relevant variable; the logistic performance index. For the global level, the investigation extends to 28 years, from 1980 to 2008, in order to capture the complete picture depicted of the actual T & C situation in the world.

5.8 Data Sources

The annual bilateral T & C export/import values with the exception of Taiwan, are obtained from the Commodity Trade Statistics Database (COMTRADE), http://comtrade.un.org, USITC Trade Data Web 2-digit level of Standard International Trade Classification (SITC) Revision 2 (65 for textiles and 84 for clothing). The export values of Taiwan are extracted and compiled from the Directorate General of Customs, Ministry of Finance, ROC, http://cus93.trade.gov.tw/english/FSCE/FSC0011E.asp. Data on real GDP, per capita GDP (at constant 1990 prices in US dollars), real exchange rates and population size of countries are secured from the International Financial Statistics (IFS) database, http://www.imfstatistics.org/imf/. Real GDP and per capita GDP of Taiwan are acquired from the Taiwan Statistical Data Book, Council for Economic Planning and Development, R.O.C. The distance between countries is drawn from the Vulcansoft Distance Calculator, http://www.vulcansoft.com/city97.html and Fitzpatrick & Modlin, (1986). Labor costs are sourced from LABORSTA operated by the International Labor Organization (ILO) Bureau of Statistics, http://laborsta.ilo.org/. The number of female workforce and value added factor of suppliers are extracted and complied from the UNIDO Industrial Statistics Database (ISDSTAT3_2006) 3-digit level

of International Standard Industrial Classification of All Economic Activities (ISIC) Revision 2 (321 for textiles and 322 for clothing)CD-ROM. The scores of LPI are obtained from studies of the World Bank (Arvis et al., 2007). The common language dummy is based on Jon Haveman's international trade dataset. The common memberships of APEC is sourced from http://www.apec.org/apec/about_apec.html, the member countries of EU is searched from http://europa.eu/about-eu/27-member-countries/index_en.htm, the memberships of NAFTA is drawn from http://www.nafta-sec-alena.org/en/view.aspx and the membership countries of WTO is obtained from http://www.wto.org/english/thewto_e/whatis_e/whatis_e.htm and the International Monetary Fund (IMF), http://www.imf.org/external/pubs/cat/longres.cfm?sk=397.0 is relevant source in acquiring related figures and statistical data.

5.9 Summary of Chapter

This chapter introduces the specifications of the basic gravity trade model with conventional explanatory determinants. In order to reinforce the gravity trade model, eight additional determinants of political, social, logistics performance

and cultural variables are added to the six modified equations to capture the sectoral effects of T & C exports/imports at national, regional and global levels and describe more accurately the comprehensive scenario of T & C trade. Also panel data analysis with fixed and random effects and their advantages are further described in the latter part of this chapter.

CHAPTER 6 AN ECONOMETRIC ANALYSIS OF T & C TRADE FLOWS

Introduction

Derived by a generic model as described in Chapter 5, T & C gravity trade model has been modified according to different characteristics in industries, data selection, countries, explanatory variables, and examined years. Using different parameters, six versions of the model is estimated for national, regional and global levels. Each version includes a series of basic explanatory and additional variables, such as industry-specific, political, social, logistics performance and cultural factors that are analyzed. The objective is to determine how each estimated parameter affects the results of the model when applied to the three different levels in order to analyze bilateral trade flows at the national, regional and global levels in the time period from 1980 to 2008.

This chapter includes the results of three analyses; namely, analyses at the national, regional and global levels of T & C trade flows. For each level of analysis, the discussion is made into two sections. The first section explains the model selection. The second part describes the estimated coefficient of the basic determinants which consists of conventional explanatory variables in the gravity trade model and the additional variables, including industry-specific, political, social, logistics performance and cultural factors in T & C export and import models separately.

6.1 Analysis at National Level- Hong Kong and its top ten trading partners

6.1.1 Model Selection for National Level

The national level of T & C trade flows is estimated by using several methodologies. First, for comparison purposes, the study performed a regression of OLS, which assumes that intercept terms are constant for all trading countries. The test results, reported in Table 6.2 & 6.3 columns (5) and (6), the coefficient of GDP of T & C importers, show a negative sign. This indicates that the OLS results are possibly biased and thus it is necessary to select an alternative model that takes into account, the individual effects.

In this context, the Hausman test is performed to select a more appropriate model that includes individual country effects; namely, the panel data estimation approach with the fixed effects model (by assuming that the individual country effects are constant for each country) or with the random effects model (by assuming that individual country effects are random for each country) as an alternative model against OLS regression. Then the gravity trade models are tested to address potential correlations between individual specific variables and unobserved individual effects. Moreover, it is necessary to determine whether preference should be given to the random effects model over the fixed effects model. That is, whether the null hypothesis from the random effects model is more appropriate than the alternative hypothesis in the fixed effects model for application purposes.

The ability of the random effects model to take into account variation between individuals as well as within individuals makes it an attractive alternative to fixed effects estimation. However, for the random effects estimator to be unbiased in large samples, the effects must be uncorrelated with the explanatory variables, an assumption that is often unrealistic. The Hausman test finds the significance of the difference between the fixed effects estimates and the random effects. Correlation between the random effects and the explanatory variables will cause these estimates to diverge, and their difference will be significant. If the difference is not significant, then there is no evidence of the offending correlation.

For the T & C export/import model of national level equation, we get the following results from the Hausman test. The values of $\chi^2_{(10)}$, the statistic for testing differences between all coefficients, are χ^2 = 62.38/64.23 and 63.74/64.90 respectively. Their corresponding *p*-values of 0.00 suggest the null hypothesis of no correlation between the explanatory variables, and the random effects should be rejected (Table 6.1a & b). Based on these results, the redundant fixed effects tests are applied and the most appropriate econometric specification of the gravity trade model is the one with period fixed effects since the four statistic values (3.15/3.17 and 3.12/3.21) of T & C exports/imports models and the associated *p*-values 0.00 strongly reject the null that the effects are redundant (Table 6.1c & d).

Table 6.1a Random Effects of Hausman Test – National Level (Export Model)

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	d.f.	Prob.
Period random (T)	62.3769	10	0.0000
Period random (C)	64.2378	10	0.0000

Table 6.1b Random Effects of Hausman Test – National Level (Import Model)

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	d.f.	Prob.
Period random (T)	63.7439	10	0.0000
Period random (C)	64.8932	10	0.0000

Table 6.1c Redundant Fixed Effects Test – National Level (Export Model)

Redundant Fixed Effects Tests			
Effects Test	Statistic	d.f.	Prob.
Period F (T)	3.15268	(20,236)	0.0000
Period Chi-square (T)	63.2712	16	0.0000
Period F (C)	3.12374	(20,236)	0.0000
Period Chi-square (C)	61.4836	16	0.0000

Table 6.1 d Redundant Fixed Effects Test – National Level (Import Model)

Redundant Fixed Effects Tests			
Effects Test	Statistic	d.f.	Prob.
Period F (T)	3.172889	(21,791)	0.0000
Period Chi-square (T)	65.36371	16	0.0000
Period F (C)	3.212818	(21,791)	0.0000
Period Chi-square (C)	62.7371	16	0.0000

6.1.2 Results of Econometric Estimation

6.1.2.1 The Devised T & C Exports Model for National Level Analysis

Table 6.2 presents the results of the OLS and panel data approach with fixed effects estimated parameters for the gravity trade model of T & C exports respectively at the national level from 1990-2008. This table offers a summary for the model fit to the data: the f-values give the test statistic and *p*-value is associated with the test of the hypothesis so that the models explain a significant portion of the variation in the data, and the adjusted R-squares indicate the ability of the models to account for variation in the data. For the individual parameters in the models, the values of the coefficients of the parameter estimates, and the *p*-values are presented in the table; indicating the significant probabilities for the parameter estimates in the fitted regression equations and reporting the tests of statistical significance by indicating which parameter estimates are significant at the 1% significance level.

At the national level, the gravity trade model used in this study fits the data well, indicating that the proposed determinants are significantly related to T & C export trade. All of the major determinants for T & C trade are statistically significant at $p<0.05$ in the regression, except for LC_{ij} in textile trade and the majority of them, including GDP, GDP per capita, population, distance, real exchange rate, value added factors and labor cost of exporting countries in clothing trade show the expected sign. The standard gravity trade model (Model 1) for T & C exports

explains around 68 % and 69% of variance in bilateral trade flows and 71% and 73% in the augmented gravity trade model (See Table 6.2, Model2).

Table 6.2 shows the OLS and panel data estimation results of variables for the determinants of Hong Kong exports to its top ten T & C trading partners from 1990 to 2008

Dependent Variable: $\ln(EX_{ij})$						
Panel Two-Stage Least Squares					Ordinary Least Square	
	Model 1		Model 2		Standard Model	
Independent Variables	Coefficient (T)	Coefficient (C)	Coefficient (T)	Coefficient (C)	Coefficient (T)	Coefficient (C)
Constant	+22.70***	+25.60***	+21.3***	+27.60***	+23.51***	+21.51***
$\ln(GDP_i)$	+1.17***	+1.26***	+1.96***	+1.28***	+1.16***	+1.08***
$\ln(PCGDP_i)$	-0.14***	-0.35***	-0.23***	-0.32***	+0.34*	+0.29*
$\ln(GDP_j)$	+1.12***	+1.33***	+1.29***	+1.48***	-1.09***	-1.12***
$\ln(PCGDP_j)$	+1.63***	+1.89***	+1.74***	+1.93***	+1.62***	+1.42***
$\ln(D_{ij})$	-0.96***	-1.05***	-1.04***	-1.15***	-0.92***	-0.84***
$\ln(POP_i)$	-0.92**	+1.02**	-1.03***	+1.03**	-0.82**	+0.76**
$\ln(POP_j)$	+0.98***	1.06***	+0.75***	1.13***	+0.66**	+0.58**
(E_{ij})	+0.51**	+0.67**	+0.53***	+0.77**	+0.42**	+0.37**
$\ln(LC_i)$	-	-	-0.23	-0.67**	-	-
$\ln(VA_i)$	-	-	+0.86***	+0.79***	-	-
Prob (F-statistic)	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	**0.68**	**0.69**	**0.71**	**0.73**	**0.63**	**0.64**
Number of observations	190	190	190	190	190	190

*** Significant at .10 level,** Significant at .05 level,**
*****Significant at .01 level**

(a) Gross domestic product/ per capita gross domestic product

Bergstrand (1989) stated that the exporter's GDP is a proxy for national output in terms of units of capital in a gravity trade equation, while the exporter's per capita GDP is a proxy of the capital-labor endowment ratio. Moreover, the importer's GDP

is the national income and the importer's per capita GDP is the per capita income.

When aggregate trade flows are disaggregated into industries or goods, Bergstrand (1989) indicated that the "positive or negative coefficient for exporter per capita income indicates that the industry under study tends to be capital or labor intensive in production and the positive or negatively signed coefficient for import per capita income is an indication of an industry's output being a luxury or necessity in consumption."

The estimated coefficient of HK's GDP has a positive sign and statistically significant, which supports a priori expectations in the conventional gravity trade model. This result indicates that a 10% increase in HK's GDP increases T & C exports to her top ten trading partners by nearly 19.6% and 12.8% respectively for the augmented gravity trade model. Thus, the HK supply of T & C products to other countries is elastic with respect to HK's GDP.

The positive and statistically significant coefficients of the importer's GDP for the modified gravity model is consistent with the theory behind the conventional gravity trade model, suggesting that the size of the economies should enhance the amount of trade between trading partners. A 10% increase in the importer country's GDP creates an increase of 12.9% and 14.8% in demand for HK's T & C products. This result reveals that the other country's demand for HK's T & C exports is elastic with respect to the importer country's GDP.

The coefficient of per capita income of HK, which is a proxy for HK capital-labor ratio, has a negative sign. According to this reasoning, the negative coefficient of HK per capita GDP tends to be labor intensive in HK T & C production. The estimated elasticity of the importer's per capita income is positive, which indicates that HK T & C products are a luxury in the consumption of importing countries and are statistically significant in the modified model.

(b) Physical Distance

The estimated physical distance is negative and statistically significant in the modified model as a trade barrier. The estimated coefficient of distance are -1.04% and -1.15% for T & C trade respectively, which means that when the distance between HK and other importing countries increases by 10%, HK T & C exports will decline by 10.4% and 11.5% respectively. The strong negative impact of distance on HK T & C exports is consistent with our intuition.

(c) Population

Population size shows a positive sign on bilateral T & C trade at the national level. As presented in the results, a 10% increase in the importer's population size would have 7.5% and 11.3% growth in T & C trade.

The coefficient of the population variable of the exporter (POP_i) is statistically significant in both T & C estimations. However, it is negatively correlated to textile exports, but directly proportional to clothing exports. The results are consistent with

Bergstrand's (1989) description that a negative sign for the coefficient of POP_i implies that a country with a lower population tends to export capital intensive products, such as textiles. Textiles production requires sophisticated machineries and a minimum number of workers. In contrast, the clothing industry is more labor-intensive, and countries with large populations are able to supply sufficient workers for mass production and thus clothing exports could be increased accordingly. This may account for the positive relation between the exporter's population size and the magnitude of the clothing trade.

(d) Exchange Rate

Real exchange rates are used in this study, and defined as changes in the prices of currencies in the importing countries, with the US dollar as the standard. The appreciation of the currency of an importing country against the US dollar implies that the importing countries increase imports from HK. The estimated coefficients of the real exchange rates are positive, as hypothesized, and statistically significant at the 1% level. The magnitude of these estimates reveals that HK exports of T & C products is sensitive to changes in the real exchange rate. As the currency of the importing country appreciates in value, HK's T & C products become cheaper in the importing markets, which increase trade flows and make them statistically significant in the modified model.

(e) Value Added Factors

Value added factors have a positive impact on T & C trade flow. The results indicate that with a 10% increase in the VA_j of suppliers, there would be a 8.6% and 7.9% increase in T & C exports. This demonstrates that customers are more willing to pay for T & C items which possess extra value, such as an established brand image or relationship marketing.

Hong Kong has instilled a favorable impression with overseas buyers on the capabilities of producing quality products at competitive prices. While OEM arrangements account for a sizeable portion of business, many manufacturers have attempted to diversify by moving upmarket and engaging in original design manufacturing (ODM) and brand development. Hong Kong T & C firms have an edge with a full range of value added services and a quick response time. They have developed internationally recognized brand names through active marketing of image. In line with this, manufacturers have continued to move their production towards more sophisticated high-value activities, such as product differentiation by upgrading quality, image and feeling, so as to raise the overall profit of the products.

(f) Labor Cost

For the labor cost variable, the coefficient is significant only in the clothing trade, but not the textile trade. The negative coefficient of LC_i in the clothing trade implies that increases in incentives for the top ten importers to import apparel products from HK, depend on the low labor costs of HK; lower costs means greater incentive. With regards to the cost-competitiveness and labor intensive clothing segment, consumers

search for quality clothing products at the best price. When they realize that the competitive advantage of Hong Kong is waning, the consumers will shift to another production site which will provide an inexpensive and productive workforce. Based on this, HK has gradually lost its competitive edge and manufacturers have shifted to other low-wage Asian apparel producers, such as China, India and Indonesia, who have become the dominant suppliers for the global clothing markets.

In order to maintain quality yet respond quickly in a dynamic global clothing scenario, some Hong Kong manufacturers have established offshore production bases to assume better customer/supplier relationships. For many others, relocating production plants that are not in China would require an enhancement to supply chain management (SCM) and make up for the geographical disadvantage in contrast to overseas apparel making competitors. Therefore, they have employed leading-edge technologies, such as electronic data interchange (EDI), global digital ID and bar-coding for effective cross-docking, on-time delivery to improve efficiency, and speed and value of the whole supply chain.

On the other hand, the labor cost variable of textile trade is insignificant in the panel data estimation. There is no indication that the level of labor cost in the textile industry affects export volume since the textile industry, in comparison to the clothing industry, it is usually more capital intensive and highly automated, particularly in developed countries. This finding reflects the insignificant influential effect of labor cost in the textile sector.

6.1.2.2 The Devised T & C Imports Model for National Level Analysis

Table 6.3 presents the results of the OLS and panel data approach with fixed-effects for T & C imports at national level from 1990-2008. This table offers a summary of the model fit to the data: the f-statistic gives the test statistic and *p*-value is associated with the test of the hypothesis so that the models explain a significant portion of the variation in the data. The R-squares indicate how good the models are at accounting for variation in the data. For the individual parameters in the models, the values of the coefficients of the parameter estimates, and the *p*-values are presented in the table. They indicate the significant probabilities for the parameter estimates in the fitted regression equations and report the tests of statistical significance by indicating which parameter estimates are significant at the 1% significance level.

In this study, the gravity trade model at the national level appears to fit the data well, indicating that the proposed explanatory variables are significantly related to T & C import trade. All of the determinants for T & C trade are statistically significant at $p<0.05$ in the regression, except for LC_{ij} in textile trade. The majority of the determinants, including GDP, GDP per capita of importing and exporting countries, population of exporting and importing countries, geographical distance between two countries, real exchange rate, value added factors and labor cost of exporter in clothing trade, demonstrate the anticipated sign. As a whole, Model 1 accounts for 67% and 71% of the variance of T & C import value. In addition to the contribution

of standard factors that are examined in Model 1, additional variables; namely, value added and labor cost, explain the extra 3% and 4% of the variance of T & C export values, improving the total adjusted R2 value to 70% and 75% in the modified model (See Table 6.3, Model 2).

Table 6.3 shows the OLS and panel data estimation results of variables for Hong Kong imports model from 1990 to 2008

Dependent Variable: $\ln(IM_{ij})$						
Panel Two-Stage Least Squares					Ordinary Least Square	
	Model 1		Model 2		Standard Model	
Independent Variables	Coefficient (T)	Coefficient (C)	Coefficient (T)	Coefficient (C)	Coefficient (T)	Coefficient (C)
Constant	+19.03***	+21.32***	+22.13***	+25.34***	+17.15***	+18.51***
$\ln(GDP_i)$	+1.07***	+1.16***	+1.73***	+1.62***	+1.23***	+1.18***
$\ln(PCGDP_i)$	-0.23***	-0.27***	-0.29***	-0.37***	+0.38*	+0.24*
$\ln(GDP_j)$	+1.18***	+1.26***	+1.24***	+1.31***	-1.15***	-1.21***
$\ln(PCGDP_j)$	+1.42***	+1.35***	+1.76***	+1.82***	+1.27***	+1.32***
$\ln(D_{ij})$	-1.06***	-1.13***	-1.09***	-1.21***	-0.87***	-0.93***
$\ln(POP_i)$	-0.89**	+1.12**	-1.13***	+1.16**	-0.86**	+0.78**
$\ln(POP_j)$	+0.82***	+1.02***	-0.71***	1.11***	+0.71**	+0.61**
(E_{ij})	-0.56**	-0.69**	-0.59***	-0.61**	-0.25**	-0.42**
$\ln(LC_i)$	-	-	-0.62	-0.82**	-	-
$\ln(VA_i)$	-	-	+0.92***	+0.83***	-	-
Prob (F-statistic)	0.00	0.00	0.00	0.00	0.00	0.00
Adjusted R^2	**0.67**	**0.71**	**0.70**	**0.75**	**0.61**	**0.63**
Number of observations	190	190	190	190	190	190

*** Significant at .10 level,** Significant at .05 level,**
*****Significant at .01 level**

(a) Gross domestic product/ per capita gross domestic product

In the import model, the coefficients for HK import GDP variables are positive,

which is consistent with a priori expectations and significance. As predicted, an importing country with higher GDP (GDP_j) would have a larger demand for T & C products. A 10% increase in the HK GDP increases HK T & C imports from her top ten trading partners by 12.4% and 13.1% respectively. T & C imports are assumed to increase directly with the size of an importer's economy. This approximate proportional relationship between bilateral trade flows and size of the importer's economy indicates that T & C trade could grow significantly if the countries are able to maintain strong economic growth. The finding is in line with a recent study by Chan et al. (2007). The coefficient of HK per capita GDP is positive and significant. Thus, HK imports of T & C products are a necessity for consumption.

The coefficient of the exporter GDPs have a positive sign and are statistically significant for T & C trade. A 10% growth in the GDP of other exporting countries increases HK T & C imports from those countries by 17.3% and 16.2% respectively. This shows that the supply of exports of other exporting countries to HK is inelastic with respect to their GDPs. The estimated coefficients of the per capita GDP of exporters have negative signs and are statistically significant for T & C trade. Thus, T & C products turn out to be labor intensive in production for the exporting countries.

(b) Physical Distance

The coefficient of the distance variable (D_{ij}) is negative, implying that two countries with greater geographical distance tend to trade less in T & C. Other than the

fundamental reason that a longer distance is likely to incur higher transportation costs and thus increase the cost of trade, time to market is another key matter of concern. There is a rising importance in fast fashion and quick response in the T & C markets. According to Au and Chan (2007), a short lead time is a determining factor in the fashion sector. Neighboring countries are able to create a more efficient supply chain by shortening the product transportation time and thus they tend to trade more frequently with each other.

(c) Population

A positive correlation effect between the importer's population size (POP_j) and their T & C imports in our estimations can be explained by Chan et al. (2008), where large markets tend to have greater demand in T & C products and rely on importing of goods. The coefficient of the exporter's population variable (POP_i) is statistically significant in both T & C estimations. However, it is negatively correlated to textile exports, but has positive effect on clothing sector. The results are consistent with Bergstrand's (1989) description that a negative sign for coefficient of POP_i implies that a country with lower population tends to export capital intensive products, such as textiles. Textiles production requires sophisticated machineries and a minimum number of workers. In contrast, the clothing industry is more labor-intensive, and countries with large populations are able to supply sufficient workers for mass production and thus clothing exports could be increased accordingly. This may account for the positive relation between the exporter's population size and the magnitude of clothing trade.

(d) Exchange Rate

The negative and significant coefficient of the real exchange rate variable supports the theoretical expectations because the appreciation of the exporter currency will make foreign T & C products more expensive in HK domestic markets.

(e) Value Added Factors

Value added factors (VA_i) have a positive impact on T & C imports to HK. The results indicate that with a 10% increase in the VA_i of suppliers, there would be a 9.2% and 8.3% increase in T & C imports respectively to HK. This demonstrates that customers are more willing to pay for T & C items which possess extra value, such as marketing, promotion or an established brand image.

(f) Labor Cost

For the labor cost variable, the coefficient is significant only in the clothing trade, but not the textile trade. The negative coefficient of labor cost factor in the clothing trade implies that the country with a lower labor cost tends to export more products to other countries. This finding is supported by the fact that the labor-intensive clothing sector requires a huge amount of labor for mass production and labor cost is a crucial factor for maintaining price competitiveness and sustaining comparative advantages for developing countries. On the other hand, the labor cost variable of textile trade is insignificant in the estimation. The textile industry, in comparison to the clothing industry, is usually more capital intensive and highly automated,

particularly in developed countries. There is no indication that the level of labor cost in the textile industry affects trade volume.

6.2 Analysis at Regional Level – Selected Asian countries and the EU-15, US and Japan

6.2.1 Model Selection for Regional Level

T & C trade flows at the regional level are estimated by using two methodologies. Since a regression of OLS was performed at the previous national level and it was noticed that there are biased results, it is therefore necessary to use the Hausman test and select a more appropriate model that includes the individual country effects; namely, the panel data estimation approach with the fixed effects or random effects model.

The gravity trade models are then tested to address the potential correlations between individual specific variables and unobserved individual effects. Moreover, it is necessary to determine whether preference should be given to the random effects model over the fixed effects model. That is, whether the null hypothesis from the random effects model is more appropriate than the alternative hypothesis in the fixed effects model for application purposes. The Hausman test reviews the significance of the differences between the fixed effects and random effects estimates. Correlation between the random effects and explanatory variables will

cause these estimates to diverge, and their differences will be significant. If the difference is not significant, then there is no implication of the offending correlation.

For the T & C export/import model of the regional level equation, we get the following results of the Hausman test. The value of the $\chi 2_{(12)}$, the statistic for testing differences between all coefficients, is 64.27/63.63 and 65.68/64.33 respectively. Their corresponding p-values of 0.00 suggest that the null hypothesis of no correlation between the explanatory variables and random effects should be rejected at the 1% level (Tables 6.4a & b). Based on this result, a redundant fixed-effects test is performed and the appropriate econometric specification of the gravity trade model is the one with period fixed-effects since the four statistic values (3.23/3.33 and 3.14/3.12) and the associated *p*-values 0.00 strongly reject the null that the effects are redundant (Tables 6.4c & d).

Table 6.4a Random Effects of Hausman Test – Regional Level (Export Model)

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	d.f.	Prob.
Period random (T)	64.2683	12	0.0000
Period random (C)	63.6278	12	0.0000

Table 6.4b Random Effects of Hausman Test – Regional Level (Import Model)

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	d.f.	Prob.
Period random (T)	65.6792	12	0.0000
Period random (C)	64.3297	12	0.0000

Table 6.4c Redundant Fixed Effects Test – Regional Level (Export Model)

Redundant Fixed Effects Tests			
Effects Test	Statistic	d.f.	Prob.
Period F (T)	3.23921	(21,765)	0.0000
Period Chi-square (T)	69.41567	19	0.0000
Period F (C)	3.33674	(21,765)	0.0000
Period Chi-square (C)	68.4276	19	0.0000

Table 6.4 d Redundant Fixed Effects Test – Regional Level (Import Model)

Redundant Fixed Effects Tests			
Effects Test	Statistic	d.f.	Prob.
Period F (T)	3.14328	(22,651)	0.0000
Period Chi-square (T)	70.32147	19	0.0000
Period F (C)	3.12868	(22,651)	0.0000
Period Chi-square (C)	69.3371	19	0.0000

6.2.2 Results of Econometric Estimation

6.2.2.1 The Devised T & C Exports Model for Regional Level Analysis

Table 6.5 presents the results of the panel data approach with fixed-effects estimated parameters for the gravity trade model of T & C exports respectively at the regional level from 2000-2008. This table provides a summary for model fit to data: the f-values give the test statistic and p-value is associated with the testing of the hypothesis whether the models explain a significant portion of the variation in the data, and the R-squares indicate how well the models explain the variation in the data. For the individual parameters in the models, the values of the coefficients of the parameter estimates, and the p-values are also illustrated in the table. It indicates the significant probabilities for the parameter estimates in the fitted regression

equations and reports the tests of statistical significance by indicating parameter estimates which are significant at the 1% level.

The gravity trade model fits the data well and all estimated coefficients are significant at $p<0.05$ (see Table 6.5). As expected, the regression results show that T & C exports increase with the GDP, GDP per capita of the importing and exporting countries, population of the importing countries, the number of female workers in clothing trade, value added factors and the LPI of exporting countries. Exports fall with distance, real exchange rate and labor cost of the clothing trade. However, variable (LC_i) in the textile trade is statistically insignificant which is in line with national effect and the number of female workers in the textile trade also shows insignificant result. As a whole, Model 1 accounts for 71% and 73% of the variance of T & C export values. In addition to the contribution of macroeconomic and industry-specified factors that are examined in Model 2, labor cost, value added factor, the number of female workers and LPI per se explains an extra 8% and 9% of the variance of T & C export values, boosting the total adjusted R^2 value to 79% and 82%.

Table 6.5 shows the panel data estimation results of variables for the determinants of selected Asian countries exports to EU-15, US and Japan from 2000 to 2008

Dependent Variable: $\ln(EX_{ij})$				
Panel Two-Stage Least Squares				
	Model 1		**Model 2**	
Independent Variables	**Coefficient (T)**	**Coefficient (C)**	**Coefficient (T)**	**Coefficient (C)**
Constant	+29.50***	+28.37***	+26.28***	+27.62***
$\ln(GDP_i)$	+1.06***	+1.16***	+1.38***	+1.24***
$\ln(PCGDP_i)$	-0.34***	-0.38***	-0.33***	-0.36***
$\ln(GDP_j)$	+1.31***	+1.17***	+1.37***	+1.29***
$\ln(PCGDP_j)$	+1.52***	+1.73***	+1.61***	+1.83***
$\ln(D_{ij})$	-0.89***	-1.12***	-1.14***	-1.21***
$\ln(POP_i)$	-0.81**	+1.16**	-1.23***	+1.15**
$\ln(POP_j)$	+0.97***	1.04***	+0.85***	+1.17***
(E_{ij})	+0.41**	+0.52**	+0.63***	+0.87**
$\ln(LC_i)$	-	-	-0.85	-1.06**
$\ln(VA_i)$	-	-	+1.12***	+1.18***
$\ln(FEMALE_i)$	-	-	+0.33	+1.12***
$\ln(LPI_i)$	-	-	+1.08***	+1.16***
Prob (F-statistic)	0.00	0.00	0.00	0.00
Adjusted R^2	**0.71**	**0.73**	**0.79**	**0.82**
Number of observations	2142	2142	2142	2142

*** Significant at .10 level,** Significant at .05 level, ***Significant at .01 level**

(a) Gross domestic product/ per capita gross domestic product

According to Bergstrand (1989), the exporter's GDP is a proxy for their national income in a gravity trade model, while exporter per capita GDP is a proxy of their capital-labor endowment ratio.

When aggregate trade flows are disaggregated into industries, Bergstrand (1989) indicated that the positive or negative coefficient for exporter per capita income

indicates that the industry under study tends to be capital or labor intensive in production and the positive or negative sign coefficient for import per capita income is an indication of an industry's output as being a luxury or necessity in consumption."

The estimated coefficient of the GDP of Asian exporters has a positive sign and is statistically significant, which supports a priori expectations in the conventional gravity trade model. This result indicates that a 10% increase in the GDP of Asian exporters increases T & C exports to the EU-15, US and Japan by nearly 13.8% and 12.4% respectively for the modified model. Thus, the Asian supply of T & C products to other countries is elastic with respect to their GDPs.

The positive and statistically significant coefficients of the importer's GDP for the modified gravity model is as expected, suggesting that the size of the economies should enhance the amount of trade between trading partners. A 10% increase in the GDP of the importing country creates an increase of 13.7% and 12.9% in demand for Asian T & C products. This result reveals that the other country's demand for Asian T & C exports is elastic with respect to the GDP of the importers.

The coefficient of per capita income of Asian suppliers, a proxy for the supplier's capital-labor ratio, has a negative sign. Hence, the negative coefficient of the exporter's per capita GDP tends to be labor intensive in T & C production. The estimated elasticity of the importer's per capita income is negative, which indicates

that Asian T & C products are a necessity in consumption of importing countries and are statistically significant in the modified model. The reason is that Asian suppliers export basic items and mass produced clothing rather than fashionable and premium products for their trading partners.

(b) Physical Distance

As a consequence of the growing pressure for quick response, geographic proximity is an important criterion for T & C sourcing. Geographical distance (D_{ij}) negatively affects T & C trading, reflecting that an increase in distance and thus logistics costs lead to a reduction in exports. This is in accordance with the argument that a greater physical distance between bilateral trading destinations becomes a barrier for trade (Au and Chan, 2008).

(c) Population

Similar to the analysis at the national level, population size demonstrates a positive effect on trade flow between countries at the regional level. As shown in the results, a 10% increase in the population size of importers results in a 8.5% and 11.7% increase in T & C trade. This supports the view that a larger population size is associated with a greater trade flow (Chan et al., 2008).

The coefficient of the exporter's population variable (POP_i) is statistically significant in both T & C estimations. However, POP_i is negatively correlated to textile exports, but directly proportional to clothing exports. The results are

consistent with Bergstrand's (1989) description where a negative sign for the coefficient of POP_i implies that a country with a lower population tends to export capital-oriented goods. Textile production needs advanced machineries while the clothing industry is more labor-intensive, and largely populated countries are able to supply sufficient workers for mass production and thus clothing exports could be increased accordingly. This may account for the positive relationship between the exporter's population size and the magnitude of clothing trade.

(d) Exchange Rate

Real exchange rates are defined as changes in the currencies of importing countries in terms of US dollar. The appreciation of an importing country's currency against the US dollar implies that there is an increase in imports from Asian suppliers. As hypothesized, the coefficients of the real exchange rates are positive and statistically significant at 1% level. The magnitude of these estimates reveals that Asian exports of T & C products are sensitive to changes in the real exchange rate. As the currency of the importing country appreciates in value, Asian T & C products become cheaper in the importing markets, increasing trade flows and making them statistically significant in the modified model.

(e) Value Added Factors

Value added factors (VA_i) have a positive impact on T & C exporting trends in Asian suppliers. The results indicate that with a 10% increase in the (VA_i) of suppliers, there would be a 11.2% and 11.8% increase in T & C exports to the

trading partners respectively. This demonstrates the importance for T & C suppliers to initiate implementation of a full-package supply model, which offers a range of high value-added services for buyers.

(f) Labor Cost

For the labor cost variable, the coefficient is significant only in the clothing trade, but not the textile trade. The negative sign for clothing exports implies that Asian exporting countries with lower production costs which result from low labor costs are seen as an attractive supply source for developed importers. This is particularly true for basic clothing items that are sold all year round and not highly time sensitive.

On the other hand, the labor cost variable of the textile trade is insignificant in the panel data estimation. There is no indication that the level of labor cost in the textile industry affects export volume since the textile industry, in comparison to the clothing industry, is usually more capital intensive and highly automated, particularly in developed countries. This finding reflects that the labor cost in the textile sector does not demonstrate a significant influential effect.

(g) Female Workers

The results show that a 10% increase in the number of female workers in the Asian exporting countries results in a 3.3% and 11.2% increase in T & C exports respectively. However, it is not statistically significant in the textile trade. The reason is that the clothing industry depends heavily on a supply of female workers in

the expansion of production capacity. Unlike the textile industry which is capital intensive, production of clothing still requires a substantial amount of manual handling even though the use of various advanced machines and equipment has improved productivity.

(h) The Logistic Performance Index

The results show that a 10% improvement in the LPI of exporters increases T & C exports by 10.8% and 11.6%, with all else equal. This clearly indicates that the logistics performance of an exporting country promotes or hinders its inclusion in global T & C supply chains. The successful transformation from a simple assembly to full-package supply model will not occur if improvements are carried out only at the firm level. Transnational logistics service providers, domestic logistics companies, port or terminal operators, financial institutions, government agencies, electronic commerce service providers, and other influential parties in the supply chain all have a role to play in improving the logistics performance of an exporting country in areas such as transportation and IT infrastructure, customs clearance systems, and domestic logistics costs, as evident in the case of Hong Kong (Au and Ho, 2002a and 2002b; Ho et al., 2003). The implications of this study for exporters in Asia is that they now have the opportunity to expand their supply from basic to fairly time sensitive clothing items, if only their logistics performance is enchaned. Equally, latecomers in Asia may have the opportunity to participate in global clothing supply chains.

6.2.2.2. The Devised T & C Imports Model of Regional Level Analysis

Table 6.6 shows the results of the panel data approach with fixed-effects estimated parameters for the gravity trade model of T & C imports respectively at the regional level from 2000-2008. The gravity trade models fit the data well, suggesting that the proposed factors are significant for T & C import trade. As predicted, the estimated results demonstrate that T & C imports increase with the GDP, GDP per capita, population, the supply of female workers in clothing trade, value added factors and the LPI of exporting countries. Exports decrease with physical distance, real exchange rate and labor cost of clothing trade. However, LC_{ij} in the textile trade is insignificant which corresponds to the national analysis and also the supply of female workers in the textile trade is statistically insignificant. As a whole, Model 1 accounts for 70% and 71% of the variance of T & C export values. In addition to the contribution of macroeconomic and industry-specified factors that are examined in Model 2, the labor cost, value added factor, number of female workers and LPI per se explains an extra 8% and 9% of the variance of T & C export values, enhancing the overall adjusted R^2 value to 78% and 80%.

Table 6.6 shows the panel data estimation results of variables for the determination of EU-15, US and Japan T & C imports from selected Asian countries during 2000 to 2008

Dependent Variable: $\ln(IM_{ij})$				
Panel Two-Stage Least Squares				
	Model 1		**Model 2**	
Independent Variables	**Coefficient (T)**	**Coefficient (C)**	**Coefficient (T)**	**Coefficient (C)**
Constant	+20.43***	+21.76***	+23.86***	+22.27***
$\ln(GDP_i)$	+1.12***	+1.62***	+1.84***	+1.67***
$\ln(PCGDP_i)$	-0.41***	-0.56***	-0.47***	-0.53***
$\ln(GDP_j)$	+1.48***	+1.24***	+1.81***	+1.75***
$\ln(PCGDP_j)$	+1.61***	+1.68***	+1.73***	+1.92***
$\ln(D_{ij})$	-1.26***	-1.42***	-1.33***	-1.46***
$\ln(POP_i)$	-1.86**	+1.21**	-1.25***	+1.29**
$\ln(POP_j)$	+0.99***	+1.07***	+0.89***	+1.23***
(E_{ij})	-0.63**	-0.75**	-0.68***	-0.77**
Ln(LCi)	-	-	-0.89	-1.31**
$\ln(VA_i)$	-	-	+1.21***	+1.63***
$\ln(FEMALE_i)$	-	-	+0.46	+1.02***
$\ln(LPI_i)$	-	-	+1.13***	+1.19***
Prob (F-statistic)	0.00	0.00	0.00	0.00
Adjusted R^2	**0.70**	**0.71**	**0.78**	**0.80**
Number of observations	2142	2142	2142	2142

*** Significant at .10 level,** Significant at .05 level, ***Significant at .01 level**

(a) Gross domestic product/ per capita gross domestic product

In the import model, the coefficients for the importer's GDP variables are positive as expected. An importing country with higher GDP (GDP_j) would have a larger demand for T & C products. A 10% increase in the GDP of the EU-15, US and Japan increases their T & C imports from Asian suppliers by 18.1% and 17.5% respectively. T & C imports are assumed to increase directly with the size of the importer's economy. This proportional relationship between bilateral trade flows and

size of the importer's economy indicates that T & C trade could increase significantly if the countries are able to maintain healthy economic progress. The coefficient of the importer's per capita GDP is positive and significant, meaning that T & C products are necessities in consumption. This may result in Asian suppliers consistently exporting the most basic style of clothing rather than high end fashion products.

The coefficient of the exporter's GDP has a positive sign and is statistically significant for T & C trade. A 10% growth in the GDP of exporting countries increases the EU-15, US and Japan T & C imports from those countries by 18.4% and 16.7% respectively. This shows that the supply of exports from other exporting countries to developed countries is inelastic with respect to their GDP. The estimated coefficients of the exporters' per capita GDP have negative signs and are statistically significant for T & C trade. Thus, T & C products are labor intensive in production for Asian suppliers.

(b) Physical Distance

The negative coefficient of the distance variable (D_{ij}) implies that two trading partners with greater physical distance would decrease T & C trade flow. Other than the common understanding that long distance is more likely to increase transportation costs, time to market is another area of importance. There is an increasing emphasis on fast fashion and quick response in the T & C markets. According to Au and Chan (2007), a short lead time is crucial in the fashion sector.

Neighboring countries are able to create a more efficient supply chain by shortening the product delivery period and therefore, they would enhance T & C trade flow.

(c) Population

Population size demonstrates a positive effect on T &C imports at the regional level. This is in line with national level analysis and supports the view that a larger population size is associated with greater trade flow (Chan et al, 2008).

(d) Exchange Rate

The exchange rate coefficient is negative and significant, suggesting depreciation in the currencies of exporting countries against those of their partner countries, and thus promoting T & C trade flow. Hence, whenever there is a real depreciation or appreciation of foreign currencies against the US dollar, there will be an increase or decrease in T & C exports (Chan and Au 2007).

(e) Value Added Factors

Value added factors (VA_i) have a positive influence on T & C imports. The results indicate that with a 10% increase in the value added factors of Asian exporters, there would be a 12.1% and 16.3% rise in T & C imports respectively to the markets in the EU-15, US and Japan. The increase shows that buyers are more willing to pay for T & C products which have increased their own value by providing brand management, marketing plans or establishing a full-package supply model.

(f) Labor Cost

The negative coefficient of LC_i is significant only in the clothing trade, but not in the textile trade, implying that countries with lower labor costs in the clothing industry tend to export more clothing products to other countries. This finding is supported by the fact that the clothing sector requires a large amount of labor for mass production and labor cost is a crucial factor for maintaining price competitiveness and sustaining comparative advantages for developing Asian suppliers. On the other hand, the labor cost variable of textile trade is insignificant in the estimation. In comparison to the clothing industry, the textile industry is usually more capital intensive and highly automated. There is no evidence that the level of labor cost in the textile industry affects trade volume.

(g) Female Workers

Female workers show a positive coefficient and are statistically significant only in the clothing trade. A 10% increase in the supply of female workers in Asian exporting countries results in 10.2% increase in clothing trade. On the other hand, it is not statistically significant in the textile sector. The clothing industry relies excessively on a supply of female workers in the expansion of production capacity which requires much manual handling, unlike the textile trade which is capital intensive.

(h) The Logistic Performance Index

The results show that a 10% improvement in the variable LPI of exporters increases T & C imports by 11.3% and 11.9%, while all other factors remain constant. This clearly indicates that better logistics performance of an exporting country can promote its global T & C supply chains. Transnational logistics service providers, domestic logistics companies, port or terminal operators, financial institutions, government agencies, electronic commerce service providers, and other influential parties in the supply chain all have a role to play in improving the logistics performance of an exporting country, in areas such as transportation and IT infrastructure, customs clearance system, and domestic logistics costs (Ho et al., 2003). The implications of this study for lead buyers in the EU-15, US and Japan mean that they can keep track of the changes for exporters' LPI and redesign their T & C supply chains. T & C suppliers in North Africa and Eastern Europe as well as Mexico that enjoy close proximity to the major markets per se cannot avoid the possibility of being delinked from the agile supply chain in providing highly time sensitive items if the logistics performance of the latecomers in the same geographical region has improved significantly.

6.3 Analysis at Global Level – Top Fifteen T & C exporters/importers and their top ten trading partners

6.3.1 Model Selection for Global Level

Two methodologies are used to estimate T & C trade flows at the global level. Since OLS is proven to distort the results at the national level, it is therefore, necessary to apply the Hausman test for selecting the panel data technique with either fixed or random effects, which include individual country effects in the model, as the appropriate model for analyzing the trade flows. The gravity trade models are then tested to address potential correlations between individual specific variables and unobserved individual effects. Moreover, it is necessary to determine whether preference should be given to the random effects model over the fixed effects model. That is, whether the null hypothesis from the random effects model is more suitable than the alternative hypothesis in the fixed effects model for application purposes.

For the export/import model of global effect equation, we get the following results of the Hausman test. The value of the $\chi^2_{(18),}$ the statistic for testing differences between all coefficients, are χ^2 = 65.87/64.62and 67.86/66.37 respectively. Their corresponding *p*-values of 0.00 suggest the null hypothesis of no correlation between the factors, and the random effects model should be rejected at the 1% level of significance (Tables 6.7a & b). Based on these results, the fixed effects specification fits the gravity trade model better since the four statistic values (3.07/3.08 and

3.08/3.09) and the associated *p*-values 0.00 strongly reject the null that the effects are redundant (Tables 6.7c & d).

Table 6.7a Random Effects of Hausman Test – Global Level (Export Model)

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	d.f.	Prob.
Period random (T)	65.8749	18	0.0000
Period random (C)	64.6247	18	0.0000

Table 6.7b Random Effects of Hausman Test – Global Level (Import Model)

Correlated Random Effects - Hausman Test			
Test Summary	Chi-Sq. Statistic	d.f.	Prob.
Period random (T)	67.8568	18	0.0000
Period random (C)	66.3682	18	0.0000

Table 6.7c Redundant Fixed Effects Test – Global Level (Export Model)

Redundant Fixed Effects Tests			
Effects Test	Statistic	d.f.	Prob.
Period F (T)	3.07636	(23,637)	0.0000
Period Chi-square (T)	72.38749	23	0.0000
Period F (C)	3.08748	(23,637)	0.0000
Period Chi-square (C)	71.18268	23	0.0000

Table 6.7 d Redundant Fixed Effects Test – Global Level (Import Model)

Redundant Fixed Effects Tests			
Effects Test	Statistic	d.f.	Prob.
Period F (T)	3.08288	(23,791)	0.0000
Period Chi-square (T)	65.36371	23	0.0000
Period F (C)	3.09237	(23,791)	0.0000
Period Chi-square (C)	64.37671	23	0.0000

6.3.2 Results of Econometric Estimation

6.3.2.1 The Devised T & C Exports Model for Global Level Analysis

Table 6.8 present the results of panel data approach with fixed-effects estimated parameters for the gravity trade model of T & C exports respectively in global level from 1980-2008. This table offers a summary for the model fit to the data: the f-values give the test statistic and *p*-value is associated with the test of the hypothesis so that the models explain a significant portion of the variation in the data, and the R-squares indicate the ability of the models to account for variation in the data. For the individual parameters in the models, the values of the coefficients of the parameter estimates, and the *p*-values are presented in the table; indicating the significant probabilities for the parameter estimates in the fitted regression equations and reporting the tests of statistical significance by indicating which parameter estimates are significant at 1% level.

The gravity trade model used in this study fits the data well, proving that the proposed determinants are significantly related to T & C export trade at the global level. All of the basic variables for T & C trade are statistically significant at $p<0.05$ in the regression (See Table 6.8), except for the labor cost and the number of female worker in textile trade, and the majority of them, including various key macroeconomic, industry-specific, common border, common language and common membership show the expected sign. As a whole, Model 1 accounts for 74% and 76% of the variance of T & C exports trade. In additional to the contribution of standard economic factors and industry-specific parameters which are estimated in

Model 2, the dummy variables expressing special trade relationships between countries which belong to a common trading blocs, share common border and cultural factor such as common language explain an extra 9% of the variance of T & C values, stimulating the adjusted R^2 value to 83% and 85% in the augmented gravity trade model.

Table 6.8 shows the panel data estimation results of variables for the determinants of top fifteen T & C exporters to its top ten trading partners from 1980 to 2008

Dependent Variable: $\ln(EX_{ij})$				
Panel Two-Stage Least Squares				
	Model 1		**Model 2**	
Independent Variables	**Coefficient (T)**	**Coefficient (C)**	**Coefficient (T)**	**Coefficient (C)**
Constant	+16.86***	+16.37***	+15.32***	+17.29***
$\ln(GDP_i)$	+1.35***	+1.37***	+1.42***	+1.47***
$\ln(PCGDP_i)$	-0.16***	-0.23***	-0.18***	-0.22***
$\ln(GDP_j)$	+2.27***	+2.17***	+2.36***	+2.29***
$\ln(PCGDP_j)$	+1.63***	+1.54***	+1.67***	+1.56***
$\ln(D_{ij})$	-0.62***	-0.68***	-0.67***	-0.66***
$\ln(POP_i)$	-1.55**	+1.23**	-1.57***	+1.33**
$\ln(POP_j)$	+0.96***	+1.17***	+0.88***	+1.24***
(E_{ij})	+0.49**	+0.56**	+0.52***	+0.61**
Ln(LCi)	-	-	-0.32	-1.12**
$\ln(VA_i)$	-	-	+1.16***	+1.26***
$\ln(FEMALE_i)$	-	-	+0.52	+1.08***
(CL_{ij})	-	-	+0.35***	+0.30***
(CB_{ij})	-	-	+0.35***	+0.34***
$(APEC_{ij})$	-	-	+0.37***	+0.39***
(EU_{ij})	-	-	+0.29***	+0.33
$(NAFTA_{ij})$	-	-	+0.39***	+0.31***
(WTO_{ij})	-	-	+0.30***	+0.32***
$(TIME\_95_{ij})$	-	-	0.62	0.73
Prob (F-statistic)	0.00	0.00	0.00	0.00
Adjusted R^2	**0.74**	**0.76**	**0.83**	**0.85**
Number of observations	4350	4350	4350	4350

*** Significant at .10 level,** Significant at .05 level, ***Significant at .01 level**

(a) Gross domestic product/ per capita gross domestic product

Consistent with previous national and regional levels analyses, the estimated coefficient of the exporter's GDP has a positive sign and statistically significant, which supports an expectations in the conventional gravity trade model. This result

indicates that a 10% increase in the exporter's GDP increases T & C exports to their top ten trading partners by 14.2% and 14.7% respectively for the augmented model. Thus, the exporter supply of T & C items to other countries is elastic with respect to their GDP.

The positive and statistically significant coefficients of the importer's GDP suggest that the size of the economies would stimulate the value of T & C trade between trading partners. A 10% increase in the importer country's GDP creates an increase of 23.6% and 22.9% in demand for T & C products. This result reveals that the other country's demand for T & C exports is elastic with respect to the importer country's GDP.

The coefficient of per capita income of exporters, which is a proxy for the capital-labor ratio of T & C products, has a negative sign similar to the national and regional analyses. According to this reasoning, the negative coefficient of exporter's per capita GDP tends to be labor intensive in their T & C production. The estimated elasticity of the importer's per capita income is positive, which indicates that exporter's T & C products are a necessity in the consumption of importing countries and are statistically significant in the modified model.

(b) Physical Distance

Consistent with the previous literature, as expected, the estimated physical distance is negative and statistically significant as a trade barrier. The estimated coefficient of

distance are -0.67 and - 0.66 for T & C trade respectively, which means that when the distance between two trading partners increases by 10%, T & C exports will decline by 67% and 66% respectively.

(c) Population

Similar to the national and regional effect, population size of importing economies demonstrates a positive effect on trade flow between countries at the global level. As shown in the results, a 10% increase in the population size of importers results in a 8.8% and 12.4% increase in T & C trade. This affirms the previous study (Chan et al., 2008); a greater size of population is directly related to T & C trade flow.

However, the coefficient of the exporter's population variable is negatively correlated to textile exports, but positively correlated to clothing trade. The results are consistent with the national and regional study, means that a country with a lower population tends to export capital-oriented goods. Textile industry requires high technological machineries while the clothing production is considered as more labor-oriented and largely populated economies are able to supply sufficient workers for mass production and thus clothing exports could be increased accordingly. This may account for the positive relationship between the exporter's population size and the magnitude of clothing trade.

(f) Exchange Rate

Real exchange rates defined as changes in the prices of currencies in the importing

countries, with the US dollar as the standard. The appreciation of the currency of an importing country against the US dollar implies that the importing countries increase imports from the suppliers. As expected, the coefficients of the real exchange rates are positive and statistically significant at 1% level. The magnitude of these estimates reveals that T & C exports are sensitive to changes in the real exchange rate. As the currency of the importing country appreciates in value, T & C products from exporting countries become cheaper in the importing markets, which increase trade flows and make them statistically significant in the augmented model.

(g) Value Added Factors

In line with the estimated result of the national and regional level analyses, value added factors (VA_i) have a positive impact on T & C exports to their trading partners. This demonstrates that customers are happy to pay for T & C items which possess a full range of value added services, such as an established brand image, marketing strategy, product differentiation, upgrading an image and feeling of the product in order to raise the overall profit of the products.

(h) Labor Cost

Similar to the national and regional study, the coefficient of labor cost is significant only in the clothing trade, but not the textile industry. The negative coefficient of LC_i in the clothing trade implies that increases in incentives for the top ten importers to import apparel products from their suppliers, depend on the low cost of labor; lower costs means greater incentive. With regards to the cost-competitiveness and labor intensive clothing segment, consumers search for quality clothing products at

the best price. When they realize that the competitive advantage of one supplier is waning, the buyer will shift to another production site which will provide cheaper and productive workforce, mostly are Asian developing countries. Based on this, few developed exporters like Hong Kong, UK and US have gradually lost their competitive edge and manufacturers have shifted to other low-wage Asian clothing producers, such as China, India, Bangladesh and Indonesia which have become the dominant suppliers to global clothing markets.

On the other hand, the labor cost variable of textile trade is insignificant in the estimation. There is no indication that the level of labor cost in the textile industry affects export volume since the textile industry, in comparison to the clothing industry, it is usually more capital intensive and highly automated, particularly in developed countries. This finding reflects the insignificant influential effect of labor cost in the textile sector.

(g) Female Workers

In line with the regional effect analysis, female workers show a positive coefficient and are statistically significant in the clothing trade. A 10% increase in the supply of female workers in exporting countries results in a 10.8% increase in clothing exports. On the contrary, it is not statistically significant in the textile industry. The clothing industry relies excessively on a supply of female workers in the expansion of production capacity which requires manual labor, unlike the textile trade which is capital intensive.

(h) Common Language

In the export model, the impact of language similarity is positive and statistically significant at 1% level in the augmented gravity trade model. Having a common language enables exporters to be more effective with trading activities and better understand how to adjust T & C products to accommodate the preferences of the importing countries. This effect is slightly more pronounced for the textile trade than for the clothing trade because for more complex and fancy products, this understanding is even more valuable since the product entails so much more.

(i) Common Border

A common border significantly affects bilateral trade flows in the gravity trade model. Countries that are adjacent to each other or share a border have higher trade between them (Frankel et al., 1998). This supports the view that regional trading blocs are formed by countries that are geographically close. In other words, geographical proximity plays an essential role in T & C trade.

(j) Common membership

Whether regional or worldwide, a common membership is assumed to eliminate trade barriers and thus foster the growth of trade between the member countries in the trade agreement.

APEC

This study incorporates a dummy variable for APEC membership countries to capture the effect of the inception of APEC on global T & C exports to member economies. The results indicate that export 3.7% and 3.9% more T & C products respectively. From the above, T & C trade flow benefits more from the creation of APEC.

(k) The EU

The positive and significant coefficient of the EU dummy variable in textile trade may attribute to the effects of implementing the European monetary system. Adoption of a single currency could be an instrument for facilitating textile trade and investment within the EU.

Regarding the clothing trade, the estimates of the EU common membership variable is not statistically significant. A possible explanation may be due to the fact that European countries within the EU, such as the global major clothing exporters, Germany, Italy, France not only exports clothing to their members but also exports to other trading regions in Asia and North America.

(l) NAFTA

A positive sign in common membership for NAFTA which stimulates the trade of textiles probably reflects the ability of NAFTA to promote trade. NAFTA was enacted in 1994. Since then, most tariffs on T & C were phased out over the

following five years, with a small proportion of tariffs to be eliminated over a period of ten years. Mexico and Canada have become the main suppliers of textiles to the US as they have preferential treatments on exports to the American market. This is in line with Tang (2005) finding that NAFTA implementation has substantially boosted trade among the US, Canada and Mexico.

Intra-NAFTA trade of clothing is significantly positive probably due to the preferential treatment among country partners under NAFTA. According to Eichengreen and Irwin (1998), although NAFTA came into effect formally in 1994, there might have been noticeable increases in trade several years before its enactment. Since the formation of NAFTA, Mexico has sent a vast majority of its clothing exports to the US, while sourcing most of the textiles and fabric materials from the US. Mexican clothing exports to the US have increased from under US$ 2 billion in 1990 to a peak at US$ 8.7 billion in 2000. Mexico's exports further exceeded those of China. Mexico's export was the top US clothing supplier in 1999 and 2000.

The T & C industries in the three NAFTA partners have been the greatest beneficiaries of the trade liberalization under FTA (Report from Trilateral Working Group, 2005). It has established a pattern of integrated manufacturing and trade in the T & C sectors in North America. Mexican producers have benefitted as a result of the preferential trade liberalization under NAFTA.

(m) WTO

In order to estimate the effect of a country's WTO membership on T & C trade flow, this study employs a dummy variable (WTO) that is designed to recruit member nations. The results indicate that exports to a foreign country experience a positive surge across T & C products after the country joins the WTO. The results show that T & C exports rose 3% and 3.2% respectively. A country's WTO membership is shown to favor T & C trade flow due to the nature of the WTO agreement, which seeks to protect free trading.

(n) Time dummy

The surprising result is the time dummy variable which implies the gradual quota phase out presents an insignificant effect. This may be explained by the safeguard measures on T & C commodities which are enforced by industrial economies as a protectionism measure under a quota-free environment. Followed by the expiration of the phase-out schedule of the ATC, all quota restrictions on T & C products among WTO members were expected to be removed completely in 2005. However, resistance to quota removal spread in the EU and US. Subsequently, China reached agreements with them in 2005. China and the US agreed on the re-imposition of quotas from 2006 to 2008, covering a total of 34 categories of T & C product. To a lesser extent, the China-EU agreement covered 10 categories of Chinese T & C exports to EU for the period of 2005-2007. In addition, both the EU and US agreed to exercise restraint in invoking China-specific safeguards against Chinese T & C products that are not covered in the agreements. Owing to these safeguard measures,

China and other competitive countries are unable to absorb a reasonable share of T & C world exports as anticipated.

6.3.2.2 The Devised T & C Imports Model for Global Level Analysis

Table 6.9 shows the estimated results of the gravity trade model of T & C imports respectively at the global level from 1980-2008. The model used in this study fits the data well, all of the variables related to these industries are statistically significant at $p<0.05$ in the regression, except for the labor cost and the number of female worker in textile trade, and the majority of them, including various key macroeconomic, industry-specific, common border, common language and common membership show the expected sign. As a whole, Model 1 accounts for 73% and 74% of the variance of T & C imports trade. In additional to the contribution of basic economic factors and industry-specific variables which are tested in Model 2, the dummy variables expressing special trade relationships between countries which share a common membership, common border and cultural issue such as common language and time dummy variable explain an additional 9% and 10% of the variance of T & C values, stimulating the adjusted R^2 value to 82% and 84% in the modified gravity model.

Table 6.9 shows the panel data estimation results of variables for the determinants of top fifteen T & C importers to its top ten trading partners from 1980 to 2008

Dependent Variable: $\ln(IM_{ij})$				
Panel Two-Stage Least Squares				
	Model 1		**Model 2**	
Independent Variables	**Coefficient (T)**	**Coefficient (C)**	**Coefficient (T)**	**Coefficient (C)**
Constant	+16.42***	+16.43***	+15.61***	+16.29***
$\ln(GDP_i)$	+1.53***	+1.59***	+1.48***	+1.52***
$\ln(PCGDP_i)$	-0.56***	-0.42***	-0.26***	-0.37***
$\ln(GDP_j)$	+2.16***	+2.18***	+2.45***	+2.31***
$\ln(PCGDP_j)$	+1.51***	+1.59***	+1.63***	+1.59***
$\ln(D_{ij})$	-0.64***	-0.71***	-0.69***	-0.73***
$\ln(POP_i)$	-1.49**	+1.35**	-1.59***	+1.23**
$\ln(POP_j)$	+0.78***	+1.12***	+0.83***	+1.32***
(E_{ij})	-0.49**	-0.51**	-0.56***	-0.63**
Ln(LCi)	-	-	-0.38	-1.62**
$\ln(VA_i)$	-	-	+1.24***	+1.22***
$\ln(FEMALE_i)$	-	-	+0.67	+1.04***
(CL_{ij})	-	-	+0.39***	+0.36***
(CB_{ij})	-	-	+0.41***	+0.37***
$(APEC_{ij})$	-	-	+0.39***	+0.41***
(EU_{ij})	-	-	+0.35***	+0.38
$(NAFTA_{ij})$	-	-	+0.42***	+0.45***
(WTO_{ij})	-	-	+0.34***	+0.36***
$(TIME\_95_{ij})$	-	-	0.56	0.68
Prob (F-statistic)	0.00	0.00	0.00	0.00
Adjusted R^2	**0.73**	**0.74**	**0.82**	**0.84**
Number of observations	4350	4350	4350	4350

*** Significant at .10 level,** Significant at .05 level, ***Significant at .01 level**

(a) Gross domestic product/ per capita gross domestic product

The importer's GDP variables are positive, which is consistent with previous national and regional levels analyses. An importing country with higher GDP would

have a larger demand for T & C products. A 10% increase in the GDP of the top fifteen importers increases their T & C imports from suppliers by 24.5% and 23.1% respectively. T & C imports would experience growth that is determined by the size of the importer's economy. This approximate proportional relationship between bilateral trade and size of the importer's economy indicates that T & C trade could increase significantly if the countries maintain economic growth. The coefficient of the importer's per capita GDP is positive which indicates that T & C products are commodities needed by the importing countries.

As in the previous levels, the exporter's GDP has a positive sign and is statistically significant for T & C trade, which suggests that the supply of exports from other exporting countries to importing countries is inelastic with respect to their GDP. The estimated coefficients of the exporters' per capita GDP have negative signs, which demonstrate that T & C products are labor intensive in production for the suppliers.

(b) Distance

In line with the literature and previous national and regional studies, the distance variable (D_{ij}) continuously shows negative coefficient, meaning that two trading partners with a farther distance would decrease T & C trade flow since there is the increase to transportation costs and time to the destination. There is an increasing importance on fast fashion and quick response in the T & C trade. Neighboring countries are able to create an efficient supply chain by shortening the product lead time and raising T & C trade flow. An example includes European countries who

prefer to source from Turkey and US who favors imports from Mexico.

(c) Population

Similar to the national and regional effect studies, population size demonstrates a positive effect on trade flow between countries at the global level. As shown in the results, a 10% increase in the population size of importers results in 8.3% and 13.2% increases of T & C trade. This supports the view that a larger population size is positively related to greater demand in T &C trade (Chan et al., 2008).

(d) Exchange Rate

The exchange rate coefficient is negative and significant, similar to previous analyses of the different levels, suggesting that there is depreciation in the currencies of exporters against those of their trading partners, and therefore promoting T & C exports. Hence, whenever there is a real depreciation or appreciation of foreign currencies against the US dollar, there will be stimulation or decline in T & C exports (Chan and Au 2007).

(e) Value Added Factors

Again, duplicating the result of the national and regional studies, value added factors have a positive impact on T & C imports. The results indicate that with a 10% increase in the VA_i of exporters, it would stimulate a 12.4% and 12.2% in T & C imports respectively to the markets in the importing countries. The increase implies that buyers are willing to pay for T & C products which have extra value, provided

by brand management, marketing plans or establishment of a full-package supply model.

(f) Labor Cost

Corresponding to the national and regional level analyses, the LC_i shows a negative sign with significant impact only in clothing, but not in textiles, implying that countries with lower labor costs in the clothing industry tend to export more clothing products to other countries. This finding is supported by the fact that the clothing sector requires a large amount of labor for mass production and labor cost is a crucial factor for maintaining price competitiveness and sustaining comparative advantages for developing Asian suppliers. On the other hand, the labor cost variable of textile trade is insignificant in the estimation. In comparison to the clothing industry, the textile industry is usually more capital intensive and highly automated. There is no evidence that the level of labor cost in the textile industry affects trade volume.

(g) Female Workers

In line with the regional effect analysis, female workers show a positive coefficient and are statistically significant only in the clothing trade. A 10% increase in the supply of female workers in exporting countries results in 10.4% increase in clothing trade. On the contrary, it is not statistically significant in the textile sector. The clothing production relies excessively on a supply of female workers in the expansion of production capacity which requires manual labor, unlike the textile trade which is capital oriented.

(h) Common Language

In the import model, the language variable is positive and significant in the modified version. Language proximity between the top fifteen T & C importers and their trading partners lead to an increase in trade flow, a result that is not very surprising because the language proximity captures general cultural similarity and thus makes transactions easier since people from different countries that that are proximate in terms of language understand each other better, improving trade relations in general and imports performance in particular. This effect is slightly more pronounced for textile products than for clothing products because for more sophisticated items, this understanding is even more valuable since the product is more complex.

(i) Common Border

Similar to export model, a common border significantly affects bilateral T & C trade flows in the model. Countries that share a border have higher trade between them (Frankel et al., 1998). This supports the view that regional trading blocs are formed by countries that are geographically close. In other words, geographical proximity plays an essential role in T & C trade.

(j) Common membership

Whether regional or worldwide, a common membership is assumed to eliminate trade barriers and therefore stimulate T & C trade between the member countries in the trade agreement.

APEC

The positive and significant coefficient of the APEC dummy variable in import model suggest that T & C trade flow benefits more from the creation of APEC since the second T & C importers in the world, US is one of the members of this organization and majority of the exporters from Asian are the common member within APEC .

(k) EU

The coefficient of common membership in textile is positive and significant, implying that enhancement in intra-EU trade of textiles. As explained in the exports model, this may be attributed to the effects of implementing the European monetary system. Adoption of a single currency could be an instrument for facilitating trade and investment within the EU. Up to 67.5% of the textiles imports come from the EU countries according to WTO trade statistics in 2008.

Regarding the clothing trade, the estimates of common membership is not statistically significant. A possible explanation for non member import expansion of clothing is that up to 51% of pre-existing quotas have been eliminated during the third and penultimate stage of the ATC. This substantial relaxation of quota restrictions might have led to an expansion of EU clothing imports from competitive low cost countries; namely, China. Furthermore, China ascended to the WTO in 2001 and enjoyed similar trade privileges, such as quota removal that was stipulated in the ATC. In 2002, the EU-15 assumed 40% of total EU clothing imports while

China, by itself, absorbed a significant 11.5% overall and was the second largest EU clothing importer at that time. The annual percentage increase of EU clothing imports from China was approximately 15% in 2001-2002.

Trade figures show that the world share of extra-EU exports of clothing was 10.5% whereas China had 8.9% in 1990. After a decade, the world clothing share of extra-EU exports dropped to 9% while China increased dramatically to 22 % in 2008. It is reasonable to believe that part of the EU clothing exports were substituted by the considerable expansion of clothing exports from non-member economy such as China.

(l) NAFTA

The impact of the NAFTA dummy has a positive effect on T & C imports, which implies that the inauguration of NAFTA enhances trade flow within member countries. The reason may be due to NAFTA's ability to open up the markets of member countries and reduce tariffs. In 1994, the share of US textile imports was comparable between the two dominant importers - China (11.4%) and Canada (9.5%), followed by Japan, Italy and Korea. From 1996 to 2001, Canada further displaced China, the top US textile supplier. However, in 2005, the share of US textiles import for China rose sharply to 26.9%, followed by Canada (9.1%), India (9%), Mexico (7.8%) and Pakistan (7.6%). This reflects that some Asian developing countries have the tendency to dominate the US textile market during recent years.

Intra-NAFTA trade of clothing is significantly positive probably due to the preferential treatment among country partners under NAFTA. Since the

establishment of NAFTA, US imports clothing from Mexico, while sourcing most of the textiles and fabric materials from the US. Romalis (2005) concluded that NAFTA has had a substantial positive effect on Canadian and Mexican shares of U.S. imports, particularly in the industries with the largest relative tariff reductions. Since NAFTA's implementation, there has been an obvious trend toward increased trade in North America and higher productivity in the US.

(m) WTO

The results indicate that T & C imports from a foreign country experience a positive coefficient, showing that T & C imports increase 3.4% and 3.6% respectively. A country's WTO membership is shown to favor T & C trade flow due to the nature of the WTO agreement, which attempts to promote free and fair trade.

(n) Time dummy

The interesting result is the time dummy variable which implies the gradual quota phase out shows an insignificant impact on T & C trade. This can explain by the safeguard measures which are enforced by the EU and US to China and other competitive importers as a protectionism measure under a quota-free environment. Due to these safeguard measures, China and other major suppliers are unable to absorb a reasonable share of T & C world exports as anticipated.

6.4 Summary of the Major Findings

The gravity trade model examined T & C trade flows separately by exports and imports at national, regional and global levels in order to investigate the underlying determinants which govern their pattern and size, as well as captures the direction of trade flow and explains trade interaction.

The OLS and panel data analysis with fixed and random effects model applied as competing models prove that the panel data estimation approach with fixed effects model is more plausible than any other competing models based on the results of the Hausman test. The main theme of this research is to investigate a collective set number of years and the data is collected from both cross-sectional units and over time, therefore, the panel data analysis with fixed effects is employed to avoid the heterogeneity bias inherent in OLS. The fundamental advantage of a panel data set over a cross section is that it allows great flexibility in modeling differences in behavior across individuals over time.

The results support the idea that the modified gravity trade model can be applied successfully to national, regional and global T & C trade flows. More importantly, in the case of T & C trade, the augmented gravity trade model also describes the characteristics of the conventional gravity trade model. From this standpoint, this study proves that the impact of GDP, per capital GDP, population, physical distance, real exchange rates on T & C commodities have the expected signs and are statistically significant. Except the exporter's population variable is negatively

correlated to textile exports since it implies that a country with a lower population tends to export capital intensive products, such as textiles. Textiles industry needs advanced machineries and a minimum number of workers while the clothing production is labor-intensive, and countries with large populations are able to supply sufficient workers for mass production and thus clothing exports could be increased accordingly. This can explain the positive relation between the exporter's population size and the magnitude of the clothing trade. .

Apart from the labor cost variable and number of female workers in textile production, other additional industry-specific variables, have significant impact on T & C trade flows at all levels. The finding reflects the insignificant impacts of labor cost and number of female workers in the textile production considering that the it is more capital oriented and highly automated.

It is worth nothing that exporter's logistics performance can confer a competitive advantage and enhance the opportunity of being integrated in global T & C supply chains at the regional level. This is especially true for exporters in the same geographical region with similar factors endowment. If trade liberalization continues to solidified, large lead buyers in EU, US and Japan will keep searching on a worldwide basis for the best mix of suppliers to forge their global lean and agile T & C supply chains. The exporter's logistics performance may become a crucial factor in differentiating the winners from losers in T & C trade flow.

Special attention should be on the consideration of geographical distance with a key role in T & C trade flow which is indicated by the gravity trade model performance, dummy variables, namely common border and common membership variables are also important determinants of trade at global level, that is, as physical distance serves to impede trade interaction, geographical proximity is important for consideration of economic integration and the preferential treatment provided by trade blocs is most effective for countries that are members of some preferential trading group. However, dummy variable of EU is not statistically significant in clothing trade. A possible explanation can be explained by the relaxation of quota restrictions and led to an expansion of clothing imports from low cost non member countries, like China and other Asian developing suppliers. Moreover, the common language variable is positive and significant in global T & C trade. Language proximity between trading partners lead to an increase in business since the language proximity captures cultural similarity and therefore makes transactions easier. This effect is slightly more pronounced for textile products than for clothing trade because for more fancy items, this understanding is even more valuable since the product is more sophisticated.

The surprising result is time dummy factor which implies the gradual phase out of quota presents insignificant influence in global T & C trade. This may be explained by the safeguard measures on T & C commodities which are enforced by industrial economies as a protectionism measure under the quota-free environment. Followed by the expiry of the phase-out schedule of the ATC, all quota restrictions on T & C

products among WTO members are expected to remove completely in 2005. However, EU and US were resistance to quota removal and finally China reached the re-imposition of quotas agreements with them in 2005. Due to these safeguard measures, China and other competitive suppliers are unable to achieve a reasonable share of T & C global exports as expected.

CHAPTER 7 THE IMPACTS OF CHINA'S T & C GROWTH ON SELECTED MAJOR ASIAN EXPORTERS

Introduction

In this chapter, an empirical study is conducted in order to explore the possibilities and ways that the growth of China's T & C exports is displacing exports of other selected Asian economies to developed countries over the period of 1990 to 2008. The endogeneity of Chinese exports is described by applying instrumental variables with country fixed effects in the modified gravity trade model. According to the theoretical model, the impacts of China's integration into the world market on other Asian's production scenarios can be considered as changes in the scale and composition of production. Therefore, this study further investigates whether the crowding-out effect varies across Asian economies and whether the effect is more significant in less developed Asian suppliers than the more advanced Asian grouping.

7.1 China's T & C Export Performance

China's integration into the world T & C industries is one of the most important developments affecting the structure and evolution of global T & C sectors at the dawn of the 21st century. Over the past 29 years, from 1980 to 2008, the average annual growth of China's T & C exports is 15.5% and 18.6%, respectively. With some 20 million Chinese workers moving from rural underemployment to the modern sector annually, the impact is akin to adding another strong economy to the world economy. Moreover, with between 200 and 300 million workers still to be

reallocated from rural underemployment, this is simply not a single incident, but an ongoing process that should continue for another decade and more.

China has rapidly emerged as a major exporter in the global T & C industries as a result of economic reforms and progressive trade liberalization since its Open Door Policy. China's shares of world T & C trade have risen from US$ 1 billion and US$ 2 billion respectively in 1980; ranking eleventh and eighth respectively among the global exporters for a value of US$ 7 billion and US$ 9 billion, moving up to fourth and third respectively on the world order in 1990. In 2000, T & C export values continued to grow to US$16 billion and US$ 36 billion respectively. In 2008, the trade value of China's T & C exports to the world amount to US$ 56 billion and US$120 billion, which represents 24% and 35% of the world's total T & C exports. Since 1995, China has become the world's largest T & C exporter. China's T & C exports to the world were observed to rise continuously during the entire period and experienced robust growth, particularly after its accession to the WTO in 2001. Its market share in the EU more than tripled between 1990 and 2008, rising from 3 percent to 11 percent. The same is true of its market share in the US, which rose from 6 percent in 1990 to 25 percent in 2008. The same is again true of Japan, but starting from a lower base, where the comparable figures are 31 percent and 82 percent.

This dramatic increase also shows that China's T & C industries have experienced substantial and structural changes in the past few decades. Since 1979, with the

process of economic reform in China, these sectors were considered as a significant source of both employment and export earnings. In this regard, the development was planned in terms of a balanced growth in all of the sectors in these industries, including supplies of raw materials. China's T & C industries are highly competitive in international terms based on the indigenous supply of raw materials, enormous manufacturing capability and an abundant pool of inexpensive labor force. In the 16th Central Committee of the Communist Party of China in 2005, the initial guidelines for the future development of T & C industries in facing keen international competition were discussed. The meeting stressed that T & C industries should further change technologically in terms of the production of equipment; the ability to achieve differentiation in products and enhance overall performance in order to maintain its position as the largest exporter in the world (Chan and Au, 2007).

The effect of rapid growth of Chinese T & C exports is likely to be felt most intensely by its Asian neighbors. Similarities in stages of economic development, factor abundance, technological capability, production costs and other comparative advantages mean that other Asian economies will compete head to head with China in third markets. Thus, China's emergence may intensify the competitive pressure felt by other Asian suppliers, slow the growth of their T & C exports, and more generally, challenge the sustainability of high growth. This vicious cycle is the motivator behind the analysis in this study. We explore the extent to which China's T & C exports affect the delivery of selected thirteen Asian suppliers to the EU-15, the

US and Japanese markets over the period 1990-2008 by using the gravity trade model and an identification strategy that explicitly acknowledges the potential endogeneity of Chinese exports by applying instrumental variables with country fixed effects. The impact of China's T & C exports on other Asian suppliers to developed markets is distinguished. In contrast to previous studies that address this issue, we estimate the impacts in question by using econometric methods, rather than deriving them from a simulation model where the results flow from the assumption implicit in the standardization of key parameters. The result determines the tendency for China to displace the exports of its Asian neighbors, which is more pronounced in less-developed Asian countries. Hence, more and less developed Asian countries are being affected differently by China's emerges.

7.2 Previous Research on China's Impact on Asia

Previously, there have been few analyses of the potential impacts of China's T & C exports on its Asian neighbors. The study that is most similar to this research is conducted by Ahearne et al. (2003). They examined the ways that exports of China and Hong Kong have affected the growth of the four NIEs; namely, the Republic of Korea, Singapore, Taiwan, and Hong Kong, as well as the ASEAN-4 members, including Indonesia, Malaysia, the Philippines and Thailand. Using a panel of annual data from 1981 to 2001, the authors regressed the export growth of Asian countries on their trading partner's income growth, movement in real effective exchange rates and China's real export growth. While the coefficient on Chinese exports tends to be positive, suggesting complementarities between its exports and those of its Asian

neighbors, the effect rarely approaches statistical significance at standard confidence levels. On this basis, the authors concluded that there is insufficient evidence to prove that increases in China's exports reduce the exports of other emerging Asian economies. Indeed, it appears that China's exports have positive correlation with the exports of other countries.

The question has also been addressed in the context of China's WTO accession. For example, Ianchovichina and Walmsley (2005) calibrated and simulated a multicountry, multisector model of international trade, and assumed China's accession to the WTO as a liberalization of its trade regime that give rise to its propensity to export. They proved that while increasing its own exports, China reduces the exports of Vietnam, the Philippines, Thailand, Indonesia and Malaysia, mainly due to the negative impact on their T & C trades. They summarized and suggested a decline in exports, mainly due to T & C trade, and a reduction in GDP relative to baseline levels in East Asia's developing countries.

Similarly, Yang and Vines (2000) applied a CGE model with differentiated products as a way of analyzing the impact of China's growth on exports from other Asian countries, finding that the exports of the ASEAN countries drop slightly. The overall effect is the sum of positive effects on exports to China itself and negative effects on exports to third markets, which differ in size depending on the concerned Asian exporter. Yet another simulation is that of the IMF (2004), which also used a CGE model designed to capture the geographical and sectoral structures of trade flows.

This analysis points to a small negative impact on the exports and output of all regions. In terms of output, this negative effect is larger for the Middle East and North Africa and smallest for the advanced economies. The ASEAN economies experience a somewhat larger than average impact, while the NIEs and South Asian economies show a somewhat smaller than average impact. The precise effects vary by sector and country. For example, countries that rely heavily on exports of T & C, labor intensive manufactures in which China also has a comparative advantage, tend to experience particularly large negative effects.

As mentioned in Chapter 4.1, CGE has proven to be a useful tool for analyzing the impact of a wide range of possible policy changes based on different scenarios. However, CGE models are stylized simplifications of the world economy and based on assumptions which fashion their outputs. For instance, since growth is often assumed to be exogenous, these models fail to capture the dynamic impact of China's rise on other regions and hence, underestimate the full effects. Moreover, there are uncertainties over the estimated trade elasticities as most models fail to take into account the key aspects of China's WTO membership, such as liberalization of services and policies to attract foreign investment (IMF, 2004).

Another set of previous studies employed an econometric methodology to examine this issue. Eichengreen et al. (2004) examined the ways that China and Hong Kong exports have affected the growth of NIEs and ASEAN members over the same period, 1990-2002, using a gravity modeling approach. Their results showed that

China crowds out less-developed Asian countries' exports of consumer goods in third markets. Most recently, Greenaway et al. (2008) applied the same method and explored whether the displacement effect on Asian exports differs when exports from Hong Kong and China were combined in comparison to the narrow case of Chinese exports only over the period of 1990 to 2003.

The limitations of the literature are now apparent. The results of simulation studies depend on the ways that the models in question are calibrated, which tend to implore the question at hand. Econometric studies have not yielded precise estimations of the key effects, leading investigators either to draw inferences from coefficients that are not significantly different from zero or suggest on the basis of their failure, identification of a significant effect that one does not exist.

Moreover, past gravity trade model research (Batra, 2004; Athukorala, 2007; Ranjan & Tobias, 2007) were only centered on regional investigations and general trading scenarios, but was not T & C specific. T & C sectors are examined in the study because of its extensive globalization of production and distribution and the complexity involved in the design of supply chains. More importantly, these sectors have created millions of jobs and contributed to economic growth for many countries, in particular the developing countries. Therefore, trade patterns of these two special industries deserve further and more comprehensive investigation. Thus, this study will make a significant contribution to existing literature by filling this gap, extending a broader analysis on the impact of China's T & C trading exports on

other thirteen Asian suppliers to EU-15, US and Japan [1] from 1990-2008. The reason to select these Asian countries and their trading partners in our study please refer to Chapter 3.3 and 3.4 and the period under investigation covers the quota elimination schedule under the ATC from 1995 to 2005 since trade patterns of T & C are likely to be affected by this quota phase-out mechanism. This enables the evaluation of T & C trade pattern before and after the quota elimination occurred in this study

7.3 Econometric Methodology

Since our purpose is to explore the impact of China's trade emergence on other countries, we adopt the following gravity specification to analyse the variables affecting the performance of China:

$$\ln(EX_{ij})_t=\alpha+\beta_1\ln(ChEXP_i)_t+\beta_2\ln(GDP_j)_t+\beta_3\ln(PCGPD_j)_t+\beta_4\ln(GDP_i)_t+\beta_5\ln(PCGPD_i)_t +\beta_6\ln(D_{ij})+\beta_7(POP_i)_t+\beta_8(E_{ij})_t+\beta_9\ln(LC_j)+\beta_{10}\ln(FEMALE_j)+\beta_{11}\ln(VA_j)+\beta_{12}Dum\_EU+ \beta_{13}Dum\_USA+\beta_{14}(TIME\_2001_{ij})+U_{ijt} \text{ ----------(7.1)}$$

where t (t = 1,2,…19), starting from 1990 and ending 2008, representing the time when trading transactions take place;

[1] Importers include 17 countries, Belgium, France, Italy, Luxembourg, Netherlands, Germany, Denmark, Ireland, United Kingdom, Greece, Portugal, Spain, Austria, Finland, Sweden , United States and Japan
Exporters include 13 Asian countries, Bangladesh, Cambodia, Hong Kong, India, Indonesia, Malaysia, Pakistan, Philippines, South Korea, Sri Lanka, Taiwan, Thailand and Vietnam

$\ln(EX_{ij})_t$	Log of export value of textile/clothing in millions of US dollars from the Asian suppliers to the EU-15, USA and Japanese markets, *i* denotes the suppliers' variables, *j* represents the EU-15, USA and Japan.
α	Unobserved or fixed effects which do not change over time, and capture all unobserved time-constant factors that affect $EXP_{ij;}$
β	Slope parameter, also known as the partial regression coefficient. It represents the expected increase in the outcome variable for a unit increase in the predictor variable. In this case, the slope coefficient β_1 measures the change in the conditional mean of the dependent variable (exported value of textile/clothing) per one unit change in independent variable X_1 (ChEXP), holding the values of the other independent variables $X_2 \ldots X_{14}$ constant.
$\ln(ChEXP_i)_t$	China's exports to country *j*
$\ln(PCGDP_i)_t$	Per capita GDP log of suppliers in millions of US dollars.
$\ln(GDP_j)_t$	GDP log of the EU-15, USA and Japan in millions of US dollars.
$\ln(PCGDP_j)_t$	Per capita GDP log of the EU-15, USA and Japan in millions of US dollars.
$\ln(D_{ij})$	Geographical distance (in km) log between the individual capitals of the EU-15, Washington; the capital of USA, Tokyo; the capital of Japan and the capitals of their Asian suppliers.
$\ln(POP_{it})$	The population size log of Asian suppliers.
$\ln(POP_{jt})$	The population size log of the EU-15, USA and Japan.
$(E_{ij})_t$	The real exchange rate of foreign currency per unit in US dollars.
$\ln(LC_i)$	Labor cost log of suppliers in millions of US dollars.
$\ln(FEMALE_i)$	Log of number of women in the work force of the suppliers.
$\ln(VA_i)$	Log of the value added amount in T & C industries of the suppliers in millions of US dollars.
Dum_EU	The dummy variable with a value of 1 if importer is European country, 0 otherwise.
Dum_USA	The dummy variable with value of 1 if import is USA; 0 otherwise.
TIME_2001	An intercept dummy variable to capture the effects of China's accession to the WTO which takes place after 2001.
U_t	Other omitted influences on exports

Exports between thirteen Asian exporting countries and seventeen importing countries were considered in this study. The dependent variable is the exported T & C value in log form, between pairs of countries. The log exports of country *i* to country *j*, log GDPs of the two countries, log per capita GDPs of the two countries, log of suppliers' labor wages, number of female workers, value added factors, the distance between importing and exporting countries, real exchange rate, population size and time dummy were regressed in the model.

The economic size of exporting and importing countries is usually measured by their GDPs, which reflect both production capacity and market size. Countries with a greater supply capacity (indicated by high GDPs) are likely to achieve a comparative advantage in exports through economies of scale. Countries with high GDPs also possess large domestic markets which can absorb more imports. As a larger production capacity is expected to increase exports and a bigger market is expected to attract more imports, the estimated coefficients should be positive.

Based on the gravity principle, the per capita GDP of the exporting country was used as a proxy of capital intensity. As T & C industries are labor-oriented, the per capita GDP of Asian suppliers were utilized to indicate the capital-labor endowment ratio of T & C trade. Additionally, the income level or purchasing power of importing countries was represented by per capita GDP. Controlling for GDP, richer countries (in terms of per capita GDP) are likely to demand more choices of differentiated products which may be imported from countries that are specialized in the

production of those products. As such, the estimated coefficients of exporter's per capita GDP is expected to be negative since T & C sector is considered as labor-intensive, on the other hand, the coefficients of importer's per capita is expected to be positive.

The identification of distance effects on international trade has proven to be one of the most robust empirical findings in international trade (Frankel and Rose, 2002). In general, longer distance demands higher trade costs, and thus erecting a trade barrier. The estimated coefficient of distance should therefore, be negative. With regard to the expected sign on the estimated coefficient of the importing country's population, it is considered to be positive because population is typically interpreted as market size which has a positive relationship with consumption of manufactured commodities. However, the coefficient estimate for the exporting country's population may be positively or negatively correlated with trade flow (Oguledo et al., 1994), depending on the different mix of commodities supplied and demanded by each country. According to Bergstrand (1989), a negative sign for the coefficient of POP_i indicates that exports tend to be capital intensive. That means a country with a lower population tends to export capital intensive products, such as textiles. Textile production nowadays is more capital and technology intensive which requires sophisticated machineries and less number of workers. The real exchange rate is a key factor affecting trade flows. The depreciation (appreciation) of a country's currency against other currencies stimulates (reduces) the country's exports. Thus, the positive or negative sign of real exchange rate will depend on the currency

changes of the exporting countries against the trading partner countries.

Since T & C trade liberalization have progressed after the completion of the ATC in 2005, price competition among T & C suppliers have become more intense. The working wage level of exporters is one of the crucial deciding factors in the entire T & C trade flow. Nearly three quarters of workers in the global T & C industries are women, and the participation rate is even higher in developing countries. As more female workers provide a higher production capacity for T & C exports, therefore, the number of female workforce is included in the list. T & C production involves a large amount of manual handling. The value added factors refer to the additional value created at a particular stage of the manufacturing process. In modern macroeconomics, this implies adverts which contribute to the factors of production, such as land, labor and capital goods. These enhance the value of a product and correspond to the incomes received by the owners. The factors of production provide "services" which increase the unit price of a product relative to the cost per unit of intermediate inputs used in production. A higher value of materials and supplies added in T & C production should contribute more to the exports. In addition, the continental distribution effects at the importer level are controlled by the continental dummy in model specification.

Lastly, the question has also been addressed in the context of China's accession to the WTO. It is assumed that China's accession to the WTO is a liberalization of its trade regime that gives rise to its propensity to export; therefore, the time dummy

variable (TIME_2001$_{ij}$) is expected to have a positive sign.

Worthnoting is that China's exports to the same market is included as one of the independent variable so as to analyze the impact of China's emergence on the T & C of other Asian countries. It is possible that the variable of interest; China's exports, in specification, may not be exogenous. Therefore, it is important to recognize its potential endogeneity. A variety of unobservable factors will probably affect the error term and thus Hong Kong's exports to the US may also affect China's exports to the US, creating a correlation between the error term and key explanatory variable. The standard treatment for this type of problem is to estimate by two-stage least squares (TSLS) using an appropriate instrumental variable, the difficulty being the paucity of plausible instruments that is the bane of empirical macroeconomics. Fortunately, in the present context, the gravity trade model suggests instruments that are both plausible exogenous and strongly correlated with Chinese exports. The obvious instrument, in other words, is the distance between China and the country that is the destination of its trading partners.

7.4 Econometric Estimation

The gravity trade model framework was applied to analyze the impact of China's T & C exports on the exports of other Asian countries. Equations for T & C trade are estimated separately (as showed in Table 7.1). These cover the period from 1990 to 2008. Recall that we include here, observations for export trade between Asian countries and their trading partners, Hong Kong's exports to Belgium (members of

EU-15), US, and Japan, and for China's exports, which is treated as one of the independent variable in the model. The instrumental variable for China's exports to a third country is, as always, China's distance to that market.

Table 7.1 The impact of China's T & C exports on exports of Asian countries to the EU-15, US and Japan markets (1990-2008)

Dependent Variable: $\ln(EX_{ij})$				
Panel Two-Stage Least Squares			**Ordinary Least Squares**	
Independent Variables	**Coefficient (T)**	**Coefficient (C)**	**Coefficient (T)**	**Coefficient (C)**
Constant	-27.73***	-67.28***	-27.52***	-24.48***
$\ln(ChEXP_i)$	-0.16**	-1.29**	+0.67***	+0.29***
$\ln(GDP_i)$	+1.10***	+0.77***	+1.01***	+0.61***
$\ln(PCGDP_i)$	-0.03***	-0.75***	-0.05*	+0.70***
$\ln(GDP_j)$	+1.50***	+2.26**	-0.84***	-0.18*
$\ln(PCGDP_j)$	+1.80***	+3.42***	+1.04*	+1.65***
$\ln(D_{ij})$	-1.22***	-1.66***	-0.66***	-1.49***
$\ln(POP_i)$	-1.03**	+1.05***	-1.08**	+1.14**
$\ln(POP_j)$	+0.97***	+0.53***	+1.31***	+1.26*
(E_{ij})	-0.46**	-0.41**	-0.88***	-0.86***
$\ln(LC_i)$	-0.20**	-0.61**	-0.08*	-0.66***
$\ln(FEMALE_i)$	+0.33**	+1.32***	+0.31***	+1.25***
$\ln(VA_i)$	+0.13**	+0.70***	+0.10*	+0.43**
Dum_EU	+5.22**	+4.62***	+5.00**	+3.38***
Dum_USA	+5.45*	+4.89***	+5.26*	+3.78***
Time_2001	+1.56***	+2.02***	+1.32***	+1.98***
Adjusted R^2	**0.81**	**0.73**	**0.85**	**0.74**
Number of observations	4199	4199	4199	4199

*** Significant at .10 level,** Significant at .05 level, ***Significant at .01 level**

The gravity trade model fits the data well. Exports rise with the GDP, GDP per capita of the importing and exporting countries, population of the importing countries, number of female workers, the value added factor and the accession of China to the WTO. They fall with distance, real exchange rate and labor wages. The

model explains 81% and 73% of variance in T & C bilateral trade flows respectively.

(a) Impact of China's T & C exports on its neighbors

The results reach a consensus with previous studies (Ianchovichina and Walmsley, 2005) in that there is an inverse relationship between the increase of China's T & C exports and other Asian exports, which proves that China reduces the exports of other Asian suppliers while increasing its own exports, due to the negative impact on their T & C trades. This has been summarized and suggests a decline in exports, mainly due to the T & C trade, and a reduction in GDP relative to baseline levels in the developing countries of East Asia.

The variable of particular interest, the fitted value or exogenous component of Chinese exports to the same market, enters with a negative coefficient of 0.16 and 1.29. China has a stronger crowding-out effect on the clothing industry than textile sector; a 10% increase in Chinese clothing exports to a particular market results in a 12.9% decline in the sales of competing Asian countries in the importing countries, while all other things being equal. However, the crowding-out effect of China on textile goods is only 1.6%. Therefore, the clothing industry is the locus of China's crowding-out effect.

An obvious interpretation is that the growing competitiveness of China's T & C exports is causing consumers in other parts of the world to substitute away from other suppliers in favor of China. China can displace other Asian suppliers due to its

highly effective workforce with comparatively low labor costs. Higher efficiency and a skilled workforce help in achieving a short lead time as the right time in marketing is the critical factor in the fashion business. In addition, China is a large country which is nearly self-sufficient in raw materials. It has the world's largest production capacities for cotton and man-made fibers. It also has ready access to high quality imported fabrics from South Korea, Taiwan and Japan, in order to provide better quality products and open up the high-end markets. For example, China's success in Japan before 2005, where there was no quota and consumers were very demanding, shows that it can supply high-quality clothing. As far as imports are concerned, China alone supplied 85% of the Japanese clothing import market in 2008.

It is also interesting to contrast the instrumental-variable results in columns (1) and (2) with the OLS results in columns (3) and (4), which are provided for illustrative purposes only. Clearly, instrumental variables make a significant difference. In columns (3) and (4), the coefficients on China's exports are positive, but the GDP of T & C importers, and per capita GDP of textile exporters, show a negative sign. This is because of the bias estimation due to a common omitted shock, such as an improvement in consumer sentiment worldwide, which should be expected to increase both the exports of China and other countries, introducing a positive correlation between the key independent variable and error term.

Since we are not deriving our estimating equation from a particular model of

international trade, we do not put a particular structural interpretation on this coefficient. An obvious interpretation is that the growing competitiveness of China's T & C exports is causing consumers in other parts of the world to substitute with other Asian suppliers in favor of China. However, one can imagine other interpretations, for example, that the pressure of China's exports is forcing importers to impose protectionist measures that disproportionately affect other T & C suppliers. Our nonstructural specification does not identify the mechanism. On the other hand, this specification should capture second-round effects. Imagine, for example, that the growth of China's exports to the US causes the US government to invoke safeguard measures on China. This might then cause the diverting of exports of China to the EU, further displacing the exports of other Asian countries. However, the first-round and second-round effects should be captured by the formulation.

(a) Gross Domestic Product/ Per Capita Gross Domestic Product

The analytical results align with other gravity trading model studies of bilateral trade (Glick & Rose, 2002), and show that the GDPs of importers and exporters would have positively influenced T & C trade. This conforms to the theoretical expectation; a higher GDP creates a stronger demand for T & C imports and also a larger supply for exports. The interpretation of the results indicates that with a 10% increase in GDP for the importers, there would be 15% and 22.6% increases in their T & C imports respectively. The same phenomenon is expected as the per capita GDP of importing countries improves. This indicates that they have stronger purchasing powers and leads to a greater demand for imports. In this case, they are clothing

imports for the EU-15, USA and Japan. These findings suggest that when there are increases in both the GDP and per capita GDP of importers, clothing imports will also increase.

The results also indicate that T & C exports would increase by 11% and 7.7% respectively to the importers as a result of a 10% increase in the GDPs of exporters. This implies that a larger quantity of exports would contribute to a higher GDP growth by T & C suppliers and boost the economies of the countries. On the other hand, the per capita GDP of Asian countries shows negative coefficient which matches the gravity principle since this variable is utilized to indicate the capital-labor endowment ratio of T & C trade and prove that these industries are considered as labor-oriented sectors.

(b) Physical Distance

Consequent to the growing pressure for quick responses, geographical proximity is an important criterion for clothing sourcing. The variable geographical distance (D_{ij}) would negatively affect apparel trading, reflecting that an increase in distance and thus logistics costs lead to a reduction in apparel exports. This is in accordance with the common prediction that a greater physical distance between bilateral trading destinations erects a barrier for trade (Au and Chan, 2008). A lower logistics cost is beneficial for exporting apparel items as it in turn, increases the profits and boosts the trade between these countries. Proximity helps reduce the costs of doing business, especially in the rapid growth of the current fashion market in European countries,

since they are constantly changing stock. Garment manufacturers must be able to respond quickly to the needs of the customers, with capabilities of adapting to the changes in the market and abilities to accelerate the flow of goods to retail stores.

(c) Exchange Rates

The results reveal that the real exchange rate plays an important role in determining the volume of T & C exports. The coefficient is negative, suggesting a depreciation of the currencies of exporting countries against those of their partner countries, and thus promoting T & C exports. This confirms the expectation that whenever there is a real depreciation or appreciation of foreign currencies against the American dollar, there will be an increase or decrease in T & C exports (Chan and Au, 2007).

(d) Population

Population size of importers demonstrates a positive effect on trade flow between countries. As shown in the analysis, T & C imports increase by 9.7% and 5.3% respectively with a 10% increase in the population size of T & C importers. This supports the view that a larger population size is associated with greater import value (Chan et al., 2008).

The coefficient of the exporter's population variable is statistically significant in both T & C estimations. However, POP_i is negatively correlated to textile exports, but directly proportional to clothing exports. The results are consistent with Bergstrand's (1989) description where a negative sign for the coefficient of POPi

implies that a country with a lower population tends to be capital intensive. Textile production nowadays is more capital and technology intensive which requires sophisticated machineries and less number of workers. In contrast, the clothing industry is more labor-intensive, and largely populated countries are able to supply sufficient workers for mass production and thus clothing exports could be increased accordingly. This may account for the positive relationship between the exporter's population size and the magnitude of clothing trade.

(e) Labor Cost

For the labor cost variable, the coefficient shows a negative sign and significant only in the clothing trade, but not the textile trade. This implies that clothing exporters with lower production costs are seen to be an attractive supply source for importers. This is particularly true for basic clothing items that are sold all year round and not highly time sensitive. However, an interesting point is that although China has a higher labor cost (US$1) when compared with other Asian countries; namely, Bangladesh, India, Pakistan and Sri Lanka, with hourly wages of US$0.39, US$0.38, US$0.23 and US$0.57 respectively in 2007 (Werner International Management Consultants, 2007), China still maintains a comparative advantage due to its highly effective and discipline. On the other hand, the labor cost variable of the textile trade is insignificant in the model implicate that there is no indication that the level of labor cost in the textile industry affects export volume since the textile industry, in comparison to the clothing industry, is usually more capital intensive and highly automated, particularly in developed countries.

(f) Female Workers

The results show that a 10% increase of female workers in the exporting countries results in a 3.3% and 13.2% increase in T & C exports respectively. It is true that these industries depend heavily on the supply of female workers in the expansion of production capacity. Unlike other industries that are capital intensive, production of T & C items requires lots of manual handling even though the use of advanced machines and equipment can improve productivity.

(g) Value added factor

The variable (VA_i) has a positive impact on T & C export trends of Asian suppliers. The results indicate that with a 10% increase in the value added factors of suppliers, there would be a 1.3% and 7% increase in T & C exports to the trading partners. This demonstrates the importance for suppliers to embark on the route to implement the full-package supply model, offering a range of high value-added services for buyers.

(h) Dummy variables

The location of importers may imply varying degrees of preferences to China and other non-Asian T & C exports. For instance, China exports may be more popular in the USA than EU-15. As a result, the displacement effect of China varies across importers. We treat this special feature as panel data structure in modeling such that importers which are located in the USA and EU belong to different groups. Two

dummy variables, the USA and EU in model specification, are used to control this effect at the continental level.

Compared with EU importers, the USA has positive values of the estimated coefficients. It means that T & C exports to the USA are 54.5% and 48.9% respectively higher than exports to the EU, holding other variables constant. Given that the exports of China are fixed, the USA is still the largest importer of T & C products of other Asian countries. The estimated coefficients of continental distribution are positively affected by the country's international trade volume.

(i) Time Dummy_2001

The time dummy variable, which implies the accession of China to the WTO and the gradual quota phase out, presents a significant impact on the T & C trade. Followed by the expiration of the phase-out schedule of the ATC, all quota restrictions on T & C products among WTO members were expected to be removed completely in 2005.

Over the past 8 years, the average annual growth of China's T & C exports to the world is 19% and 16% respectively. China's shares of the world T & C trade has risen from US$16 billion and US$36 billion respectively in 2000; and to an export value of US$17 billion and US$37 billion in 2001. In 2005, T & C export values continued to grow to US$42 billion and US$74 billion respectively. In 2008, the trade value of China's T & C exports to the world amounted to US$66 billion and US$121 billion respectively, which represents 24% and 35% of the world's total T &

C exports. China's T & C exports to the world were observed to grow continuously during this period and experienced robust increase, particularly after its accession to the WTO in 2001. Its market share in the EU more than tripled between 2000 and 2008. The same is true of its market share in the US and Japan. Due to a quota-free environment, China is able to absorb a reasonable share of T & C world exports as anticipated.

7.5 Sensitivity analysis for checking the structural changes in T & C trade

In order to check the robustness of the above results with respect to possible structural changes in the T & C trade, third country effects could be different in earlier and later years, given the rapid changes in the composition and direction of China's exports. Therefore, in Table 7.2a, the first set of sensitivity analysis replicates the preceding analysis for every three years of the sample period (1990-1992/1993-1995/1996-1998/1999-2001/2002-2004/2005-2008) in order to check the impacts between different time slots, especially to see whether there has been significant difference in the displacement effect before and after the quota era. The second set of sensitivity analysis is performed and shown in Table 7.2b which repeats the second half of the sample period (1995-2008). This period is chosen because international T & C trade has been going through fundamental changes under the 10-year transitional program of the WTO Agreement on T & C (ATC) since 1995. The displacement effects of China's T & C exports in the recent period are found to be -4.6% and -14.6% respectively, which are higher than -1.4% and -12.8% in the longer period (Refer to Table 7.1). Both sensitivity analyses suggest

that China has improved its T & C exports in the later years. These sensitive results basically confirm and are consistent with the earlier analysis except that the difference in China's impact on Asian suppliers is even more pronounced after the quota phasing out period. Shortening the observation period to three years of time has certain and substantial effects on the results of the displacement effect of China's exports before the phasing out of quota. There is clear evidence that the introduction of the WTO Agreement in 1995 has substantially changed the market of T & C and show an increasing competitive advantage of China over the rest of Asia

Table 7.2a Sensitivity Analysis of T & C trade for every three years from 1990 to 2008

Dependent Variable: $\ln(EX_{ij})$												
Method: Panel Two-Stage Least Squares												
Year	**1990-1992**		**1993-1995**		**1996-1998**		**1999-2001**		**2002-2004**		**2005-2008**	
Independent Variables	**Coefficient (T)**	**Coefficient (C)**	**Coefficient (T)**	**Coefficient (C)**	**Coefficient (T)**	**Coefficient (C)**	**Coefficient (T)**	**Coefficient (C)**	**Coefficient (T)**	**Coefficient (C)**	**Coefficient (T)**	**Coefficient (C)**
Constant	-36.03***	-38.58***	+32.07***	-24.58***	-34.05***	-26.58***	-29.73***	-22.72***	-33.35***	-29.58***	+32.07***	-24.58***
$\ln(ChEXP_i)$	+0.60**	+4.17**	-3.81***	-2.36***	-0.60**	-2.95**	-0.55***	-2.63**	-0.68**	-2.65**	-0.81***	-2.48***
$\ln(GDP_i)$	+1.23***	+1.15***	+1.52***	+1.02***	+1.63***	+1.26***	+1.39***	+1.14***	+1.59***	+1.32***	+1.54***	+1.22***
$\ln(PCGDP_i)$	-0.03***	+0.93***	-*0.52***	+0.65***	-0.35***	+0.93***	-0.44***	+0.82***	-0.41***	+0.91***	-0.53***	+0.89***
$\ln(GDP_j)$	+2.95***	+2.36***	+2.32***	+2.42***	+2.70***	+2.56***	+2.48***	+2.83***	+2.75***	+2.61***	+2.42***	+2.68***
$\ln(PCGDP_j)$	+3.76***	+2.06***	+3.24***	+2.73***	+3.14***	+2.32***	+3.68***	+2.46***	+3.17***	+2.38***	+3.34***	+2.63***
$\ln(D_{ij})$	-1.53***	-1.58***	-1.23***	-2.29***	-1.23***	-1.86***	-1.43***	-1.40***	-1.13***	-1.76***	-1.27***	-1.90***
$\ln(POP_i)$	-1.04***	+1.07***	-1.07***	+1.03***	-1.13***	+1.07***	-1.05***	+1.08***	-1.06***	+1.02***	-1.09***	+1.06***
$\ln(POP_j)$	+1.45***	+2.8***	+1.38***	+1.39***	+1.39***	+1.80***	+1.28***	+1.59***	+1.32***	+1.62***	+1.31***	+1.41***
(E_{ij})	-0.34***	-0.25***	-0.41***	-0.24***	-0.37***	-0.32***	-0.36***	-0.38***	-0.42***	-0.37***	-0.46***	-0.38***
Ln(LCi)	-0.27	-0.16**	-0.26	-0.11**	-0.31	-0.23**	-0.25	-0.12**	-0.33	-0.29**	-0.28	-0.19**
$\ln(FEMALE_i)$	+0.24*	+0.95**	+0.31**	+1.03***	+0.35*	+1.12**	+0.28**	+1.02**	+0.32*	+1.22**	+0.31**	+1.33***
$\ln(VA_i)$	+0.70**	+0.82**	+0.51**	+0.93***	+0.63*	+0.91**	+0.57**	+0.88**	+0.73*	+0.97**	+0.71**	+0.93***
Dum_EU	+0.63***	+3.79***	+0.67***	+3.23***	+0.71***	+3.18***	+0.73**	+3.03***	+0.69***	+3.25***	+0.67***	+3.23***
Dum_USA	+0.87***	+3.86***	+0.92***	+3.46***	+0.84***	+3.36***	+0.79**	+3.12***	+0.76***	+3.24***	+0.82***	+3.36***
Adjusted R^2	**0.84**	**0.72**	**0.72**	**0.67**	**0.76**	**0.71**	**0.78**	**0.75**	**0.78**	**0.76**	**0.76**	**0.73**
Number of observations	663	663	663	663	663	663	663	663	663	663	884	884

Table 7.2b: Sensitivity Analysis of T & C trade for the second half of the sample period from 1995 to 2008

Dependent Variable: $\ln(EX_{ij})$		
Method: Panel Two-Stage Least Squares		
Independent Variables	**Coefficient (T)**	**Coefficient (C)**
Constant	-24.3***	-49.19***
Ln(ChEXPi)	-0.46***	-1.46**
$\ln(GDP_i)$	+1.24***	+0.71***
$\ln(PCGDP_i)$	-0.12***	+0.74***
$\ln(GDP_j)$	+1.57***	+1.39***
$\ln(PCGDP_j)$	+1.39***	+3.19***
$\ln(D_{ij})$	-1.29***	-1.72***
$\ln(POP_i)$	-1.05**	+1.09***
$\ln(POP_j)$	+3.45***	+1.25***
(E_{ij})	-0.60***	-0.29***
Ln(LCi)	-0.511	-1.08*
$\ln(FEMALE_i)$	+0.31*	+1.01*
$\ln(VA_i)$	+0.25*	+0.35*
Dum_EU	+5.13*	+4.01***
Dum_USA	+5.87*	+4.02***
Adjusted R^2	**0.75**	**0.74**
Number of observations	3094	3094

*** Significant at .10 level,** Significant at .05 level, ***Significant at .01 level**

7.6 Elasticity Test for checking the variations in the displacement effect across selected Asian countries

From the view of exporters, previous models have not captured the entire picture of the displacement effect. Given evidence of the considerable impact of China's T & C exports on the selected thirteen Asian suppliers to the EU-15, US and Japanese markets in the previous section, this section attempts to investigate the group of countries that are most affected by China. Asian exporting countries are classified into three income groups: high income (Hong Kong, Korea and Taiwan), lower-

middle income (India, Indonesia, Malaysia, the Philippines and Thailand) and low income economies (Bangladesh, Cambodia, Sri Lanka, Pakistan and Vietnam). Table 7.3 summarizes the displacement effects of China, in terms of elasticities and magnitudes.

Table 7.3: Displacement Effects by China

Dependent Variable: China_Export_Value		
Method: Panel Least Squares		
Independent Variables	**Coefficient (T)**	**Coefficient (C)**
Constant	-15.35***	-28.71***
Importer_Per_Capita_GDP(Low-income group)	+0.78***	+2.65***
Importer_Per_Capita_GDP(Lower-middle-income group)	+0.75***	+2.62***
Importer_Per_Capita_GDP(High-income group)	+0.69***	+2.58***
Exporter_Per_Capita_GDP	+0.23***	+0.14***
Exporter_GDP	+0.02**	+0.05***
Population	+1.39***	+1.13***
Adjusted R^2	**0.84**	**0.89**
Number of observations	4199	4199

**** Significant at .05 level, ***Significant at .01 level**

The elasticity test shows that China's growth has different effects on the exports of T & C industries in Asian high, lower-middle and low-income economies. More specifically, it shows that China is making life difficult (0.78 and 2.65 for T & C exports respectively) for its low-income neighbor suppliers; namely, Bangladesh, Cambodia, Pakistan, Vietnam and Sri Lanka, as they specialize in T & C industries and hence, face strong Chinese competition. This is because most low income countries have comparative advantages in unskilled labor-intensive manufactured goods and their exports tend to be concentrated in T & C products. For instance, T &

C accounted respectively for about 85%, 67% and 52% of total merchandise exports of Bangladesh, Pakistan and Sri Lanka in 2007. This largely overlaps with China's factor endowments and comparative advantage. However, given that China only became a WTO member in 2001, its exports of T & C to industrialized countries are quota-constrained. Although China is a large exporter of T & C, these restrictions impose limitations on its ability to gain a substantial market share that would displace other Asian producers. The latter might also have captured a market share over time. However, the abolition of protectionism measures on Chinese T & C in key markets in 2009 will pose serious threats to the exports of low income countries in the years ahead. Unless they adjust their export structures, infrastructure, transportation system, improved trade facilitation and the poor state of human capital in response to such heightened competition, the T & C sectors of these economies may stagnate or even decline.

A lesser impact is observed on China's T & C exports for the lower-middle income group; namely India, Indonesia, Malaysia, the Philippines and Thailand (0.75 and 2.62 for T & C exports respectively). There is some suggestion that the exports of these countries have moved hand-in-hand with that of China. This may reflect the ability of this group, dominated by the ASEAN-4, to adjust their export structures as they accommodate China's growing export capacity. It may also indicate the growing integration and specialization between China and ASEAN. China has emerged as a major assembler of T & C finished products for exports to global markets, sourcing its supply of specialized raw material, i.e. fiber, thread, yarn or

fabric from these countries. For India, it has a vertically integrated production structure, with up to 98.5% of value addition taking place within the country itself. This has enabled India to have the shortest lead time as well as ensure availability of inputs at a relatively cheapest cost. In addition, India government uses industrial policy to develop a good support mechanism for T &C sectors in order to establish a well diversified production and export structure. These factors have contributed to enhancing resilience of the industries and avoiding China as a threat.

The impact of China on high-income economies that include Hong Kong, Taiwan and South Korea, is much less pronounced (0.69 and 2.58 for T & C exports respectively). This supports the view that the comparative advantages of the high-income group have changed from production of low-technology, low-skilled intensive T & C items to high value added and functional products.

For example, Hong Kong manufacturers have attempted to diversify from original equipment manufacturing (OEM) by moving upmarket and engaging in original design manufacturing (ODM) and brand development. Moreover, Hong Kong firms have an edge in a full range of value-added services with quick response. They can develop internationally recognized brand names through active marketing of image. In line with this, Hong Kong manufacturers continue to gravitate towards more sophisticated high-value activity, such as product differentiation by upgrading quality, image and feel, so as to raise the overall cost of the apparel items. Apart from upgrading the design of the product, Hong Kong manufacturers have

consequently employed leading-edge supply chain management and logistic technologies, such as electronic data interchange (EDI), global digital ID and bar-coding for effective cross-docking, in-time delivery to improve the efficiency, speed and value of the whole supply chain, to growing pressure for quick response.

Taiwan has a strong history in OEM production, and is evolving toward ODM and OBM, as well as expanding its marketing efforts. Taiwan has advanced competence in developing "economical" clothing items with strong technical and functional capabilities and consistent quality. Another niche area that Taiwan clothing manufacturers have recently developed is haute couture. The country's specialties in synthetic yarns, spinning, weaving, knitting, dyeing and finishing provide advantages to its development in high fashion, which differentiates them from products made in China. South Korea has strengthened its designing abilities in order to gain international recognition; South Korean fashion designers are presenting their design lines in Paris and Tokyo collections.

7.7 Implications of the Study and Summary of the Chapter

7.7.1 Implications of the Results

The effects of China’s emergence on the T & C export competitiveness of their neighbors have important implications at the national, regional and global levels. Most obviously, the impact of China’s T & C exports has implications for national development trajectories in Asia and elsewhere. If the annual addition of another emerging market to the global economy drives down the world market prices of

labor-intensive manufactures, this will heighten the incentive for other countries to move up the technological ladder, into the production of more technologically-intensive, less labor-intensive exports in order to better insulate themselves from Chinese competition. In order to do so, they will presumably want to invest even more in human capital. In contrast, countries that produce raw materials and capital goods utilized intensively in Chinese manufacturing, may wish to specialize further in these areas.

At the regional level, China's emergence suggests that any regional free trade arrangements or efforts to more closely coordinate monetary and financial policies will not be attractive if it does not involve what will eventually be the region's largest economy. This fact already finds reflection in policy, for example, in the Chiang Mai initiative to provide swap lines and credits for financially-embattled economies, which is a project of ASEAN+3 (ASEAN plus China, Japan, and South Korea).

Globally, the impact of China's exports on the exports of other Asian countries has implications for whether we should expect a revaluation of the RMB to lead to a general revaluation of Asian currencies and to thereby help to redress the problem of global imbalances. One common argument is that if China revalues, moderating the competitive pressure felt by other Asian economies, those other Asian economies will be able to revalue as well, and the general realignment of Asian currencies against the US dollar will help in narrowing the US current account deficit and

relieve the competitive pressure felt by Europe without causing major disruptions to the world economy.

A revaluation of the RMB, which tend to slow the growth of China's exports, may work to reduce the exports of the neighbors; depressing rather than boosting their own growth and creating pressure for depreciation rather than appreciation elsewhere in the region. Thus, the general revaluation of Asian currencies seen by some observers as a solution to the problem of global imbalances may not in fact, follow from a slowing of Chinese growth due to a tightening of domestic credit or from a RMB revaluation.

7.7.2 Summary of the Chapter

This study examines the impact of China's growth on the T & C exports of its Asian neighbors and the tendency to crowd out the exports of its Asian more and less-developed countries from 1990 to 2008. The use of the gravity trade model has enabled us to undertake the aggregate analysis and adjust for the endogeneity of Chinese T & C exports. The gravity trade model fits the data well. Exports rise with the GDP, GDP per capita of the importing countries and population of the importing countries. They fall with distance and real exchange rate.

The innovation in this study has been to explore the tendency for China's increase in T & C penetration of third markets to crowd out the exports of other Asian suppliers. However, this effect is felt more in markets for basic items and hence, by less-

developed Asian suppliers that export those products than in markets for value added and sophisticated T & C products by the more advanced Asian economies which comprise a significant fraction of total exports. This makes sense, in that it has been markets for basic T & C products and affected to a lesser extent, advanced suppliers which produce functional items that have been the first to be penetrated by Chinese exporters.

Hence, developed and developing Asian countries are being affected differently by China. Our benchmark results suggest that an increase in Chinese T & C exports will negatively affects the exports of its Asian economies. This is especially true for the less-developed countries that seek to compete with China on the basis of labor costs that are particularly affected.

China's impact on the trade of other countries is evident not just in Asia, but the EU and US as well. Europeans see China as a producer of an increasingly broad range of high-quality T & C products, and further compounding its competitive difficulties. Americans enjoy the flood of cheap clothing from China especially during the economic crisis. In Asia, where proximity presumably magnifies the impact of China's growth, all of these effects are evident. Labor abundant countries feel competitive pressure from China with a similar resource endowment.

CHAPTER 8 CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The conclusion chapter comprises of four elements: (i) restatement of the study's purpose; (ii) summary of the major findings and policy implications; (iii) recommendations for future research; and (iv) significance and implications of the study.

8.1 Restatement of the Study's Purpose

Global T & C trade has been characterized by large-scale variations over the past fifty years. Many changes in this particular sector could be driven by market factors, changing policies and economic conditions. Other factors, such as globalization trends, international competition from exporting countries and the rapid development of RTAs, also have a crucial effect on global trade. The current study is an attempt to examine and divulge the impacts of major determinants on global T & C trade. So far, little attention has been devoted to the influences of a comprehensive set of variables on global T & C trade. There remains a gap in our understanding of T & C industries. The gravity trade model is used as an instrument of analysis for trade flow patterns. Yet, the vast majority of previous research has focused on total merchandise trade rather than on a particular industry.

This dissertation elaborates and estimates a modified form of the gravity trade model derived from a conventional model to apprise trade flows of a single commodity of

T & C trade separately. The purpose of this study is to evaluate, analyze, and classify the significant determinants affecting T & C trade at the national, regional and global levels for the period from 1980 to 2008. The models for T & C trade are estimated based on the panel data estimation approach with fixed effect for all three levels. Apart from the fundamental gravity variables, a more comprehensive set of variables is developed in this study, such as industry-specific factors being added to capture the industry features of the T & C sectors. Moreover, special consideration is also given in investigating the impact of logistics performance as well as socio-political and cultural factors that have shaped T & C trade patterns during the trade restriction era and the dynamic situation of global T & C trade. Moreover, this study explains the endogeneity of Chinese T & C exports by applying instrumental variables with country fixed effects in the gravity trade model to examine the ways that their growth of China's T & C exports has displaced that of the other selected Asian economies over the period of 1990 to 2008. Furthermore, the elasticity test is applied to see whether the displacement effect varies across the selected Asian countries. Finally, a sensitivity analysis is conducted so as to provide an opportunity to examine the robustness of the results with respect to the changes in the underlying parameters.

Previous research that analyzed T & C industries with the gravity trade model covered a narrow range of the investigation period and a limited number of countries. Therefore, in order to strengthen the comprehensiveness of the gravity trade model, this research explores additional determinants and thoroughly analyzes their impacts

based on historical trade data at the national, regional and global levels. The national level includes: Hong Kong T & C exports and her top ten trading partners from 1990 to 2008. The regional level includes: Asian exporters and the EU-15, US and Japan T & C markets from 2000 to 2008. The global level includes: the top fifteen T & C exporters/importers and their top ten trading partners from 1980 to 2008. In order to improve the credibility and see the displacement effect of China's T & C exports growth on the other selected Asian economies over the period of 1990 to 2008, China was added into the sample countries and undergone the detailed investigation. The period under investigation at the national level and China's displacement effect on other selected Asian economies in Chapter 7 covers the quota elimination schedule under the ATC from 1995 to 2005 since trade patterns are likely to be affected by the quota phase-out mechanism. This enables the evaluation of T & C trade pattern before and after the quota elimination. The regional level is studied during the period of 2000 to 2008 due to the unavailability of data of a relevant variable; the logistic performance index. For the global level, the investigation extends to 28 years, from 1980 to 2008, in order to capture the complete picture depicted of the actual T & C situation in the world. Consequently, the use of the gravity trade model is enriched, light is shed on the interrelations among different determinants, and a comprehensive analysis is drawn on the global T & C trade flow.

8.2 Summary of the Major Findings

The gravity trade model examines T & C trade flows separately by exports and imports to investigate the underlying determinants which govern their pattern and size, as well as captures the direction of trade flows and explains trade interaction from the standpoint of international trade theory and region economic integration theory (Frankel, 1997).

The OLS, and panel data estimation approach with fixed effects and random effects model employed as competing models show that the panel data with fixed effects is more plausible and gives more robust results than any other competing models based on the results of the Hausman test. The main theme of this research is to investigate a collective set number of years. Therefore, panel data with fixed effects estimation is used to avoid the heterogeneity bias inherent in OLS. The panel data approach enables an exploration of the dynamic changes over time which cannot be accomplished in either cross-sectional or time series data sets. It can also be used to address particular kinds of omitted variable problems so as to improve the relevance of estimates that cannot be accomplished by the standard methods.

The empirical results support the idea that the modified gravity trade model can be applied successfully to national, regional and global T & C trade flows. More importantly, this modified gravity trade model also describes the characteristics of the conventional gravity trade model. From this standpoint, this dissertation finds that the impact of GDP, per capital GDP, population, physical distance, real

exchange rates on T & C product trade have the expected signs and are statistically significant. However, there is an exception where the exporter's population variable is negatively correlated to textile exports since it implies that a country with a lower population tends to export capital intensive products. Textile production requires sophisticated machineries and a minimum number of workers. In contrast, the clothing industry is considered as more labor-intensive, and countries with large populations are able to supply sufficient workers for mass production and thus clothing exports could be increased accordingly.

Apart from the labor cost variable and number of female workers in textile industry, additional industry-specific variables; namely, labor cost and number of female workers in clothing production, value added factors have significant effects on T & C trade flows at all levels. The finding reflects the insignificant influential effect of labor cost and number of female workers in the textile sector considering that the textile industry, in comparison to the clothing industry, is usually more capital intensive and highly automated, particularly in developed countries.

At the regional level, it is worth noting that the logistics performance of exporting countries can confer a competitive advantage and thus also erects a trade barrier in its own right, either enhancing or reducing the chances of being integrated in global T & C supply chains. This is especially true for exporting countries in the same geographical region with similar factor endowments. If trade liberalization continues to solidify, large lead buyers in the EU, USA and Japan will keep searching on a

worldwide basis for the best mix of suppliers to forge their global agile supply chains. The logistics performance of exporting countries may become a key determinant in differentiating the winners from losers in the T & C trade flow.

Special attention should be on the consideration of physical distance with a crucial role in T & C trade flow which is indicated by the gravity trade model performance, dummy variables, such as common borders and common trade bloc membership factors. They are also important determinants of trade at the global level; that is, as physical distance serves to impede trade interaction, geographical proximity is important for consideration of economic integration and the preferential treatment provided by trade blocs is most effective for countries that are members of some preferential trading group. However, the coefficient of EU is not statistically significant in clothing trade. A possible explanation may be due to the substantial relaxation of quota restrictions and led to an expansion of EU clothing imports from competitive low cost non member countries, like China and other Asian developing suppliers. Moreover, the common language variable is positive and significant in global T & C industry. Language proximity between trading partners leads to an increase in trade flow because it captures general cultural similarity and thus makes transactions easier since people understand each other better, improving trade relations in general. This effect is slightly more pronounced for textile commodities than for clothing products because for more sophisticated items, this understanding is even more valuable as the product is more complex.

The surprising result is the time dummy variable which implies the gradual quota phase out shows an insignificant impact. This may be explained by the safeguard and anti-dumping measures on T & C products which are enforced by industrial economies such as the EU and US as a protectionism measure to China and other competitive suppliers under a quota-free environment. Owing to these safeguard measures, China and other competitive countries are unable to absorb a reasonable share of T & C world exports as anticipated. Undoubtedly, the safeguard and anti-dumping measures can be seen as "discriminatory" actions to restrict T & C imports to developed countries and can not achieve the ultimate goal of free trade.

This study also examines the impact of China's growth on the T & C exports of selected Asian neighbors and the tendency to crowd out the exports of its Asian more and less-developed countries from 1990 to 2008. The use of the gravity trade model has enabled us to adjust for the endogeneity of Chinese T & C exports. The gravity trade model fits the data well. Exports rise with the GDP, GDP per capita of the importing and exporting countries, and population of the importing countries. They fall with distance and real exchange rate.

The innovation has been to explore the tendency for China's increase in T & C penetration of EU-15, USA and Japanese markets to crowd out the exports of other Asian suppliers. However, this effect is felt more in markets for basic items and hence, by less-developed Asian suppliers that export those products than in markets for value added and sophisticated T & C products by the more advanced Asian

economies which comprise a significant fraction of total exports. This makes sense, in that it has been markets for basic T & C products which are affected to a lesser extent, and advanced suppliers which produce functional items that have been the first to be penetrated by Chinese exporters. Therefore, more and less developed Asian countries are being affected differently by China. The benchmark results suggest that an increase in Chinese T & C exports will negatively affects the exports of its Asian economies. This is especially true for the less-developed countries that seek to compete with China on the basis of labor costs.

8.3 Recommendations for Future Research

Although the results of this study indicates that the gravity trade model provides useful insights into national, regional and global T & C trade flows, the addition of other variables, such as price of goods and production costs to the model could measure bilateral trade in terms of country production efficiency and comparative advantage. The gravity model could be derived for a version of the H-O trade model (Deardorff, 1998) for future studies.

The introduction of transportation cost in the gravity trade model may shed further light on the factors that affect trade flow between countries. Transportation costs act much like tariffs and other barriers to trade in creating gaps between prices of traded goods in different countries (Engel & Rogers, 1998). As discussed in Chapter 5, it is difficult to obtain transport costs for international trade (Yeates, 1968). A way of measuring transport costs is by taking the difference between the f.o.b. value of a

good when it leaves a country and its c.i.f. value when it enters another country (Isard & Freutel, 1954; Beckerman, 1956; and Bergstrand, 1989). However, there are two problems with this method: (1) it involves one commodity when thousands of commodities are involved in international trade; and (2) available international trade statistics are inconsistent and the variations within the data make their use highly doubtful (Beckerman, 1956). Also, available transportation modes and their cost would influence exports in terms of both quantities and composition (Hanink & Kier, 1993). In their work, Frankel et al. (1997) addressed three kinds of costs to doing business at a distance: shipping, time-related, and unfamiliarity. Likewise, political factors, such as import policies of import tariffs and quantitative restrictions; namely, protectionism measures, may be appropriately formulated in the gravity trade model to measure the effect arising from political aspects that affect the global trade patterns of T & C.

A marked trend is the move towards a mega-bloc network whereby the RTA encompasses influential countries and covers a large proportion of the population in the world. There is also a tendency for new agreements to fall within the sphere of the influence of the EU and US, which creates a scene where there is a world of trading mega-blocs. Additional work could be done on the impacts of these mega-blocs on global T & C trade. It is also noteworthy that a growing number of agreements are signed between RTAs, and between RTAs and individual countries. It would be interesting to determine whether the overlapping of RTAs can facilitate

T & C trade in the world and thus enhance the building of a multilateral trading system.

8.4 Implications of the Results

The results of this study have several important policy implications that can be drawn for T & C trade strategies for local, regional and international organization decision makers.

8.4.1 National Level

The US has been Hong Kong's largest market for T & C trade. However, with the economy already slowing down, adoption of a market diversification strategy is a way to sustain its business. It is apparent that the EU provides an alternative source of demand since their economy has remained relatively robust and they have a larger population than the US. However, it should be noted that the EU market is heterogeneous and remains very fragmented in character. To be successful, T & C suppliers need to have a better understanding of the individual markets and formulate an appropriate market strategy accordingly to satisfy different demand preferences.

Additionally, since China's WTO commitments granted Hong Kong manufacturers the liberty of establishing their own retailing units, Hong Kong T & C manufacturers should establish medium-to-high end retail stores in large cities. A case in point is Giordano, which has teamed up with China Resources to leverage on the latter's retail network in mainland China and has garnered a good market reputation.

8.4.2 Regional Level

The logistics performance of exporting countries may become a key determinant in differentiating the winners from losers in T & C trade since performance can confer a competitive advantage to enhance the opportunity of being integrated in global T & C supply chains. T & C suppliers in North Africa and Eastern Europe as well as Mexico which enjoy close proximity to the major markets per se cannot avoid the possibility of being delinked from the agile supply chain in the supply of highly time sensitive items if the logistics performance of latecomers in the same geographical region has improved significantly. Suppliers in Asia may have the chance to expand their supply from basic to fairly time sensitive clothing items, if the logistics performance of their country is improved. The implications of this study for lead buyers in the USA, EU and Japan are that they can keep tracking the changes of exporters' LPI in addition to key macroeconomic variables in the (re)design of their T & C supply chains.

8.4.3 Global Level

Free trade agreements, whether implemented multilaterally or bilaterally, will enhance potential trade flows between member countries and regions. From an export promotion standpoint, it is important for trading partners to maintain established trade links and extend them to other trade regions in order to realize export potential.

The rise of RTAs in recent years draws attention to the effects of these arrangements for both member and non-member countries. Apart from the impact of RTAs on their member countries which we have mentioned previously, the global consequences of establishing a regional trading bloc must be also taken into account. The growth of regional trading blocs raises concerns since they can shift attention away from the multilateral negotiation process of the WTO to reduce international trade barriers. The discriminatory trade barriers established within RTAs may have undesirable effects for non-member countries. In other words, the sales of member countries could replace those of more efficient non-member countries, which deny the access of member country consumers to lower cost and higher quality T & C products.

APPENDIX 1 Selection of Sample Countries in the Study

National Level (Period: 1990-2008)

HK and her top ten trading partners

Australia, China, Canada, France, Germany, Italy, Japan, Netherlands, UK and USA

Regional level (Period: 2000-2008)

Thirteen Asian countries and their seventeen trading partners

Bangladesh, Cambodia, Hong Kong, India, Indonesia, Malaysia, Pakistan, Philippines, South Korea, Sri Lanka, Taiwan, Thailand and Vietnam

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, UK, USA and Japan

Global Level (Period: 1980-2008)

Top Fifteen Exporters/Importers and their top ten trading partners

Top Fifteen Exporters of Textile Trade

Asia: China, Hong Kong, India, Japan, Pakistan and South Korea

Europe: Belgium, France, Germany, Italy, Netherlands, Spain, Turkey and UK,

North America: USA

Top Fifteen Importers of Textile Trade

Asia: China, Hong Kong and South Korea

Europe: Belgium, France, Germany, Italy, Poland, Spain, Turkey and UK

North America: Canada, Mexico and USA

Top Fifteen Exporters of Clothing Trade

Asia: Bangladesh, China, Hong Kong, India and Indonesia

Europe: Belgium, France, Germany, Italy, Romania, Spain, Turkey and UK

North America: Mexico and USA

Top Fifteen Importers of Clothing Trade

Asia: Hong Kong, Japan and South Korea

Europe: Austria, Belgium, Denmark, France, Italy, Germany, Netherlands, Spain, Switzerland and UK

North America: Canada and USA

Trading Partners of T & C Trade

Africa: Tunisia

Asia: Bangladesh, China, Hong Kong, India, Indonesia, Japan, Macao, Philippines, South Korea, Thailand and Vietnam

North America: Mexico, Morocco and USA

Europe: Austria, Belgium, France, Germany, Greece, Hungry, Italy, Ireland, Netherlands, Poland, Portugal, Republic of Dominican, Romania, Turkey and UK

APPENDIX 2 RTA's Membership and Key Development

RTAs	Creation Date	Current Membership		Key Developments
APEC	1989	1. Australia	joined in 1989	
		2. Brunei	joined in 1989	
		3. Canada	joined in 1989	Imposes no treaty obligations on members and the only inter governmental coalition in the world
		4. Indonesia	joined in 1989	operating on the basis of nonbinding commitments decisions that are reached by voluntary
		5. Japan	joined in 1989	commitments
		6. South Korea	joined in 1989	
		7. Malaysia	joined in 1989	
		8. New Zealand	joined in 1989	
		9. Philippines	joined in 1989	
		10. Singapore	joined in 1989	
		11. Thailand	joined in 1989	
		12. United States	joined in 1989	
		13. Tawai	joined in 1991	
		14. Hong Kong	joined in 1991	
		15. China	joined in 1991	
		16. Mexico	joined in 1993	
		17. Papua New Guinea	joined in 1993	
		18. Chile	joined in 1994	

		19. Peru	joined in 1998	
		20. Russia	joined in 1998	
		21. Vietnam	joined in 1998	
EU	EEC formation: 1957 (Treaty of Rome) EU formation: 1993 (Maastricht Treaty)	1. Belgium	joined in 1957	Single European Act (1986-1987) set the goal of a single European market for goods, labor and capital in Europe in 1992
		2. France	joined in 1957	
		3. Germany	joined in 1957	
		4. Italy	joined in 1957	European Monetary System (EMS) established in 1979. The process of Economic and Monetary Union (EMU) includes three steps: 1) Improve economic and monetary policy in 1990. 2) The European Monetary Institute (EMI) was created in 1994 3) Adoption of a single currency in 1999
		5. Luxembourg	joined in 1957	
		6. Netherlands	joined in 1957	
		7. Denmark	joined in 1973	
		8. Ireland	joined in 1973	
		9. UK	joined in 1973	
		10. Greece	joined in 1981	The EU largest enlargement in 2004, with accession of 10 states
		11. Portugal	joined in 1986	
		12. Spain	joined in 1986	
		13. Austria	joined in 1995	
		14. Finland	joined in 1995	
		15. Sweden	joined in 1995	

		16. Cyprus	joined in 2004	
		17. Czech Republic	joined in 2004	
		18. Estonia	joined in 2004	
		19. Hungary	joined in 2004	
		20. Latvia	joined in 2004	
		21. Lithuania	joined in 2004	
		22. Malta	joined in 2004	
		23. Poland	joined in 2004	
		24. Slovakia	joined in 2004	
		25. Slovenia	joined in 2004	
		26. Bulguria	joined in 2007	
		27. Romania	joined in 2007	
NAFTA	Signed: 1992	1. Canada	joined in 1994	Mexico's unilateral trade liberalization started in 1985
	Formed: 1994	2. Mexico	joined in 1994	Canada-US FTA in 1998
		3. United States	joined in 1994	NAFTA negotiations started in 1990

Appendix 3 WTO Member Countries and their Year of Membership

Country	Date of accession	Country	Date of accession	Country	Date of accession
Albania	8 September 2000	The Gambia	23 October 1996	Nicaragua	3 September 1995
Angola	23 November 1996	Georgia	14 June 2000	Niger	13 December 1996
Antigua and Barbuda	1 January 1995	Germany	1 January 1995	Nigeria	1 January 1995
Argentina	1 January 1995	Ghana	1 January 1995	Norway	1 January 1995
Armenia	5 February 2003	Greece	1 January 1995	Oman	9 November 2000
Australia	1 January 1995	Grenada	22 February 1996	Pakistan	1 January 1995
Austria	1 January 1995	Guatemala	21 July 1995	Panama	6 September 1997
Bahrain	1 January 1995	Guinea	25 October 1995	Papua New Guinea	9 June 1996
Bangladesh	1 January 1995	Guinea Bissau	31 May 1995	Paraguay	1 January 1995
Barbados	1 January 1995	Guyana	1 January 1995	Peru	1 January 1995
Belgium	1 January 1995	Haiti	30 January 1996	Philippines	1 January 1995
Belize	1 January 1995	Honduras	1 January 1995	Poland	1 July 1995
Benin	22 February 1996	Hong Kong	1 January 1995	Portugal	1 January 1995
Bolivia	12 September 1995	Hungary	1 January 1995	Qatar	13 January 1996
Botswana	31 May 1995	Iceland	1 January 1995	Romania	1 January 1995
Brazil	1 January 1995	India	1 January 1995	Rwanda	22 May 1996
Brunei Darussalam	1 January 1995	Indonesia	1 January 1995	Saint Kitts and Nevis	21 February 1996
Bulgaria	1 December 1996	Ireland	1 January 1995	Saint Lucia	1 January 1995
Burkina Faso	3 June 1995	Israel	21 April 1995	Saint Vincent & the Grenadines	1 January 1995

Burundi	23 July 1995	Italy	1 January 1995	Saudi Arabia	11 December 2005
Cambodia	13 October 2004	Jamaica	9 March 1995	Senegal	1 January 1995
Cameroon	13 December 1995	Japan	1 January 1995	Sierra Leone	23 July 1995
Canada	1 January 1995	Jordan	11 April 2000	Singapore	1 January 1995
Cape Verde	23 July 2008	Kenya	1 January 1995	Slovak Republic	1 January 1995
Central African Republic	31 May 1995	Republic of Korea	1 January 1995	Slovenia	30 July 1995
Chad	19 October 1996	Kuwait	1 January 1995	Solomon Islands	26 July 1996
Chile	1 January 1995	Kyrgyz	20 December 1998	South Africa	1 January 1995
China	11 December 2001	Latvia	10 February 1999	Spain	1 January 1995
Colombia	30 April 1995	Lesotho	31 May 1995	Sri Lanka	1 January 1995
Congo	27 March 1997	Liechtenstein	1 September 1995	Suriname	1 January 1995
Costa Rica	1 January 1995	Lithuania	31 May 2001	Swaziland	1 January 1995
Côte d'Ivoire	1 January 1995	Luxembourg	1 January 1995	Sweden	1 January 1995
Croatia	30 November 2000	Macao	1 January 1995	Switzerland	1 July 1995
Cuba	20 April 1995	Madagascar	17 November 1995	Chinese Taipei	1 January 2002
Cyprus	30 July 1995	Malawi	31 May 1995	Tanzania	1 January 1995
Czech Republic	1 January 1995	Malaysia	1 January 1995	Thailand	1 January 1995
Democratic Republic of the Congo	1 January 1997	Maldives	31 May 1995	Togo	31 May 1995
Denmark	1 January 1995	Mali	31 May 1995	Tonga	27 July 2007
Djibouti	31 May 1995	Malta	1 January 1995	Trinidad and Tobago	1 March 1995

Dominica	1 January 1995	Mauritania	31 May 1995	Tunisia	29 March 1995
Dominican Republic	9 March 1995	Mauritius	1 January 1995	Turkey	26 March 1995
Ecuador	21 January 1996	Mexico	1 January 1995	Uganda	1 January 1995
Egypt	30 June 1995	Moldova	26 July 2001	Ukraine	16 May 2008
El Salvador	7 May 1995	Mongolia	29 January 1997	United Arab Emirates	10 April 1996
Estonia	13 November 1999	Morocco	1 January 1995	United Kingdom	1 January 1995
European Communities	1 January 1995	Mozambique	26 August 1995	United States of America	1 January 1995
Fiji	14 January 1996	Myanmar	1 January 1995	Uruguay	1 January 1995
Finland	1 January 1995	Namibia	1 January 1995	Venezuela	1 January 1995
Former Yugoslav Republic of Macedonia	4 April 2003	Nepal	23 April 2004	Viet Nam	11 January 2007
France	1 January 1995	Netherlands	1 January 1995	Zambia	1 January 1995
Gabon	1 January 1995	New Zealand	1 January 1995	Zimbabwe	5 March 1995

LIST OF REFERENCES

1. Ahearne, A. G., Fernald, J.G., Loungani, P. & Schindler, J.W. (2003). *China and Emerging Asia: Comrades or Competitors?* International Finance Discussion Paper 789, Board of Governors of the Federal Reserve System, Washington, D.C.

2. Aitken, N.D. (1973). The Effect of the EEC and EFTA on European Trade: A Temporal Cross-Section Analysis. *American Economic Review*, **5**, 881-892.

3. Anderson, J. (1979). A Theoretical Foundation for the Gravity Equation. *American Economic Review*, **69**(1), pp106-116.

4. APEC website, available at: http://www.apec.org/apec/about_apec.html (accessed 8th June 2009).

5. Arvis, J. F., Mustra, M., Panzer, J., Ojala, L. & Naula, T. (2007). Connecting to Compete: Trade Logistics in the Global Economy. World Bank: Washington.

6. Athukorala, P.C. (2007). The Rise of China and East Asian Export Performance: Is the Crowding-out Fear Warranted? Working paper, 2007, 10, The Australian National University.

7. Au, K.F. & Chan, M.H. (2007). *The Effects of Determinants on EU-5 and USA Apparel Imports: A Gravity Model Analysis Approach*. The 10th International Business & Economic Development Conference. August, 2007.

8. Au, K.F. & Chan, M. H. (2008). *Economic, Social and Policy Determinants of EU-5 and American Apparel Imports: A Gravity Model Analysis*. International Journal of Information Systems and Supply Chain Management **1**(3), 33-48.

9. Au, K. F., & Ho, D. C. K. (2002a). Electronic commerce and supply chain management: Value-adding service for clothing manufacturers", *Integrated Manufacturing Systems*, **13**(4), 247-254.

10. Au, K. F., & Ho, D. C. K. (2002b). Electronic commerce: A business model for Hong Kong clothing SMEs. International Journal of Services. *Technology and Management*, **3**(1), 5-21.

11. Balassa, B. (1967). Trade Creation and Trade Diversion in the EEC, Economic Journal, **77**(305), 1-21.

12. Baltagi, B.H. (2002). *Econometric Analysis of Panel Data*, 2nd ed., New York: John Wisely and Sons.

13. Baltagi, B. H. & Raj, C. (1992). *Recent developments in the econometrics of panel data*, Cheltenham, UK ; Northhampton.

14. Batra, A. (2004). India's Global Trade Potential: The Gravity Model Approach. ICRIER Working paper, 151, New Delhi: Indian Council for Research on International Economic Relations.

15. Bayoumi, T. & Eichengreen, B. (1997). *Is Regionalism Simply a Diversion? Evidence from the Evolution of the EC and EFTA*. IMF Working Paper 109.Washington D.C. (Chicago: University of Chicago Press), 189-226.

16. Becker, K. (1995). *International Business: An introduction to Environments Strategies and Operations*, Boston, MA.

17. Beckerman, W. (1956). Distance and the Pattern of Intra-European Trade, *Review of Economic and Statistics*, **28**, 31-40.

18. Bergstrand, J. H. (1985). The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence, *Review of Economics and Statistics*, **67**(3), 474-481.

19. Bergstrand, J. H. (1989). The Generalized Gravity Equation, Monopolistic Competition and the Factor-Proportions Theory in International Trade? *Review of Economics and Statistics*, **71**(1), 43-153.

20. Brada, J.C. & Mendex, J.A. (1983). Regional economic integration and the volume of intra-regional trade, a comparison of developed and developing country experience, *KYKLOS*, **36**, 92-105.

21. Bruce, M., Daly, L. & Towers, N. (2004), Lean or agile: A solution for supply chain management in the textiles and clothing industry? *International Journal of Operations & Production Management*, **24**(2), 151-170.

22. Brulhart, M. & Kelly J. (1999). Ireland's Trading Potential with Central and Eastern European Countries: A Gravity Study, Economic and Social Review, **30**, 159-174.

23. Burfisher, M. (1998). The Economics of Regional Integration. In M.E. Burfisher and E.A. Jones, *Regional Trade Agreements and U.S. Agriculture*. Washington, D.C.: Economic Research Service, Market and Trade Economic Division, U.S.

24. Carrere, C. (2006). Revising the effects of regional trade arrangements on trade flows with proper specification of the gravity model. *European Economic Review*, **50**, 223-247.

25. Caruso, R. (2003). The Impact of International Economic Sanction on Trade An empirical Analysis, Paper prepared for the European Peace Science Conference, Amsterdam, June 1-3.

26. Chamberlain, G. (1985). Heterogeneity, Omitted Variable Bias, and Duration Dependence," Heckman, J. and Burton S. eds., *Longitudinal Analysis of Labor Market Data*, Cambridge University Press, Cambridge.

27. Chan, M.H., Eve, Au, K.F. (2007). Determinants of China's Textiles Export: An analysis by gravity model. Journal of Textile Institute, **98**(5), 463-469.

28. Chan, M.H., Au, K.F., Sarkar, M.K. (2008). Antecedents to India's Textile Exports: 1985-2005. International Journal of Indian Culture and Business Management, **1**(3), 265-276.

29. Cheng,I.H. & Wall H.J.(1999). *Controlling for Heterogeneity in Gravity Models of Trade and Integration*. Working paper 1999-010E, Federal Reserve Bank of St.Louis.

30. Chua, S. Y. (1997). Economic Interdependence and Cooperation in East Asia, Ph.D. dissertation paper, Southern Illinois University.

31. Clarete, R., Edmonds, C. & Wallack, J.S. (2002). *Asian Regionalism and Its Effects on Trade in the 1980s and 1990s*. ERD Working Paper Series No.30. Asian Development Bank.

32. Commodity Trade Statistics Database (COMTRADE), available at http://comtrade.un.org (accessed 6th April, 2009).

33. Daniels, J.D. & Radebaugh, L.H. (1998). *International Business: environments and operations*, 8th edition, Addison-Wesley, 230.

34. Davidson, R. & MacKinnon, J.G. (1993). *Estimation and Inference in Econometrics*, Oxford University Press, New York.

35. Deardorff, A.V. (1998). *Determinants of Bilateral Trade: Does Gravity Work in a Neoclassical World*? National Bureau for Economic Research Working Papers Series, No. 5377.

36. Directorate General of Customs, Ministry of Finance, ROC, available at: http://cus93.trade.gov.tw/english/FSCE/FSC0011E.asp(accessed 3rd March 2009).

37. Dell'Aricca, G. (1999). Exchange Rate Fluctuations and Trade Flows: Evidence from the European Union, *IMF Staff Papers*, **46**, No.3, Washington, D.C.

38. Diao, X. & Somwaru, A. (2001). *Impact of MFA Phase-Out on the World Economy- An Intertemporal, Global General Equilibrium Analysis*. At Fourth Annual Conference on Global Economic Analysis, June 27-29, 2001.

39. Djankov, S., Freund, C. & Pham, C. S. (2006). Trading on Time. World Bank Policy, research working paper, No. 3909.

40. Eaton, J. & Tamura, S. (1994), "Technology, Geography and Trade". *Econometrica*, ***70***, (5), 1741-1779.

41. Egger, P. (2000). A Note on the Proper Econometric Specification of the Gravity Equation, *Economics Letters*, **66**(1), 25-31.

42. Egger, P. (2002). An econometric view on the estimation of gravity models and the calculation of trade potentials, *World Economy*, **25**, 257-312.

43. Egger, P. & Pfaffermayr, M. (2004). Foreign direct investment and European integration in the '90s", *World Economy*, **27**, 99-110.

44. Eichengreen, B. & Irwin, D. (1998). *The Role of History in Bilateral Trade Flows*, in: J. Frankel (Ed.) The Regionalization of the World Economy (Chicago: University of Chicago Press).

45. Eichengreen, B., Rhee, Y. & Tong, H. (2004). The Impact of China on the Export of Other Asian Countries", Working Paper 10768, National Bureau of Economic Research (Cambridge, MA: NBER).

46. Eichengreen, B. & Tong H. (2005). Is China's FDI coming at the Expense of other Countries? Working paper No. 11335, National Bureau of Economic Research (Cambridge, MA: NBER).

47. Eichengreen, B., Rhee, Y. & Tong, H. (2007). China and the Exports of Other Asian Countries. *Review of World Economics*, **143**(2) 201-226.

48. Eichengreen, B. & Tong, H. (2006). How China is Reorganizing the World Economy? *Asian Economic Policy Review*, **1**, 73-97.

49. Eremenko, I., Dean, J. & Mankovska, N. (2003). Will WTO membership really improve market access for Ukrainian Exports? Paper presented at the 37th Annual meeting of the Canadian Economics Association Conference, Carleton University, Ottawan, Ontario.

50. EU website, available at:
http://europa.eu/about-eu/27-member-countries/index_en.htm
(accessed 8th June 2009).

51. Evenett, J.S. & Keller, W. (1998). On Theories Explaining the Success of the Gravity Equation, NBER Working Paper Series, No. 6529.

52. Feenstra, R.C., Markusen, J.A., & Rose, A. K. (1998). Understanding the Home Market Effect and the Gravity Equation: the Role of Differentiating Goods, NBER Working Paper Series, No.6804.

53. Fitzpatrick, G. L. & Modlin M.J. (1986). *Direct-Line Distance*, International Edition, The Scarecrow Press, London.

54. Frankel, J. A. & Wei S. J. (1993). Continental Trading Blocs: Are they Natural or Super-Natural, NBER Working Paper Series, No.4588.

55. Frankel, J. A. & Wei S. J. (1995). Trading Blocs and the Americas: The Natural, the Unnatural, and the Super-Natural, *Journal of Development Economics*, **47**, 61-95.

56. Frankel, J.A. (1997). *Regional Trading Blocs in the World Economic System*. Institute for International Economics, Washington D.C.

57. Frankel, J. A. & Wei, S.J. (1998). Regionalization of World Trade and Currencies: Economies and Politics, in: J. Frankel Ed. *The Regionalization of the World Economy*.

58. Frankel, J. A., Stein E. & Wei S.J. (1998). Continental Trading Blocs: Are they Natural or Super-Natural? In J. Frankel (Ed.), *The Regionalization of the World Economy*. Chicago: University of Chicago Press.

59. Frankel, J. A. & Rose, A. (2002). An Estimate of the Effect of Common Currencies on Trade and Income. Quarterly Journal of Economics, **117**, (2), 437-466.

60. Garcia-Herrero A. & Santabarbara D. (2007). Does China have an impact on foreign direct investment to Latin America? *China Economic Review*, **18**(3), 266-286.

61. Gereffi, G. (1999), International trade and industrial upgrading in the apparel commodity chain. *Journal of International Economics*, **48**(1), 37-70.

62. Gereffi, G., Memedovic, O. (2003). The Global Apparel Value Chain: What Prospects for Upgrading by Developing Countries, United Nations Industrial Development Organization (UNIDO).

63. Gereffi, G., Spener, D, & Bair, J. (2002). *Free Trade and Uneven Development: the North American Apparel Industry after NAFTA*. Philadelphia: Temple University Press.

64. Gibb, R. & Michalak W. (1994). *Continental Trading Blocs: The Growth of Regionalism in the World Economy*, John Wiley & Sons.

65. Glick, R. & Rose, A.K. (2002). Does a Currency Union Affect Trade? The Time-Series Evidence. *European Economic Review*, **46**(6), 1125-1151.

66. Golub, S. S. (1999). *Labour costs and international trade*, AEI Press, Washington D.C.

67. Grimwade, N. (2000). International Trade: New Patterns of Trade, Production and Investment, 2nd ed., Routledge, London.

68. Greenaway, D. (1998). *Economic Development and International Trade*, St. Martin's Press.

69. Greenaway, D., Mahabir, A. & Milner, C. (2008). Has China displaced other Asian countries' exports? *China Economic Review*, **19**(2), 152-169.

70. Greence, W.H. (2003) *Econometric Analysis*, 5th ed., New York, Prentice Hall.

71. Gros, D. & Gonciarz, A. (1996). A Note on the Trade Potential of Central and Eastern Europe, *European Journal of Political Economy*, **12**, 709-721.

72. Gujarati, D. (2003). *Basic Econometrics*, 4th edition, New York, McGraw Hill.

73. Gunawardana, P.J. & Hewarathna, R. (2000). The Asian Crisis and Australia-East Asia Trade Flow: A Modified Gravity Approach, Discussion Paper, La Trobe University.

74. Hamilton, C. B. & Winters, A. (1992). Opening up International Trade with Eastern Europe, *Economic Policy*, 77-116.

75. Harrigan, J. (2002). Specialization and the Volume of Trade: Do the Data Obey the Laws. In K. Choi & J. Harrigan (eds.). The Handbook of International Trade, London: Basil Blackwell.

76. Hauseman, J.A. & Taylor, W.E. (1981). Panel Data and Unobservable Individual Effects. *Econometrica*, **49**(6), 1377-1398.

77. Havrylyshin, O. & Pritchett, L. (1991). "European Trade Patterns after the Transitions." PRE Working Paper Series, no.748. Washington, DC: The World Bank.

78. Head, K. (2000). Gravity for Beginners, *Rethinking the Line: The Canada-U.S. Border Conference*, Vancouver, British Columbia, 1-10.

79. Heckscher, E.F. & Ohlin, B. (1919) with Flam, H. & Flanders, M. (Eds), *Heckscher-Ohlin Trade Theory*, The MIT Press, Cambridge, MA.

80. Helliwell, J.F. (1996). Do national borders matter for Quebec's trade? *Canadian Journal of Economics,* **29**, 507-522.

81. Helliwell, J.F. (1998). How much do National Borders Matter? Washington D.C.: The Brookings Institution.

82. Helpman, E. (1987). Imperfect competition and international trade: Evidence from fourteen industrial countries. *Journal of the Japanese and International Economies,* **1**, 62-81.

83. Helpman, E. & Krugman, P.R. (1985). *Market Structure and Foreign Trade*: MIT Press, Cambridge, MA.

84. Hewett, E.A. (1976). A Gravity Model for CMEA Trade in Josef C. Brada (ed.), Quantitative and Analytical Studies in East-West Economic Relations, Bloomington: International Development Research Center.

85. Hong Kong Trade Development Council, available at: http://www.hktdc.com (accessed 20th August 2008).

86. Ho, D. C. K., Au, K. F., & Newton, E. (2002). Empirical research on supply chain management: A critical review and recommendations. *International Journal of Production Research,* **40** (17), 4415-4430.

87. Ho, D. C. K., Au, K. F., & Newton, E. (2003). The process and consequences of supply chain virtualization. *Industrial Management and Data Systems*, **103**(5-6), 423-433.

88. Hufbauer, G.C., Elliott, K.A., & Winton, E. (1997). U.S. Economic Sanctions: Their Impact on Trade¸ Jobs and Wages. Working papers, Institute for International Economics, Washington, D.C.

89. Hufbauer, G.C. & Schott J. (1992). *Prospects for North American Free Trade. Institute for International Economics*, Washington, D.C.

90. Hummels, D. & Levinsohn, J. (1995). Monopolistic Competition and International Trade: Reconsidering the Evidence. *Quarterly Journal of Economies*, **110**(3), 799-836.

91. Ianchovichina, E. & Walmsley, T. (2005). Impact of China's WTO Accession on East Asia. *Contemporary Economic Policy*, **23**(2), 261-277.

92. International Financial Statistics (IFS) database, available at: http://www.imfstatistics.org/imf/ (accessed 10th June 2009).

93. Isard, W. & Freutel G. (1954). *Regional and National Product Projection*. Princeton University Press.

94. Isard, W. (1990). Gravity, Potential, and Spatial Interaction Models. In *Practical Methods of Regional Science and Empirical Applications: Selected Papers of Walter Isard.* vol. 2, ed. by Christine Smith. New York: New York University Press. Previously published in 1960.

95. IMF (International Monetary Fund, 2004. The Global Implications of the U.S. Fiscal Deficit and of China's Growth. World Economic Outlook 63-102.

96. International Monetary Fund (IMF) website, available at: http://www.imf.org/external/pubs/cat/longres.cfm?sk=397.0 (accessed 8th June 2009).

97. Jackson, J. H. (1997). *The World Trading System*. 2nd edition, Law and Policy of Internatioanl Economic Relations, MIT Press.

98. James, W.E. & Umemoto, M. (1999). *Rules of Origin and the Competitive Position of Asian Textiles and Apparel Producers in the North American Market*. ICSEAD Working Paper Series 99-101. Kitakyushu, Japan.

99. Jones, R.W. (2000). Globalization and the theory of input trade. The MIT Press, London.

100. Junius, K. (1999). The Economic geography of production, trade, and development. Mohr Siebeck, Germany.

101. Koo, W.W. Karemera, D. & Taylor R. (1994). A Gravity Model Analysis of Meat Trade Policies. *Agricultural Economics*, **10**, 81-88.

102. Krugman, P. (1979). Scale Economies, Product Differentiation and the Pattern of Trade. *American Economic Review*, **70**, 950-959.

103. Krueger, A. O. (1999). *Trade Creation and Trade Diversion under NAFTA*. National Bureau of Economic Research, Working Paper 7429 (December).

104. Krueger, A. O. (2000). NAFTA's Effects: A Preliminary Assessment. *World Economy*, **23**(6), 761-775.

105. Kucera, D., Sarna, R. (2006). Trade Union rights, Democracy, and Exports: a Gravity Model Approach. *Review of International Economics*, **14**(5), 859-882.

106. *LABORSTA* Internet operated by the ILO Bureau of Statistic: available at: http://laborsta.ilo.org/ (accessed 16th March 2009).

107. Leamer, E.E. & Stem, R.M (1970). *Quantitative International Economics*. Boston: Allyn and Bacon.

108. Leamer, E.E. (1974). *The Commodity Composition of International Trade in Manufacturers: An Empirical Analysis*. Oxford Economic Papers 26, 350-374.

109. Leamer, E.E. & Levinsohn, J. (1995). International Trade Theory: The Evidence. in: Grossman, G. and K. Rogoff, (eds.), *Handbook of International Economics*, **3**, 1339-1394.

110. Leontif, W.W. (1954). Domestic Production and Foreign Trade: The American Capital Position Re-examined. *Economica Internazionale*, **19**, 9-36.

111. Liebscher, K., Christl, J., Mooslechner, P. & Ritzbergerger, D. (2005). *European Economic Integration and South-East Europe: Challenges and Prospects*. Edward Elgar Publishing Limited, Cheltenham, U.K.

112. Linder, S. B. (1961). *An Essay on Trade and Transformation*. New York: John Wisely & Sons.

113. Linnemann, H. (1966). *An Econometric Study of International Trade Flows*. North-Holland, Amsterdam.

114. Limao, N. & Venables A.J. (2001). *Infrastructure, Geographical Disadvantage and Transport Costs*. World Bank Economic Review, **15**(3), 451-479.

115. Lissovolik, B. & Lissovolik, Y. (2004). *Russia and the WTO: The "Gravity" of Outsider Status*. Working Paper WP/04/159, International Monetary Fund.

116. Liu, T. & Jiao, W. (2006). *Impact of Regional Trade Agreements on Commodity Trade between China and Australia*. University of Washington. May 2006.

117. Martinez-Zarzoso, I & Nowak-Lehmann, D. F. (2003). *Effects of Regional Trade Agreements using a Static and Dynamic Gravity Equation.* Discussion Papers. Nr. 149. July 2006.

118. McCallum, J. (1995). National Borders Matter: Canada-U.S. Regional Trade Patterns. *American Economic Review*, **85**, 615-623.

119. Micco, A., Stein E. & Ordonez, G. (2003). The Currency Union Effect on Trade: Early Evidence from EMU. *Economy Policy*, **10**, 315-356.

120. Milgram, J.B., 2005. Quotas on Clothing Imports: Impact and Determinants of EU Trade Policy. *Review of International Economics*, **13**(3), 445-460.

121. NAFTA website, available at: http://www.nafta-sec-alena.org/en/view.aspx (accessed 8th June 2009).

122. Nathan, K.S. (2002). *The European Union, United States and ASEAN: Challenges and Prospects for Cooperative Engagement in the 21st Century*. London, ASEAN Academic.

123. Naumann, E. (2005). *Textiles and Apparel: Reflections on the Sector's Integration into the Post-Quota Environment*. Trade law Centre for Southern Africa Working Paper, No. 1.

124. Nilsson, L. (2002). Trade integration and the EU economic membership criteria. *European Journal of Political Economy*, **16**, 807-827.

125. Nitsch, V. (2002). Honey, I shrunk the currency union effect on trade. *World Economy*, **25**, 457-474.

126. Nordas, H. K., Pinali, E., & Grosso, M. G. (2006). *Logistics and time as a trade barrier*. OECD trade policy working papers, OECD Publishing, No. 35.

127. Oguledo, V.I. & Macphee, C.R. (1994). Gravity Models: A Reformulation and an Application to Discriminatory Trade Agreements. *Applied Economics*. **26**, 107-120.

128. Pelzman, J. (1977). Trade Creation and Trade Diversion in the Council of Mutual Economic Assistance 1954-1970. *American Economic Review*, **67**, 713-722.

129. Perdikis, N. & Kerr, W.A. (1998). *Trade theories and empirical evidence*, Manchester University Press, Manchester, U.K.

130. Polder, M. (2000). Forecasting International Trade Flows: A Gravity-Based Approach. *Econometrishe Toepassingen*, 24-28.

131. Porter, M.E. (1990). *Competitive Strategy*. The Free Press, New York, N.Y.

132. Porter, M.E. (1998). *The Competitive Advantage of Nations: with a new introduction*. The Free Press, New York, NY.

133. Posner, M.V. (1961). International trade and technical change. *Oxford Economic Papers*, **13**(3), pp.323-341.

134. Tinbergen, J. (1962). *Shaping the World Economy: Suggestions for an International Economic Policy*. New York: Twentieth Century Fund.

135. Poyhonen, P. (1963). A Tentative Model for the Volume of Trade between Countries. *Weltwirtschaftliches*, Archive, **90**, 93-100.

136. Ranjan, P. & Tobias, J.L. (2007). Bayesian Inference for the Gravity Model. *Journal of Applied Econometrics*, **22**, 817-838.

137. Ricardo, D. (1817). *Principles of Political Economy and Taxation*. New York: E.P. Dutton.

138. Ricart, J.E., Enright, M.J., Ghemawat, P., Hart, S.L. & Khanna, T. (2004). New Frontiers in International Strategy. *Journal of International Business Studies*, **35**(3), 175-200.

139. Romalis, J. (2005). NAFTA's and CUSFTA's Impact on North American Trade. NBER Working Papers 11059, forthcoming in *Review of Economics and Statistics*.

140. Rose, A. K. (2002). Honey, the currency union effect on trade hasn't blown up. *World Economy*, **25**, 475-479.

141. Rose, A. (2004). Do We Really Know That The WTO Increases Trade? *American Economic Review*, **94**(1), 98-114.

142. Sanso, M., Cuairan, Rogelio & Sanz, F. (1993). Bilateral Trade Flows, The Gravity Equation, and Functional Form. *Review of Economics and Statistics*, **75**, 266-275.

143. Sapir A. (1998). The Political Economy of EC Regionalism. *European EconomicReview*, **42** (3/5), 717-732.

144. Savage, I. R. & Deutsch, K.W. (1960). A Statistical Model of the Gross Analysis of Transaction Flows. *Econometrica*, **28**, 551-572.

145. Sen, A. & Smith, T.E. (1995). *Gravity Models of Spatial Interaction Behavior. Advances in Spatial and Network Economics Series*. Springer, New York.

146. Serlenga, L. & Shin, Y. (2005). *Gravity Models of the Intra-EU Trade: Application of the Hausman-Taylor Estimation in Heterogeneous Panels with Common Time-specific Factors*. Paper presented in The Italian Congress of Econometrics and Empirical Economics, Italy, Venice.

147. Sharma, S.C. & Chua, S.Y. (2000). ASEAN economic integration and intra-regional trade. *Applied Economic Letters*, **17**, 165-169.

148. Smith, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations*. Everyman's Library, London.

149. Soloaga, I. & Winters, A. (2001). Regionalism in the nineties: what effect on trade? *North American Journal of Economics and Finance*, **12**, 1-29.

150. Spinanger, D. (1992). The Impact on Employment and Income of Structural and Technology Change in the Clothing Industry. *Kiel Reprints*, 39.

151. Stewart, J.Q. (1948). Demographic Gravitation: Evidence and Applications. *Sociometry*, **1**(2), 31-58.

152. Subramanian, A. & Wei S.J. (2007). The WTO promotes trade, strongly but unevenly. *Journal of International Economics*, **72**(1), 151-175.

153. Tang, D. (2005). Effects of the Regional Trading Arrangements on Trade: Evidence from the NAFTA, ANZCER and ASEAN Countries, 1989-2000. *Journal of International Trade & Economic Development*, **14** (2), 241-265.

154. Thursby, J. G. & Thursby, M.C. (1987). Bilateral trade flows, The Linder hypothesis, and exchange risk. *Review of Economics and Statistic*, **69**(3), 488-495.

155. Thoumi, F.E. (1989). Bilateral Trade Flows and Economic Integration in Latin America and the Caribbean. *World Development*, **17**(3), 421-429.

156. Tinbergen, J. (1962). *Shaping the World Economy: Suggestions for an International Economy Policy*. The Twentieth Century Fund, New York, PB. 330.

157. Vernon, R. (1966). International Investment and International Trade in the Product Cycle. *Quarterly Journal of Economics*, **80**(2), 190-207.

158. Wall, H. J. (1999). Using the Gravity Model to Estimate the Costs of Protection. *Federal Reserve Bank of St. Louis Review*, **81**, 33-40.

159. Wang, Z., Coyle, W.T., Gehlhar, M. & Vollrath, T. (1998). The Impact of Distance on. U.S. Agricultural Exports: An Econometric Analysis. *Economic Research Services* (ERS)/USDA, Technological Changes, Transportation Sector/MP-1566, 71-83.

160. Warburton, R. D. H. & Stratton, R. (2002). Questioning the relentless shift to offshore manufacturing. *Supply Chain Management-an International Journal*, **7**(2), 101-108.

161. Wei, S.J. (1996). ASEAN in a Regional Perspective. Written for the Southern Asia and Pacific Department, International Monetary Fund. CIDER Working Paper No. C96-074, U.C. Berkeley, November.

162.Wei, D. H. (2004). Enlargement and the Textiles, Clothing and Footwear Industry. *Vienna Institute for International Studies*, 923-945.

163. Werner International Management Consultants, The Hourly Labor Costs in the Textile Industry 2007, available at: http://www. werner-newtwist.com (accessed 18th October 2008).

164. World Trade Organization, International Trade Statistics, available at: http://www.wto.org (accessed 6th May 2009).

165. WTO, (2004). The Agreement on Textiles and Clothing, available at: http://www.wto.org/english/tratop_e/texti_e/texintro_e.htm#(ATC) (accessed 7th June 2009).

166. WTO website, available at: http://www.wto.org/english/thewto_e/whatis_e/whatis_e.htm (accessed 8th June 2009).

167. Yaffee (2003). A primer for panel data analysis, available at: http://www.nyu.edu/its/pubs/connect/fall03/yaffee_primer.html

(accessed 3rd June 2009).

168. Yang, T.Z. & Vines D. (2000). *The Fallacy of Composition and the Terms of Trade of Newly Industrializing Economies*. Oxford University.

169. Yeats, A.J. (1998). *What Can Be Expected from African Regional Trade Arrangements? Some Empirical Evidence*. World Bank Policy Research Working Paper 2004.

170. Zipf, G.K. (1946). The Hyphothesis: On the Intercity Movement of Persons. *American Sociological Review*, **11**(6):677-686