An Assessment of the Impact of the North American Free Trade Agreement (NAFTA) on the U.S. Textile Industry’s Production Activities: Qualitative and Quantitative Approaches

Mikyung Lim

Dissertation submitted to the Faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
in
Apparel, Housing, and Resource Management

Moon Won Suh, Co-chair
LuAnn Gaskill, Co-chair
Julia Beamish
Sherry Schofield-Tomschin
Valerie Giddings

June 20th, 2006
Blacksburg, Virginia

Keywords: NAFTA, Textile Industry, Economic Analysis, Textile Trade, Textile Production
Copyright 2006, Mikyung Lim
An Assessment of the Impact of the North American Free Trade Agreement (NAFTA) on the U.S. Textile Industry’s Production Activities: Qualitative and Quantitative Approaches
Mikyung Lim

(ABSTRACT)

The implementation of the North American Free Trade Agreement (NAFTA) between the United States, Canada, and Mexico created a barrier-free production and trade zone in North America. Surrounding the implementation of NAFTA, a great volume of public, political, and academic attention was given to the impact of the agreement on the aging U.S. textile industry with high labor costs. The major NAFTA provisions, the elimination of tariffs and quotas and rules of origin, were predicted to create and divert U.S. trade in textile goods and expand domestic textile production activities. Since its implementation, however, volatile macroeconomic and political environmental changes have severely interfered with the role of NAFTA.

Over ten years have passed since the implementation of NAFTA. The objectives of this research are to investigate the pattern of the U.S. textile industry’s production activities under NAFTA and to determine the impact of the agreement on the industry’s production activities. This research consists of two parts. Part I is a qualitative analysis that investigates changes in the industry’s trade and production activities under NAFTA based on the review of literature and trade and industry data. Part II of this research, a quantitative analysis, applies a normalized restricted translog profit model to the textile industry’s production activities under the influence of NAFTA in order to identify the pattern of the industry’s output supply and input demand and to determine the impact of NAFTA on the industry. The outcomes of these analyses are used to make an overall assessment of the impact of NAFTA on the U.S. textile industry and draw policy implications.

The outcome of the qualitative analysis suggests NAFTA as an effective policy in expanding and regionalizing U.S. trades in textile goods and promoting domestic textile production activities in the early years of implementation. Since the late 1990s, however, macroeconomic and political changes have dominated over the role of NAFTA, partially undoing the changes in U.S. textile trade and production activities made in the early years of the agreement. The outcome of quantitative analysis identifies the significant but negative effect of NAFTA on the U.S. textile industry’s profit performance in the early years of NAFTA, probably due to intensified import competition, fall of real output prices, and numerous mill closings. Overall, NAFTA is recognized as a short-term, transitional policy measure for the U.S. textile industry because of the limited importance of Mexico in U.S. textile trade, the short period of NAFTA implementation, and several dynamic environmental factors including exchange rate changes, U.S. signings of multiple regional trade agreements, and the emerging dominance of China in world textile trade under the phase-out of the Multi-fiber Arrangement that have changed international and domestic textile market competition. Ultimately, this study concludes that a trade policy is not likely to provide a long-term solution for the survival of U.S. textile industry.
I thank God for the completion of this dissertation. Too many things have happened during my doctoral study. If he had not sent me a few key people at the critical points of time, this dissertation would not have been completed.

First and most of all, I express my great appreciation to Dr. Moon W. Suh. He took on the advisorship in the middle of this research and guided me to focus on the most important aspects. Soon after Dr. Suh became involved in my research, I got pregnant with my second daughter, Naomi. This was a major setback in doing research. I owe great thanks to his patience during this period. Without him, I would not have known where to turn. I am also grateful to Dr. LuAnn Gaskill for helping me continue and complete my research throughout the process.

My special thanks go to Dr. Valerie Giddings and Dr. Sherry Schofield-Tomschin who have been the enduring pillars of my committee. I got professional and emotional support from them when I needed it most. I also wish to acknowledge Dr. Julia Beamish who joined the committee at a late stage and helped me complete this dissertation.

I would like to thank Terry Tope, Durga Rajaram, Kurtis Geerlings, and Harry Crowcroft for their help with proof reading. Andre Lebedev helped me and my family many times and when I injured my ankle and could not move for a few weeks.

Finally, I thank my family. My husband and my daughters, Alex and Naomi, provided support throughout. Without them, I would not have had the courage to go on.
Contents

1 Introduction
  1.1 Problem Statement ................................................. 2
  1.2 Research Objectives ............................................... 3
  1.3 Justification and Limitation of Research ......................... 4
  1.4 Organization of Study ............................................ 5

I Qualitative Analysis .................................................... 7

2 The U.S. Textile Industry in the pre-NAFTA Period ................. 8
  2.1 Definition of the Textile Industry ............................... 8
  2.2 The U.S. Textile Industry and Market Environments ............. 9
  2.3 Technological Development ....................................... 10
  2.4 Productivity ...................................................... 12

3 International Trade Policies ........................................... 14
  3.1 Multilateralism and Regionalism ................................ 14
  3.2 The GATT and the WTO ........................................... 17
  3.3 The Multi-fiber Arrangement ..................................... 17
  3.4 Phase-out of MFA and Agreement on Textiles and Clothing ... 19
  3.5 Trade Policies of the United States .............................. 20
    3.5.1 Prior to the 1900s - the 1970s ............................. 20
    3.5.2 The 1980s - the 2000s ..................................... 21

4 The North American Free Trade Agreement ........................ 24
  4.1 Formation of NAFTA .............................................. 24
  4.2 Purposes and Provisions of NAFTA ................................ 25
  4.3 Predictions of the Impacts of NAFTA ............................ 27
    4.3.1 Expectations on Benefits ................................ 27
    4.3.2 Expectations on Disadvantages ............................ 27
  4.4 Early Empirical Studies of NAFTA ............................... 28
5 Evaluation of the Impact of NAFTA on U.S. Textile Industry: A Qualitative Approach

5.1 Environmental Factors that have altered the Course of NAFTA

5.1.1 Mexico’s Peso Devaluation, Recession, and Policy Change

5.1.2 Asian Currency Devaluation, Manipulation, and Rise of China

5.1.3 Difficult U.S. Market Conditions in the 2000s

5.1.4 Resurge of Protectionist Pressure and Trade Barriers after MFA Phase-out

5.2 Changes in the Pattern of U.S. Trade in Textile Goods Under NAFTA

5.2.1 U.S. Imports of Textiles

5.2.2 U.S. Imports of Apparel

5.2.3 U.S. Exports of Textiles

5.2.4 U.S. Exports of Apparel

5.3 Changes in U.S. Textile Production Activities under NAFTA

5.3.1 Growth of U.S. Economy and Consumer Consumption

5.3.2 U.S. Textile Market Environments

5.3.3 Changes in Textile Shipments

5.3.4 Changes in Textile Employment

5.3.5 Changes in Capital Investments and Production Systems

5.3.6 Changes in Productivity

5.4 Evaluation of Impacts of NAFTA on U.S. Textile Trades and Production Activities

5.4.1 Evaluation of Impacts of NAFTA on U.S. Textile Trade

5.4.2 Evaluation of Impacts of NAFTA on U.S. Textile Production

5.5 Policy Implications of NAFTA: Perspectives from Qualitative Approach

5.6 Research Hypotheses

II Quantitative Analysis

6 Economic Analysis of U.S. Textile Production under NAFTA

6.1 Profit Model

6.2 Advantage of Using Profit Model

6.3 Selection of Functional Form

6.4 Translog Functional Form

6.5 Application of Normalized Restricted Translog Profit Model to the U.S. Textile Industry Production Data

6.5.1 Profit Share Equations of Variable Input Expenditures

6.5.2 Own- and Cross-Price Elasticities of Demand for Variable Inputs

6.5.3 Elasticities of Demand for Variable Inputs with respect to Fixed Inputs

6.5.4 Elasticities of Variable Input Demand with respect to Output Prices
6.5.5 Elasticities of Output Supply with respect to Output and Variable Input Prices .......................... 91
6.6 Selection of Data Sources .................................................. 93
6.7 Selection of Time Points for the Two Periods ......................................... 97
6.8 Method of Statistical Estimation ................................................. 99

7 Results and Discussion of Economic Analysis .......................... 101
7.1 Parameter Estimates of Profit Model and Profit Share Equations ............... 101
7.2 Parameter Estimates of Profit Share Equations of Variable Input Expenditures 104
  7.2.1 Profit Share Equation of Labor Expenditure .......................... 104
  7.2.2 Profit Share Equation of Material Expenditure .......................... 104
  7.2.3 Profit Share Equation of Electricity Expenditure .......................... 105
7.3 Estimation of Own- and Cross-Price Elasticities .................................. 105
  7.3.1 Textile Output Supply .................................................. 105
  7.3.2 Labor Demand ...................................................... 107
  7.3.3 Material Demand .................................................... 107
  7.3.4 Electricity Demand ..................................................... 108
7.4 Discussion of Findings of Economic Analysis .................................... 109
7.5 Discussion of Parameter Estimate of NAFTA Variable .......................... 111
7.6 Policy Implications of NAFTA: Perspectives from Quantitative Approach ........ 113
7.7 Limitations of Economic Analysis ............................................. 114

8 Conclusions ................................................................. 116
8.1 Impact of NAFTA on U.S. Textile Trade and Production: A Qualitative Assessment .................................................. 116
8.2 Impact of NAFTA on U.S. Textile Production Activities: A Quantitative Assessment .................................................. 118
8.3 Implications ................................................................. 119
8.4 Current and Future Strategies for the U.S. Textile Industry ................. 121
  8.4.1 Beyond Production-Oriented Competitive Strategy .......................... 121
  8.4.2 Shift to Push and Pull (Niche) Marketing .................................. 122
  8.4.3 Development of Global Textile and Apparel Supply Chain ................. 123

9 Bibliography ................................................................. 124
References ................................................................. 124

A U.S. Bureau of Census Definition of Data ......................................... 137
List of Figures

5.1 Exchange Rates of North American and East Asian Countries . . . . . . . . 33
5.2 U.S. Imports of Textiles . . . . . . . . . . . . . . . . . . . . . . . . . . . . 37
5.3 Shares of Exporters in U.S. Imports of Textiles . . . . . . . . . . . . . . . 38
5.4 U.S. Imports of Apparel . . . . . . . . . . . . . . . . . . . . . . . . . . . . 42
5.5 Shares of Exporters in U.S. Imports of Apparel . . . . . . . . . . . . . . . 43
5.6 U.S. Exports of Textiles . . . . . . . . . . . . . . . . . . . . . . . . . . . . 47
5.7 Shares of Importing Regions in U.S. Exports of Textiles . . . . . . . . . . . 48
5.8 U.S. Exports of Apparel . . . . . . . . . . . . . . . . . . . . . . . . . . . . 51
5.9 Shares of Importing Regions in U.S. Exports of Apparel . . . . . . . . . . . 52
5.10 GDP Growth of North America in Comparison to those of East Asia. . . . . 55
5.11 Consumer Consumption of Apparel and Shoes: 1960-2004 . . . . . . . . . . . 56
5.12 Personal Consumer Expenditure of Apparel, Household Textiles,... . . . . 57
5.14 U.S. Shipments, Exports, and Imports of Textiles and Apparel . . . . . . . . 62
5.15 Employment of U.S. Textile and Apparel Industry . . . . . . . . . . . . . . 64
5.16 New and Old Capital Investments of Textile and Apparel Industry . . . . . . 65
5.17 Output per Labor Hour, Capital, Multifactor Productivity, Textiles . . . . . . 67
5.18 Output per Labor Hour, Capital, Multifactor Productivity, Apparel . . . . . . 68
List of Tables

5.1 Growth and Shares of Exporters in U.S. Imports of Textiles ............... 39
5.2 Growth and Shares of Exporters in U.S. Imports of Apparel .............. 44
5.3 Growth Rates and Shares of Importing Regions in U.S. Exports of Textiles . 49
5.4 Growth Rates and Shares of Importing Regions in U.S. Exports of Apparel . 53

6.1 Textile Product Groups used in this Research ............................. 94
6.2 Theoretical Definitions of Variables and Preparation of Raw Data for Analysis 98

7.1 Parameter Estimates of Profit Model and Profit Share Equations ....... 102
7.2 Elasticity Estimates of U.S. Textile Output Supply and Variable Input Demand 106
Chapter 1

Introduction

The textile industry of the United States (U.S.) has undergone the difficult transition from monopolizing the large affluent domestic market under relatively protected market conditions to becoming increasingly vulnerable to import competition over several decades. As ways of protecting its domestic market share against imports, the industry has engaged in upgrading its production systems to enhance its productivity and price competitiveness and intensive lobby activities to obtain protective government policies, which have often exerted crucial influence on U.S. policymaking. The protective U.S. trade policies, with respect to the textile industry, were voluntary export restraints in the 1930s through 1950s, the Short-Term and the Long-Term Arrangements in the 1960s, and the Multi-fiber Arrangement (MFA) with its extensions from the 1970s through the early 1990s. Over decades, the U.S. government’s trade policies have become a major source of influence on the U.S. textile industry’s trade relationships and production activities.

The U.S. textile industry in the 1990s experienced rapidly changing political and economic environments that greatly affected the industry’s production activities. The implementation of the North American Free Trade Agreement (NAFTA) on January 1, 1994 was the most distinguished of the changing environmental factors. The agreement created a free trade and production zone in North America (the United States, Canada, and Mexico) to help North American firms restructure and improve their international competitiveness (Clifton, 1989; Grinspun, 1993; Thuermer, 1991).

The onset of NAFTA goes back to the mid-1980s. The U.S. government shifted its political stance from multilateral trade talks to regional trade agreements (RTAs) and signed free trade agreements (FTAs) with Israel in 1985 and Canada in 1989 (Krueger, 1993; Krueger, 1995; Krueger, 2000). Since then, newly formed FTAs / RTAs including NAFTA have dominated international trade scenes and U.S. textile market competition. Since the implementation of NAFTA, the U.S. government has negotiated numerous RTAs to extend the free trade area beyond North America. They include the early Enterprise for the Americas Initiative, the 1993 agreement of the Asia Pacific Economic Cooperation Forum on free trade and investment, the Trade and Development Act of 2000, the Andean Trade Promotion and Drug Eradication Act of 2002, the U.S.-Central America-Dominican Republic Free
Trade Agreement (CAFTA-DR) in 2004, and the proposed Free Trade Area of the Americas. Other sub-regional trade agreements or negotiations have also rapidly developed worldwide, including the negotiations for MERCOSUR, the ASEAN Free Trade Agreement, the agreement of an EU-Mexico free trade area in 2000, and the expansion of EU membership to 25 members in 2004. NAFTA and the global proliferation of RTAs are believed to have influenced the U.S. textile industry’s trade and production activities.

Along with changing U.S. and international trade policies, the business environments for the U.S. textile industry became further complicated in the 1990s and 2000s as changing macroeconomic and market environments took turbulent turns. The Mexican and Asian currency devaluations in late 1994/1995 and late 1997/1998 shifted the flow of U.S trade in textile goods between Mexico and Asian countries. China’s undervalued currency since 1994 and its accession to the WTO in late 2001, and the phase-out of MFA quotas in 2005 have caused a surge in U.S. imports of textile goods from China. In addition, the events of September 11th, 2001, an economic recession during 2002-2003, and wars against Afghanistan and Iraq since 2001 and 2003, respectively, have further worsened the business environment for the U.S. textile industry. These dramatic changes in U.S. and international trade policies, macroeconomic environments, and domestic market environments during the last two decades have imposed great challenges on the U.S. textile industry’s production activities.

1.1 Problem Statement

During the recent two decades, NAFTA has been the most prominent U.S. trade policy. NAFTA eliminated tariffs and quotas on general merchandise, including textiles and apparel, traded within North America that met rules of origin. This trade preference gives a significant price advantage to exports from the NAFTA signatory countries. On the other hand, it discriminates exports from the non-NAFTA countries that face most-favored-nation tariffs and non-tariff barriers to enter the North American market. The difference between NAFTA preference given to exports from the signatory countries and trade restrictions imposed on exports from the non-NAFTA countries was believed to be large enough for textile trade to result in significant trade diversion (James & Umemoto, 2000).

The U.S. textile industry has undergone many turns in its trade and production activities since the implementation of NAFTA. In the early years of implementation, NAFTA appeared to be successful in trade regionalization. However, the expected positive effects of NAFTA were soon challenged by several market environmental changes such as volatile exchange rates, China’s undervalued currency and WTO membership, the MFA phase-out, and difficult U.S. economic and political conditions in the 2000s.

The effect of NAFTA is interwoven with the effects of these changing market environments and the business style of U.S. textile producers, who have historically been known as being relatively insensitive to changing market environments and consumer demands, in shaping the industry’s production activities. U.S. textile producers’ business style may have
reflected the industry’s production-oriented competitive strategy through mass-production, long production runs, adoption of advanced technologies, and pursuit of large economies of scale and productivity.

Over ten years have passed since the implementation of NAFTA. The questions to be raised at this point are: What has happened to the U.S. textile industry under NAFTA? Have U.S. textile producers adapted to changing import competition and market environmental changes under NAFTA? Has NAFTA effected the industry’s production activities in a positive way as was originally intended? It is of interest to see to what extent NAFTA and changing U.S. trade in textile goods under the agreement have affected the domestic textile industry’s production activities in the midst of other intervening environmental factors.

1.2 Research Objectives

The objectives of this research are to investigate the pattern of the U.S. textile industry’s production activities under the influence of NAFTA and determine the impact of the agreement on these production activities. This research consists of two parts. The first part consists of a qualitative analysis. It investigates changes in the textile industry’s trade and production activities under NAFTA based on a review of literature and graphical analyses of trade and industry data. The outcome of this qualitative analysis is used to make an overall assessment of the impact of NAFTA on the industry’s trade and production and draw the policy implications.

The second part of this research is a quantitative analysis. A normalized restricted translog profit model and the derived system of profit share equations of variable input (material, labor, and electricity) expenditures are applied to the U.S. textile industry’s production activities under the influence of NAFTA to identify the pattern of the industry’s output supply and input demand and determine the significance of the impact of NAFTA on the industry’s production activities. A dummy variable is introduced for the two time periods in the restricted translog profit model to measure the impact of NAFTA.

Symmetry and homogeneity restrictions are imposed across the normalized restricted translog profit model and the derived systems of profit share equations of variable input expenditures to obtain consistent statistical estimates. Seemingly Unrelated Regression with the application of Generalized Least Squares is applied to simultaneously estimate the parameters of the normalized restricted translog profit model and the profit share equations of variable input expenditures. The dependent variables are the restricted profits of the U.S. textile industry normalized by indices of textile output prices and the shares of variable input expenditures. The independent variables are indices of unit variable input costs (hourly labor cost, unit material cost, and hourly electricity cost), which are normalized by indices of textile output prices, and the dollar values of fixed inputs (capital and maintenance expenditures). The estimated coefficients of the parameters of the restricted translog profit model and the profit share equations of variable input expenditures are used to calculate the own- and cross-price elasticities of textile output supply and variable input
demand.

In performing this impact analysis, data from the Census of Manufactures for Standard Industrial Code (SIC) 22 and 23 and those from the Economic Census for North American Industry Classification System (NAICS) 313, 314, and 315 are used because of their comprehensive nature. SIC 22 and 23 and NAICS 313, 314, and 315 cover the U.S. textile sectors of spinning, weaving, knitting, dyeing, finishing, floor coverings, and home furnishings. The years 1992 and 1997 are chosen for the economic analysis because of the availability of consistent and detailed data needed for this analysis. Because the latest census data available at the time of analysis is from 1997, the economic analysis is limited to the investigation of the relatively short-term adjustment of production activities of the U.S. textile industry under the influence of NAFTA. These selected years appear to be more suitable than any other years to investigate the significance of NAFTA on the industry’s production activities because they avoid the effects of the following volatile macroeconomic and political environmental factors of the last two decades: an economic recession in the early 1990s, the Mexican Peso devaluation in late 1994/1995, the Asian currency devaluation in late 1997/1998, an economic recession in the early 2000s, the event of September 11th, wars against Iraq and Afghanistan, China’s undervalued currency and accession to the WTO, and the phase-out of MFA. The outcome of this quantitative analysis is used to make an assessment of the impact of NAFTA on the industry’s production activities and draw policy implications. Finally, the outcomes of the qualitative and quantitative analyses are used to draw conclusions and implications.

1.3 Justification and Limitation of Research

Surrounding the implementation of NAFTA, a great volume of public, political, and academic attention had been given to the industry. Many empirical studies had predicted the impacts of NAFTA on U.S. textile trade, production, employment, and welfare under the various policy scenarios of trade barrier removal. Since the implementation of NAFTA, however, there have been only a few follow-up studies that assess the actual impact of the agreement on the textile and apparel industry’s production activities in the United States and Mexico under NAFTA ([Bair, 2002] [Gereffi, 2000] [Kessler, 1999] [Oh & Suh, 2003]). This research is important to fill this void in knowledge and determine whether the initial goal of NAFTA on the textile industry was achieved as the government and textile interest groups had hoped. As debates have been ongoing with respect to the impacts of other NAFTA-like U.S. RTAs with developing countries that have been completed or are in progress, it is timely to evaluate the impact of NAFTA ([CBO, 2003]) and see whether a change in government policy can be an effective tool to influence the industry’s production activities.

Understanding the textile industry’s output supply and input demand pattern and the impact of NAFTA on the industry’s production activities will help textile entrepreneurs, academicians, and policy makers evaluate or predict the impacts of current or future government policies and their decision makings on business plans. Assessing the impact of NAFTA on the
U.S. textile industry has many implications. The industry has a close business relationship with many industrial sectors through its input purchase and output distribution channels. Because of this channel relationship with a broad range of industrial sectors, changes in the industry’s production activities under NAFTA may have affected production activities, employment, and welfare of the related industrial sectors.

This research has several limitations. The economic analysis is limited to the investigation of the short-term impact of NAFTA on the U.S. textile industry’s production activities because of the limited availability of data at the time of data analysis. Despite drastic changes in the industry’s production activities under volatile macroeconomic and political environments and import surges since the late 1990s, lack of data prevents this analysis from investigating the industry’s production activities after 1997. The economic analysis does not differentiate the effect of NAFTA from those of other market environmental factors on the industry’s production activities. The results of the economic analysis, therefore, should be interpreted cautiously in relation to the industry and market situations during the years examined.

1.4 Organization of Study

This dissertation is organized as follows. Part I of this research includes Chapters 2, 3, 4, and 5 that are related to a qualitative analysis of NAFTA. Chapter 2 presents the definition of the textile industry and the historical review of the U.S. textile industry’s conditions, market environments, technological developments, and productivity from the 1950s to the early 1990s, the pre-NAFTA period. Chapter 3 contains the overall review of international trade policies, discussion of GATT/WTO, and the phase-out and replacement of MFA with the ATC.

Chapter 4 reviews the history of U.S. trade policies with respect to textile and apparel, along with the formation, purposes, and provisions of NAFTA. This chapter also reviews the predicted effects and early empirical studies of NAFTA. Chapter 5 investigates the major environmental factors during the post-NAFTA period that have interfered with the role of NAFTA. This chapter also examines changes in U.S. trade in textile goods and the textile industry’s production activities under the influence of NAFTA using a review of literature and available trade and industry data. Based on the outcome, an attempt is made to evaluate the impacts of NAFTA on the U.S. textile industry and draw policy implications.

Part II of this research includes Chapters 6, 7, and 8 that are related to a quantitative analysis of NAFTA. Chapter 6 introduces the theoretical framework for, and application of, the normalized restricted translog profit model to the U.S. textile industry’s production activities under NAFTA, the derived system of profit share equations of variable input expenditures, and the own- and cross-price elasticities of output supply and input demand with respect to output and variable input prices. This chapter also presents the selection of data sources, time period, research hypotheses, and method of statistical estimation.

Chapter 7 reports the results of the economic analysis and presents interpretation and
discussion of the findings. The outcome of economic analysis is used to evaluate the impact of NAFTA on the U.S. textile industry and draw the policy implications. Chapter § draws the conclusions from the outcomes of the qualitative (Part I) and quantitative (Part II) analyses of this research and suggests implications and future strategies for the U.S. textile industry’s survival.
Part I

Qualitative Analysis
Chapter 2

The U.S. Textile Industry in the pre-NAFTA Period

This chapter aims to provide understanding about the nature and overall conditions of the U.S. textile industry before NAFTA became effective in 1994. It presents the definition of the textile industry and a historical review of the U.S. textile industry and market environments from the 1950s to the early 1990s. The discussions of the industry’s technological development and productivity follow. The detailed discussions on U.S. market environments and the U.S. textile industry’s production activities, capacities, productivity and trade patterns in the 1990s are presented in Chapter 5 Evaluation of the Impact of NAFTA on U.S. Textile Industry: A Qualitative Approach.

2.1 Definition of the Textile Industry

Textile industry can be defined broadly as the textile complex from the production of fibers, yarns, and fabrics to chemicals, machinery, wet processing, and end-use applications (Amacher, Rogers, Vaughn, Rippy, Hunter, Elliott & Bailey, 1991; Dickerson, 1999; U.S. Congress, 1987). From a narrow perspective, the textile industry consists of fiber preparation, the primary textile sectors (yarn spinning, fabric weaving and knitting), dyeing, finishing, and production of floor coverings and home furnishings (Shui, Beghin & Wohlen, 1993).

In the United States, the industry is often referred to as primary textile sectors, excluding production of fiber, chemical processing, machinery, and end-use products (Dickerson, 1999; Amacher et al., 1991). In this research, the textile industry is defined to consist of the primary textile sectors, dyeing, finishing, floor coverings, home furnishings, and others that belong to Standard Industrial Code (SIC) 22 and 23.
2.2 The U.S. Textile Industry and Market Environments

The U.S. textile industry has evolved under the influence of advances in production technologies and changing market environments, domestic market size, and consumer demand patterns. These factors have shaped the industry’s nature, structure, competitive strategies, production systems, and output supply and input demand patterns. The traditional U.S. textile industry consisted of a large number of small- and medium-size family-owned firms and a small number of big firms ([Amacher et al., 1991] [Dickerson, 1999] U.S. Congress, 1987). Access to the large and relatively protected domestic market and the availability of advanced technologies cultivated the industry’s mass production systems of relatively standardized products with long production runs. These contributed to the industry’s decreasing production costs, but limited flexibility in meeting orders of diverse sizes or differentiated products. Technological developments, along with import competition, have driven many small- and medium-size textile firms either out of business or transformed them into larger, financially stronger firms to be able to afford innovations in manufacturing, marketing, and distribution systems. The industry’s reliance on the domestic market has also prevented it from exploring export markets, isolating itself from the dynamic global market environments (Toyne, Arpan, Barnett, Ricks & Shimp, 1983).

On the other hand, the large size of the U.S. textile market and the rapid development of transportation and communication systems resulted in fierce import competition from developing countries, including Japan from the late 19th century through the 1950s, Hong Kong, South Korea, Taiwan, China, and Southeast and South Asian countries since the late 1950s to the present, and Caribbean Basin countries, Mexico, and Canada, from the 1980s to the present. As a result of intensifying import competition, the U.S. textile industry has undergone the difficult transition from monopolizing the large domestic market to sharing it with producers in developing countries.

The textile industry in the 1950s and 1960s experienced a rapid growth of imported cotton textile goods, with excess production capacities in this sector. Technological advances have caused the industry’s gradual shift of input consumption from natural fibers to synthetic fibers that required larger, rationalized firms through vertical and horizontal integration of production systems, modernization, automation, and improved scale economies (Pelzman, 1984; Toyne et al., 1983).

In the 1970s, an increase in cotton and wool prices in 1973 and the oil shock in 1974 raised the industry’s short-term production costs. The overall textile market environments, however, were favorable because of technological changes in chemical production, growth of petrochemical production capacity, devaluation of the U.S. dollar, slow growth of wages, and decreased prices of oil, gas, and synthetic fibers (Cline, 1990; Toyne et al., 1983). The textile industry in this decade focused on minimizing production cost and enhancing the scale economies of long production runs. The industry’s capital intensity continued to increase in response to its growing substitution of cotton fibers with synthetic fibers, increasing consumer
demand for easy care fabrics, and introduction of cotton dust standards to improve textile work environments (Toyne et al., 1983).

The U.S. textile industry in the 1980s emerged as a world leader in productivity and low cost production (Toyne et al., 1983). However, the early decade oil shock and recession, market saturation, the appreciated U.S. dollar, and import surge slowed down the growth of market demand and worsened the industry’s competitive conditions (Cline, 1990; USITC, 1987). More than 350 plants closed during 1981-1988 and 142,000 jobs were lost during 1980-1985 (Amacher et al., 1991; Cline, 1990; Finnie, 1992; USITC, 1987).

There were also major shifts in market demand patterns during the 1980s. The declining share of young adults in U.S. population and changing lifestyles of aging baby boomers changed market demand patterns. The popularity of natural and manufactured fibers fluctuated and consumer demand for quality textiles, casual / leisure wear, and home furnishings increased, along with the development of specialized fibers and new end-use applications of textiles (USITC, 1987).

Facing these challenging market environments and deteriorating competitive conditions, the U.S. textile industry adopted the survival strategies of modernization, automation, adoption of new technologies, cost reduction, and vertical and horizontal integration. It also sought close working relationships within the softgood chain, promoted domestic products, and searched for import-resistant / non-import competing market niches. These adjustment efforts improved the industry’s productivity, economies of scale, and price competitiveness by the end of the 1980s. This was also accompanied by increased textile firm sizes, while the number of firms decreased from 6,520 to slightly over 5,000 between 1982 and the early 1990s (U.S. Congress, 1987; USITC, 1987). These changes also involved the transformation of the industry’s traditional fragment structure into a dual structure, in which small and medium size firms met market demand for a narrow selection of specialized products and a few large firms meet the bulk of market demand with a wide range of products (Cline, 1990). By the end of the decade, however, the industry still remained vulnerable to import competition because many textile firms continued to specialize in long production runs of relatively standardized products that were close substitutes for imports and, therefore, faced fierce import competition. The industry’s structural adjustments also brought heavy debt burdens, interest payments and lower profits to the remaining firms (Amacher et al., 1991; Cline, 1990; U.S. Congress, 1987).

### 2.3 Technological Development

Technological development has exerted major influence on the U.S. textile industry’s production activities and structure of production systems, in pursuit of improving productivity, economies of scale, and cost effectiveness (Verret, 1991). The industry’s technological breakthroughs include commercial production of manufactured fibers, adoption of high-speed, direct-feed carding and open-end spinning, replacement of shuttle looms with shuttleless looms, and advances in computer and electronic applications in production sys-
tems (Jablonski, 1995). The detailed developments of textile technologies are reviewed in chronological order.

In the 1950s, the development of manufactured fibers and adoption of shuttleless looms contributed to the industry’s structural changes (Toyne et al., 1983; Finnie, 1992, U.S. Congress, 1987) by increasing the substitution of cotton fibers with synthetic fibers and deepening the capital intensity of production systems (Shui et al., 1993). In the 1960s, the introduction of advanced ring spinning and open-end spinning, continuous development of synthetic fibers, advances in chemical and petrochemical production, and decreased prices of synthetic fibers significantly improved the efficiency and cost effectiveness of the spinning and weaving sectors (Finnie, 1992; Morrison & Siegel, 1998; Verret, 1991). The U.S. agricultural program, however, maintained higher cotton prices than international levels and, therefore, high textile production costs (Cline, 1990). The introduction of high-speed circular knitters and double knitting machines by the mid-1960s produced knits for “wash and wear” tailored apparel that obtained about 50 percent of the fabric market in the early 1970s (Finnie, 1992).

The 1970s embraced the most remarkable developments in technology. In the spinning sector, one process replaced the roving, spinning, and winding processes, and advances in open-end spinning improved yarn evenness and elasticity (Verret, 1991). In the weaving sector, shuttleless looms replaced wooden fly shuttle looms with improved speed, safety, and decreased noise levels (Cline, 1990). New safety and health regulations diverted a significant portion of the industry’s capital investments towards reducing cotton dust and noise in the workplace (Jablonski, 1995). Excessive investment in computerized knitting machines burdened the knitting sector financially. Increased input prices related to the oil crisis of 1973 and heavy capital investments in modernization drove many commission finishers out of business (Finnie, 1992).

In the 1980s, the U.S. textile industry emerged as the world leader in productivity and low cost production (Toyne et al., 1983) and ranked second in average equipment age (Amacher et al., 1991). However, difficult market conditions due to the U.S. dollar appreciation and import surges resulted in extensive industry restructuring including many mill closures and vertical and horizontal integration. The industry also engaged in modernization and automation of production systems including the adoption of automated ring and open-end spinning and the introduction of air-jet, water-jet, rapier and projectile shuttleless looms. These efforts of upgrading textile production systems sped up spinning and weaving process, produced wider fabrics of higher quality, and reduced yarn breaks, loom stops, and noise levels (Finnie, 1992; Jablonski, 1995; Verret, 1991). Computers were applied to integrate the procedures from bale opening to yarn wind-up (Finnie, 1992) and to monitor and control spinning, weaving, knitting, dyeing, and finishing processes, and connected these processes to packaging and distribution systems (Amacher et al., 1991; Cahill, 1996; Melling, 1997; Unifi, 1998; Greco, 1996). Robots were also used for such limited functions as delivering materials and splicing broken yarn (U.S. Congress, 1987).

The industry’s growing optimization of production systems limited the industry’s flexibility in accommodating diverse market demands such as seasonal / fluctuating demand and small orders of diversified styles (Finnie, 1992; Pelzman, 1984). This led to increasing need
to replace traditional sequential, long production runs with flexible production systems and to experiment with organizational innovations, such as quick response, teamwork, and a reduction in management levels into flatter organizational structures (Amacher et al., 1991; Finnie, 1992; Rudie, 1998). The excessive adoption of new technologies and accumulation of production capacities caused many textile firms’ financial burden. This led to mergers, acquisitions, and financially weak firms being driven out of business (Amacher et al., 1991; Rozelle, 1998).

Overall, the majority of textile firms were not able to fully take advantage of advanced technologies because of their lack of enough capital (Cooper, 2004), slow adjustments to changing market conditions, and unwillingness to engage in flexible business practices (Amacher et al., 1991; Forney et al., 1990). The following section examines the industry’s productivity prior to the implementation of NAFTA.

2.4 Productivity

The U.S. textile industry’s technological developments have contributed to the industry’s on-going restructuring of production systems, decreasing input consumption of labor and natural fibers, and increasing consumption of capital and synthetic fibers. In this sense, the industry’s structural adjustments have been capital/synthetic fiber using and labor/natural fiber saving (Shui et al., 1993). Its modernization, automation, technological developments, and structural adjustments have increasingly optimized machine speeds, efficiency, productivity, and cost effectiveness over decades (Finnie, 1992; Verret, 1991). These developments greatly augmented labor efficiency but decreased textile employment and production capacity (Bala, 1979; Cline, 1990; Jablonski, 1995; U.S. Congress, 1987; USITC, 1987). The industry’s use of capital has increased higher than proportional to the growth of textile output production, causing the industry’s capital deepening (Morrison & Siegel, 1998; Shui et al., 1993). Changes in prices of natural and synthetic fibers, labor, energy and consumer demand have also contributed to the industry’s input substitution. Synthetic fibers accounted for 75 percent of domestic fiber consumption in the 1990s compared to 20 percent in the 1950s (Finnie, 1992; Pelzman, 1984).

As a result of modernization, automation, technological developments, and high input substitution, the textile industry’s productivity, especially labor productivity, has increased rapidly since the 1970s. It ranked the highest in the world by the late 1970s and early 1980s and again in the late 1990s (U.S. Congress, 1987). During 1967-1990, the productivity of the U.S. cotton spinning sector improved 8.5 times and that of the weaving sector improved 6.5 times (Verret, 1991). Labor productivity in the spinning sector improved 3.98 times (kg/operative hour) during 1967-1990 and that of the weaving sector 2.75 times (m2/operative hour) (Verret, 1991). The annual growth rate of labor productivity in the weaving sector was 3.1 percent during 1972-1991 and the productivity of capital annually grew at 0.2 percent during the period. A more comprehensive productivity measure is a multifactor productivity that relates output to the combined inputs of labor, capital, and
intermediate inputs. During 1972-1991, the multifactor productivity of the U.S. textile industry increased 0.8 percent annually (Jablonski, 1995).

Morrison and Siegel (1998) reported the scale economies of the U.S. textile industry from the 1960s through the 1980s. According to their study, the industry experienced moderately increasing scale economies over time. The largest scale economies occurred in the 1970s followed by those of the 1980s and the 1960s in order. The scale economies of yarn and thread mills have been far higher than that of weaving mills. Cotton weaving mills showed higher scale economies than the average of the textile industry while synthetic fiber and silk weaving mills showed lower scale economies than the average of the industry (Morrison & Siegel, 1998).

This chapter reviewed the definition of the textile industry and the U.S. textile industry’s development, market environments, technological developments, and productivity from the 1950s to the early 1990s. Changing market environments such as import competition, technological advances, changing consumer demand, and macroeconomic conditions have shaped the industry’s development, structure, and size over decades, motivating the industry’s heavy reliance on modernization, automation, adoption of advanced technologies, and to improve productivity and price competitiveness. The industry’s structural adjustments have often sacrificed flexibility in production systems, caused serious financial burdens, and driven many small firms out of business. The majority of textile producers have been reluctant to abandon their traditional business practices and slow at adjusting to rapidly changing market environments, resulting in frequent business failures or downsizing. The further discussion on the U.S. textile industry’s production activities, capacities and market environments in the 1990s under NAFTA is reviewed in Chapter 5. The next chapter reviews major international trade policies that, along with technological developments, have affected the textile industry’s trade, domestic market competition, and production activities.
Chapter 3

International Trade Policies

This chapter reviews major international trade policies that have affected world trade in textile goods. Multilateralism and regionalism are reviewed first to understand the trend of international trade policies, followed by the discussion on the General Agreement on Tariffs and Trade (GATT) that was later replaced by the World Trade Organization (WTO). The next sections examine the Multi-fiber Arrangement (MFA), the phase-out of MFA, and its replacement with the Agreement on Textiles and Clothing (ATC) under the WTO. Finally, this chapter presents a historical review of U.S. trade policies to aid understanding of the domestic political environments that effect the textile industry.

3.1 Multilateralism and Regionalism

International trade policies have been classified into two trends: multilateralism and regionalism. Multilateralism represents a cooperative international approach to harmonize rules and policies on major global issues. It is mainly represented by international organizations such as the General Agreement on Tariffs and Trade (GATT), the Organization for Economic Cooperation and Development, the United Nations (UN), and the UN Conference on Trade and Development [Jackson, 1994]. GATT contributed to the partial liberalization of world trade in textiles and apparel through the gradual decline of tariffs and the phase-out of MFA quotas.

Regionalism refers to forming preferential trade agreements or political alliances among a group of countries based on geographic proximity and/or common interests. The first wave of regionalism emerged with the formation of the European Community (EC) in 1958, followed by multiple proposals such as the Free Trade Area among developing countries, the North Atlantic Free Trade Area, the Pacific Free Trade Area, the Latin American Free Trade Area, and the European Free Trade Area (EFTA) in the 1960s. Except for the EC and EFTA, the first wave of regionalism died by the end of the decade [Bhagwati, 1992, Tweeten, 1993].

The second wave of regionalism emerged in the mid-1980s as a reaction to the shift of U.S. foreign policy from multilateralism toward regionalism. This was in response to in-
creasing inefficiencies in and skepticism of multilateral trade negotiations, difficult economic conditions, and anticipated political benefits of regional trade agreements (RTAs) and the consequent U.S. signing of free trade agreements (FTAs) with Israel in 1985, Canada in 1989, and Mexico and Canada in 1994. The European Community (EC) had continuously enlarged its membership to form the European Union (EU) in 1992. This political preference of the United States and Western Europe is represented by the formation of NAFTA and the EU and has contributed to the global spread of RTAs since the mid-1990s (Bhagwati, 1992; Braga, 1992; Brown, Deardorff & Stern, 1992; Busse, 1996; Gagne, 2000; WTO, nd).

The worldwide proliferation of RTAs is examined region by region. In Europe, the EC had undergone deeper market integration, harmonized internal and external economic policies, and established common tariffs and custom systems that eventually led to the formation of the EU single market in 1992 (Hinojosa-Ojeda & Robinson, 1991). The EU has continued to expand its free trade relationships by signing the Europe Agreement with the Central and East European Association in 1995. This agreement enlisted Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, the Slovak Republic, and Slovenia in the EU membership by 2004. Bulgaria and Romania are expected to join later in the decade. By 2004, the EU had 25 member countries. The EU signed the Cotonou Agreement with 77 African, Caribbean, and Pacific (ACP) countries in 2000. This agreement is the successor of the Lome Convention that had governed the relationship between the EU and ACP countries during 1975-2000. The EU has trade agreements with Turkey, Mexico, and Nordic, South African, Mediterranean, and Balkan countries. It had been negotiating a FTA with MERCOSUR for five years, which collapsed in 2004 because of conflicting political and economic interests of participating countries. The EU is currently negotiating trade agreements with the Andean Community and Canada.

In North America, the U.S. government has pursued numerous RTAs. The United States signed the agreement on free trade and investment with the Asia Pacific Economic Cooperation forum (APEC) members in 1993, which will liberalize trade and investment among the industrialized APEC members by 2010 and among the remaining APEC members by 2020. The implementation of NAFTA in 1994 created a free trade and production area in North America that freed the movements of goods, services, investments, and capital within the continent. In the 2000s, the government also signed the Trade and Development Act, the Andean Trade Promotion and Drug Eradication Act, and the U.S.-Central America-Dominican Republic Free Trade Agreement (CAFTA-DR). The U.S. government has also pursued the signing of the Free Trade Area of Americas (FTAA) by 2005 to extend the North American free trade area to South America. These RTAs provide the NAFTA-like trade preferences to Caribbean Basin, African, and South American countries. The detailed discussion of U.S. trade policies and NAFTA is presented in the next chapter.

Along with the signing of NAFTA, Mexico has also diversified its preferential trade agreements with Venezuela, Colombia, Costa Rica, Bolivia, Nicaragua, Chile, El Salvador, Guatemala, Honduras, Uruguay, EFTA, EU, Israel, and Japan and is negotiating with Ecuador, Peru, Panama, and MERCOSUR (Bergsten, 1997; Jacobs, 1999; OAS, nd). The signing of the EU-Mexico Free Trade Area in 2000 was aimed at counterbalancing the U.S.
dominance in the Mexican economy and trade under NAFTA while promoting EU’s exports to, and investments in, Mexico. Despite the signing, Mexico’s heavy reliance on the U.S. market continued and Mexico’s exports to the EU decreased (Sanahuja, 2000; The Americas: Fox, 2001).

In Asia, Japan and East Asian countries have established a close trade partnership that has evolved into a trade bloc. In 1992, as a reaction to increasing formations of RTAs worldwide, the members of the Association of Southeast Asian Nations (ASEAN), including Malaysia, Indonesia, the Philippines, Singapore, Thailand, Brunei, Vietnam, Laos, and Myanmar, agreed to establish an ASEAN Free Trade Area (AFTA), decreased tariffs, and eliminated non-tariff barriers among the member countries (Ng, 2002). Japan has a FTA with Mexico and is negotiating one with Chile. Korea is also negotiating trade agreements with Canada and MERCOSUR and India is also negotiating FTAs with Chile and MERCOSUR. Singapore signed the Panama-Singapore Free Trade Agreement and the Strategic Economic Associating Agreement with Chile, New Zealand, and Brunei in 2005. Other trade negotiations are in progress between Taiwan and Guatemala, China and Chile, and among Thailand, the United States, and Chile.

The GATT appears to be partially responsible for the emergence of regionalism. It has allowed its members to form free trade areas or customs unions with relatively easy conditions for compliance. The ineffectiveness of GATT’s enforcement and the lack of regulations on preferences has contributed to the global proliferation of RTAs. By the late 1980s, RTAs influenced almost 50 percent of world trade (Bhagwati, 1992; Braga, 1992; Krueger, 1993; Solocha, 1994). Currently, most of the WTO members participate in RTAs. The number of RTAs reached 162 by 2002 and, according to the WTO prediction, is expected to reach over 300 by 2007 (WTO, nd).

In response to the formation of numerous FTAs such as NAFTA and the EU and inefficiencies in multilateral trade talks, nations have adopted RTAs to achieve faster trade liberalization within signatory countries and to benefit from trade creation and diversion effects, enlarged market size, enhanced economies of scale, productivity, and specialization, and enhanced political bargaining power (Tweeten, 1993). RTAs are also considered beneficial as they serve as (a) transitional / adjustment processes toward multilateral trade liberalization and (b) vehicles to promote participating countries’ deeper commitments to trade talks and to more easily resolve sensitive trade issues such as agricultural subsidies, intellectual property protection, government procurement, and trade in services. However, RTAs have been criticized because of the following reasons: (a) discrimination against non-member countries, which is a violation against the WTO principle of most-favored-nation treatment, (b) disturbance to multilateral trade talks because RTAs may cause conflicts in trade interests and laws among their signatory countries, (c) increasing administrative barriers and costs for firms to comply with different terms of preferential treatments, (d) potential increase in political and economic tensions, hostility, and retaliation, and (e) distortion of efficient allocation of global production sites.
3.2 The General Agreement on Tariffs and Trade and the World Trade Organization

The GATT was initially founded in 1947 as a multilateral trade and tariff agreement but became the center of world trade that was aimed at liberalizing world trade, improving global economic development and welfare, reducing tariffs, and reducing quantitative trade restrictions. The GATT had the agendas of (a) providing a stable basis for world trade, (b) promoting the rules of nondiscrimination, most-favored-nation, and national treatment on international trade, (c) handling consultation, conciliation, and settlement of trade disputes, and (d) sanctioning regional trade arrangements (Braga, 1992; Cline, 1990; Cohen, 1989; Dickerson, 1999; Krueger, 1993; Jackson, 1994).

The GATT has held five rounds of multilateral trade talks since its foundation. The first ministerial conference, the Kennedy Round (1964-1967), contributed to tariff reductions in more than 80 percent of world trade in industrial goods. The Tokyo Round (1973-1979) reached the resolutions of additional tariff cuts and rules to control non-tariff barriers such as quotas, import licenses, and technical standards. In these two ministerial conferences, textile and apparel trade received special treatment, maintaining the highest tariff protection because of its importance to nations’ economies and the difficulty of resolving trade disputes (Dickerson, 1999). The third ministerial conference, the Uruguay Round (1986-1994), was aimed at strengthening the role of GATT with its expanded coverage for agriculture and manufactured goods to services and trade-related intellectual property rights. The round reached the resolutions of replacing the GATT with the World Trade Organization (WTO), the phase-out of the MFA and non-MFA quotas over a ten-year period, return of textile trade to the GATT rules, protection of intellectual property rights, and strengthening antidumping and countervailing duty provisions. In 1995, the WTO replaced the GATT as the forum of multilateral trade negotiations and arbitration that extends and refines the functions of GATT in harmonizing multilateral trade rules and trade-related issues (Dickerson, 1999; Krueger, 1993; Krueger, 1995).

The multilateral negotiations under the WTO have progressed through the Fourth Ministerial Conference in Doha, Qatar in 2001 and the Fifth Ministerial Conference in Cancun, Mexico in 2003, both of which experienced setbacks without reaching resolutions because of conflicting issues such as market access, tariff reduction, and elimination of subsidies to agricultural and manufacturing industries (Morrissey, 2005b). Overall, multilateral trade talks under the GATT/WTO have reduced tariffs in developed countries and contributed to the partial liberalization and expansion of world trade.

3.3 The Multi-fiber Arrangement

The MFA had guided bilateral negotiations of quotas on textile goods traded between developed and developing countries from the early 1970s to the mid-1990s (Krueger, 1993). The origin of the MFA goes back to the Short-Term Arrangement (STA) (1961) and Long-Term
Arrangement (LTA) (1962, 1967, and 1970) that had controlled the growth of cotton textile imports to developed countries. These agreements legitimized the use of bilateral and unilateral quotas outside the GATT principles in order to prevent market disruption in developed countries (Cline, 1990; Cohen, 1989; Finger & Harrison, 1994; Khanna, 1994; Pelzman, 1984; Reinert, 2000). As the STA and LTA had caused developing countries to increase their exports of manufactured-fiber products, developed countries’ concerns about the loopholes of these import restrictions had risen (Kirby, 1993; Krueger, 1993; Pelzman, 1984). As the U.S. textile industry faced increasing difficulties from intensifying import competition, oil crisis, and increased production costs, the U.S. government negotiated bilateral agreements with Japan, Hong Kong, Taiwan, and South Korea in 1971 to control their exports of wool and manufactured-fiber textiles and apparel. The government also attempted to extend the LTA coverage to wool and manufactured-fiber products. This effort led to the signing of the MFA in 1973. The MFA replaced the LTA and controlled developed countries’ imports of manufactured-fiber and wool products in addition to cotton textile products (Trela & Whalley, 1990).

The MFA was the culmination of voluntary export restraints (VERs) in textile and apparel trade (Underhill, 1998), which became the most enduring part of U.S. protectionist policies on textile goods. The initial goals of MFA were to expand and liberalize world trade in textile goods by reducing trade barriers without disrupting the corresponding industries in importing countries (Cline, 1990; Cohen, 1989; Dickerson, 1999; Pelzman, 1984). The actual role of MFA, however, conflicted with its initial goals and the GATT rules of most-favored-nation, national treatments without discrimination, and use of tariffs instead of quotas. Importing countries controlled the MFA quota system by issuing export licenses to exporting countries that allocated quotas to their domestic firms (Trela & Whalley, 1990; Trela & Whalley, 1992). The MFA functioned as a regime to restrict trade, discriminate against developing exporters, and suppress competitive or new exporters (Cline, 1990; Khanna, 1994; Yang, 1994; USITC, 1994).

The MFA lasted for two decades through the several renewals from the original MFA-I in the early 1970s to the extensions of the MFA-IV in the early 1990s until it was expired in December 1994. The quota coverage of MFA had also extended from the original cotton textiles under the STA and LTA in the 1960s to manufactured-fiber and wool products in the 1970s, and to vegetable-fiber and silk blend products in the 1980s. The impacts of the MFA had been obvious on U.S. imports of textile goods. By 1993, the United States had bilateral agreements with 40 countries in 147 commodity groups, which covered 80 percent of U.S. imports of textiles and apparel. The tariff equivalents of both the MFA quotas and tariffs were 23 percent for textiles and 48 percent for apparel, indicating strong protectionism on these sectors (Cline, 1990; Dickerson, 1999; USITC, 1994; Krueger, 1993; Krueger, 1995).
3.4 Phase-out of MFA and Agreement on Textiles and Clothing

The Uruguay Round of the GATT reached resolutions on textile and apparel trade in 1993 that are specified in the Agreement on Textiles and Clothing (ATC). These resolutions are as follows: (a) the elimination of all MFA and non-MFA quotas on textile and apparel trade over a ten-year period and, in the process, the acceleration of quota growth rates for remaining products that had not yet integrated into the WTO, (b) the replacement of MFA with the ATC in 1995, and (c) the return of textile and apparel trade to the WTO rules of multilateral trade without discrimination. These resolutions reflect the weakening political influence of U.S. textile interest groups, the shift of U.S. political interests from textiles to service and high-tech industries, and developing countries’ opposition to the MFA (Finger & Harrison, 1996; Underhill, 1998). The MFA quotas expired in December 1994 although the MFA quota system remained in effect during the phase-out process.

The ATC specified the minimum import volume to be integrated into the WTO in each of the three MFA phase-out stages. The remaining quotas were subject to increased growth rates. Importing countries chose the quota categories among tops and yarns, fabric, made-up textile products, and apparel to be integrated into the WTO (Reinert, 2000; Wang, 1999; Baughman, Mirus, Morkre & Spinanger, 1997). The ATC also enforced the following requirements on WTO members as a part of the integration process: (a) to improve access to textile and apparel markets by reducing tariffs, eliminating or reducing non-tariff barriers, and relaxing customs procedure and licensing formalities, (b) to provide fair conditions in areas of anti-dumping and countervailing measures, subsidies, and protection of intellectual property rights, and (c) to eliminate the discrimination of origin (Kirby, 1993). The ATC also provided guidelines on resolving violations in textile trade against the WTO rules of nondiscrimination and transparency (Dickerson, 1999; Reinert, 2000).

The phase-out of the MFA by 2005 was expected to partially return world trade in textile goods to the rule of comparative advantage (Treia & Whalley, 1990) and increase efficiencies in competition, production, consumption, and manufacturing in world textile and apparel markets (Kirby, 1993). However, the full liberalization of textile and apparel trade was delayed to the last stage of the phase-out process because of the loopholes in the provisions of ATC such as long transition period, lack of definition of import-sensitive products, importing countries’ control over the phase-out process and selection of products to be integrated into the WTO, including import-insensitive, non-MFA junk products (Baughman et al., 1997; Spinanger, 1999), and potential abuse of safeguard provisions even when there is no significant injury or threat of injury from imports to the domestic industry (USITC, 1994; Reinert, 2000). There also have been concerns about possibly continuing protectionist pressure on world trade in textile goods after the establishment of the ATC and the phase-out of the MFA. Textile interest groups’ continuous lobby activities were expected to create new protectionist policies and trade barriers in the forms of tariffs, anti-dumping, safeguards, and trade blocs such as the EU and NAFTA (Moon, Leung, Chang & Yeung, 1997; Reinert,
3.5 Trade Policies of the United States

3.5.1 Prior to the 1900s - the 1970s

U.S. trade policies have been relatively protective for the textile industry. The beginning of protective policies for the industry dates back to duty imposed on textile imports in 1808, followed by policies of import substitution, tariffs, and embargoes since the late 1800s through the early 1900s. As Japan emerged as the largest exporter of cotton textiles in the world from the late 1800s through the early 1900s, the U.S. government tried to decrease import competition from the country in the domestic market by negotiating the first voluntary export restraints (VERs) on the country’s textile exports in 1935 and additional VERs in 1937 through 1940 (Dickerson, 1999; Faini, Melo & Takacs, 1995; Finger & Harrison, 1994).

As the U.S. economy entered the Great Depression after World War I and the implementation of the Smoot-Hawley Tariff Act of 1930, and the consequent increase in U.S. tariffs, the U.S. government led international efforts to establish the GATT in 1947 as a multilateral trading system, which was designed to facilitate world trade and the recovery of world economy (Krueger, 1993). In the early 1950s, the Japanese textile industry experienced rapid export growth and other developing countries also increased their exports. In the meantime, the U.S. textile industry experienced adjustment problems due to excess production capacities in the cotton textiles sector, a shift to synthetic fibers, and technological changes that increased the industry’s vulnerability to import competition and dependence on protectionism (Dickerson, 1999; Faini et al., 1995; Krueger, 1993; Pelzman, 1984).

The industry’s political pressure led to the U.S. imposition of VERs on Japan’s exports of cotton textile in 1955 and 1957 (Khanna, 1994; Finger & Harrison, 1994). These VERs failed to control import growth because other developing countries filled the gap left by declining Japanese exports, which led to the U.S. negotiation of VERs on Hong Kong, India, and Pakistan’s cotton textile exports (Reinert, 2000). The VERs on Hong Kong’s exports were not effective because of Hong Kong’s low dependency on U.S. market, close diplomatic relationships with Great Britain, and its skillful Washington negotiators. Hong Kong became the largest exporter to the United States by 1960 (Cline, 1990; Cohen, 1989; Dickerson, 1999).

In the early 1960s, intensifying U.S. textile lobby activities against imports resulted in U.S. initiation of multilateral discussions that led to the Short-Term Cotton Textile Arrangement (STA) in 1961 and the Long-Term Arrangement on Cotton Textiles (LTA) in 1962, 1967, and 1970. The control of LTA over imports of cotton fiber textiles and apparel caused the rapid import growth of manufactured fiber textiles and apparel from the newly industrializing Asian countries during 1962-1973 (Krueger, 1993; Pelzman, 1984). In response, the U.S. government completed bilateral agreements with several East Asian countries in 1971 and signed the MFA in 1973 to control imports of manufactured fiber and wool products.
Changing economic and political conditions in the 1970s, on the other hand, gradually triggered the departure of U.S. trade policy from multilateralism toward unilateralism and protectionism (Krueger, 1995), which slowed down the process of global trade liberalization. The outcome of this shift was the U.S. adoption of the Section 301 of the Trade and Tariff Act of 1974 that allowed unilateral and retaliatory practices against unfair foreign trade practices. The adoption of the Generalized System of Preferences in 1976, on the other hand, allowed preferential tariff treatments to exports from developing countries although import-sensitive goods including textiles and apparel were excluded from the preferential treatments (Krueger, 1993).

3.5.2 The 1980s - the 2000s

Difficult international and domestic market conditions in the early 1980s, including recession, the U.S. dollar appreciation, and import surges, strengthened U.S. protectionism, especially for labor-intensive or import competing industries. This included textiles, apparel, steel, automobile, and agriculture whose lobbying activities have become powerful forces in U.S. politics. U.S. protectionism has been carried over through tariffs, quotas, anti-dumping and countervailing measures, and rules of origin. Tariffs have become insignificant trade barriers among developed countries through several GATT resolutions (Krueger, 1993). However, tariffs on textile and apparel trades remained strong, ranging between 12 percent and 23 percent by 1986 (Cline, 1990) as they received special treatments in the multilateral trade talks of GATT. The tariff equivalents of all protective measures (including tariffs and quotas) were 23 percent for textiles and 48 percent for apparel in the 1980s (Krueger, 1995). The corresponding estimates of Cline (1990) were 28 percent and 53 percent in 1986. Another protective policy, rules of origin, was implemented in 1984. This policy requires substantial physical transformation of goods in their origin country to prevent transshipments, which have become significant administrative barriers to trade (Dickerson, 1999).

U.S. foreign policy underwent a major drift from multilateralism to regionalism and protectionism in the mid-1980s in response to the complicated process of completing multilateral talks, difficult economic conditions, and the need for foreign market access (Gagne, 2000; Brown et al., 1992; Krueger, 1993; Krueger, 1995; Krueger, 2000; Underhill, 1998). This policy shift started with its signing of free trade agreements (FTAs) with Israel in 1985 and Canada in 1989, which triggered the second wave of regionalism. The U.S. government also signed the Framework Agreement with Mexico in 1987 and a four-year bilateral textile agreement in 1988 (Jacobs, 1990).

The United States also adopted the protectionist policy, Omnibus Trade and Competitiveness Act, in 1988 to achieve reciprocal access to foreign markets, help domestic industries, and reduce U.S. trade deficits. The Super-301 provision of this Act was a revised version of Section 301 of the Trade and Tariff Act of 1974 that allowed imposing unilateral retaliatory tariffs or restricting imports from a specific country in response to its allegedly unfair trade practices. This provision expired in 1990 (Dickerson, 1999; Krueger, 1993; Krueger, 1995).
Another major trade policy introduced by the U.S. government in 1963 was Article 807 in the U.S. Tariff Schedule. This policy was designed to complement the U.S. disadvantage of high labor costs by promoting U.S. foreign assembly of electronics, automobiles and apparel using U.S. input material and importing the assembled products under quota restrictions with duty paid on the value-added. In 1986, Article 807a was added to remove quota restriction on these goods. In 1989, Article 807 was replaced by Subheading 9802.00.80 when the Harmonized Tariff Schedule (HTS) was implemented to facilitate foreign trade and standardize trade data (Dickerson, 1999; Krueger, 1993).

In 1990, the U.S. policy shift to regionalism was materialized with the launch of the Enterprise for the Americas Initiative (EAI) that was aimed at integrating the North American Free Trade Area and Latin American countries to create a Western Hemisphere Free Trade Area (WHFTA) for the goals of facilitating trade and capital investments, achieving economic ties between the United States and Latin American countries, debt crisis resolution, economic growth, and stabilizing political reforms (Braga, 1992; Hufbauer & Schott, 1996). The United States also initiated the summit of the Asia Pacific Economic Co-operation forum (APEC) in 1993 that reached the agreement on free trade and investments among the industrialized APEC members by 2010 and among the remaining members by 2020. This agreement is expected to create the largest trade bloc in the world because the economic power of APEC members accounts for more than half of that of the world and its membership is open to non-member countries (Bergsten, 1997).

The United States signed the North American Free Trade Agreement (NAFTA) with Mexico and Canada in 1994, which will be discussed in the next section. NAFTA was considered the first step toward a WHFTA or the Free Trade Area of Americas (FTAA) (Braga, 1992; Tweeten, 1993). The U.S. government also negotiated Chile’s accession to NAFTA and extended such negotiations with Central American, Caribbean, MERCOSUR and Andean countries (Bhagwati, 1992; Busse, 1996; Hanson, 1998; Hufbauer & Schott, 1994, Hufbauer & Schott, 1996). The Summits of the Americas held in Miami (1994), Santiago (1998), and Quebec (2001) planed to complete FTAA negotiations by 2005 to establish a free trade zone of North and South Americas (Bergsten, 1997; Hufbauer & Schott, 1996) that will help open new foreign markets for U.S. products and services, protect intellectual property, simplify customs procedures, strengthen labor and environmental laws, and reduce U.S. prices of consumer goods (Morrissey, 2005b). The negotiation process, however, has stalled, including the failure of the latest summit in Mar del Plata, Argentina (2005), in reaching resolutions, because of participating countries’ different political and economic agendas in areas of agricultural subsidies, anti-dumping protections, liberalization of government procurement and services, and patent protections. Despite the bumpy road ahead, the completion of FTAA and the agreement on free trade and investments among the APEC members in 2020 will change the future grouping of major players in world trade (Ellis, 2000).

U.S. preference of regionalism continues in the 2000s. The U.S. government signed the Trade and Development Act of 2000, which consists of the African Growth and Opportunity Act (AGOA) and the Caribbean Basin Trade Partnership Act (CBTPA), to provide NAFTA-like preferential trade treatments and investment opportunities to sub-Saharan and
Caribbean basin countries that will last for eight years from October 1, 2000 or until FTAA comes into effect. This agreement gives duty- and quota-free status to apparel exports from qualifying sub-Saharan African and Caribbean basin countries to the United States, which is similar to NAFTA benefits for Mexico. The effect of AGOA on the U.S. textile and apparel industry was expected to be negligible (Cottrill, 2000; Lynch, 2000; USITC, 1997; USITC, 2001; Verdisco & Cain, 2000).

In 2002, the U.S. government signed the Andean Trade Promotion and Drug Eradication Act (ATPDEA) with Andean countries - Bolivia, Colombia, Ecuador, and Peru, which is the renewal of the previous Andean Trade Preference Act implemented in 1991-2001. ATPDEA is designed to provide duty and quota-free treatments to exports from the beneficiary countries to the U.S. market, reduce drug production and trafficking, and promote economic development and democracies in the region (White House, 2002). The government also signed the United States-Morocco Free Trade Agreement in 2004. The U.S. government plans to establish a Middle East Free Trade Area (MEFTA) by 2013 to help the Middle East fully participate in world trade, prevent terrorism, and promote economic development.

The U.S.-Central America-Dominican Republic Free Trade Agreement (CAFTA-DR) was signed in 2004 and obtained approvals of the U.S. Senate and House in 2005. CAFTA-DR promotes reforms in the beneficiary countries’ economic, democratic, and legal systems and provides U.S. exports with reciprocal market access to Central America - Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, and Nicaragua - as the agreement eliminates 80 percent of these countries’ tariffs on U.S. exports with the ten-year phase-out of remaining tariffs and yarn-forward rule of origin. Prior to the signing, however, 70 percent of Central American exports had already entered the U.S. market duty free under the Caribbean Basin Initiative and General System of Preference programs. The current concern on CAFTA-DR is that Central America may become the entry port of Chinese textiles to the U.S. market as input materials used in the region’s assembled apparel goods (Reichard, 2005).

Currently, the United States has FTAs or preferential trade agreements with Canada, Mexico, Jordan, Chile, Australia, Singapore, Morocco, Bahrain, and countries in the Caribbean Basin, sub-Saharan African, Central American, and Andean regions. It will negotiate FTAs with Panama, Thailand, and countries of the Southern African Customs Union (Botswana, Lesotho, Namibia, South Africa, and Swaziland) Oman, and the United Arab Emirates (CBO, 2003; Morrissey, 2004). This section reviewed U.S. political environments behind the creation of NAFTA. The following sections present the discussion of NAFTA in terms of formation, purposes, provisions, empirical studies, and the pre-NAFTA expectations of the effects of the agreement.

This chapter reviewed international trade policies, including multilateralism, regionalism, the GATT and its replacement with the WTO and the MFA and its phase-out and replacement with the ATC. A historical review of U.S. trade policies with respect to the textile industry followed. The next chapter presents an overview of NAFTA.
Chapter 4

The North American Free Trade Agreement

In this chapter, the economic and political perspectives that influenced the North American Free Trade Agreement (NAFTA) are reviewed in terms of formation, purposes, provisions, and expected benefits and disadvantages. These perspectives were shared by many academicians, politicians, and the public around the time of NAFTA implementation. Finally, this chapter reviews the predictions of the empirical studies of NAFTA that had been published prior to or in the beginning of NAFTA implementation.

4.1 Formation of NAFTA

The political background behind the formation of NAFTA is outlined in this section. The United States, Canada, and Mexico signed NAFTA in December 1993 that went into effect in January 1994. Along with the EU, NAFTA was considered the most comprehensive FTA to create the largest market/trade bloc against the EU, and the economic ties between Japan and neighboring countries. NAFTA was expected to eventually expand the North American Free Trade area to Central and South America and the APEC countries (Bergsten, 1997; Hufbauer & Schott, 1993; Orme, 1996; Solocha, 1994; Rees, Hathcote & Dyer, 1993).

The creation of a North American free trade and production zone without barriers on movements of goods, services, investments, and capital was aimed at facilitating the necessary restructuring and improving competitiveness of North American transnational corporations (TNCs) (Clifton, 1989; Grinspun, 1993; Thuemer, 1991). The Mexican government had pursued NAFTA to revitalize its impoverished economy. The country’s economy had been impoverished since World War II as a result of its protectionism and inward-oriented/import-substitution development policy. Mexico underwent a debt crisis in 1982 due to rising international interest rates, peso devaluation, and the fall of oil prices (Hinojosa-Ojeda & Robinson, 1992; Kehoe & Kehoe, 1994; Sobarzo, 1992).

To deal with its economic crisis, the Mexican government initiated trade reform in 1985...
to participate in international competition and decrease dependence on oil exports. It also joined the GATT in 1986 to indicate its political shift to an outward-oriented, export-promotion development policy (Boyd, Krutilla & McKinney, 1991; Hinojosa-Ojeda & Robinson, 1991; Hinojosa-Ojeda & Robinson, 1992; Kehoe & Kehoe, 1994). Mexico’s needs to recover economic growth, improve access to the U.S. market, and improve the credibility of a political shift to outward-oriented development policy were reflected in its signing of the Framework Agreement with the United States in 1987 and a four-year bilateral textile agreement in 1988. Mexico proposed a free trade agreement with the United States in 1988 and they launched liberalization and integration policy of trade and foreign investments in 1990, endorsed a bilateral free trade agreement, and completed NAFTA negotiations with Canada in 1992. Mexico also engaged in a special regime program to export its assembled apparel goods made of U.S. inputs to the U.S. market without quota restrictions and with tariffs imposed on the value added (Gruben, 1992; Hanson, 1998; Hinojosa-Ojeda & Robinson, 1991; Hinojosa-Ojeda & Robinson, 1992; Jacobs, 1990; Kehoe & Kehoe, 1994).

The negotiation process of NAFTA was complicated. Populist politicians, such as Ross Perot and Patrick Buchanan, warned of the harmful effect of NAFTA on U.S. jobs. Labor and environmental groups were concerned about the potential impact of the agreement on wages and labor standards, the lack of labor adjustment and environmental treatments in NAFTA provisions, and the potential relocation of U.S. industries to Mexico (Faux, 1993; Friedman, 1992; Hanson, 1998; Hufbauer & Schott, 1993; Krueger, 1993; Perot & Choate, 1993; Thorbecke & Eigen-Zucchi, 2002).

The U.S. government made efforts to compromise with these conflicts by introducing protective measures in the NAFTA provisions such as strict rules of origin, long transitional period for adjustments, and safeguard mechanisms to protect import sensitive industries (Hufbauer & Schott, 1993). The government also completed the negotiations on labor and environmental side agreements in 1993 to promote basic labor principles such as freedom of association, right to organize, collective bargain and strike, protection of child, underage, migrant, and forced labor, minimum employment standards, and environmental concerns (Orme, 1996). The side agreements, however, were criticized for their limited effects and not dealing with the major environmental issues related to energy, natural resources, and agriculture (Grinspun, 1993; Mayer, 1998). The purposes and provisions of NAFTA are presented in the following sections.

4.2 Purposes and Provisions of NAFTA

Many politicians and economists envisioned NAFTA to complement scarce and abundant production resources, enhance scale economies, and facilitate the growth of economy and employment in North America by liberalizing regional movements of goods, services, capital, and investments (Brown et al., 1992; Hufbauer & Schott, 1993; Krugman & Hanson, 1993; Solocha, 1994). With respect to textiles and apparel, the important NAFTA provisions were the elimination of tariffs and quotas, rules of origin, and safeguards (CBO, 1993). Tariffs on
textile goods meeting rules of origin were subject to elimination immediately (most items) or over five, ten, or fifteen years (a few selective items). Meanwhile, the signatory countries’ external tariffs on imports from non-NAFTA countries remained in place. The MFA quotas on U.S. imports of Mexican origin textile goods were immediately eliminated upon the implementation of NAFTA while those on non-originating imports faced a ten-year MFA phase-out schedule (Barry & Siwicki, 1993; CBO, 1993; Gantz, 1992; Lipsey, Schwanen & Wonnacott, 1994; USITC, 1993).

Rules of origin were included to prevent the transshipments of non-North America-origin exports to a target NAFTA country by taking advantage of differences in the NAFTA member countries’ external tariff rates. This provision requires goods to be made from North American inputs and undergo significant physical transformation in North America in order to be eligible for NAFTA preferences. This provision is most restrictive with respect to textiles and apparel that reflect abundant North American supply and vulnerability to import competition of these goods and strong political pressure from textile interests to adopt protective policy measures and prevent the transshipments of Asian exports to the U.S. market through Mexico (Hufbauer & Schott, 1993; Kessler, 1999; Rees, Hathcote & Dyer, 1993; Solocha, 1994; Vosko, 1993). This provision was expected to cause the diversion of trade and investments from Asia to Mexico (Braga, 1992; Lipsey et al., 1994; Solocha, 1994; USITC, 1993).

The general rule is yarn-forward rule of origin that requires textile and apparel goods to contain yarns produced in North America and undergo physical transformation through weaving, cutting, and sewing and changes in their tariff headings within North America. Fiber-forward rule of origin is applied to textile and apparel goods made of fibers that are produced enough to meet demand in North American, which include knitted and non-woven fabrics, spun yarns made of cotton or synthetic fiber, and made-up textile articles and tufted carpets made of synthetic fibers (CBO, 1993; Crosby, 1994; USITC, 1993; Lipsey et al., 1994). Less strict rules of origin are applied to textile and apparel goods whose North American supply does not meet market demand (Crosby, 1994). Overall, rules of origin require 62.5 percent North American content for duty-free treatment (Solocha, 1994). Political pressure from textile interest groups was also reflected in the inclusion of safeguard provision that allows the temporary imposition of quotas on surging imports from non-NAFTA countries to protect domestic industries (Barry & Siwicki, 1993; Gantz, 1992; Hufbauer & Schott, 1993).

With respect to foreign investments, NAFTA requires national treatments of, and removal of, performance requirements (e.g., local contents and export performance requirements) on regional investments and provides regional investors access to Mexico’s core industrial sectors such as petrochemicals and financial services. Overall, NAFTA complies the GATT/WTO requirements for establishing a free trade area by including the provisions of tariffs and non-tariff barrier elimination and national treatment of investments (Solocha, 1994). This section examined the purposes and major provisions of NAFTA that have most affected the U.S. textile industry and trade. The predictions of the benefits and disadvantages of NAFTA are reviewed in the next sections.
4.3 Predictions of the Impacts of NAFTA

4.3.1 Expectations on Benefits

Surrounding the implementation of NAFTA, many researchers had predicted the potential benefits of NAFTA for the United States and North America such as market expansion, accelerated economic and income growth, enhanced scale economies, decreased trading costs, and improvement in North American firms’ comparative advantage and specialization. The agreement was expected to create and divert the flow of trade and investments and change the composition and magnitude of them with increased Mexican demand for U.S. intermediate, capital, and high-tech products \cite{Brown et al., 1992, Gantz, 1992, Gruben, 1992, Hufbauer & Schott, 1993, Koechlin & Larudee, 1992, Krugman & Hanson, 1993}. The liberalization of investments and company ownership under NAFTA was predicted to rationalize the allocation of industrial manufacturing sites in North America based on labor costs, returns to scale, and size of economy and consumer market. Labor-intensive production systems, such as that of apparel, were expected to shift away from the United States and other developing countries to Mexico while capital-, knowledge-intensive production systems remain in the United States \cite{Hanson, 1998, Orme, 1996, Solocha, 1994, Venables & Wijnbergen, 1993}.

The trade creation and diversion effects of NAFTA were expected to be noticeable in U.S. trade of textile goods, automobiles, and agricultural goods \cite{Braga, 1992, Busse, 1996}. Trade creation occurs when cheaper imports from a signatory country replace more expensive, domestically produced goods. Trade diversion occurs when more expensive imports from a NAFTA country replace cheaper U.S. imports from non-member countries \cite{Orme, 1996}. The trade diversion effect of NAFTA was expected to be significant in the case of textile and apparel trade because the difference between the NAFTA preference and the combined effects of most-favored-nation tariff rates, quotas, and other trade restrictions is large \cite{James & Umemoto, 2000}. NAFTA was expected to make Mexico an U.S. sourcing alternative over Asia and increase Mexican demand for U.S. textiles as a result of the expanding Mexican economy and apparel industry. Overall, the greatest economic gains of NAFTA were predicted for Mexico, minor gains were anticipated for the United States, and no gains were expected for Canada beyond those achieved under the Canada-U.S. Free Trade Agreement \cite{Hinojosa-Ojeda & Robinson, 1992, Krugman & Hanson, 1993, Rees et al., 1993, USITC, 1993}.

4.3.2 Expectations on Disadvantages

There had been warnings of the negative effects of NAFTA. The agreement was expected to increase intra-NAFTA trade and relocate labor-intensive industries and jobs to Mexico at the expense of the rest of the world (ROW). NAFTA was likely to divert the flow of trade and investments and relocate labor-intensive production away from the United States and developing countries in Asia, Caribbean Basin, and other developing countries to Mexico in order to take advantages of Mexico’s low labor costs, labor and environmental standards,
and NAFTA preference. Meanwhile, capital- and knowledge-intensive production systems were expected to remain in the United States. This diversion of trade and production to Mexico was considered partially against the rule of comparative advantage and optimal global allocation and was expected to put downward pressure on wages, employment of unskilled labor, and working conditions in North America. There was also a concern about non-NAFTA countries possibly creating export platforms in Mexico to improve their access to the U.S. market (Brown et al., 1992; Friedman, 1992; Hufbauer & Schott, 1993; Koechlin & Larudee, 1992; Krueger, 1993; Solocha, 1994).

The U.S. apparel industry was expected to be most negatively influenced by NAFTA because of its labor-intensive nature. Decreasing demand for U.S. textiles from the declining U.S. apparel industry was projected to be partially compensated by increasing demand from the expanding Mexican apparel industry. However, the disappearing base of the U.S. apparel industry was likely to eventually cause the decline of the U.S. textile industry because geographical proximity between input suppliers and output producers is critical (Scheffer, 1994, p. 117).

Up to now, the early expectations on the positive and negative effects of NAFTA are discussed based on a review of literature. The next section presents the outcomes of the empirical studies of NAFTA that had been published prior to, or in the early years of the implementation of the agreement.

### 4.4 Early Empirical Studies of NAFTA

The majority of early NAFTA studies that predicted the impacts of agreement used applied general equilibrium (AGE) models or, in other words, computable general equilibrium (CGE) models, to predict the potential economic impacts of NAFTA. AGE models have been common economic tools to simulate and predict the impacts of policies on industrial production, prices of production resources, welfare, and resource allocation among industrial sectors in single or multiple economies (Brown et al., 1992; Hinojosa-Ojeda & Robinson, 1991; Hinojosa-Ojeda & Robinson, 1992; Kehoe & Kehoe, 1994). A partial equilibrium model, on the other hand, applies to only one industrial sector.

Most AGE models used in the empirical studies of NAFTA have been static and cannot endogenize the dynamic effects of foreign investments, labor, and capital adjustments, market structure, and uncertainty in predicting the impacts of policies. Therefore, some researchers preferred dynamic models to incorporate these dynamic factors for producing more realistic estimates (Kehoe & Kehoe, 1994; Morales, 1997; Venables & Wijnbergen, 1993; Weintraub, 1992). Most of the early empirical studies of NAFTA were simulation studies of various policy scenarios in the agreement to predict the potential impacts of the agreement, using data mostly collected prior to the 1990s.

In general, the use of different structural settings, data sources, assumptions, and groupings of countries and industrial sectors had resulted in varied outcomes of the empirical studies (Kehoe & Kehoe, 1994; Morales, 1997). However, the overall consensus among the
empirical studies of NAFTA predicted gains from the agreement such as improved welfare and scale economies, expanding trade between the United States and Mexico, and a minor but positive impact on the U.S. economy and trade. The projections for U.S. employment were conflicting, either a slight increase or decrease. Mexico was expected to experience greater economic impact and structural adjustments. With respect to textiles and apparel, the overall consensus was that NAFTA would increase the signatory countries’ trade in textiles and apparel at the cost of third countries. The agreement was expected to yield a positive, but minor impact on the U.S. textile industry’s output, employment, capital, and trade while the U.S. apparel industry loses most and the Mexican textile and apparel industry gains. The detailed findings of some of these studies with respect to textiles and apparel are presented.

INFORUM (1990) predicted the effects of the U.S.-Mexico Free Trade Agreement (FTA) on these countries’ industrial outputs, employment, consumption, trade, and income. This study used two dynamic macroeconomic models for Mexico and the United States and simulated the NAFTA scenarios of removing tariffs and non-tariff barriers using 1988 and 1989 data. This study projected that FTA would improve the U.S. economy and employment with chemicals, rubber, plastic, textile sectors gaining from the agreement, while retailing, food, and beverage sectors would lose. Mexico’s textiles, apparel, footwear, and service sectors were predicted to gain. Removing both tariffs and non-tariff barriers was projected to yield a larger effect on U.S.-Mexican trade than that of removing tariffs only.

Boyd, Krutilla, and McKinney (1991) employed a static CGE model to measure the effects of tariff removal between the United States and Mexico on the U.S. economy. They predicted that removing tariffs between these countries would significantly expand bilateral trade between them with minor impact on U.S. economy, production, trade, and income allocation. Manufacturing and chemical industries were projected to gain from FTA while crude oil, refining, and agricultural sectors would lose (Boyd et al., 1991). Using a static CGE model, Hinojosa-Ojeda and Robinson (1991) examined the impact of the NAFTA scenarios of eliminating tariffs and non-tariff barriers, capital inflow, and labor migration on the U.S. and Mexican economies, labor, capital, and productivity. They predicted the minor impact of eliminating tariffs and non-tariff barriers on the U.S. economy and a little impact on reducing Mexican migration to the United States and real wages in both countries. The Mexican economy was projected to undergo a slightly larger impact and structural adjustment than those of the United States (Hinojosa-Ojeda & Robinson, 1991).

Brown, Deardorff, and Stern (1992) used a static CGE model to simulate the impacts of eliminating tariffs and non-tariff barriers and liberalizing capital investments on resource prices, intersectoral and international allocation of resources and production, and welfare, using 1989 data. They projected the improved welfare and scale effects of NAFTA on all signatory countries with the United States experiencing little intersectoral relocation of production resources, slightly decreased employment, a slight rise in wage and rents, and a small change in total imports from Mexico. Mexico’s exports of agriculture, textiles, apparel, and leather to the United States were predicted to increase. The outcome of sectoral model projected removing tariffs with 25 percent increase in import quotas was predicted to slightly
increase the U.S. textile and apparel industry’s output, employment, capital, number of firms, and trade (Brown et al., 1992).

Sobarzo (1992) measured the impact of NAFTA on the Mexican economy in terms of welfare, GDP, employment, profits, trade balance, exchange rates, and individual industrial sectors using a CGE model. He predicted decreases in Mexico’s product prices, increases in industrial outputs, and little changes in employment, profits, and exchange rates of NAFTA signatory countries and ROW. The number of firms in North America was projected to decline with improved utilization of production resources. Mexico’s textile and apparel exports to North America were predicted to increase significantly (Sobarzo, 1992). Young and Romero (1991) and Kehoe (1992) used a static CGE model and regression analysis, respectively, to estimate the impact of NAFTA on Mexico. They predicted the growth of Mexican net domestic product and increased manufacturing output per worker (Kehoe, 1992).

In a study of textile, apparel, and steel sectors, Trela and Whalley (1992) measured the effects of removing tariffs and quotas among the NAFTA signatory countries on production, trade, welfare, and rent transfer using an AGE model and 1986 data. They projected overall welfare gains for the United States and Mexico with the majority of gains accruing to Mexico. Bilateral and trilateral free trade was projected to yield a slight decrease in U.S. textile and apparel production, a slight increase in U.S. welfare, and an increase in Mexico’s textile and apparel production with little effect on Canada and a slightly negative effect on the ROW (Trela & Whalley, 1992). Using explicit and ad valorem modeling approaches of a static general equilibrium model, Trela and Whalley (1994) also predicted that removing both tariffs and non-tariff barriers would yield more gains than removing non-tariff barriers only, slightly increasing U.S. welfare and imports. Eliminating only non-tariff barriers was predicted to have larger effects than eliminating tariffs only. Mexico was predicted to lose. Explicit modeling appeared to more accurately capture the effects of NAFTA while ad valorem modeling produced unstable estimates (Trela & Whalley, 1994).

Nam (1995) performed a simulation analysis to estimate the effects of NAFTA and the MFA phase-out on the U.S. textile and apparel industry’s production, consumption, and trade using a partial equilibrium model. This study predicted decreases in the U.S. textile and apparel industry’s production and employment under NAFTA and the MFA phase-out with the apparel industry losing most. There were also some NAFTA studies that looked at the automobile industry. Hunter, Markusen, and Rutherford (1992) developed an AGE model to examine the spatial organization of the North American automobile industry and trade under NAFTA and concluded that Mexico would benefit most from FTA in automobiles with increased exports at little cost and rationalization of the automobile industries in the United States and Canada. Using an AGE model, Markusen and Rutherford (1993) also investigated the effects of FTA on the automobile industry’s choices of profitable production locations. They predicted that decreasing trade barriers would increase locational concentration of automobile production with fewer plant locations (Markusen & Rutherford, 1993).

The following chapter conducts the qualitative analysis of the U.S. textile industry’s trade
and production activities during the post-NAFTA period based on a review of literature and available trade and industry data. Based on the outcome, it is attempted to make a qualitative assessment of the impact of NAFTA on the U.S. textile industry’s trade and production activities and draw policy implications.
Chapter 5


This chapter investigates changes in the pattern of U.S. textile trade and production activities under the influence of NAFTA. The first part of this chapter identifies the major environmental factors that have interfered with the course of NAFTA during the recent two decades and investigates changes in the pattern of U.S. textile and apparel imports and exports under NAFTA. The second part of this chapter investigates changes in U.S. market environments and the textile industry’s production activities in terms of shipments, employment, production systems and capital investments, and productivity during the post-NAFTA period. The outcomes of this qualitative analysis and the review of literature on the nature of U.S. textile industry and international and U.S. trade policies including the NAFTA in the previous chapters are used to make an overall assessment of the impact of NAFTA on the textile industry during the last ten years and draw the policy implications.

5.1 Environmental Factors that have altered the Course of NAFTA

U.S. trade in textile goods during the 1990s and 2000s underwent many turns due to changing macroeconomic and political environments. These environmental factors often appear to have interfered with the role of NAFTA in guiding U.S. trade in textile goods. Volatile exchange rate fluctuations have been recurring factors that have caused turbulent turns in international trade since the 1980s. The Mexican financial crisis and peso devaluation in late 1994, the Asian financial crisis and currency devaluation in late 1997, and China along with several Asian countries’ currency manipulation in the 2000s severely interfered with the intended effect of NAFTA. Other environmental changes that occurred during the post-NAFTA period include Mexico’s unstable economic and political conditions, a Mexican
Figure 5.1: Exchange Rates of North American and East Asian Countries

Source: International Monetary Fund.
Note: The exchange rates are normalized by the exchange rates of 1993 to plot them in one graph and to make the comparison of exchange rate changes easier.
trade policy change since the mid-1990s, and its recession in the early 2000s. Difficult U.S. economic and political conditions in the early 2000s and the rise of China in the international trade scene along with the MFA phase-out in the 2000s were also significant environmental factors. This section reviews these major environmental factors in detail.

5.1.1 Mexico’s Peso Devaluation, Recession, and Policy Change

The Mexican financial crisis and peso devaluation, or the Tequila Crisis, in late 1994/1995 imposed a short-term, but significant change in U.S. trade with Mexico. It had originated from the rapid entry of foreign capital into Mexico in the anticipation of NAFTA-induced profits. Unstable Mexican economic and political conditions, including poor financial management, an overvalued peso, a recession, assassinations, a presidential election, and the Mexican government’s plan for peso devaluation were all factors in the crisis. Increased U.S. interest rates, however, led to the abrupt departure of speculative foreign capital away from Mexico to the United States, causing the Mexican financial crisis, peso devaluation, and recession in late 1994 (CBO, 2003; Krueger, 2000; Stokes, 1997; Thorbecke & Eigen-Zucchi, 2002).

As shown in Figure 5.1, the value of Mexican peso rapidly declined in late 1994 due to the peso devaluation. Mexico’s export prices decreased 50 percent at that time while the NAFTA-related tariff elimination reduced only ten percent of Mexico’s export prices over the NAFTA transitional period. This large price gap suggests a short-term, but stronger effect of the peso devaluation than that of NAFTA in shaping trade between the United States and Mexico (Krueger, 2000).

Another noticeable factor was a change in Mexico’s trade policy. To compensate its revenue loss from decreased oil prices, the Mexican government increased the tax on imports from non-NAFTA countries during the Mexican financial crisis in 1998-early 1999 while imports from the NAFTA countries faced NAFTA preferential rates. This change in Mexico’s trade policy made U.S. exports to the country more attractive compared to imports from the rest of world and strengthened the role of NAFTA in promoting U.S. exports to the country (Krueger, 2000).

5.1.2 Asian Currency Devaluation, Manipulation, and Rise of China

A noticeable phenomenon in the world trade of textile goods in the 2000s is the rise of China. A surge in U.S. imports of textile goods from China has become one of the major forces limiting the role of NAFTA in shaping the pattern of U.S. trade in textile goods. China’s competitive edge in this decade has come from its undervalued currency, new WTO membership, protective government policies, and advantage in labor force. China’s undervalued currency originated from the Chinese government’s currency devaluation by over 40 percent in 1994, as shown in Figure 5.1 which led to the Asian financial crisis and currency devaluation in late 1997 with the 40 percent reduction of the value of several Asian currencies (ATMI, 2003b). Since then, China and several Asian countries’ currencies have been
artificially undervalued and this has contributed to the U.S. import surge from China in the 2000s. If China does not stop its currency manipulation and revalue its yuan, a new congressional bill is expected to impose a 27.5 percent tariff on all China’s exports to the United States (Reichard, 2005). In June 2005, China announced its plan to devalue its currency by 2.5 percent and unpeg it from the U.S. dollar (Smith, 2005).

China’s accession to the WTO in 2001 subjected its exports of textile goods to the MFA quota phase-out and MFN tariff rates that have greatly improved the price competitiveness and global market access of Chinese exports. During 2001-2003, as China’s WTO membership partially lifted MFA quotas on China’s exports of 29 apparel product categories, the average price of China’s exports in these categories decreased 58 percent while the corresponding price of exports from the rest of world decreased only three percent (ATMI, 2003b).

As a part of complying with the requirements of WTO membership, China opened its market to international competition by reducing tariffs and eliminating non-tariff barriers on imports. China’s capital-intensive industries, such as automobile and machinery, are vulnerable to intensifying import competition and expected to shrink during the transitional period. The freed resources from these shrinking industries are expected to be reallocated to the production and exports of labor-intensive industries such as textiles and apparel (Bach, Martin & Stevens, 1996; Brooks & Ran, 2003), further expanding China’s capacity for producing these goods.

The price competitiveness of China’s exports has been supported by the Chinese government’s protective policies, including the subsidy of and non-performing loans to state-owned textile and apparel companies and preferential export tax rebates (ATMI, 2003b; ATMI, 2003c; ATMI, 2003f; ATMI, 2003c). China is gradually reforming and privatizing these state-owned companies (Smith, 2005). In addition, China’s natural advantage of production resources, including incomparably low labor costs (below $0.50 per hour) and the pool of 160 million unemployed rural workers, is far greater than that of Mexico or any other country. Mexico’s labor costs have ranged between $2-$3 per hour and have been subjected to a constant rise, along with the shortage of cheap labor for apparel assemblies (ATMI, 2003d; ATMI, 2003a; ATMI, 2003f; ATMI, 2003c; Brooks & Ran, 2003).

Supported by the factors mentioned above, China’s exports of textile goods have surged in the 2000s which has sent a warning sign of the potential dominance of China in world trade in textile goods after the MFA phase-out in 2005. Many researchers have predicted that China’s dominance in world textile and apparel trade will cause potentially disruptive structural adjustments of the competing textile and apparel industries in developed, developing, and less developed countries, including massive mill closings and unemployment (Anderson & Yao, 2001; ATMI, 2003b; ATMI, 2003f; Isaacs III, 2000; Reichard, 2000; Sukun, 2004; Wang, 1999; Yang, 1996).
5.1.3 Difficult U.S. Market Conditions in the 2000s

The U.S. textile market in the early 2000s underwent a severe downturn in the face of difficult economic and political conditions, that included the collapse of the high-tech bubble, corporate scandals, the events of September 11th, wars against Afghanistan and Iraq, recession, and the rapid decline of domestic apparel production and the home furnishings markets (Cone Mills Corp., 2003d; Cone Mills Corp., 2003b). In response to this series of unfortunate events, the growth of U.S. Gross Domestic Product (GDP) slowed down to 3.7 percent in 2000 and 0.2 percent in 2001, but increased to 1.9 percent in 2002 and 3.0 percent in 2003. Difficult market environments and slowdown of economic growth suppressed consumer spending and demand for textile goods that, along with import surge from China, severely suppressed the textile industry’s production and export activities in the early 2000s.

5.1.4 Resurge of Protectionist Pressure and Trade Barriers after MFA Phase-out

Earlier, many researchers warned of the potential emergence of new protectionist policies and trade barriers in the forms of tariffs, safeguards, anti-circumvention, anti-dumping measures, and trade blocs after the MFA phase-out (Moon et al., 1997; Reinert, 2000; USITC, 1994). These predictions have become true. The fear of China’s potential dominance in the world trade of textile goods after the MFA phase-out and the possible damage to the textile and apparel industries in the United States and other developed and developing countries have ignited vigorous political reaction from textile and apparel interest groups in the United States and worldwide. U.S. textile interest groups demanded the imposition of safeguards on Chinese exports, prevention of currency manipulation and transshipments, and the exclusion of the tariff reduction issues from the WTO talks. They also opposed the use of loose rules of origin in FTAs (ATMI, 2003c; Ellis & Ramey, 2003; Hawkins, 2003; Morrissey, 2005b; Morrissey, 2005d). Internationally, textile interest groups in Sub-Saharan Africa, Mexico, Turkey, the United States, Italy, Belgium, and Austria signed the Istanbul Declaration for Fair Trade in Textiles and Clothing in 2004. The agreement demanded the delay of the MFA phase-out until 2008 and investigation of unfair trade practices such as currency manipulation, subsidies, tax rebates, and non-performing loans (Johnson, 2003; Sukun, 2004).

In response, new trade barriers have been raised against China’s exports. These include the U.S. use of safeguards in 2003 to impose quotas on selected Chinese apparel items, and a unilateral decision in 2004 to limit the growth of China’s exports of seven textile and apparel product groups to 7.5 percent for the coming year. Currently, 25 petitions are filed demanding the imposition of safeguard, along with petitions to impose anti-dumping and countervailing duties (Morrissey, 2005e; Morrissey, 2005a). Also, a new congressional bill is designed to impose a 27.5 percent tariff on all China’s exports to the United States upon the country’s continuation of currency manipulation (Morrissey, 2004; Morrissey, 2005c; Reichard, 2005). These series of newly raised trade barriers work against the effect of MFA
Figure 5.2: U.S. Imports of Textiles

Source: Office of Textiles and Apparel, U.S. Department of Commerce.
Note: North America consists of Canada and Mexico in this Graph. East Asia includes China, Hong Kong, South Korea, and Taiwan.
Figure 5.3: Shares of Exporters in U.S. Imports of Textiles

Source: Office of Textiles and Apparel, U.S. Department of Commerce.
### Table 5.1: Growth and Shares of Exporters in U.S. Imports of Textiles

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>75.0%</td>
<td>28.2%</td>
</tr>
<tr>
<td>North America</td>
<td>270.1%</td>
<td>-6.7%</td>
</tr>
<tr>
<td>Mexico</td>
<td>400.0%</td>
<td>-13.4%</td>
</tr>
<tr>
<td>Canada</td>
<td>210.1%</td>
<td>-1.4%</td>
</tr>
<tr>
<td>CAFTA</td>
<td>7.7%</td>
<td>-19.3%</td>
</tr>
<tr>
<td>CBI</td>
<td>1.7%</td>
<td>-19.8%</td>
</tr>
<tr>
<td>Sub-Saharan</td>
<td>-0.1%</td>
<td>-10.0%</td>
</tr>
<tr>
<td>ANDEAN</td>
<td>13.0%</td>
<td>6.2%</td>
</tr>
<tr>
<td>East Asia</td>
<td>31.6%</td>
<td>88.5%</td>
</tr>
<tr>
<td>China</td>
<td>49.8%</td>
<td>177.6%</td>
</tr>
<tr>
<td>ASEAN</td>
<td>150.6%</td>
<td>-31.2%</td>
</tr>
<tr>
<td>India &amp; Pakistan</td>
<td>144.5%</td>
<td>51.1%</td>
</tr>
<tr>
<td>Turkey</td>
<td>289.2%</td>
<td>43.3%</td>
</tr>
<tr>
<td>EU 15</td>
<td>38.0%</td>
<td>10.3%</td>
</tr>
</tbody>
</table>

**Note:** North America consists of Canada and Mexico in this Graph. East Asia includes China, Hong Kong, South Korea, and Taiwan.
phase-out and the spirit of multilateral trade negotiations and liberalization. The following sections investigate the patterns of U.S. exports and imports of textile goods under NAFTA.

5.2 Changes in the Pattern of U.S. Trade in Textile Goods Under NAFTA

5.2.1 U.S. Imports of Textiles

The decade of the 1990s was the period of expansion and regionalization of U.S. trade under the influence of NAFTA. This was especially the case for textile trade. The major NAFTA provisions - rules of origin and the elimination of tariffs and quotas - were effective in creating and diverting textile and apparel trade away from Asia to Mexico as the most restrictive rules of origin were applied to U.S. trade in these goods (Braga, 1992; Busse, 1996; Hufbauer & Schott, 1993; Kessler, 1999; Vosko, 1993). Changes in prices and the patterns of U.S. trade in textile goods under NAFTA are believed to have affected competition and textile prices in the domestic market and the textile industry’s output production, input demand, and profits. Favorable U.S. economic growth and the Mexican peso devaluation in the decade are believed to have helped the growth of U.S. imports, especially from Mexico (CBO, 2003).

In the early 1990s, East Asia, including China, Hong Kong, South Korea, and Taiwan, was the largest textile exporter to the U.S. market, supplying 35.8 percent of U.S. imports in 1992, followed by the EU (20.1%), North America (9.3%), India / Pakistan (8.9%), and ASEAN (7.0%) (Figure 5.3, Table 5.1). East Asia’s export competitiveness, however, had already shown signs of decline in the late 1980s in response to the region’s rising wages and industrial shift to capital-intensive industries (Lim, 2003). NAFTA appears to have reinforced the process. Among countries, China was the leading individual textile exporter to the U.S. market in 1992, supplying 15.9 percent of U.S. textile imports, followed by Canada (6.3%) and Mexico (2.9%).

U.S. merchandise trade experienced little diversion under NAFTA (Krueger, 2000). U.S. trade in textile goods, however, experienced a noticeable diversion as East Asian and ASEAN countries’ textile exports increasingly diverted away from the North American market to Japan, which imposed relatively low import restrictions and no MFA quotas (Burfisher, Robinson & Thierfelder, 2001; James & Umemoto, 2000). During 1992-1999, U.S. textile imports increased 75.0 percent (Figure 5.2). U.S. imports from North America (Canada and Mexico) increased 270.1 percent and those from Mexico 400.0 percent during the period. Deepening U.S. trade regionalization during the period accompanied the decline of U.S. import shares from the major exporters of the early decade, East Asia, China, and the EU. The corresponding shares of developing exporters, Mexico, India / Pakistan, and ASEAN countries increased. The NAFTA preferences over textile imports from Mexico and the Mexican Peso devaluation in late 1994/1995 are believed to have further accelerated the decline of East Asia’s export competitiveness in the U.S. market. The Asian currency devaluation in late 1997 reversed the trend and improved the price competitiveness of Asian export
By 2000, East Asia still remained the largest exporter of textiles to the U.S. market by supplying 26.9 percent of U.S. textile imports, followed by North America (19.9%), the EU (15.4%), India / Pakistan (12.9%), and ASEAN (9.8%) (Figure 5.3, Table 5.1). As an individual country, China remained the leading exporter (14.0% of U.S. imports of textiles) in 2000, followed by Canada (11.1%), Mexico (8.9%), India (6.6%), and Pakistan (6.3%).

The pattern of U.S. textile imports in the early 2000s, however, took an abrupt turn in response to difficult U.S. economic and political conditions and the resurgence of China in world trade in textile goods based on its undervalued currency and WTO membership. The rapid growth of Chinese textile exports to the U.S. market in this decade appears to have occurred at the expense of Mexico, other U.S. RTA signatory countries, the EU, and ASEAN countries. U.S. trade policies, on the other hand, are believed to have partially contributed to this trade pattern as they have promoted U.S. apparel production sharing with its RTA countries and their input demand for U.S. textiles, which may have diverted these countries’ production resources to apparel assembly activities away from developing or expanding their textile industries and export.

In 2001, during a recession and the resulting slowdown in consumer spending, U.S. textile imports decreased 4.7 percent. But their growth has resumed since then. During 2000-2004, U.S. textile imports increased 28.2 percent (Figure 5.3, Table 5.1). U.S. textile imports from China and East Asia increased 177.6 percent and 88.5 percent during the period while those from North America (Canada and Mexico), Mexico, CAFTA, CBI, Sub-Saharan African, and ASEAN countries declined. The share of East Asia in U.S. textile imports rapidly increased from 26.9 percent in 2000 to 38.1 percent in 2004, followed by those of India / Pakistan (15.2%), North America (14.5%), the EU (13.3%), and ASEAN countries (5.4%). Despite the negative influence of U.S. trade policies, fluctuating macroeconomic environments, and intensifying competition from China in the 2000s, the steady growth of U.S. textile imports from India / Pakistan through the 1990s and 2000s is noticeable. Among countries, China was the dominant exporter to the U.S. market, with its share in U.S. textile imports increasing from 14 percent in 2000 to 30 percent in 2004, followed by Canada (8.5%), India (7.6%), Pakistan (7.6%), and Mexico (6.0%). According to this trade pattern, the environmental factors in the 2000s appear to have outperformed the role of NAFTA on shaping the pattern of U.S. textile imports, which can be mainly characterized by the rise of China and India / Pakistan at the expenses of Mexico, CBI, CAFTA, Andean, sub-Saharan African, the EU, and ASEAN regions.

5.2.2 U.S. Imports of Apparel

U.S. apparel imports in the 1990s also showed a high regionalization within North America. In the early 1990s, East Asia was the largest apparel exporter to the U.S. market, supplying 43.8 percent of U.S. apparel imports in 1992, followed by ASEAN (15.0%), CBI (12.2%), CAFTA (10.4%), and North American (4.7%) regions (Figure 5.5, Table 5.2). Hong Kong was the leading individual exporter to the U.S. apparel market (15.3% of U.S. apparel imports), followed by China (12.8%), South Korea (7.0%), Dominican Republic (4.5%),
Figure 5.4: U.S. Imports of Apparel

Source: Office of Textiles and Apparel, U.S. Department of Commerce.
Figure 5.5: Shares of Exporters in U.S. Imports of Apparel

Source: Office of Textiles and Apparel, U.S. Department of Commerce.
Table 5.2: Growth and Shares of Exporters in U.S. Imports of Apparel

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>90.2%</td>
<td>13.2%</td>
</tr>
<tr>
<td>North America</td>
<td>628.3%</td>
<td>-19.4%</td>
</tr>
<tr>
<td>Mexico</td>
<td>736.8%</td>
<td>-20.5%</td>
</tr>
<tr>
<td>Canada</td>
<td>352.0%</td>
<td>-13.9%</td>
</tr>
<tr>
<td>CAFTA</td>
<td>193.5%</td>
<td>6.0%</td>
</tr>
<tr>
<td>CBI</td>
<td>171.3%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Sub-Saharan</td>
<td>199.0%</td>
<td>134.8%</td>
</tr>
<tr>
<td>ANDEAN</td>
<td>93.1%</td>
<td>59.2%</td>
</tr>
<tr>
<td>East Asia</td>
<td>8.5%</td>
<td>21.2%</td>
</tr>
<tr>
<td>China</td>
<td>28.2%</td>
<td>98.4%</td>
</tr>
<tr>
<td>ASEAN</td>
<td>74.0%</td>
<td>33.5%</td>
</tr>
<tr>
<td>India &amp; Pakistan</td>
<td>106.3%</td>
<td>24.0%</td>
</tr>
<tr>
<td>Turkey</td>
<td>153.1%</td>
<td>11.6%</td>
</tr>
<tr>
<td>EU 15</td>
<td>57.5%</td>
<td>0.5%</td>
</tr>
</tbody>
</table>
Philippines (4.4%), Mexico (3.4%), and Indonesia (3.1%). During 1992-1999, U.S. apparel imports from North America and Mexico increased 628.3 percent and 736.8 percent under the influence of NAFTA while U.S. apparel imports from the world increased 90.2 percent (Figure 5.4). U.S. apparel imports from East Asia and China were stagnant in the 1990s with declines in 1993 and 1995-1996 under the influence of NAFTA and the Mexican peso devaluation, increasing only 8.5 percent and 28.2 percent during 1992-1999. On the other hand, despite NAFTA, fluctuating exchange rates, and increasing U.S. trade regionalization, a relatively steady growth was observed in U.S. apparel imports from CBI (171.3%), CAFTA (193.5%), and India / Pakistan (106.3%) during 1992-1999.

The rapid regionalization of U.S. apparel imports in the 1990s within North America may suggest the effects of increased U.S. apparel assembly activities and the rapid expansion of apparel maquiladoras in Mexico as a result of NAFTA, 807/9802 provision, and the Mexican peso devaluation (Allen, 1997; Isaacs III, 2000), at the expenses of East Asia including China. By 2000, Mexico was the leading apparel exporter to the U.S. market (14.7% of U.S. apparel imports), followed by China (7.9%), Hong Kong (7.8%), Dominican Republic (4.2%), South Korea (4.0%), and Indonesia (3.6%) (Figure 5.5 Table 5.2). Intensifying import competition under NAFTA, and the transfer of the U.S. apparel production bases to Mexico, appear to have accelerated the transformation of the U.S. apparel industry from focusing on manufacturing into increasing reliance on international sourcing. Bair (2002) also reported the increased diversion of apparel production and sourcing sources by U.S. apparel manufacturers, branded marketers, designers, and retailers away from the United States and non-NAFTA countries in Asia and the Caribbean Basin region, to Mexico under NAFTA. This research identifies little evidence of U.S. apparel trade diversion from Caribbean Basin region to Mexico.

Along with this trend, the nature of the U.S. apparel industry has also changed. U.S. apparel producers appear to have made domestic operation more focused on management, marketing, organization of foreign production, and developing brand names and/or retail outlets (Gereffi, 2001). From 1997 up to 2000, U.S. imports from East Asia resumed their growth under the influence of the Asian currency devaluation. In the 2000s, U.S. apparel imports showed a noticeable change. The noticeable phenomenon is the rise of China, ASEAN, and sub-Saharan African countries in the shares of U.S. apparel imports in response to China’s improved trade status with its WTO membership, the lift of MFA quotas, and the U.S. trade policy of the African Growth and Opportunity Act (AGOA). The corresponding shares of North America, CBI, and CAFTA regions declined despite the presence of NAFTA, CBTPA, and the signing of CAFTA-DR. During 2000-2004, U.S. apparel imports from the world increased only 13.2 percent due to the early U.S. recession (Figure 5.4). U.S. imports from North America and Mexico decreased 19.4 percent and 20.5 percent during the period with their shares in U.S. apparel imports decreasing from 17.8 percent to 12.6 percent and from 14.7 percent to 10.3 percent (Figure 5.5 Table 5.2). U.S. apparel imports from China and East Asia increased 98.4 percent and 21.2 percent during the period and those from ASEAN and India / Pakistan also increased. U.S. apparel imports from sub-Saharan African and Andean regions showed highest growth of 134.8 percent and 59.2 percent, al-
though their shares in U.S. imports remained very small. U.S. apparel imports from CBI and CAFTA regions were stagnant in the 2000s. Among individual countries, China was the most rapidly rising apparel exporter to the U.S. market by supplying 13.8 percent of U.S. apparel imports in 2004, followed by Mexico (10.3%), Hong Kong (5.9%), Vietnam (4.0%), Indonesia (3.7%), and India (3.4%).

Overall, the shares of China, East Asia, and ASEAN countries in U.S. apparel imports declined in the 1990s but slightly recovered in the 2000s. The opposite is true in the case of North America and Mexico whose corresponding shares reached the highest level in 1999 under NAFTA, but have continuously declined since 2000. The corresponding shares of CBI and CAFTA in U.S. apparel imports steadily increased up to 1997. Since then, these regions’ shares in U.S. imports started declining because the growth of U.S. imports from these regions slowed down compared to that from world. Despite their relatively high growth in the 2000s, the shares of ASEAN, India / Pakistan, and Andean countries in U.S. apparel imports remained relatively stagnant throughout the 1990s and 2000s, mostly because of their initial small export bases.

5.2.3 U.S. Exports of Textiles

U.S. textile exports in the 1990s, under NAFTA, showed a strong trade diversion to North America, as observed in the pattern of U.S. imports of textile goods, although fluctuating U.S. and Mexican business cycles and Mexico’s recession and peso devaluation (CBO, 2003) had short-term negative effects on U.S. exports to the country. Mexico’s policy to increase tax on imports from the world, except those from the NAFTA signatory countries, however, helped the rise of U.S. exports to the country (Krueger, 2000). U.S. textile exports to CBI region also increased faster than the growth of U.S. exports to the world. On the other hand, U.S. exports to East Asia were stagnant and those to Sub-Saharan Africa, Andean, SAMERICA, ASEAN, Japan, and the EU declined during the decade. This pattern of U.S. textile exports in the 1990s, may reflect the effect of U.S. trade policies including NAFTA and the 9802/807 provision that promoted U.S. production sharing of labor-intensive apparel at the cost of a declining U.S. apparel production base and increased foreign demand for U.S. textile inputs.

North America was the largest market for U.S. textile exports in the early 1990s by absorbing 38.4 percent of them in 1992, followed by the EU (19.6%), East Asia (6.6%), CBI (6.4%), and SAMERICA (6.3%) (Figure 5.7, Table 5.3). Canada received 27 percent of them to be the largest individual U.S. textile market while Mexico received 11.3 percent and Japan received 4.4 percent. During 1992-1999, U.S. textile exports increased 55.6 percent under the influence of NAFTA, despite the stagnant growth during 1997-1999 under the Asian currency devaluation (Figure 5.6). U.S. exports to North America increased 147.5 percent during 1992-1999. U.S. exports to Mexico alone increased 285.0 percent during the period. North America and Mexico’s shares in U.S. textile exports increased from 38.4 percent to 62.2 percent and from 11.3 percent to 32.6 percent, respectively, between 1992 and 2000 (Figure 5.7, Table 5.3). U.S. exports to Canada increased 89.8 percent during 1992-1999.
Figure 5.6: U.S. Exports of Textiles

Source: Office of Textiles and Apparel, U.S. Department of Commerce.
Figure 5.7: Shares of Importing Regions in U.S. Exports of Textiles

Source: Office of Textiles and Apparel, U.S. Department of Commerce.
Table 5.3: Growth Rates and Shares of Importing Regions in U.S. Exports of Textiles

<table>
<thead>
<tr>
<th>Importing Regions</th>
<th>Growth Rates of U.S. Exports of Textiles</th>
<th>Share in U.S. Exports of Textiles</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>55.6%</td>
<td>8.2%</td>
</tr>
<tr>
<td>North America</td>
<td>147.5%</td>
<td>-8.7%</td>
</tr>
<tr>
<td>Mexico</td>
<td>285.0%</td>
<td>-10.2%</td>
</tr>
<tr>
<td>Canada</td>
<td>89.8%</td>
<td>-7.0%</td>
</tr>
<tr>
<td>CBI</td>
<td>78.4%</td>
<td>184.1%</td>
</tr>
<tr>
<td>Sub-Saharan</td>
<td>-28.0%</td>
<td>-1.3%</td>
</tr>
<tr>
<td>ANDEAN</td>
<td>-1.2%</td>
<td>38.5%</td>
</tr>
<tr>
<td>SAMERICA</td>
<td>-4.6%</td>
<td>-26.7%</td>
</tr>
<tr>
<td>East Asia</td>
<td>3.6%</td>
<td>20.1%</td>
</tr>
<tr>
<td>ASEAN</td>
<td>-27.3%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Japan</td>
<td>-2.0%</td>
<td>2.4%</td>
</tr>
<tr>
<td>EU 15</td>
<td>-4.2%</td>
<td>-22.4%</td>
</tr>
<tr>
<td>Australia, New Zealand</td>
<td>0.0%</td>
<td>-12.4%</td>
</tr>
</tbody>
</table>
The country received 29.6 percent of U.S. textile exports in 2000. The shares of the EU and East Asia in U.S. textile exports shrank. U.S. textile exports to CBI region increased 78.4 percent during 1992-1999 with the region’s share in U.S. textile exports increasing from 6.4 percent to 8.8 percent during the period. U.S. exports to sub-Saharan African, Andean, SAMERICAN, and ASEAN countries, and Japan declined.

U.S. textile trade faced the toughest challenge in the 2000s. U.S. textile exports reached their highest level in 2000 but, since then, have declined and/or become stagnant under difficult U.S. market conditions, Mexico’s recession, and the sudden rise of China’s exports of textile goods. The growth of U.S. textile exports resumed in 2004. During 2000-2004, U.S. textile exports decreased 13.0 percent (Figure 5.6). U.S. exports to North America decreased 8.7 percent as its exports to Mexico and Canada decreased 10.2 percent and 7.0 percent, respectively.

Along with the decline of Mexico as a major U.S. textile market, U.S. textile exports to CBI showed the highest growth of 184.1 percent during 2000-2004 with the region’s share in U.S. textile exports rapidly increasing from 8.8 percent to 23.2 percent during the period. U.S. textile exports to Andean region also increased 38.5 percent during 2000-2004. This trend may reflect the positive effects of CBTPA and ATPDEA for promoting U.S. production-sharing activities with these regions and their increasing demand for U.S. textile inputs. U.S. textile exports to Sub-Saharan Africa declined in the 1990s through the 2000s, despite the signing of AGOA, with the region’s share in U.S. textile exports declining from 6.3 percent in 1992 to 2.6 percent in 2004. U.S. textile exports to the EU also declined with the region’s share shrinking to 7.9 percent of U.S. textile exports in 2004. U.S. exports to East Asia, on the other hand, slightly increased. Overall, despite the intervening effects of changing macroeconomic environments, the market composition of U.S. textile exports in the 1990s and 2000s appears to have reflected the positive effects of U.S. trade policies including NAFTA, 807/9802 provision, and the recent policies of CBTPA and ATPDEA for production sharing.

5.2.4 U.S. Exports of Apparel

Under NAFTA, U.S. apparel exports rapidly increased up to 1997, with the noticeable diversion to North American and CBI regions. The CBI region was the largest market for U.S. apparel exports in the early 1990s by receiving 35.9 percent of them in 1992, followed by North America (23.9%), the EU (12.5%), and SAMERICA (4.3%) (Figure 5.8 Table 5.4). Among individual markets, Mexico was the largest and received 15.4 percent of U.S. apparel exports, followed by Japan (11.8%) and Canada (8.6%). During 1992-1999, U.S. apparel exports to the world rose 105.6 percent despite the sluggish growth and decline in 1998-1999 under the influence of Asian currency devaluation. U.S. exports to North America and Mexico increased 215.0 percent and 262.5 percent during the period (Figure 5.7), with North America and Mexico’s shares in U.S. apparel exports increasing from 23.9 percent to 34.3 percent and from 15.4 percent to 25.1 percent, respectively, between 1992-2000 (Figure 5.8 Table 5.4). U.S. apparel exports to CBI region increased 146.1 percent during 1992-1999
Figure 5.8: U.S. Exports of Apparel

Source: Office of Textiles and Apparel, U.S. Department of Commerce.
Figure 5.9: Shares of Importing Regions in U.S. Exports of Apparel

Source: Office of Textiles and Apparel, U.S. Department of Commerce.
Table 5.4: Growth Rates and Shares of Importing Regions in U.S. Exports of Apparel

<table>
<thead>
<tr>
<th>Importing Regions</th>
<th>Growth Rates of U.S. Exports of Apparel</th>
<th>Share in U.S. Exports of Apparel</th>
</tr>
</thead>
<tbody>
<tr>
<td>World</td>
<td>105.6%</td>
<td>-39.4%</td>
</tr>
<tr>
<td>North America</td>
<td>215.0%</td>
<td>-28.0%</td>
</tr>
<tr>
<td>Mexico</td>
<td>262.5%</td>
<td>-44.1%</td>
</tr>
<tr>
<td>Canada</td>
<td>129.8%</td>
<td>15.6%</td>
</tr>
<tr>
<td>CBI</td>
<td>146.1%</td>
<td>-55.2%</td>
</tr>
<tr>
<td>Sub-Saharan</td>
<td>51.5%</td>
<td>34.4%</td>
</tr>
<tr>
<td>ANDEAN</td>
<td>30.0%</td>
<td>-52.1%</td>
</tr>
<tr>
<td>SAMERICA</td>
<td>16.2%</td>
<td>-56.2%</td>
</tr>
<tr>
<td>East Asia</td>
<td>42.2%</td>
<td>64.9%</td>
</tr>
<tr>
<td>ASEAN</td>
<td>-22.3%</td>
<td>-27.4%</td>
</tr>
<tr>
<td>Japan</td>
<td>-10.9%</td>
<td>-32.2%</td>
</tr>
<tr>
<td>EU 15</td>
<td>22.5%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Australia, New Zealand</td>
<td>140.1%</td>
<td>20.9%</td>
</tr>
</tbody>
</table>
with the region’s share in U.S. apparel exports increasing from 35.9 percent in 1992 to 46.7 percent in 2000. As U.S. apparel exports had been increasingly directed to North American and CBI regions, U.S. exports to the rest of world including the EU, Japan, sub-Saharan African, Andean, SAMERICAN, and ASEAN regions had been either stagnant or declined (Figure 5.7).

The 2000s brought a stop to the expansion of U.S. apparel exports under difficult U.S. and international market conditions. After experiencing a slowdown and decline in 1998 and 1999 under the Asian currency devaluation, U.S. apparel exports increased in 2000 but have declined rapidly since (Figure 5.7). U.S. apparel exports to the world decreased 39.4 percent during 2000-2004 while those to North America declined 28.0 percent. North America’s share in U.S. apparel exports, however, increased from 34.3 percent in 2000 to 40.8 percent in 2004 because of the overall decline of U.S. exports (Figure 5.8 Table 5.4). U.S. apparel exports to Mexico decreased 44.1 percent during 2000-2004 with Mexico’s share in U.S. apparel exports decreasing to 23.2 percent, which may reflect a recession and increased competition from China in the Mexican market. U.S. exports to Canada, on the other hand, increased 15.6 percent during the period (Figure 5.7) and Canada’s share in U.S. apparel exports rose from 9.2 percent to 17.6 percent (Figure 5.8 and Table 5.4). U.S. apparel exports to CBI region, on the other hand, rapidly declined (-55.2%) during the period with the region’s share in U.S. apparel exports declining from 46.7 percent to 34.5 percent. U.S. apparel exports to Andean and SAMERICA also rapidly declined with these regions’ small shares shrinking further. However, the exception is observed in increasing U.S. exports to sub-Saharan African countries in the 2000s despite their decline in the 1990s.

The pattern of U.S. apparel exports in the 2000s has shown the dominant effects of other environmental factors over the effects of NAFTA. Compared to U.S. textile exports, U.S. apparel exports appear to have been far more severely affected by environmental factors such as the Asian currency devaluation and manipulation, the rise of China, the MFA phase-out, and U.S. and Mexico’s recessions in the 2000s. In this decade, U.S. apparel exports to Canada, East Asia, and sub-Saharan African countries have increased while those to Mexico, CBI, Andean, and SAMERICA regions have declined (Figure 5.7). U.S. exports to the EU, Japan, and ASEAN countries also continuously decreased in the 2000s.

The pattern of U.S. textile and apparel exports in the 2000s partially reversed the U.S. export diversion to North American and CBI regions that occurred in the 1990s under NAFTA and other U.S. trade polices. Nonetheless, the overall share of the rest of world, including sub-Saharan, Andean, SAMERICA, the EU, and ASEAN countries, in U.S. textile and apparel exports by the mid-2000s was smaller than that of the pre-NAFTA period due to the strong diversion in the 1990s.

U.S. trade policies, including NAFTA, appear to have promoted U.S. apparel production sharing activities in and the transfer of U.S. apparel production bases to foreign assembly sites. Increasing U.S. apparel production sharing has expanded foreign demand for U.S. textile inputs and helped preserve U.S. textile production base while negatively affecting the U.S. apparel industry’s production and export activities. The exception to this trend is observed in increasing U.S. apparel exports to sub-Saharan African countries in the 2000s.
Figure 5.10: GDP Growth of North America in Comparison to those of East Asia.

Source: International Monetary Fund.
Figure 5.11: Consumer Consumption of Apparel and Shoes: 1960-2004

Figure 5.12: Personal Consumer Expenditure of Apparel, Household Textiles, and Floor Coverings as Quintiles of Income before Taxes: 1984-2003

5.3 Changes in U.S. Textile Production Activities under NAFTA

This section examines the production activities of the U.S. textile industry during the post-NAFTA period in terms of changes in domestic market environments, shipments, employment, production systems, capital investments, and productivity.

5.3.1 Growth of U.S. Economy and Consumer Consumption

The United States experienced a high economic growth during the 1990s. NAFTA is believed to have had a relatively small, positive impact on the growth (CBO, 2003) because Mexico’s share in U.S. trade has been relatively small. The growth of U.S. gross domestic product (GDP) is compared to those of other North American and East Asian countries in Figure 5.10. U.S. GDP increased 3.7 percent in 1996 and over 4.0 percent annually during 1997-1999, which is higher than the average annual GDP growth rate of 2.8 percent during 1985-1995. During 1994-2000, U.S. GDP increased 43.4 percent, which was faster growth than Canada (28.2%) or Mexico (34.5%). Along with the growing U.S. economy, U.S. consumption of apparel and shoes increased 34.2 percent during 1994-2000 (Figure 5.11). Personal consumption of apparel and service fluctuated, but increased 8.5 percent during the period, and consumption of household textiles also increased 15.2 percent (Figure 5.12). Personal consumption of floor coverings, on the other hand, decreased 38.0 percent.

In the 2000s, the growth of U.S. GDP slowed down to 3.7 percent in 2000 and 0.2 percent in 2001 in response to economic recession, the events of September 11th, and wars against Afghanistan and Iraq. Since then, U.S. GDP increased to 1.9 percent in 2002, 3.0 percent in 2003 and 4.4 percent in 2004. In response to difficult economic conditions, U.S. consumption of apparel and shoes increased only 9.7 percent during 2000-2004 (Figure 5.11). Personal consumption of apparel and service and of floor coverings decreased 11.6 percent and 18.2 percent during this period while that of household textiles increased 6.6 percent (Figure 5.12). The following section examines changes in the U.S. textile market environments under the influence of NAFTA.

5.3.2 U.S. Textile Market Environments

The U.S. textile industry entered the 1990s with improved productivity and price competitiveness as a result of its intensive restructuring and technological development in the 1980s. These conditions left many textile firms with heavy financial burdens. The industry’s vulnerability to import competition continued in this decade because its continuous specialization in long production runs of relatively standardized products maintained the industry’s direct competition with imports (Cline, 1990; Finnie, 1992; USITC, 1987).

The U.S. market conditions in the late 1980s through the early 1990s deteriorated in response to the stock market crash in the late 1980s, a recession, and suppressed consumer
Figure 5.13: Indices of Prices of Textiles and Apparel and U.S. Inflation: 1960-2005

spending. The textile industry’s price competitiveness also weakened as a result of the increasing cost of fibers, chemicals, and labor that undermined the positive effect of the weak U.S. dollar (Finnie, 1992). After getting out of the recession of the early 1990s, the U.S. textile industry’s production activities became more active than before under the implementation of NAFTA and recovering economy until the Mexican financial crisis and peso devaluation in late 1994 caused the stagnation of the industry’s production activities in 1995-1996. The industry’s performance rebounded and improved in 1997. Since 1997 through the 2000s, the industry’s production activities have been interrupted again because of the Asian currency devaluation in late 1997 and import surge, and difficult U.S. economic and political environments and the rise of China in international trade in textile goods in the 2000s. U.S. import surges from Asia, especially China, have caused the severe downturn of the U.S. textile industry’s shipments, employment, and capital investments in the 2000s.

Increasing pressure from intensifying import competition on U.S. textile and apparel prices during the post-NAFTA period has been reflected in the stagnant growth and decline of domestic price indices of textiles and apparel. U.S. textile and apparel price indices grew very slowly in the early 1990s, were stagnant in the mid-1990s, and slowly decreased in the late 1990s in contrast to a sharp increase in U.S. inflation (Figure 5.13). The rapidly increasing gap between textile and apparel price indices and inflation during the post-NAFTA period indicates the rapid fall of real prices of textiles and apparel and eroding U.S. producers’ profit levels.

Volatile exchange rates and import surges have caused the textile industry’s severe restructuring and have driven many inefficient firms to exit the business. Due to the Asian currency devaluation, the industry underwent 47 and 45 consolidation and restructuring activities in 1998 and 1999. Thirty-five production facilities either closed or laid off workers in 1999. Textile firms and stocks became undervalued as the number of buyers for textile business plummeted (Morrissett, Dawson & Sexton, 2000). Closings of many inefficient mills, modernization, and technological development helped the industry achieve the highest productivity in the world by the end of the 1990s while the industry’s capital investments lagged behind those of other countries (Isaacs III, 1998, McCurry, 1997).

The U.S. textile industry in the 2000s has felt enormous pressure because of difficult market conditions and the import surge from China as explained earlier. Global overcapacity in textile and apparel production, increasing imports of home furnishings from Mexico, and illegal transshipments into the U.S. market further worsened the industry’s competitive conditions (Cone Mills Corp., 2003d, Isaacs III, 2000). A series of these unfortunate events has caused the downturn of the industry’s production capacities and continuous plant closings. In 2002, 116 mills closed and, during 1997-2002, 215 mills closed, contributing to the plummeting value of textile firms and stocks and the shrinking number of textile business buyers. The closing of Pillowtex in 2003 yielded 6,500 job losses, the largest number of job losses in North America (ATMI, 2003b, ATMI, 2003a, Morrissett et al., 2000; Morrissey, 2005b, Morrissey, 2005d, Reichard, 2005). According to Giermanski and Lodge (2002), foreign competition and NAFTA appear to have had a moderately minor contribution to textile mill closures (15.1%) while the major contributing factors are identified as the outcome of
textile firms’ restructuring, reorganization, or business failure, including consolidation and restructuring (25.2%), cutbacks and downsizing (10.6%), sales, closure, or elimination of business (9.1%), financial and economic difficulties (7.7%), relocation / production moved (6.7%), competition (3.4%), and bankruptcy (3.4%).

The difficult market conditions in the 2000s have motivated U.S. retailers’ careful inventory liquidations and management to prevent inventory build-up and excessive markdowns, business consolidation, conservative orders, and suppressed textile price growth and profits. A successful business demands customer service, product styling and differentiation, flexibility in and shortened time for production, material handling, packaging, and delivery (Abernathy, Dunlop & Weil, 2001; Cone Mills Corp., 2002). However, textile producers’ passive business style in the 1990s continuously prevails in the 2000s as many of them refuse or are unable to adapt to challenging market environments and rely on government protection, causing the industry’s adjustment problems (Giernanski & Lodge, 2002). By the mid-2000s, the favorable U.S. economic growth is improving the production activities of textile sectors that are not challenged by fierce import competition. U.S. apparel sales are also projected to rise (Reichard, 2005). However, the textile industry’s problems are expected to continue as it faces difficult capital markets, decreasing textile firm and stock values, a declining number of buyers, the rising costs of oil, other raw materials, and shipping, rapid changes in fashion trends and business cycles, and the gap between consumer demand and supply from producers and retailers (Cone Mills Corp., 2003c; Cone Mills Corp., 2003a; Reichard, 2005). The next sections investigate changes in U.S. textile production activities under NAFTA.

5.3.3 Changes in Textile Shipments

Despite the relatively stagnant growth during 1995-1996 under the Mexican Peso devaluation, U.S. textile shipments had been in an upward movement in the early years of NAFTA, increasing 15.5 percent during 1992-1997 (Figure 5.14). This positive growth may have reflected the effect of NAFTA, a favorable U.S. economy, and increasing exports to the NAFTA countries during the period. U.S. textile shipments turned into a downturn since 1997 through the 2000s, especially at a faster rate in the 2000s, in response to the Asian financial crisis and currency devaluation in late 1997, Asian and China’s currency manipulation, China’s WTO entry, and U.S. import surge from Asia, especially from China. During 1997-2003, however, U.S. textile shipments decreased 18.2 percent in response to the Asian currency devaluation in late 1997, difficult U.S. economic and political conditions in the 2000s, including recession and slowdown of consumer spending, and U.S. import surge, especially from China. These market environments from the late 1990s through the 2000s appear to have outweighed the positive role of NAFTA on promoting the industry’s production activities. During 1992-2003, U.S. textile shipments decreased 5.5 percent despite the presence of NAFTA because of the combined effects of the market environments mentioned above. U.S. apparel shipments have followed a similar pattern. They increased 10.5 percent during 1992-1997 under NAFTA, but decreased 40.3 percent during 1997-2003 in response to the difficult market environments. During 1992-2003, apparel shipments decreased 34.0 percent,
Figure 5.14: U.S. Shipments, Exports, and Imports of Textiles and Apparel

Source: Data of Shipments from Manufacturer’s Shipments, Inventories, and orders: 1992-2002 and Current Industrial Reports, August 2003, M3-1 (02); Data of Exports and Imports from Office of Textiles and Imports, U.S. Department of Commerce.
suggesting a declining apparel production base in the United States.

5.3.4 Changes in Textile Employment

There have been conflicting views of the impact of NAFTA on U.S. employment. The critics of NAFTA believe that the agreement had a negative effect on U.S. employment. The supporters believe that NAFTA has helped maintain the U.S. manufacturing base against Asian imports, limit the loss of labor-intensive industries by allowing U.S. companies to use inexpensive Mexican labor and U.S. input materials in their Mexican assembly plants, and help the U.S. employment structure shift toward higher-skilled jobs (Gereffi, 2000, Whalen, Magnusson & Smith, 2001).

U.S. textile employment in the early 1990s increased 1.97 percent during 1991-1994 (Figure 5.15). Since 1994 through the 2000s, however, both U.S. textile and apparel employment sharply declined. During 1992-2000, U.S. textile employment of all workers declined 14.3 percent and that of production workers declined 16.1 percent. Expanded trade in textile goods between the United States and Mexico under NAFTA is believed to have contributed to preserving U.S. textile and apparel jobs. Because two-thirds of U.S. textile and apparel imports from Mexico in value contain U.S. components implying Mexican maquiladoras and apparel industry’s high input consumption of U.S. textile goods although at a decreasing rate (Oh & Suh, 2003). The major driving forces behind the decline of textile employment have been the textile industry’s production technologies and import competition over decades. The industry’s automation, modernization, and technological developments have developed labor-saving and capital-using production systems that have mainly contributed to the decline of textile employment.

The decline of textile employment in the 2000s has been faster than that of the 1990s as difficult U.S. market environments including a recession and U.S. import surge from China have rapidly decreased textile producers’ domestic market share and shipments and caused massive mill closings and job losses during 2000-2005 (Morrissey, 2005b, Morrissey, 2005d). During 2000-April 2005, textile employment of all workers declined 30.8 percent and that of production workers declined 31.9 percent (Figure 5.15). During 1992-April 2005, textile employment of all workers decreased 40.7 percent from 679.5 thousand workers to 403.2 thousand workers while the employment of textile production workers decreased 42.9 percent from 568.0 thousand workers to 325.5 thousand workers. U.S. apparel employment of all workers showed a deeper decline of 71.3 percent from 912.8 thousand workers to 262.2 thousand workers during the period (Figure 5.15). Apparel employment of production workers also decreased 75.1 percent from 819.1 thousand workers to 203.5 thousand workers. Under the partial liberalization of world trade in textile goods and intensifying import competition after the phase-out of the MFA quotas, labor-intensive production activities are likely to continue to be relocated to low-wage countries and decrease U.S. textile employment.

63
Figure 5.15: Employment of U.S. Textile and Apparel Industry

Figure 5.16: New and Old Capital Investments of Textile and Apparel Industry


Note: Data prior to 1997 are according to Standard Industrial Classification (SIC) code (SIC 22, textile mill products; SIC 23, apparel and other textile products); Data since 1997 are according to North American Industrial Classification System (NAICS) (NAICS 313, textile mills; NAICS 314, textile product mills; NAICS 315, apparel manufacturing)
5.3.5 Changes in Capital Investments and Production Systems

The capital investments of the U.S. textile industry’s in the 1990s had been in an upward movement under the positive anticipation of NAFTA effect. During 1992-1994, under the recovering U.S. economy from the earlier recession and positive expectations about the impact of NAFTA, the textile industry’s capital investments increased 31.3 percent from 2.39 billion dollars to 3.14 billion dollars (Figure 5.16). They declined 9.7 percent to 2.83 million dollars during 1994-1996 under the Mexican Peso devaluation but increased 20.3 percent in 1997 to reach the highest amount of 3.41 billion dollars.

From 1997 through the 2000s, the industry’s capital investments continuously declined due to the Asian currency devaluation in late 1997, difficult U.S. economic conditions, the import surge from China, declining domestic textile shipments, numerous mill closings, and the rapid decline of U.S. apparel industry in the 2000s. As a result, during 1997-2003, the textile industry’s capital investments decreased 59.4 percent. Over the period of 1992-2003, the industry’s capital investments declined 42.0 percent from 2.39 billion dollars to 1.39 billion dollars. The apparel industry’s capital investments also decreased 59.0 percent during 1993-2003 as the industry’s domestic production has rapidly declined and apparel producers have increasingly relied on international sourcing.

The capital investments of the U.S. apparel industry also increased 23.9 percent from 1.03 billion dollars to 1.28 billion dollars during 1993-1995 (Figure 5.16). Since then, they declined 26.7 percent to 935.4 million dollars in 1998. They slightly increased in 1999 but declined again, reaching 423.1 million dollars in 2003. During 1993-2003, the industry’s capital investments decreased 59.0 percent.

The composition of U.S. textile production systems has undergone dramatic changes under NAFTA, which can be characterized as the decreasing number of looms in place, the rapid disappearance of shuttle type looms and shift to shuttleless looms, and increasing dominance of air-jet shuttleless looms among weaving machines. Earlier in the decade, the majority of operating weaving machines were projectile and rapier looms with a small number of water jet looms for specialty fabrics (Finnie, 1992). However, the major part of capital investments in the weaving sector in the 1990s was devoted to the installation of new shuttleless, air-jet looms because of their fast weaving speeds and fewer defects and better quality of produced fabrics. For example, 90 percent of loom sales in the 1990s were of air-jet and rapier looms, 70 percent of which were sales of air-jet looms. However, sales of weaving looms decreased 66 percent in 1998 and 40 percent in 1999 under the influence of the Asian currency devaluation, compared to the level of 1997 (Melling, 2000).

According to available data from the Bureau of the Census, the number of weaving looms in place decreased 32.8 percent from 94,286 looms to 63,344 looms during 1992-1998 mainly due to the 83.5 percent decline in the number of shuttle type looms with their share shrinking to only 8 percent of total looms in 1998. The number of shuttleless looms also decreased 10.2 percent from 65,184 looms to 58,531 looms during the period although their share in total looms increased to 92 percent in 1998. Among shuttleless looms in place (in case of single filling insertion), only the number of air jet looms increased 10.6 percent during 1992-
Figure 5.17: Indices of Output per Labor Hour and Capital and Multifactor Productivity of U.S. Textile Industry (1996=100).

Figure 5.18: Indices of Output per Labor Hour and Capital and Multifactor Productivity of U.S. Apparel Industry (1996=100).

1998 with its share in shuttleless looms increasing from 40.2 percent to 53.6 percent during the period. The numbers of projectile, rapier, and water jet looms in place declined. The operating hours of total looms declined 30 percent from 643.2 million hours to 450.2 million hours during 1993-1998 mainly because of the corresponding decline of shuttle looms. The operating hours of shuttleless looms slightly decreased between 1994 and 1997 but started declining faster since 1997. They accounted for 74.7 percent of total loom operating hours in 1993 and 92 percent in 1998, while shuttle type looms accounted for the remaining hours ([U.S. Bureau of the Census, 1998]). The following section examines changes in the textile industry’s productivity under the NAFTA.

5.3.6 Changes in Productivity

The U.S. textile industry has relied on advanced technologies, automation, and high substitution of labor and natural fibers with capital and synthetic fibers as ways of improving its production speed, productivity, and price competitiveness. The industry’s productivity has been measured in terms of labor productivity, capital productivity, and multifactor productivity. The industry’s labor productivity, measured as the indices of output per labor hour, increased 33.6 percent during 1992-2001, compared to 25.3 percent growth during the corresponding pre-NAFTA period of 1983-1992 (Figure 5.17). The industry’s capital productivity has fluctuated whenever the market conditions deteriorated due to exchange rate changes, import surges, and recession. But it has been in an overall decline since the implementation of NAFTA despite the expectation that the industry’s increasing adoption of open-end air-jet spinning and shuttleless air-jet looms, the rapid discard of outmoded shuttle looms, and many mill closings in the 1990s must have improved the industry’s capital productivity. The decline of capital productivity may be interpreted as a reflection of the negative effects of many textile mill closings, mergers, consolidations, and decreasing machine operating hours in response to intensifying import competition. The productivity of the apparel industry has also shown a similar pattern as that of the textile industry, except the fact that the productivity growth of apparel labor has been far more dramatic than that of textile labor under NAFTA (Figure 5.18).

A comprehensive productivity measure is a multifactor productivity that relates textile outputs to the combined inputs of labor, capital, and intermediate inputs. The textile industry’s multifactor productivity has been increasing overall although its growth has been slower than that of labor productivity since 1994 as capital productivity has continuously declined. Between 1992-2001, the industry’s multifactor productivity increased 15.7 percent (Figure 5.17). The industry’s improved productivity over time appears to have not compensated the industry’s disadvantage of high production costs and gradual decline of competitiveness.
5.4 Evaluation of Impacts of NAFTA on U.S. Textile Trades and Production Activities

Overall, NAFTA is considered as moderately successful although its success appears to be overshadowed by harsh criticism from well-organized interest groups. The pattern of U.S. trade in and production of textile goods has taken dramatic turns during the last two decades. Assessing the impacts of NAFTA on U.S. textile trade and production activities is complicated because of the intervening effects of other environmental factors, including volatile exchange rate changes, changing economic and political conditions in the U.S. and Mexican markets, and the sudden rise of China in world textile trade (CBO, 2003; Krueger, 2000). Based on the outcomes of the qualitative analysis of U.S. textile trade and production activities under NAFTA presented in the previous sections, it is attempted to evaluate the impacts of the agreement on the U.S. textile industry.

5.4.1 Evaluation of Impacts of NAFTA on U.S. Textile Trade

(a) The NAFTA effects of reducing trading costs of North American origin goods and discriminating against imports from non-NAFTA countries have significantly contributed to the diversion of U.S. textile and apparel trade away from Asia, Western Europe, and other developing and less developed countries to Mexico in the 1990s, expanding and regionalizing North American trade in textile goods. Several studies confirmed the trade diversion effect of NAFTA (Burfisher, Robinson & Thierfelder, 2001; Fukao, Okubo & Stern, 2002; James & Umemoto, 2000). The growth of U.S. trade with CBI, on the other hand, has been sustained, though at a lower rate than that with Mexico. The MFA phase-out process has not been effective to counteract the role of NAFTA during the decade.

(b) The favorable growth of the U.S. economy and the Mexican peso devaluation have helped the rise of U.S. imports from Mexico in the 1990s while NAFTA and Mexico’s tax increase on all imports, except those from NAFTA signatories, have helped the growth of U.S. exports to the country. These economic and political factors appear to have strengthened the role of NAFTA in facilitating U.S. trade in textile goods with Mexico in the 1990s. Fluctuating U.S. and Mexican business cycles and Mexico’s recession in 1994, on the other hand, have had negative effects on U.S. exports to the country (CBO, 2003; Krueger, 2000).

Increased U.S. trade diversion away from East Asia to Mexico under NAFTA appears to have accelerated the general decline of East Asia’s export competitiveness and dominance in U.S. imports of textile goods in the 1990s (Burfisher et al., 2001; Isaacs III, 2000; James & Umemoto, 2000). The price competitiveness of textile exports from China and other East Asian countries had been strong until the late 1980s, despite the presence of MFA (Lim, 2003). Since then and through the 1990s, their export
competitiveness has declined as their labor costs have risen along with their industrial 
shifts toward capital-intensive industries, which has been further deteriorated by U.S. 
trade policies that have regionalized trade.

c) Since the late 1990s through 2000s, the environmental factors appear to have severely 
interfered with the course of NAFTA by weakening the price discriminating effect 
of the agreement against imports from non-NAFTA countries. Under the influence 
of the Asian currency devaluation in late 1997, China’s undervalued currency, WTO 
membership, and protective government policies, and the MFA phase-out, the pattern 
of U.S. textile imports in the 2000s has been mainly characterized by the fast export 
expansion of China and India / Pakistan and the moderate export growth of the EU 
at the expenses of Mexico, CAFTA, CBI, sub-Saharan African, and ASEAN regions. 
Difficult U.S. economic and political conditions and Mexico’s recession in the early 
2000s, on the other hand, have suppressed the growth of U.S. trade with Mexico and 
diverted it to China, which appears to have partially reversed the pattern of U.S. textile 
trade shaped in the early years of NAFTA.

d) U.S. textile exports in the 1990s have also shown a strong trade diversion away from 
the rest of world to North America as observed in the pattern of U.S. textile imports. 
U.S. textile exports to CBI region have also increased faster than the growth of corre-
responding exports to the world during the decade. The growth of U.S. exports to 
East Asia, on the other hand, has been stagnant while those to sub-Saharan Africa, 
Andean, SAMERICA, ASEAN, Japan, and the EU have declined. 
The pattern of U.S. textile exports in the 1990s may have reflected increased U.S. 
apparel production sharing activities with its RTA signatory countries whose apparel 
assembly activities and input demand for U.S. textiles have increased under the in-
fluence of U.S. trade policies including NAFTA, 807/9802 provision, and Mexico’s 
increased import tax during the peso devaluation and the late 1990s while inevitably 
accelerating the decline of U.S. apparel production base and decreasing the importance 
of major U.S. textile export markets of the 1980s and early 1990s, the EU and Japan, 
in the U.S. export scene.

(e) The market composition of U.S. textile exports in the 2000s has become more diversified 
because of the declining share of Mexico and the increasing shares of other developing 
regions in U.S. textile exports. CBTPA and ATPDEA have promoted U.S. production-
sharing activities with these regions and their demand for U.S. textiles. Despite AGOA, 
U.S. textile exports to sub-Saharan African countries have continuously declined during 
the last two decades with the region’s share in U.S. textile exports decreasing from 6.3 
percent to 2.6 percent between 1992 and 2004. The concentration in the 1990s and 
diversification in the 2000s of market composition of U.S. textile exports appear to 
have strongly reflected the effects of U.S. trade policies. Overall, however, the severe 
U.S. trade diversion to North America in the 1990s resulted in the declined shares of
sub-Saharan African, Andean, SAMERICA, the EU, East Asia, and ASEAN regions in U.S. textile exports during the last two decades.

(f) Overall, under U.S. trade policies including NAFTA, U.S. textile exports to and apparel imports from its RTA signatory countries have increased while U.S. textile imports from and apparel exports to these countries have declined. U.S. trade policies, along with the effects of domestic and international market environments and intensifying import competition, are believed to have contributed to the rapid decline of U.S. apparel production and exports. As U.S. trade policies have promoted U.S. production sharing with, U.S. textile input exports to, and apparel imports from its RTA signatory countries, they may have contributed to the diversion of these developing signatory countries’ industrial interests and production resources to apparel assembly using U.S. textile inputs and exports to the U.S. market. The decline of these countries’ textile exports to the U.S. market suggests that U.S. trade policies may have undermined these countries’ potential development of textile industries.

5.4.2 Evaluation of Impacts of NAFTA on U.S. Textile Production

(a) Despite intensifying import competition from Mexico under NAFTA and the stagnant growth of shipments under the Mexican peso devaluation and U.S. import surge from Mexico, the U.S. textile industry’s shipments increased 15.5 percent during 1992-1997, with its slightly increased domestic market share. The possible contributing factors to the industry’s increased shipments are believed to be NAFTA, favorable U.S. economic growth, Mexican apparel maquiladoras’ increased assembly activities and input demand for U.S. textiles, and increased U.S. textile exports.

(b) Since the late 1990s through the 2000s, U.S. textile production activities have abruptly deteriorated in the face of exchange rate changes and difficult U.S. economic and political environments including recession, the events of September 11th, wars against Afghanistan and Iraq, rapid decline of U.S. apparel production, and the import surge from China. These environmental factors appear to have outshone the role of NAFTA in shaping U.S. textile production activities and partially reversed the positive changes that occurred in the 1990s under NAFTA. As a result, during 1997-2003, the textile industry’s shipments declined 18.2 percent. During 1992-2003, U.S. textile shipments decreased 5.5 percent despite the presence of NAFTA. The disappearing U.S. apparel production base may imply the delocalization of the domestic demand base for the U.S. textile industry and possibly the future delocalization of the U.S. textile production base to other developing countries.

(c) U.S. textile employment and production capacities have declined continuously during the post-NAFTA period. NAFTA is known to have helped the industry maintain its employment. The major contributing factors to the declining textile employment appear to have been technological advances, capital deepening of production systems,
high labor productivity, and volatile exchange rate-related import surges. Increasing adoption of open-end air-jet spinning, decreasing number of looms, disappearing outmoded shuttle looms and their replacement with shuttleless, air-jet looms, and many closings of inefficient mills have drastically changed the composition of textile production systems and are believed to have greatly improved textile labor productivity while decreasing textile employment and capital productivity since the implementation of NAFTA.

(d) Despite their decline under the Mexican peso devaluation and import surge, the U.S. textile industry’s capital investments have increased up to 1997, reaching a peak of 3.4 billion dollars in that year under the positive influence of NAFTA. Since 1997, however, the industry’s capital investments have continuously declined in response to its shrinking domestic market share, shipments, decreasing number of looms, and many mill closings and layoffs under the negative influence of exchange rate changes and the sudden rise of Chinese exports in the 2000s. If there had not been sudden exchange rate changes and import surges, the levels of U.S. textile employment and capital investments may have been far higher than the current levels.

5.5 Policy Implications of NAFTA: Perspectives from Qualitative Approach

Despite the changing course of NAFTA in response to interfering macroeconomic and political environments in the 1990s through the 2000s, the regionalized U.S. trades in textile goods, changing U.S. market competition, and textile production activities in the early years of NAFTA suggest that U.S. trade policies or signing FTAs/RTAs can be significant or moderately important sources of U.S. trade diversion of textile goods and changes in domestic textile production activities. The outcome, however, would depend on the significance of participating countries in U.S. trade relationship and their economic and political conditions and other environmental factors.

If there had not been the intervening macroeconomic and political factors of the late 1990s and 2000s, could NAFTA have been a successful policy for the survival of U.S. textile industry in a long-term? Hardly could it have been so. Multiple factors indicate that NAFTA could have been a short-term, transitional policy measure. These factors are as follows:

1. Phase-out of MFA that has helped the re-emerging dominance of China in world trade in textile goods,

2. Recurrence of volatile exchange rate changes,

3. Ongoing U.S. negotiations for RTAs with developing and less developed countries,

4. Relatively limited initial importance and growth of Mexico in U.S. trade in and production of textile goods,
5. Emergence of full package systems in Mexico and the potential development of the Mexican fiber, textile, and apparel industry as competitors to the corresponding U.S. sectors,

6. Unrealized expectation of the delocalization, relocation of labor-intensive apparel production base and exports away from the United States and Asia to Mexico under NAFTA,

7. Aging and overall decline of the U.S. textile industry, and

8. NAFTA as a distortion in the global market efficiency of allocating production resources and manufacturing bases and barrier to trade liberalization of textile goods under the WTO.

First, trade liberalization under the MFA phase-out and China’s re-emerging dominance in world trade in textile goods have become the major forces against the role of NAFTA in trade regionalization. The MFA quota phase-out with the presence of relatively low tariffs imposed on trade in textile goods will strengthen the role of comparative advantage based on low labor costs in governing the flow of world trade in textile goods. Tariffs have become insignificant and subject to further decreases through future WTO trade negotiations. As textile production technologies are easily available worldwide through trade in textile machinery and have become a relatively insignificant factor in determining a country’s competitiveness of specializing in textiles, low labor costs, along with infrastructure, appear to maintain their importance in determining the competitiveness.

China has re-emerged as the major exporter of textile goods to the United States in the 2000s. The country’s advantage of specializing in textile and apparel production and exports is far greater than that of Mexico. China’s competitive edge in this decade has become ever stronger because of the lift of MFA quota restrictions and this country’s freed access to developed markets based on its WTO membership. China’s undervalued currency, protective policies, and incomparably low labor costs have further helped the country’s export competitiveness ([ATMI, 2003d] [ATMI, 2003a] [ATMI, 2003f] [Brooks & Ran, 2003]). The Chinese government’s currency manipulation and protective industrial policies, however, are against the WTO rules ([ATMI, 2003e] Hawkins, 2003). As a WTO member, the Chinese government has an obligation to correct them. China’s potential dominance in world trade of textile goods after 2005 has been predicted to disrupt the structural adjustments of the textile and apparel industries in the United States and other developed and developing nations.

Second, volatile exchange rate fluctuations have been the recurring factor in international trade scene for the last two decades. The appreciation of the U.S. dollar in the early 1980s, late 1994/1995, late 1997/1998, and the early 2000s under the Mexican peso devaluation and the Asian currency devaluation and manipulation has dominated over all other factors in governing the pattern of U.S. trade in textile goods, market competition, and the textile industry’s production and restructuring activities that have involved massive mill closings and job losses. These abrupt exchange rate changes have obviously weakened the effectiveness
of NAFTA for guiding the flow of U.S. trade in textile goods by diminishing the price discriminating effect of the agreement on exports from non-NAFTA countries.

Third, since NAFTA, the U.S. government has negotiated multiple RTAs with many developing and less developed countries, including AGOA, CBTPA, ATPDE, CAFTA-DR, and the proposed FTAA. These RTAs provide NAFTA-like trade preferences to the Caribbean Basin, Sub-Saharan African, Andean, and Central American regions and extend the free trade area beyond North America. NAFTA has been a stepping-stone in this process. RTAs can be significant sources of trade diversion of textile goods away from non-RTA signatory countries to RTA signatory countries as they differentiate trade prices and enhance the price competitiveness of regional trades. As FTAA is expected to be signed in the future, the inclusion of more developing countries in the North American Free Trade Area will decrease the advantage of Mexico as a low-cost U.S. manufacturing / assembly site and exporter of labor-intensive products including textile goods to the U.S. market. The global proliferation of RTAs along with the MFA phase-out is expected to weaken the price discriminating effect of NAFTA on trade, reshaping the pattern of U.S. trades in textile goods established in the early years of NAFTA (Lim, Suh & Gaskill, 2004).

Fourth, despite the effect of NAFTA on expanding U.S. regional trade, Mexico’s exports of textile goods had not grown long and large enough to exert a strong influence on the U.S. textile industry’s production activities before the macroeconomic environmental changes interrupted the growth pattern of the country in the late 1990s. Mexico’s share in U.S. textile imports was limited to 12 percent by the end of the 1990s. U.S. imports from the country declined since. Because imports accounted for only 22.8 percent of U.S. textile sales by 1997, 12 percent of U.S. textile imports represent a relatively small share in total U.S. textile sales, implying the relatively limited effect of NAFTA on U.S. textile markets by the end of the 1990s.

Despite the presence of NAFTA, the Mexican peso devaluation, and the general decline in East Asia’s comparative cost advantage and specialization in textile goods (Isaacs III, 2000), Asia has still remained as a major exporter of textile goods to the U.S. market by the end of the 1990s through the 2000s. The Asian currency devaluation and manipulation and the rise of China in international trade in textile goods, have severely interrupted the role of NAFTA in the 2000s in shaping U.S. trade in textile goods, stifling the growth potential of Mexico.

Fifth, Mexican maquiladoras’ increasing apparel assembly activities and domestic sourcing of textile inputs could have grown long enough to develop Mexico’s full package systems if there had not been the interruption by exchange rate changes, the MFA phase-out, and new U.S. RTAs in the process. NAFTA does not require Mexican apparel maquiladoras to use U.S. cut fabrics in apparel assembly to receive NAFTA benefits. As a result, Mexican apparel maquiladoras have increasingly searched for domestic input materials under NAFTA, encouraging the development of Mexican fiber and fabric sectors. More than ten times higher growth of Mexico’s non-807/maquiladora exports to the United States during 1994-2000 may indicate the gradual shift of Mexican apparel maquiladoras to full package systems (Bair, 2002; Gereffi, 2000), which implies the emerging new Mexican competitors.
to the U.S. counterparts. However, the development of Mexico’s full package systems have reportedly faced many challenges such as poor quality control and infrastructure and rising labor costs (Oh & Suh, 2003).

Sixth, NAFTA was expected to relocate labor-intensive apparel industry to Mexico away from the United States, Asia, and Caribbean Basin countries. This expectation, however, has not been fully materialized. Despite the rapid growth of U.S. apparel imports from Mexico during the early years of NAFTA, the corresponding U.S. imports from Caribbean Basin region had also grown at a moderate level. During 1994-1999, the combined share of the United States, Canada and Mexico in U.S. apparel sales had dropped from 48 percent to 29 percent while the corresponding share of the rest of the world had risen from 52 percent to 71 percent (Isaacs III, 2000). The contributing factors to this trend may be the rapid decline of U.S. apparel production base and increasing U.S. imports from other developing countries as well as Mexico.

This trend suggests that NAFTA has not been strong enough to protect and maintain the apparel production base within North America while accelerating the decline of U.S. apparel production base and shifting the role of the industry from manufacturing to increasingly specializing in international sourcing and domestic distribution. The delocalization of the U.S. apparel production base is a critical disadvantage to the U.S. textile industry because it is likely to result in the gradual delocalization of the textile industry because geographical proximity between textile input suppliers and apparel producers is important. The recent U.S. signing of FTAs with Caribbean, sub-Saharan African, ANDIAN, and CAFTA regions were designed to expand foreign demand for U.S. textile goods by promoting U.S. production sharing in these regions although this expectation has not been fully materialized yet.

Seventh, the textile industry’s aging in relation to market saturation and high wage rates has been a major barrier in determining U.S. competitiveness in textile and apparel production and trade. It is because labor costs claim the relatively large part of textile production costs with wide international variation while international trade in textile machinery has made textile production technology widely available which poses few entry barriers worldwide for conducting textile business. A study result appears to indirectly verify the more dominant effect of low labor costs than production technology factor ceteris paribus in determining textile export competitiveness. Lim (2005) identified that, in response to intensifying market competition in the 1980s, the U.S. textile industry’s efforts to improve its productivity and price competitiveness through technological developments and restructuring has resulted in the improved price competitiveness of its exports only in developed markets but not in developing markets by the end of the decade, implying the limitation of relying on advanced technologies and high productivity as a way of overcoming the disadvantage of high labor costs in international market competition. Cooper (2004) also agrees that the higher importance of low labor costs over technology and productivity factors in the textile business. In a similar way, a government policy to improve the textile industry’s competitiveness is likely to not be strong enough to reverse or complement the industry’s disadvantage of high labor costs and become a short-term measure.

Eighth, the NAFTA effect of decreasing prices of products originated and traded within
North America is believed to have had a distorting effect on the global market efficiency of allocating production and exports of textile goods to globally competitive producers rather than regionally competitive producers. Several Asian countries’ artificial currency devaluation prior to and since the Asian currency devaluation in 1997, on the other hand, has counteracted against the discriminative effect of NAFTA, partially reversing the damage done on their exports by NAFTA.

The evaluation of the effects of the NAFTA examined in this chapter can be compared with the predictions of the previous empirical studies of NAFTA conducted in the early 1990s. Changes in macroeconomic environments in the 1990s complicate this comparison because the early NAFTA studies used data for the years prior to 1990 in their simulation analyses and none of them had expected and incorporated the effects of these macroeconomic changes in their policy scenarios. Nonetheless, the slight growth of U.S. textile production and expanded trade under NAFTA until 1997 partially accords with the prediction made by Brown et al. (1992) if the stagnation and decline of U.S. textile shipments under the devaluation of Mexican peso and several Asian currencies are ignored. Brown et al. (1992) predicted a slight increase in the U.S. textile industry’s outputs, employment, capital, exports, and imports under NAFTA. Their prediction on the industry’s increasing capital and employment are not consistent with the industry’s actual decline in capital investments, installation of machinery, and employment. Trela and Whally (1992)’s prediction of a slight decrease in U.S. textiles and apparel production and Nam (1995)’s prediction of a one-third reduction of U.S. textile production under the NAFTA turned out to not agree with the industry’s actual production activities.

5.6 Research Hypotheses

In the next part of this dissertation we try to confirm the results of the analysis presented in this part using an economic model. Based on the observations and conclusions presented above the following hypotheses are formulated. An economic model will be developed in the next chapter to test these hypotheses.

To determine the significance of the impact of NAFTA on the U.S. textile production activities, the hypothesis is formed as below.

Hypothesis A: NAFTA had had a positive impact on the U.S. textile industry’s profit performance.

Hypothesis A is formed based on the following considerations: First, the previous empirical studies of NAFTA predicted a small but positive effect of the agreement on U.S. textile production activities. Second, the results of Part I, a qualitative analysis, show the growth of the U.S. textile industry’s shipments between 1992 and 1997 as likely to be associated with the positive growth of the industry’s profits under NAFTA. Based on this rationale, NAFTA is believed to have had a positive impact on the U.S. textile industry’s profit performance as stated in Hypothesis A.
To investigate the pattern of the U.S. textile industry’s output supply and input demand in response to changes in textile output and input prices under the influence of NAFTA, Hypotheses B and C are formulated as below:

Hypothesis B: U.S. textile producers’ output supply and input demand activities had not been sensitive to changes in output prices.

Hypothesis B is developed based on the general belief that U.S. textile producers have been slow at adjusting their production activities to changing market environments and consumer demand patterns that are reflected in changing textile output prices. Their emphasis on production side - mass production of standardized goods with long production runs and high productivity - and the consequent inflexibility of textile production systems are believed to have made textile producers less sensitive to changing market demands and prices.

Hypothesis C: U.S. textile producers’ output supply and input demand patterns had been sensitive to changes in variable input prices.

Hypothesis C is formed based on the textile industry’s increasing input substitution of expensive labor and natural fibers with cheaper capital and synthetic fibers to increase the speed and productivity of output production and lower production costs. The increasing input substitution between labor and capital and between natural and synthetic fibers are considered an indication of the industry’s sensitivity to changes in variable input prices. The next chapter examines an economic model that is applied to the U.S. textile industry’s production activities under NAFTA.
Part II

Quantitative Analysis
Chapter 6

Economic Analysis of U.S. Textile Production under NAFTA

The second part of this research deals with economic analyses of the U.S. textile industry under the influence of NAFTA to understand the pattern of the industry’s output supply and input demand and identify the statistical significance of the changes in the industry’s production activities. This chapter reviews a theoretical framework for the economic analysis including a profit model, advantages of using a profit model, the selection of a functional form, and nature of the translog functional form.

Finally, the normalized restricted translog profit model is applied to the analysis of production activities for the U.S. textile industry, followed by the derived systems of profit share equations of variable input expenditures. Own- and cross-price elasticity measures are specified to identify the responsiveness of the industry’s output supply and input demand to changes in output and input prices. The selection of data sources and time period are discussed next, followed by research hypotheses, method of statistical estimation, and limitations of this research.

6.1 Profit Model

Economists have developed economic models to depict the production and profit-maximizing behaviors of industrial firms. One direct approach is to use a production model (function) and derived input demand functions to analyze the firms’ behavior. A production model, however, requires the use of complex mathematical techniques for solving problems relating to profit maximization (Diewert, 1971). Attempts to avoid these difficult problem solving techniques led to an indirect approach of using a profit model and deriving output supply and input demand functions by differentiating the profit model with respect to output and input prices. A profit model used in empirical studies specifies a firm’s profit maximizing behavior as a function of output and variable input prices and the quantities of fixed inputs (Diewert, 1973, Diewert, 1974, Lau & Yotopoulos, 1971, Lau & Yotopoulos, 1972, Varian, 1980).
The profit function must meet certain properties. It can not be negative (nonnegativity). It does neither decrease when output prices increase nor increase when input prices increase (Varian, 1992). The profit function should be decreasing and convex (convexity) upon increasing variable input prices and have the corresponding concave production function (Diewert, 1973; Diewert, 1974; Lau, 1976). The function should be continuous and positive linear homogeneous in output and input prices (homogeneity). The output supply and input demand functions derived from a profit function should be homogeneous of degree zero (Varian, 1992). The profit function should be differentiable (differentiability) with respect to output and input prices so that the profit-maximizing output supply and input demand functions can be derived using Hotelling’s Lemma (Chambers, 1997; Diewert, 1973; Diewert, 1974).

6.2 Advantage of Using Profit Model

The profit function has desirable features. It can be used to determine a firm’s production function. The one-to-one corresponding relationship (duality) between a production function and the corresponding profit function allows one to derive the profit-maximizing output supply and input demand functions from the profit function using Hotelling’s Lemma, as long as it satisfies the properties of a profit function, such as nonnegativity, convexity, homogeneity, and differentiability with respect to output and input prices. The parameter estimates of a profit function are equivalent to those of the corresponding production function because of the dual relationship between a profit function and its corresponding production function. Therefore, it is easier to use a profit function and derive the system of output supply and input demand functions from it than using a production function and dealing with the complicated problem solving of profit maximization (Diewert, 1973; Diewert, 1974; Lau & Yotopoulos, 1971; Lau & Yotopoulos, 1972).

Previous studies showed that using a profit function, such as the normalized restricted profit function and derived input demand functions, yields statistically consistent estimates, allows flexibility in empirical analysis, and is suitable for analyzing policy implications. Using a profit function and the system of derived output supply and input demand functions, written as the functions of exogenous prices, makes econometric estimation easier and avoids the difficulties of using production function and input demand functions. Estimating input demand functions and elasticities directly from the production function using ordinary least squares faces simultaneous equations bias and yields statistically inconsistent results (Diewert, 1973; Diewert, 1974; Lau & Yotopoulos, 1971; Lau & Yotopoulos, 1972; Sidhu & Baanante, 1979).

Using a profit function and the system of derived equations also increases the degrees of freedom to the sum of the number of variable inputs and outputs per observation, while using a production function yields only one degree of freedom per observation. Imposing the symmetry and homogeneity restrictions across the profit model and the derived system
of equations also increases degrees of freedom (Diewert, 1973). Because of the advantages described above, this research chooses the profit function as an economic model to analyze the U.S. textile industry’s production activities under the influence of NAFTA.

6.3 Selection of Functional Form

A proper functional form should be applied to the profit model. The desirable functional form should possess the following qualities: First, it should enable the selected profit model to provide a second order approximation to arbitrary twice-differentiable production function and variable input function so that it is possible to derive output supply and input demand functions from the profit model. The estimates of parameters of these derived functions have the quality of linear homogeneity, which facilitates the econometric estimation of these parameters. Second, the selected functional form should allow the profit function to maintain the properties of nonnegativity, homogeneity, and convexity (Diewert, 1973; Diewert, 1974). Third, it is desirable for a functional form to be flexible and impose fewer restrictions on the parameters, which makes the econometric estimation easier (Chambers, 1997).

There are two categories of functional forms: traditional non-flexible forms and flexible forms. Traditional non-flexible functional forms include Cobb-Douglas and Constant Elasticity of Substitution (CES) forms. These functional forms are relatively simple but most restrictive in that they set the elasticities of substitutions among inputs to be either unitary or constant and impose separability among outputs and inputs (Chambers, 1997; Mefford, 1986). Separability assumes no interaction or interdependence among output and input prices and quantities in production process. Separability of inputs implies that inputs are technologically independent from each other in production process. Therefore, interaction between outputs and inputs or among inputs cannot be measured (Blackorby, Primont & Russell, 1977; Lopez, 1985).

Imposing unitary or constant elasticities of substitutions among inputs and separability is too restrictive and sacrifices the flexibility of functional forms in depicting complicated production technologies and various economic effects of production factors (Blackorby et al., 1977; Christensen et al., 1973; Diewert, 1971; Lopez, 1985). These restrictions are also unrealistic in terms of depicting textile production process because textile labor, capital, and material interact with each other as substitutes or complements in output production process and the textile industry has undergone increasing labor-capital substitution to automate the production systems.

The restrictive nature of non-flexible functional forms motivated the development of flexible functional forms that include Generalized Leontief, Generalized Cobb-Douglas, quadratic, and translog forms. These flexible functional forms allow elasticities of substitution among inputs and outputs to vary with fewer restrictions imposed. These flexible forms are able to describe more complicated production technologies and help the econometric estimation (Appelbaum, 1979; Blackorby et al., 1977; Chambers, 1997; Christensen et al., 1973; Diewert, 1971; Kohli, 1978). Because of this flexibility, flexible functional form became most popular
for empirical studies. Diewert (1973), on the other hand, suggested the application of flexible functional forms to a profit function.

Flexible functional forms, however, satisfy local convexity or concavity conditions in the neighborhood of observed data points, providing only local approximation but not global approximation. This local approximation improves the flexibility of these functional forms but does not provide understanding of the global behavior of these functional forms. Among flexible functional forms, only the normalized quadratic form is found to satisfy the global convexity or concavity conditions. However, this functional form imposes the prior restrictions of homotheticity and separability on production technology, which are not desirable. However, empirical researchers have made arbitrary decisions on functional forms depending on their research purposes (Chambers, 1997; Lopez, 1985).

6.4 Translog Functional Form

Christensen, Jorgenson and Lau (1971) introduced a translog form as a non-linear flexible functional form that does not impose a restriction on elasticities of substitution (Christensen, Jorgenson & Lau, 1971; Lopez, 1985). A translog form can be applied to homogeneous functions such as a profit function. This form, however, cannot provide a second order approximation to a function with weak separability (Blackorby et al., 1977). By comparing the applications of linear flexible functional forms (the Generalized Leontief and quadratic functional forms) and non-linear flexible functional form (the translog form) to the profit function, Lopez (1985) found that linear flexible functional forms are not desirable because they impose the strong prior restrictions of quasi-homotheticity and separability on production technology, which is not desirable in describing complicated production technology. Quasi-homotheticity implies linear expansion paths, in which elasticities of input demand with respect to output prices approach one and, therefore, changes in output levels do not affect the marginal rate of input substitution, and, therefore are not realistic.

Because of these limitations of linear flexible functional forms, non-linear flexible functional forms such as the translog form are favored by many researchers. This functional form is flexible enough to not impose restrictions such as homotheticity and separability on production technology and allows elasticities of substitutions to vary. The translog form is also better applicable to the profit function as it provides a second-order approximation to an arbitrary twice-differentiable profit function while satisfying the necessary properties of a profit function such as convexity, continuity, and homogeneity (Chambers, 1997; Christensen, Jorgenson & Lau, 1971; Diewert, 1974; Lopez, 1985; Berndt, Darrough & Diewert, 1976).

Translog refers to transcendental logarithm. Use of translog provides many benefits. The translog form uses a logarithm in expressing the function and thus transforms a non-linear model into a linear model so that a linear regression method can be applied for the statistical estimation of parameters. The translog also simplifies mathematical calculations of deriving output supply and input demand functions from the profit model by taking partial derivatives. Calculation of price elasticities of output supply and input demand are
also simplified.

The disadvantage of translog is its inability to provide an approximation to global convexity of the profit function. Therefore, it can only be used under the assumption of local convexity of the profit function and the interpretation of the results should be limited to local, over the observed data (Chambers, 1997). This is an acceptable feature as long as it meets the properties of the profit function locally in the neighborhood of data points because, for many empirical applications, the profit function does not necessarily meet its required properties globally for all possible prices (Lau, 1976). The limitation of translog form is that it cannot be applied to describe the production technology of non-homotheticity and weak separability (Blackorby et al., 1977). Because of the desirable qualities examined earlier, the profit model and translog functional form are selected for this economic analysis.

6.5 Application of Normalized Restricted Translog Profit Model to the U.S. Textile Industry Production Data

The preferential elimination of tariffs and quotas on North American trade under NAFTA had caused the expansion and regionalization of U.S. textile trade within North America and the promotion of domestic textile production activities in the 1990s until abnormal macroeconomic, political, and other market environments have negatively interfered with the role of NAFTA since the late 1990s through the 2000s.

The normalized restricted translog profit model is applied to the U.S. textile industry’s production activities to investigate the industry’s pattern of output supply and input demand under the influence of NAFTA and identify whether the agreement had a significant impact on the industry’s profit performance. A short-run model is chosen for this analysis because of the limited availability of data for this analysis that will be explained in the section of data sources.

The production activities of the U.S. textile industry can be represented by profit maximization. A competitive textile firm is assumed to choose the levels of output production and input consumption to maximize profits (Varian, 1992). The short-run profit function of the U.S. textile industry can be specified as a function of variable input prices - labor \(P_l^*\), material \(P_m^*\), electricity \(P_e^*\) - and fixed inputs - capital expenditure \(K\) and maintenance expenditure \(MN\).

Following previous empirical studies (Antle, 1984; Christensen et al., 1971; Christensen et al., 1973; Lau, 1978; Sidhu & Baanante, 1981), the normalized restricted translog profit model of the U.S. textile industry is specified as a function of the normalized prices \(P_l^*, P_m^*, \text{ and } P_e^*\) of variable inputs (labor \(L\), material \(M\), and energy \(E\)), fixed-inputs (capital \(K\) and maintenance \(MN\) expenditures), and interactions of these variables. A time dummy variable \(D\) is included in the model as an exogenous variable to indicate the
pre- and post-NAFTA periods.

\[
\ln \pi^* = a + a_l \ln p_l^* + a_m \ln p_m^* + a_e \ln p_e^* + a_K \ln K + a_{MN} \ln MN + a_D \ln D
\]

\[
+ \frac{1}{2} a_{ll} \ln p_l^* \ln p_l^* + a_{lm} \ln p_l^* \ln p_m^* + a_{lk} \ln p_l^* \ln K + a_{lMN} \ln p_m^* \ln MN
\]

\[
+ \frac{1}{2} a_{mm} \ln p_m^* \ln p_m^* + a_{me} \ln p_m^* \ln p_e^* + a_{mk} \ln p_m^* \ln K + a_{mMN} \ln p_m^* \ln MN
\]

\[
+ \frac{1}{2} a_{ee} \ln p_e^* \ln p_e^* + a_{le} \ln p_e^* \ln p_e^* + a_{ek} \ln p_e^* \ln K + a_{eMN} \ln p_e^* \ln MN
\]

\[
+ \frac{1}{2} a_{KK} \ln K \ln K + a_{kMN} \ln K \ln MN + \frac{1}{2} a_{MNMN} \ln MN \ln MN\]

(6.1)

Here,

- \( \pi^* \) = normalized restricted profit of textile production, defined as the total dollar value of shipments less the total costs of variable inputs including labor (\( l \)), materials (\( m \)), and electricity (\( e \)), normalized by textile output price (\( p_y \)),
- \( p_l^* \) = price of labor normalized by the textile output price (\( p_y \)),
- \( p_m^* \) = price of input materials (\( m \)) normalized by the textile output price (\( p_y \)),
- \( p_e^* \) = price of electricity (\( e \)) normalized by the textile output price (\( p_y \)),
- \( K \) = dollar value of the new and old capital expenditures for buildings, other structures, machinery and equipment,
- \( MN \) = dollar value of maintenance expenditures such as purchased services for repair of buildings and machinery, communications, legal, accounting, advertising, software, and refuse removal,
- \( D \) = time dummy (pre- and post-NAFTA periods), and
- \( a, a_l, a_m, a_e, a_K, a_{MN}, a_d, a_{ll}, a_{lm}, a_{me}, a_{kk}, a_{MNMN}, a_{lm}, a_{le}, a_{lK}, a_{lMN}, a_{me}, a_{mK}, a_{mMN}, a_{eK}, a_{eMN}, a_{KK}, a_{MNMN} = \) coefficients to input parameters.

The term "restricted" implies the short-run nature of this economic model with fixed inputs - capital and maintenance expenditures - whose consumption in textile production process does not change in the short-run. In the long-run, however, every input becomes a variable input as the industry’s consumption of all inputs varies in response to their market prices.

The profit and price variables in this model are normalized by textile output price, which is set to one. Normalization allows one to measure all input prices relative to output price, therefore deflating them. It has the benefits of making the econometric specification of output supply and input demand functions easier and helping simplify and obtain a unique solution to the problem solving of profit maximization while meeting the necessary properties of a profit function [Chiang, 1984] [Lau, 1976] [Lau & Yotopoulos, 1971].
1972). Normalized input prices and quantities of fixed inputs are exogenous variables to a firm’s profit maximization in the short-run under the assumption that the firm is competitive and takes market prices as given. This normalized profit function is linearly homogeneous in prices of variable inputs and outputs [Kohli, 1978] [Sidhu & Baanante, 1981], in which a change in input and output prices results in the corresponding proportional change in restricted profits.

Conventionally, economists have imposed symmetry restrictions on this kind of economic analysis to obtain consistent statistical estimates, reduce the number of parameters, and increase the number of degrees of freedom. The validity of imposing these restrictions was tested and proved (Christensen et al., 1973; Diewert, 1973). This analysis follows this convention and imposes the following symmetry restrictions in setting the normalized restricted translog profit model of the U.S. textile industry:

\[
\begin{align*}
    a_{lm} &= a_{ml}, & a_{le} &= a_{el}, & a_{me} &= a_{em}, & a_{lK} &= a_{Kl}, & a_{lMN} &= a_{MNI}, \\
    a_{mK} &= a_{Km}, & a_{mMN} &= a_{MNM}, & a_{eK} &= a_{Ke}, & a_{eMN} &= a_{MNE}, & a_{KMN} &= a_{MNK} \quad (6.2)
\end{align*}
\]

Imposing and testing symmetry is equivalent to imposing homogeneity because these restrictions share the same condition. Homogeneity of degree one in outputs and inputs implies production technology of constant returns to scale (Christensen et al., 1973).

### 6.5.1 Profit Share Equations of Variable Input Expenditures

Using Hotelling’s Lemma, the profit share equations of variable input expenditures can be derived from the normalized restricted translog profit model as a linear function of logarithms of input and output prices by differentiating the profit model with respect to the logarithms of input and output prices, \( \ln p^*_i \) and \( \ln p_y \) [Christensen, Jorgenson & Lau, 1973] [Diewert, 1974] [Kohli, 1978] [Sidhu & Baanante, 1981] [Yotopoulos, Lau & Lin, 1976]. This system of profit share equations of variable input expenditures and output supply possesses the same nature of the equations of output supply and input demand functions derived from the profit model. This derived system of profit share equations has a symmetric relationship with its original profit model and provides convenience in statistical estimation [Appelbaum, 1979].

The profit share equation of output supply \( y \) is defined as \( S_y = \frac{\pi}{\sum S_i} \). This analysis, however, ignores \( S_y \) because the sum of these shares is one (\( \sum_i S_i + S_y = 1 \)) [Appelbaum, 1979] [Diewert, 1974] [Sidhu & Baanante, 1981].

The profit share equation \( (S_i) \) of variable input expenditure for each of labor \( l \), material \( m \), and electricity \( e \) is derived from the normalized restricted translog profit model for each of the variable textile inputs - labor, materials, and electricity.
\( S_l = \frac{-p_l^* x_l}{\pi^*} = \frac{\partial \ln \pi^*}{\partial \ln p_l^*} \)  

\[ (6.3) \]

\( S_m = \frac{-p_m^* x_m}{\pi^*} = \frac{\partial \ln \pi^*}{\partial \ln p_m^*} \)

\[ (6.4) \]

\( S_e = \frac{-p_e^* x_e}{\pi^*} = \frac{\partial \ln \pi^*}{\partial \ln p_e^*} \)

\[ (6.5) \]

Here, \( x_l, x_m, \) and \( x_e \) are the physical quantities of variable input demand for labor, materials, and electricity. The superscripts, \( SL, SM, \) and \( SE \) are used to differentiate the parameters in these equations from the corresponding parameters in the original normalized restricted translog profit equation (Equation 6.1) and the system of the profit share equations (Equations 6.3, 6.4, and 6.5). The parameter estimates of these profit share equations provide information on the interaction between the shares of variable input expenditures in restricted profits and changes in variable input prices and fixed inputs.

It has been conventional to impose equality restrictions across the restricted translog profit equation and the profit share equations of variable input expenditures in order to obtain consistent statistical estimates (Christensen et al., 1973). Imposing equality restrictions implies that the common parameters appearing in the normalized restricted translog profit model and the corresponding profit share equations are identical. This feature is important for the economic model to perform consistently. These sets of parameters can be identical only if they are obtained from a system of the restricted translog profit model and profit share equations derived from a profit-maximizing firm (Christensen et al., 1973; Lau & Yotopoulos, 1972; Sidhu & Baanante, 1981; Yotopoulos et al., 1976).

This economic analysis also follows the convention and imposes the following equality restrictions across the system of the profit equation (Equation 6.1) and profit share equations (Equations 6.3 6.4 and 6.5):

\[
\begin{align*}
a_l &= a_l^{SL}, & a_{ll} &= a_{ll}^{SL}, & a_{lK} &= a_{lK}^{SL}, & a_{IMN} &= a_{IMN}^{SL}, & a_{im} &= a_{im}^{SL} = a_{im}^{SM}, \\
a_m &= a_m^{SM}, & a_{mm} &= a_{mm}^{SM}, & a_{mK} &= a_{mK}^{SM}, & a_{mMN} &= a_{mMN}^{SM}, & a_{le} &= a_{le}^{SL} = a_{le}^{SE}, \\
a_e &= a_e^{SE}, & a_{ee} &= a_{ee}^{SE}, & a_{eK} &= a_{eK}^{SE}, & a_{eMN} &= a_{eMN}^{SE}, & a_{me} &= a_{me}^{SM} = a_{me}^{SE} \end{align*}
\]

\[ (6.6) \]

Imposing this equality restriction implies that when the same parameters appear in different equations, they are restricted to be identical. Imposing the symmetry and equality restrictions on the parameters of the restricted translog profit model and the system of derived profit share equations has the benefits of reducing the number of parameters in these
equations, increasing the number of degrees of freedom, and obtaining consistent estimate results (Diewert, 1973). These benefits of the restrictions helps deal with the problem of limited number of observations of the data used in this research.

6.5.2 Own- and Cross-Price Elasticities of Demand for Variable Inputs

Measuring elasticities gives information on the U.S. textile industry’s pattern of output supply and input demand in response to changes in output and input prices. The elasticities of variable input demand and output supply with respect to output and variable input prices can be computed as the linear transformations of the parameters of the profit model at given variable input and output prices (Sidhu & Baanante, 1981). The equations for the calculation of elasticities of the U.S. textile industry’s output supply and input demand with respect to output and variable input prices and fixed inputs are presented in this section.

\[
x_i = \frac{\pi}{p_i} \left( -\frac{\partial \ln \pi}{\partial \ln p_i} \right)
\]

(6.7)

\[
\ln x_i = \ln \pi - \ln p_i + \ln \left( -\frac{\partial \ln \pi}{\partial \ln p_i} \right)
\]

(6.8)

where \( i = l \) (labor), \( m \) (material), and \( e \) (energy).

Based on Equation (6.8), the own-price elasticity \( (e_{ii}) \) of demand for variable input \( x_i \) is defined as:

\[
e_{ii} = \frac{\partial \ln x_i}{\partial \ln p_i}
\]

\[
= \frac{\partial \ln \pi}{\partial \ln p_i} - 1 + \frac{\partial \ln}{\partial \ln p_i} \left( -\frac{\partial \ln \pi}{\partial \ln p_i} \right)
\]

\[
= S_i - 1 + \frac{a_{ii}}{S_i}
\]

(6.9)

Based on Equation (6.9), the own-price elasticities of the textile industry’s variable input demand for labor, material, and electricity are derived as below.

\[
e_{ll} = S_l - 1 + \frac{a_{ll}}{S_l}
\]

(6.10)

\[
e_{mm} = S_m - 1 + \frac{a_{mm}}{S_m}
\]

(6.11)

\[
e_{ee} = S_e - 1 + \frac{a_{ee}}{S_e}
\]

(6.12)
The calculation of the above elasticity equations would show how much the U.S. textile industry’s demand for variable inputs - labor, materials, and electricity - changes in response to changes in these input prices. For example, if the calculated elasticity of the textile industry’s demand for labor \((e_l\)) with respect to labor price is -1.5, it means that the industry decreases its input demand for labor \((l)\) by 1.5 percent in response to an one percent increase in labor price, indicating the negative relationship between the industry’s demand for labor and labor price.

The cross-price elasticity \((e_{ih})\) of demand for \(i^{th}\) input with respect to the \(h^{th}\) input price is defined as:

\[
e_{ih} = \frac{\partial \ln x_i}{\partial \ln p_h} = \frac{\partial \ln \pi}{\partial \ln p_h} + \frac{\partial \ln \pi}{\partial \ln p_h} \left(-\frac{\partial \ln \pi}{\partial \ln p_i}\right) = S_h + \frac{a_{ih} S_i}{S_i}
\]  

(6.13)

where \(i, h = l\) (labor), \(m\) (material), and \(e\) (energy); \(i \neq h\).

Based on Equation (6.13) the cross-price elasticities \((e_{ih})\) of the textile industry’s variable input demand with respect to other variable input prices are derived as below.

\[
e_{lm} = S_m + \frac{a_{lm}}{S_l}
\]  

(6.14)

\[
e_{le} = S_e + \frac{a_{le}}{S_l}
\]  

(6.15)

\[
e_{ml} = S_l + \frac{a_{ml}}{S_m}
\]  

(6.16)

\[
e_{me} = S_e + \frac{a_{me}}{S_m}
\]  

(6.17)

\[
e_{el} = S_l + \frac{a_{le}}{S_e}
\]  

(6.18)

\[
e_{em} = S_m + \frac{a_{me}}{S_e}
\]  

(6.19)

The interpretation of calculated cross-price elasticities is same as that of own price elasticities as explained above. If the calculated cross-price elasticities of the industry’s demand for labor with respect to material price \((e_{lm})\) is 1.3, it means that an one percent increase in labor cost contributes to a 1.3 percent increase in the industry’s demand for input materials, suggesting the positive complementary relationship between labor and input materials in textile production systems.
6.5.3 Elasticities of Demand for Variable Inputs with respect to Fixed Inputs

The elasticities \(e_{ij}\) of the textile industry’s variable input demand with respect to fixed inputs, capital \((K)\) and maintenance \((MN)\) expenditures, are derived as below.

\[
e_{ik} = \frac{\partial \ln x_i}{\partial \ln k} = \frac{\partial \ln \pi}{\partial \ln k} - \frac{\partial \ln p_i}{\partial \ln k} + \frac{\partial \ln (\pi)}{\partial \ln p_i} - \frac{\partial \ln (\pi)}{\partial \ln p_i},
\]

(6.20)

where \(i = l\) (labor), \(m\) (material), and \(e\) (energy); \(k = K\) and \(MN\).

Based on Equation (6.20), the elasticities of variable input demand for labor, material, and electricity with respect to capital and maintenance expenditures can be calculated as:

\[
e_{lK} = a_K + a_{lK} \ln p_l^* + a_{mK} \ln p_m^* + a_{eK} \ln p_e^* + a_{KK} \ln K
\]

\[+ a_{KMN} \ln MN + \frac{a_{lK}}{S_l} \]

(6.21)

\[
e_{mK} = a_K + a_{lK} \ln p_l^* + a_{mK} \ln p_m^* + a_{eK} \ln p_e^* + a_{KK} \ln K
\]

\[+ a_{KMN} \ln MN + \frac{a_{mK}}{S_m} \]

(6.22)

\[
e_{eK} = a_K + a_{lK} \ln p_l^* + a_{mK} \ln p_m^* + a_{eK} \ln p_e^* + a_{KK} \ln K
\]

\[+ a_{KMN} \ln MN + \frac{a_{eK}}{S_e} \]

(6.23)

\[
e_{lMN} = a_{MN} + a_{lMN} \ln p_l^* + a_{mMN} \ln p_m^* + a_{eMN} \ln p_e^* + a_{KMN} \ln K
\]

\[+ a_{MMN} \ln MN + \frac{a_{lMN}}{S_l} \]

(6.24)

\[
e_{mMN} = a_{MN} + a_{lMN} \ln p_l^* + a_{mMN} \ln p_m^* + a_{eMN} \ln p_e^* + a_{KMN} \ln K
\]

\[+ a_{MMN} \ln MN + \frac{a_{mMN}}{S_m} \]

(6.25)

\[
e_{eMN} = a_{MN} + a_{lMN} \ln p_l^* + a_{mMN} \ln p_m^* + a_{eMN} \ln p_e^* + a_{KMN} \ln K
\]

\[+ a_{MMN} \ln MN + \frac{a_{eMN}}{S_e} \]

(6.26)

6.5.4 Elasticities of Variable Input Demand with respect to Output Prices

The elasticity of demand for the \(i^{th}\) input with respect to textile output price \(p_y\) can be defined as
\[
e_{iy} = \frac{\partial \ln x_i}{\ln p_y}
\]

\[
= \frac{\partial \ln \pi^*}{\ln p_y} - \frac{\partial \ln p_i^*}{\ln p_y} + \frac{\partial \ln}{\ln p_y} \left( \frac{\partial \ln \pi^*}{\ln p_i^*} \right)
\]

\[
= \sum_h \frac{\partial \ln \pi^*}{\ln p_h^*} \frac{\partial \ln p_y}{\ln p_y} - (-1) - \sum_h \frac{a_{ih}}{S_i}
\]

\[
= 1 - \sum_h \left( S_h + \frac{a_{ih}}{S_i} \right) \quad (6.27)
\]

Based on Equation (6.27), the elasticities of the textile industry’s variable input demands with respect to changes in output prices are derived below.

\[
e_{ty} = -S_t - S_m - S_e + 1 - \frac{a_{tl} + a_{lm} + a_{le}}{S_t}
\]

\[
e_{my} = -S_t - S_m - S_e + 1 - \frac{a_{lm} + a_{mm} + a_{me}}{S_m}
\]

\[
e_{ey} = -S_t - S_m - S_e + 1 - \frac{a_{le} + a_{me} + a_{ee}}{S_e}
\]

### 6.5.5 Elasticities of Output Supply with respect to Output and Variable Input Prices

The elasticities of output supply with respect to output and variable input prices and fixed inputs are shown as follows. Based on duality, the equation for output supply \( y \) can be written as below (Lau & Yotopoulos, 1972).

\[
y = \pi^* + \sum_i p_i^* x_i
\]

\[
= \pi^* + \sum_i \pi^* \left( -\frac{\partial \ln \pi^*}{\ln p_i^*} \right)
\]

\[
= \pi^* \left( 1 - \sum_i \frac{\partial \ln \pi^*}{\ln p_i^*} \right)
\]

\[
\ln y = \ln \pi^* + \ln \left( 1 - \sum_i \frac{\partial \ln \pi^*}{\ln p_i^*} \right)
\]

Then, the elasticity of output supply with respect to the price of the \( i \)th variable input \( (e_{yu}) \) can be defined as:
\[ e_{yi} = \frac{\partial \ln y}{\partial \ln p_i^*} \]
\[ = \frac{\partial \ln \pi^*}{\partial \ln p_i^*} + \frac{\partial \ln}{\partial \ln p_i^*} \left( 1 - \sum_h \frac{\partial \ln \pi^*}{\partial \ln p_h^*} \right) \]
\[ = S_i - \frac{\sum_h a_{ih}}{1 - \sum_h S_h} \quad (6.33) \]

where \( i, h = l, m, e; i \neq h; y = \) textile output supply.

Based on Equation 6.33, the elasticities of the U.S. textile industry’s output supply with respect to changes in variable input prices are derived as below.

\[ e_{yl} = S_l - \frac{a_{ll} + a_{lm} + a_{le}}{1 - S_l - S_m - S_e} \quad (6.34) \]
\[ e_{ym} = S_m - \frac{a_{lm} + a_{mm} + a_{me}}{1 - S_l - S_m - S_e} \quad (6.35) \]
\[ e_{ye} = S_e - \frac{a_{le} + a_{me} + a_{ee}}{1 - S_l - S_m - S_e} \quad (6.36) \]

The own-price elasticities of the textile industry’s output supply with respect to changes in textile output price \( (e_{yy}) \) are derived as below.

\[ e_{yy} = \frac{\partial \ln y}{\partial \ln p_y} \]
\[ = \frac{\partial \ln \pi^*}{\partial \ln p_y} + \frac{\partial \ln}{\partial \ln p_y} \left( 1 - \sum_i \frac{\partial \ln \pi^*}{\partial \ln p_i^*} \right) \]
\[ = \sum_i \frac{\partial \ln \pi^*}{\partial \ln p_i^*} \frac{\partial \ln p_i^*}{\partial \ln p_y} - \sum_h \frac{\sum_i - a_{ih}}{1 - \sum_i S_i} \quad (6.37) \]
\[ = -\sum_i S_i + \sum_i \sum_h a_{ih} \frac{1}{1 - \sum_i S_i} \quad (6.38) \]

Based on Equation 6.38, the own price elasticities of textile output supply is derived as below.

\[ e_{yy} = -S_l - S_m - S_e + \frac{a_{ll} + a_{mm} + a_{ee} + 2a_{lm} + 2a_{le} + 2a_{me}}{1 - S_l - S_m - S_e} \quad (6.39) \]

The elasticities of the textile industry’s output supply with respect to changes in fixed input \( (e_{yk}) \) are derived as below.
\[
e_{yk} = \frac{\partial \ln y}{\partial \ln k} = \frac{\partial \ln \pi^*}{\partial \ln k} + \frac{\partial \ln}{\partial \ln k} \left(1 - \sum_i \frac{\partial \ln \pi^*}{\partial \ln p_i^*}\right) = a_k + \sum_i a_i k \ln p_i^* + \sum_j a_j k \ln j - \frac{\sum_i a_{ik}}{1 - \sum_i S_i} \tag{6.40}
\]

\[
e_{yK} = a_K + a_{lK} \ln p_l^* + a_{mK} \ln p_m^* + a_{eK} \ln p_e^* + a_{KK} \ln K + a_{KMN} \ln MN - \frac{a_{lK} + a_{mK} + a_{eK}}{1 - S_l - S_m - S_e} \tag{6.41}
\]

\[
e_{yMN} = a_{MN} + a_{lMN} \ln p_l^* + a_{mMN} \ln p_m^* + a_{eMN} \ln p_e^* + a_{KMN} \ln K + a_{MN MN} \ln MN - \frac{a_{lMN} + a_{mMN} + a_{eMN}}{1 - S_l - S_m - S_e} \tag{6.42}
\]

The next section presents data sources and time period chosen for this analysis.

### 6.6 Selection of Data Sources

The selected data sources for this economic analysis are The Census of Manufactures: Industry Series and The Economic Census: Manufacturing Industry Series issued by the U.S. Bureau of Census. The Economic Census replaced the Census of Manufactures in 1997. These census data are issued every five years. Although annual data are more desirable for this analysis, the lack of detailed annual data needed for this analysis makes it necessary to use census data.

The major complication of using these data sources is the highly aggregated level of data across textile firms which limits this analysis to examine the industry’s behavior rather than individual firms. Another complication of using these data sources is the change in the commodity classification codes of these two publications. Data of the Census of Manufactures is organized in accordance with the Standard Industrial Classification (SIC) system, which was replaced by the North American Industry Classification System (NAICS) in 1997. Data of the Economic Census is organized in accordance with NAICS. Appendix A shows how the raw data is collected and handled. As these two publications follow different commodity classification systems, there are slight differences in the groupings of data from these publications. In an attempt to make these two sets of data comparable, the commodity groupings of the Census of Manufactures (SIC) are slightly reorganized in Table 6.1 to make them comparable to those of the Economic Census (NAICS).

After making the commodity groupings of these two publications comparable, raw data of these two publications undergo transformation, including aggregation, deduction, and...
Table 6.1: Textile Product Groups used in this Research

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>North American Industry Classification System (NAICS)</td>
<td>Standard Industrial Classification (SIC)</td>
</tr>
<tr>
<td>313111 Yarn spinning mills</td>
<td>228100 Yarn spinning mills</td>
</tr>
<tr>
<td></td>
<td>229910 Textile goods, n.e.c.¹</td>
</tr>
<tr>
<td>313112 Yarn texturing, throwing, and twisting mills</td>
<td>228210 Yarn throwing and winding</td>
</tr>
<tr>
<td>313113 Thread mills</td>
<td>228410 Thread mills (pt)²</td>
</tr>
<tr>
<td></td>
<td>229920 Textile goods, n.e.c. (pt)</td>
</tr>
<tr>
<td>313210 Broadwoven fabric mills</td>
<td>221100 Weaving mills, cotton</td>
</tr>
<tr>
<td></td>
<td>222100 Weaving mills, synthetics</td>
</tr>
<tr>
<td></td>
<td>223110 Weaving and finishing mills, wool (pt)</td>
</tr>
<tr>
<td></td>
<td>229930 Textile goods, n.e.c. (pt)</td>
</tr>
<tr>
<td>313221 Narrow fabric mills</td>
<td>224100 Narrow fabric mills</td>
</tr>
<tr>
<td></td>
<td>229940 Textile goods, n.e.c. (pt)</td>
</tr>
<tr>
<td>313222 Schiffli machine embroidery</td>
<td>239700 Schiffli machine embroideries</td>
</tr>
<tr>
<td>313230 Nonwoven fabric mills</td>
<td>229700 Nonwoven fabrics</td>
</tr>
<tr>
<td></td>
<td>229950 Textile goods, n.e.c. (pt)</td>
</tr>
<tr>
<td>313241 Weft knit fabric mills</td>
<td>225710 Circular knit fabric mills (pt)</td>
</tr>
<tr>
<td>313249 Other knit fabric and lace mills</td>
<td>225810 Lace and warp knit fabric mills (pt)</td>
</tr>
<tr>
<td></td>
<td>225910 Knitting mills, n.e.c. (pt)</td>
</tr>
<tr>
<td>313311 Broadwoven fabric finishing mills</td>
<td>223120 Weaving and finishing mills, wool (pt)</td>
</tr>
<tr>
<td></td>
<td>226100 Finishing plants, cotton</td>
</tr>
<tr>
<td></td>
<td>226200 Finishing plants, synthetics</td>
</tr>
<tr>
<td></td>
<td>513105 Piece goods, notions, and other dry goods (pt)</td>
</tr>
</tbody>
</table>

Continued on next page
<table>
<thead>
<tr>
<th>NAICS Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>313312</td>
<td>Textile and fabric finishing (except broadwoven fabric) mills</td>
</tr>
<tr>
<td>223130</td>
<td>Weaving and finishing mills, wool (pt)</td>
</tr>
<tr>
<td>225720</td>
<td>Circular knit fabric mills (pt)</td>
</tr>
<tr>
<td>225820</td>
<td>Lace and warp knit fabric mills (pt)</td>
</tr>
<tr>
<td>226900</td>
<td>Finishing plants, n.e.c.</td>
</tr>
<tr>
<td>228220</td>
<td>Yarn throwing and winding mills (pt)</td>
</tr>
<tr>
<td>228420</td>
<td>Thread mills (pt)</td>
</tr>
<tr>
<td>229600</td>
<td>Textile goods, n.e.c. (pt)</td>
</tr>
<tr>
<td>513110</td>
<td>Piece goods, motions, and other dry goods (pt)</td>
</tr>
<tr>
<td>313320</td>
<td>Fabric coating mills</td>
</tr>
<tr>
<td>229500</td>
<td>Coated fabrics, not rubberized</td>
</tr>
<tr>
<td>306910</td>
<td>Fabricated rubber products, n.e.c. (pt)</td>
</tr>
<tr>
<td>314110</td>
<td>Carpet and rug mills</td>
</tr>
<tr>
<td>227300</td>
<td>Carpets and rugs</td>
</tr>
<tr>
<td>314121</td>
<td>Curtain and drapery mills</td>
</tr>
<tr>
<td>239100</td>
<td>Curtains and draperies</td>
</tr>
<tr>
<td>571401</td>
<td>Drapery, curtain, and upholstery stores (pt)</td>
</tr>
<tr>
<td>314129</td>
<td>Other household textile product mills</td>
</tr>
<tr>
<td>239210</td>
<td>Housefurnishings, n.e.c. (pt)</td>
</tr>
<tr>
<td>314911</td>
<td>Textile Bag Mills</td>
</tr>
<tr>
<td>239220</td>
<td>Housefurnishings, n.e.c. (pt)</td>
</tr>
<tr>
<td>239300</td>
<td>Textile bags</td>
</tr>
<tr>
<td>314991</td>
<td>Rope, cordage &amp; twine mills</td>
</tr>
<tr>
<td>229800</td>
<td>Cordage &amp; twine</td>
</tr>
<tr>
<td>314912</td>
<td>Canvas and related product mills</td>
</tr>
<tr>
<td>239400</td>
<td>Canvas and related products</td>
</tr>
<tr>
<td>314991</td>
<td>Rope, Cordage, and Twine Mills</td>
</tr>
<tr>
<td>229800</td>
<td>Cordage and Twine</td>
</tr>
<tr>
<td>314992</td>
<td>Tire Cord and Tire Fabric Mills</td>
</tr>
<tr>
<td>229600</td>
<td>Tire cord and fabric</td>
</tr>
<tr>
<td>314999</td>
<td>All other miscellaneous textile product mills</td>
</tr>
<tr>
<td>229970</td>
<td>Textile goods, n.e.c. (pt)</td>
</tr>
<tr>
<td>239510</td>
<td>Pleating and stitching (pt)</td>
</tr>
<tr>
<td>239610</td>
<td>Automotive and apparel trimmings (pt)</td>
</tr>
<tr>
<td>239910</td>
<td>Fabricated textile products, n.e.c.(pt)</td>
</tr>
<tr>
<td>399905</td>
<td>Manufacturing industries, n.e.c.(pt)</td>
</tr>
</tbody>
</table>

95

Continued on next page
### Note:
The six digit NAICS and SIC product classification codes shown in this table indicate the different types of textile sectors.

**Source:** The reorganization of SIC in accordance to NAICS in this table is prepared based on data from the Economic Census and the Census of Manufacturers.

1. 'n.e.c.' stands for 'not else where classified.'
2. 'pt' implies 'part.' This industry was split into pieces in the process of the conversion of SIC into NAICS.

| 315192 Underwear & nightwear knitting mills | 225400 Knit underwear mills       |
|                                          | 225930 Knitting mills, n. e. c. (pt) |
division, to create the final data set for the statistical estimation of parameters. Table 6.2 shows how raw data of these publications are prepared to create the final data set.

To normalize textile profits and unit variable input prices, unit textile output prices need to be calculated using the dollar value and quantity data of textile shipments from the census data. However, the census data have too many missing entries for textile shipment quantities, thus making it impossible to calculate the unit textile output prices. For this reason, producer price indices of textile commodities from the Bureau of Labor Statistics are used instead.

6.7 Selection of Time Points for the Two Periods

Because of the limited availability of the diverse and consistent data - only provided by the census data - needed for this analysis, the time period of this analysis is limited to the census years of 1992 and 1997. Data for the pre-NAFTA year, 1992, are provided by the Census of Manufactures. Data for the post-NAFTA year, 1997, are available from the Economic Census. The contents and details of census data have changed slightly over time, and therefore affect the consistency of data and limit the selection of time period to the years that provide the full data set needed for this analysis. The data of 1997, which are the latest data available at the time of data analysis, represent the industry’s production activities in the post-NAFTA year when the effect of the agreement had been most strong before abnormal macroeconomic factors started dominating the market environments.

Compared to other years, the selection of 1992 and 1997 helps render the impacts on the textile industry’s production activities of other environmental factors, such as the economic recession in the early 1990s, the Mexican (late 1994-1995) and Asian (late 1997-1998) currency devaluations, difficult U.S. economic and political conditions in the early 2000s, China’s WTO membership and undervalued currency, the MFA phase-out, and U.S. import surges, least influential. Therefore, these selected years are considered to be the most suitable for the economic analysis.

The 1992-1997 period, however, allows the investigation of the short-run adjustments of the U.S. textile industry’s output supply and input demand activities under the influence of NAFTA. This period is considered to be a relatively short-run for the textile industry’s production activities because it is not long enough for all of the industry’s variable and fixed inputs - including machinery and buildings - to become variable inputs. For example, five-year old machinery (capital) is considered to be a fixed input in textile production as the average life span of textile machinery is expected to be around ten years.

Maintenance expenditure is introduced in this model as a fixed input because data are available and it is identified as statistically significant. It is assumed that the business supporting systems for textile production do not change annually. It is impossible to obtain price data for this variable because it combines many different types of raw data. The short-run nature of the data makes it necessary to apply a short-run economic model, the normalized restricted translog profit model, to the production activities of the U.S. textile
Table 6.2: Theoretical Definitions of the Variables and Preparation of Raw Data for the Analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>Model Definition</th>
<th>Preparation of Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\pi^*$</td>
<td>Dependent Variable: Restricted profit is the difference between a firm’s revenue and costs of variable inputs</td>
<td>Restricted profit = (dollar value of textile shipments - wages of textile production and non-production workers - costs of inputs [materials including raw cotton / synthetic fibers, spun yarn, and broadwoven fabrics] - costs of purchased electricity) / output price indices</td>
</tr>
<tr>
<td>$p_l^*$</td>
<td>Independent Variable: Price of labor ($l$) normalized by output price ($p_y$)</td>
<td>Hourly labor cost = (production worker wages / production worker hours) / output price</td>
</tr>
<tr>
<td>$p_m^*$</td>
<td>Independent Variable: Price of input material ($m$) normalized by output price ($p_y$)</td>
<td>Unit material cost = (costs of cotton and synthetic fibers, yarns, and broadwoven fabrics / quantity of cotton and synthetic fibers, yarns, and broadwoven fabrics) / output price</td>
</tr>
<tr>
<td>$p_e^*$</td>
<td>Independent Variable: Price of electricity ($e$) normalized by output price ($p_y$)</td>
<td>Unit electricity cost = (costs of purchased electricity / quantity of purchased electricity (kwh per hour)) / output price</td>
</tr>
<tr>
<td>$K$</td>
<td>Independent Variable: Capital expenditure</td>
<td>New and old capital expenditure for buildings, other structures, machinery, and equipment</td>
</tr>
<tr>
<td>$MN$</td>
<td>Independent Variable: Maintenance expenditure</td>
<td>Expenditures of purchased services for the repair of buildings and machinery, communications, legal, accounting, advertising, software, and refuse removal</td>
</tr>
<tr>
<td>$D$</td>
<td>Time dummy</td>
<td>Indicate the pre- and post-NAFTA periods</td>
</tr>
</tbody>
</table>

Note: The variables listed in this table are defined based on the availability of raw data in the Census of Manufactures and the Economic Census.
industry.

6.8 Method of Statistical Estimation

To estimate the parameters of the normalized restricted translog profit model (Equation 6.1) and the derived system of profit share equations (Equations 6.3, 6.4, and 6.5), symmetry and equality restrictions are imposed across the system of equations. Seemingly Unrelated Regression (SUR) with the application of Generalized Least Squares (GLS) is employed to jointly estimate the parameters of the system of equations. The dependent variables are the U.S. textile industry’s restricted profits and the shares of the industry’s variable input expenditures of labor, material, and electricity in its restricted profits (in other words, the ratios of these variable input expenditures to restricted profits). The independent variables are the normalized unit prices of variable inputs (labor, material, and electricity) and the dollar values of fixed inputs (capital and maintenance expenditures).

The joint estimation of these equations is necessary because the common parameters existing in these equations may cause covariance among error terms (Sidhu & Baanante, 1981; Woodland, 1977). A number of highly correlated independent variables such as square terms and cross product terms in these equations may also cause multicollinearity among these independent variables. Using both time series and cross section data, as in the case of this analysis, may cause autocorrelation in OLS estimators because the errors in different equations may be correlated. In the presence of these statistical problems, ordinary least squares (OLS) does not yield efficient parameter estimates (Lau & Yotopoulos, 1972).

Another problem that may cause the inefficiency of statistical estimates is the partial duplication in data of input material costs and textile shipment values in the two government publications used for this analysis. U.S. Bureau of the Census (1992) points out that certain textile sectors’ material costs and shipment values are partially overlapped because these sectors comprise successive stages in the process of textile production and some sectors’ outputs are used as the other sectors’ input materials. The use of these duplicate data in the statistical analysis may cause error terms in the different equations to be correlated, causing autocorrelation in OLS estimators. In this case, OLS provides biased parameter estimates because the error terms are not identically distributed.

The application of SUR and GLS allows estimates of the parameters of the equations simultaneously, takes into account the possible covariance among the error terms of the different equations, makes the varying error terms constant, and generates more efficient and consistent parameter estimates than those obtained by OLS. These methods especially increase the efficiency of estimates if independent variables and disturbance terms in different equations are correlated (Lau & Yotopoulos, 1972; Sidhu & Baanante, 1981; Woodland, 1977). Based on the parameter estimates, the own- and cross-price elasticities of the textile industry’s output supply and input demand are calculated.

The next chapter presents the results of the economic analysis and interprets and discusses the results. Based on the outcome, an attempt is made at a quantitative assessment of
the impact of NAFTA on the U.S. textile industry’s production activities and the policy implications.
Chapter 7

Results and Discussion of Economic Analysis

This chapter presents the results of economic analysis of the U.S. textile industry’s production activities under the influence of NAFTA. First, the parameter estimates of the normalized restricted translog profit model and the system of derived profit share equations of variable input expenditures are reported and interpreted. The own- and cross-price elasticities of the textile industry’s output supply and variable input demand with respect to prices of textile outputs and variable inputs are presented next, followed by a discussion of the findings. Finally, the outcomes of the economic analysis are used to make a quantitative assessment of the impact of NAFTA on the U.S. textile industry and draw policy implications.

7.1 Parameter Estimates of Profit Model and Profit Share Equations

The parameter estimates of the normalized restricted translog profit model of the U.S. textile industry (Equation 6.1) and the derived profit share equations of variable input expenditures (Equation 6.3, 6.4, and 6.5) presented in Chapter 6 are reported in Table 7.1. The value of $R^2$ is 0.94, which shows a relatively good statistical adequacy, although the high value does not always indicate the suitability of the model.

All of the parameter estimates of variable and fixed inputs and NAFTA variable in the profit model are negative (Table 7.1). These negative relationships between dependent (restricted profits) and independent variables (variable input prices and maintenance and capital expenditures) are expected because increases in prices of labor, material, and electricity, and capital and maintenance expenditures increase production costs, which, in turn, decrease the textile industry’s profits (Table 7.1). Except for that of capital expenditure, all of the parameter estimates are statistically significant. Among these independent variables, labor (-5.135) and material (-6.601) prices are the most statistically significant, followed by electricity price (-0.457), maintenance expenditure (-4.862), and NAFTA dummy variable
Table 7.1: Parameter Estimates of Normalized Restricted Translog Profit Model and Profit Share Equations of Variable Inputs.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Intercept</th>
<th>Labor Price (ln $P_l^*$)</th>
<th>Material Price (ln $P_m^*$)</th>
<th>Electricity Price (ln $P_e^*$)</th>
<th>Capital Expenditure (ln $K$)</th>
<th>Maintenance Expenditure (ln $MN$)</th>
<th>Time Dummy (Pre- &amp; Post-NAFTA Year) (ln $D$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profit Model ($\pi^*$)</td>
<td>62.189 ** (15.040)</td>
<td>-5.135 ** (1.016)</td>
<td>-6.601 ** (1.197)</td>
<td>-.457 ** (.094)</td>
<td>-1.442 (1.995)</td>
<td>-4.862 * (1.959)</td>
<td>-.340 * (.155)</td>
</tr>
<tr>
<td>Profit Share Equation of Labor Expenditure ($S_l$)</td>
<td>-5.135 ** (1.016)</td>
<td>.394 (.297)</td>
<td>-.126 (.174)</td>
<td>-.083 ** (.023)</td>
<td>-.910 ** (.052)</td>
<td>1.187 ** (.027)</td>
<td>43.803 (.001)</td>
</tr>
<tr>
<td>Profit Share Equation of Material Expenditure ($S_m$)</td>
<td>-6.601 ** (1.197)</td>
<td>-.126 (0.174)</td>
<td>-.396 ** (.118)</td>
<td>-.002 (.012)</td>
<td>.313 ** (.056)</td>
<td>-.027 (.035)</td>
<td>-.788 (.4367)</td>
</tr>
<tr>
<td>Profit Share Equation of Electricity Expenditure ($S_e$)</td>
<td>-.457 ** (.094)</td>
<td>-.083 ** (.022)</td>
<td>-.002 (.012)</td>
<td>.012 * (0.007)</td>
<td>-.033 ** (.006)</td>
<td>.057 ** (.006)</td>
<td>9.357 (.001)</td>
</tr>
</tbody>
</table>
Table 7.1 (continued): Parameter Estimates of Normalized Restricted Translog Profit Model and Profit Share Equations of Variable Inputs.

| Key:     | Independent Variable |  |  |  |  |  |
|----------|----------------------|------------------|------------------|------------------|------------------|
|          | $\ln P^*_l \ln P^*_l$ | $\ln P^*_m \ln P^*_m$ | $\ln P^*_e \ln P^*_e$ | $\ln P^*_l \ln K$ | $\ln P^*_l \ln MN$ |
| $\beta$  |                      |                  |                  |                  |                  |
| S.E.     | .394                 | -.126            | -.083 **          | -.910 **          | 1.187 **         |
| T-statistic | 1.325              | -.723            | -3.741            | -17.473           | 43.803           |
| Prob > $|T|$ | (.2038)              | (.4801)          | (.0018)           | (.0001)           | (.0001)          |
|          |                      |                  |                  |                  |                  |
| System Weighted $R^2$ |                 |                  |                  |                  |                  |
| 0.94     |                      |                  |                  |                  |                  |
| $\ln P^*_m \ln P^*_n$ |                  |                  |                  |                  |                  |
|          | -0.396 *             | -0.002           | 0.313 **          | -0.027            | 0.012 *          |
| (.118)   | (.012)               | (.056)           | (.035)            | (.007)            |                  |
| -3.368   | -0.125               | 5.550            | -0.788            | 1.816             |                  |
| (.0039)  | (.9017)              | (.0001)          | (.4424)           | (.0882)           |                  |
|          |                      |                  |                  |                  |                  |
| $\ln P^*_e \ln K$ |                      |                  |                  |                  |                  |
|          | -0.033 **            | 0.057 **         | 0.046             | 0.045             | 0.278 **         |
| (.006)   | (.006)               | (.164)           | (.070)            | (.046)            |                  |
| -5.601   | 9.357                | 0.280            | 0.640             | 6.037             |                  |
| (.0001)  | (.0001)              | (.7833)          | (.5312)           | (.0001)           |                  |

*Note: $\beta$ represents parameter estimates; S.E. is the abbreviation of standard error.
*: P < 0.1 ,  **: P < 0.001
NAFTA dummy variable in this model indicates the difference between the pre- and post-NAFTA periods. The parameter estimate of this variable is negative and statistically significant (-0.340), indicating that the U.S. textile industry’s profit performance had been significantly worsened under the influence of NAFTA. Therefore, Hypothesis A which states the positive impact of NAFTA on the U.S. textile industry’s production activities is rejected. The statistical insignificance of the parameter estimate of capital expenditure is of interest because the U.S. textile industry is known to have emphasized the importance of technological development over decades.

7.2 Parameter Estimates of Profit Share Equations of Variable Input Expenditures

7.2.1 Profit Share Equation of Labor Expenditure

The signs of labor price and maintenance expenditure are positive, implying that increases in these variables had been associated with positive increases in the profit share of labor expenditure. The positive relationship between the profit share of labor expenditure and maintenance expenditure may indicate the complementing nature between production labor and maintenance services that include various supporting systems for textile production including repair of buildings and machinery, communication, legal, and accounting, etc.

Except those of labor price and maintenance expenditure, the signs of all parameter estimates of this profit share equation are negative, implying that increases in prices of material and electricity and capital expenditure had been associated with a decrease in the share of labor expenditure in the industry’s restricted profits.

Among the parameter estimates of this equation, only the parameter estimates of maintenance (1.187) and capital (-0.910) expenditures and electricity price (-0.083) are statistically significant, implying that these variables had significantly affected the profit share of labor expenditure in restricted profits. The negative association of capital expenditure with the profit share of labor expenditure may indicate the substitution relationship between capital and labor.

7.2.2 Profit Share Equation of Material Expenditure

Except that of capital expenditure, the signs of all parameter estimates of this share equation are negative, indicating a negative relationship between prices of labor, material, electricity, and maintenance expenditures and the profit share of material expenditure. The negative sign of material price is unexpected because an increase in material price is expected to increase the share of material expenditure in restricted profits.

Among the parameter estimates, only those of material price (-0.396) and capital expenditure (0.313) are statistically significant. The positive sign of capital expenditure may be
because capital and synthetic fibers are complements. Synthetic fibers constitute a significant part of the textile industry’s material consumption due to the industry’s high automation and capital-intensity of production systems and the consequent high substitution of natural fibers with synthetic fibers.

7.2.3 Profit Share Equation of Electricity Expenditure

Except those of electricity price and maintenance expenditure, the signs of all parameter estimates of this equation are negative. Among the parameter estimates, only those of labor price (-0.083) and capital (-0.033), and maintenance (0.057) expenditures are statistically significant in this equation. According to this result, labor price and capital expenditure had been negatively and significantly associated with the profit share of electricity expenditure while maintenance expenditure had been positively and significantly associated with it.

7.3 Estimation of Own- and Cross-Price Elasticities

The estimates of own- and cross-price elasticities of U.S. textile output supply and input demand are presented in Table 7.2. These elasticities are computed using the parameter estimates of the system of restricted profit model and the derived profit share equations presented in Table 7.1 and Equations 6.9 - 6.42. These estimates give detailed information on the industry’s production activities with respect to changes in output and variable input prices. These estimates also help understand the potential impact of changes in U.S. government policies or macroeconomic environments, whose impacts are usually embedded in changes in market prices, on the textile industry’s output supply and input demand patterns. The interpretation of these elasticity estimates are presented below.

7.3.1 Textile Output Supply

The U.S. textile industry’s output supply appears to have been highly responsive to changes in output and input prices during the years examined. The estimated own-price elasticity of textile output supply with respect to textile output prices is 2.503, implying that an one percent increase in textile output price is associated with a 2.5 percent increase in textile output supply (Table 7.2). This identified positive relationship between textile output supply and output prices is consistent with economic theory.

The cross-price elasticities of U.S. textile output supply with respect to variable input prices of labor, material, and electricity are negative, which is consistent with economic theory. Among these calculated elasticities, the cross-price elasticity of textile output supply with respect to material price is most different from zero (-1.401), followed by those with respect to labor (-0.991) and electricity (-0.0515) prices. According to these estimates, a one percent increase in material price had been associated with a 1.4 percent decrease in textile output supply and a one percent increase in labor price had been linked to one percent
Table 7.2: Elasticity Estimates of U.S. Textile Output Supply and Variable Input Demand

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>Textile Output Price (lnP_t)</th>
<th>Labor Price (lnP_l)</th>
<th>Material Price (lnP_m)</th>
<th>Electricity Price (lnP_e)</th>
<th>Capital Expenditure (lnK)</th>
<th>Maintenance Expenditure (lnMN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textile Output Supply</td>
<td>2.503</td>
<td>-0.991</td>
<td>-1.401</td>
<td>-0.052</td>
<td>-1.626</td>
<td>-4.604</td>
</tr>
<tr>
<td>Labor Demand</td>
<td>3.364</td>
<td>-2.359</td>
<td>-1.414</td>
<td>0.017</td>
<td>1.135</td>
<td>-0.543</td>
</tr>
<tr>
<td>Material Demand</td>
<td>3.898</td>
<td>-0.858</td>
<td>-2.293</td>
<td>-0.071</td>
<td>-0.036</td>
<td>0.737</td>
</tr>
<tr>
<td>Electricity Demand</td>
<td>4.570</td>
<td>0.220</td>
<td>-1.528</td>
<td>-1.242</td>
<td>0.605</td>
<td>-0.066</td>
</tr>
</tbody>
</table>
decrease in output supply. The effect of electricity price on textile output supply appears to be minor.

The elasticities of textile output supply with respect to maintenance expenditure (-4.604) and capital expenditure (-1.626) are negative and highly different from zero. These elasticity measures show that an one percent increase in maintenance expenditure had been related to a 4.6 percent decrease in textile output supply and an one percent increase in capital expenditure had been linked to a 1.6 percent decrease in textile output supply during the years examined.

7.3.2 Labor Demand

The textile industry’s demand for labor had been most sensitive to changes in textile output prices, followed by changes in labor and material prices during the years examined. The elasticity of the industry’s demand for labor with respect to textile output price is positive and highly different from zero (3.364). According to the estimate, a one percent increase in textile output prices had been associated with a 3.4 percent increase in the industry’s demand for labor to expand output production.

The textile industry’s demand for labor appears to have decreased in response to increases in variable input prices during the years examined. The own-price elasticity of demand for labor with respect to labor price is negative and highly different from zero (-2.359), implying that a one percent increase in labor price had been associated with a 2.4 percent decrease in labor employment during the years examined. The cross-price elasticity of demand for labor with respect to material price is negative and relatively different from zero (-1.414). This estimate indicates that a one percent increase in material price had been associated with a 1.4 percent decrease in the textile industry’s demand for labor, suggesting that labor and material are complements. The cross-price elasticity of demand for labor with respect to electricity price is positive but not highly different from zero (0.017), implying that these are weak substitutes.

The elasticity of demand for labor with respect to capital expenditure is positive and relatively different from zero (1.135), implying that a one percent increase in capital expenditure had been associated with a 1.1 percent increase in the textile industry’s demand for labor. On the other hand, the elasticity of demand for labor with respect to maintenance expenditure is negative and slightly different from zero (-0.543).

7.3.3 Material Demand

The textile industry’s input demand for material had been most sensitive to changes in textile output prices and, to lesser degrees, changes in material and labor prices under the influence of NAFTA. The estimated cross-price elasticity of the industry’s input demand for material with respect to textile output price is 3.898, implying that an one percent increase in textile output prices had been associated with a 3.9 percent increase in the industry’s demand for material during the years examined. The own-price elasticity of the industry’s
demand for material is negative and highly different from zero (-2.293). It means that a one percent increase in material price had been associated with a 2.3 percent decrease in the industry’s demand for material. The cross-price elasticity of input demand for material with respect to labor price is negative and different from zero (-0.858), implying that a one percent increase in labor price had been linked to a 0.9 percent decrease in the industry’s demand for material that implies the complementing nature of labor and material. The elasticity of demand for material with respect to maintenance expenditure is positive (0.7374) but not highly different from zero.

### 7.3.4 Electricity Demand

The textile industry’s input demand for electricity had been significantly affected by changes in prices of textile outputs, material, and electricity during the years examined. The cross-price elasticity of demand for electricity with respect to textile output prices is 4.570. According to this estimate, a one percent growth of textile output prices had been associated with a 4.6 percent increase in the industry’s demand for electricity. The estimated own-price elasticity of the industry’s demand for electricity is negative and relatively different from zero (-1.242), implying that the industry’s demand for electricity had decreased by a 1.2 percent in response to one percent increase in electricity price in the years examined. The cross-price elasticity of the industry’s demand for electricity with respect to textile output price is positive and highly different from zero (4.570). According to this estimate, a one percent increase in textile output price had been associated with a 4.6 percent increase in the industry’s input demand for electricity.

The cross-price elasticity of demand for electricity with respect to material cost is negative and different from zero (-1.528) while the corresponding measure with respect to labor price is negligible. According to the estimates, a one percent increase in material price had been associated with a 1.5 percent decrease in the industry’s demand for electricity (complements). The elasticities of demand for electricity with respect to capital and maintenance expenditures are negligible.

As examined above, the elasticity estimates show that U.S. textile producers’ output supply and input demand for labor, material, and electricity had been very sensitive to changes in textile output prices under the influence of NAFTA. Therefore, Hypothesis B which states the insensitivity of U.S. textile producers’ output supply and input demand activities with respect to changes in textile output prices is rejected.

The elasticity estimates also show that the U.S. textile industry’s output supply and input demand activities had been very sensitive to changes in material price. The industry’s input demand for labor and electricity had been also sensitive to changes in labor and electricity prices. Except these cases, however, the industry’s output supply and input demand activities had not been sensitive to changes in other variable input prices. Therefore, Hypothesis C which states the high sensitivity of U.S. textile output supply and input demand activities to changes in variable input prices is partially accepted.
7.4 Discussion of Findings of Economic Analysis

The economic analysis investigated the U.S. textile industry’s production activities around the onset of the influence of NAFTA (1992, the pre-NAFTA year) and at the height of the impact of the agreement (1997, the post-NAFTA year) based on the availability of relevant data. Assuming the average longevity of textile machinery is ten years, this five-year period is considered a relatively short-run for all textile inputs, including capital, to become variable inputs. This analysis, therefore, reveals the relatively short-run adjustment of the industry’s production activities under the influence of NAFTA.

The parameter estimates of the normalized restricted translog profit model show that, among the industry’s variable and fixed inputs, material and labor prices were the most significant and negative factors in determining the industry’s profits, followed by maintenance expenditure during the years examined. This result is consistent with the fact that input materials account for the largest part of textile production costs, ranging between 35 percent and 85 percent of total textile production costs depending on the type of products. Labor costs, on the other hand, account for 21 percent of production costs in case of broadwoven fabrics [USITC, 2001]. The significantly negative effects of material and labor prices in the industry’s production costs and profits explain the reason for the textile industry’s increasing substitution of natural fibers with synthetic fibers and human labor with textile machinery (capital) in production systems. The parameter estimate of NAFTA variable, which is measured using time dummy variable, is statistically significant and negative. A detailed discussion of the NAFTA variable is presented in the next section.

The elasticity estimates reveal that the output supply and input demand activities of the U.S. textile industry under the influence of NAFTA had been very responsive to changes in textile output and variable input prices. For example, a one percent increase in textile output price had been associated with a 2.5 percent increase in the industry’s output supply in dollar value, a 3.4 percent increase in the industry’s input demand for labor, a 3.9 percent increase in input demand for material, and a 4.6 percent increase in input demand for electricity during the years examined. The possible explanations of these higher than proportional increases in the industry’s output supply and input demands in response to changes in textile output prices may be interpreted as the indication of one of the following: (a) the industry’s high sensitivity to changes in market demand for and market prices of textile outputs; (b) the outcome of the industry’s inflexible, long production runs of mass standardized textile goods to achieve economies of scale and high productivity; or (c) the combination of both (a) and (b).

In any case, the industry’s long production runs and additional operating costs due to overproduction, overconsumption of inputs, and excessive inventory accumulation and management must have undermined the industry’s benefits from high productivity and reduced production costs. Improving efficiency in market demand forecasting and implementing demand-driven marketing / manufacturing / delivery systems with tight inventory control may reduce the levels of output production runs, input consumption, and additional operating costs due to overproduction, overconsumption of inputs, and managing accumulated
inventory. These changes in business practices will improve the industry’s competitiveness although they will reduce benefits from economies of scale and productivity. In the economic analysis, these improvements in business practices will be measured in the reduced sizes of the corresponding elasticity estimates.

According to the elasticity estimates, the industry’s expenditures related to maintaining production capacity (capital expenditure) or its administrative supporting systems (maintenance expenditure) had a far more dominant and negative effect than material and labor prices on determining the textile industry’s output supply. For example, a one percent increase in maintenance expenditure was associated with a 4.6 percent decrease in output supply and a one percent increase in capital expenditure led to a 1.6 percent decrease in output supply. The importance of these production capacity-related variables in U.S. textile output supply may suggest the limited role of NAFTA (or a U.S. trade policy), compared to the production capacity-related variables, in influencing the industry’s output supply.

The elasticity estimates showed that, among variable input prices, material and labor prices had been the most negative and important variables in determining textile output supply and input demand during the years examined. According to the elasticity estimates, a one percent increase in unit material cost had been related to a 1.4 percent decrease in the U.S. textile industry’s output supply, a 1.4 percent decrease in its labor demand, a 2.3 percent decrease in material demand, and a 1.5 percent decrease in electricity demand. A one percent increase in labor price, on the other hand, had been associated with a one percent decrease in the industry’s output supply, a 2.4 percent decrease in labor demand, a 0.9 percent decrease in material demand, and a 0.2 percent increase in electricity demand. Input material costs account for the largest part of textile production costs followed by labor costs. However, labor costs vary to great extents across borders and appear to have a stronger impact on determining the international price competitiveness of textile and apparel production and trade worldwide.

These elasticity measures explain the motives behind the U.S. textile industry’s high substitution of cotton fibers with synthetic fibers and labor with capital to reduce production costs and accelerate the production speed for the benefits of high productivity and scale economies, which have contributed to the industry’s increasing capital intensities of production systems and changing input demand patterns. Textile input material is a slight complement to labor but a substitute to capital. Natural fibers are substitutes for manufactured fibers, and capital is a complement to manufactured fibers. Labor is a complement to natural fibers but a substitute for capital (Shui et al., 1993).

The elasticity measurement suggests the dominant role of production capacity-related variables (maintenance and capital expenditures) over textile output and variable input prices in determining the pattern of textile output supply and input demand during the years examined. This result appears to be consistent with the industry’s production-oriented competitive strategy and, therefore, the stronger effect of production-side factors than changing market demand patterns or environmental factors on influencing U.S. textile production activities. According to this result, under normal market environments and as long as current production systems prevail without undergoing structural adjustments, U.S. textile produc-
ers’ production-side factors are likely to play a more dominant role than any other factors in determining the industry production activities. This suggests the limited effect of government policy on the industry and the industry’s limited adaptability to dynamic global market environments.

The short-run nature of this analysis, on the other hand, does not allow investigating the effect of technological development in the industry’s production activities. Technological development and capital deepening of U.S. textile production systems have been known to have an undeniable impact on the industry’s output supply and input demand pattern. Advances in textile technologies along with continuous automation and restructuring over decades have contributed to the textile industry’s reliance on long production runs that are oriented to saving labor/natural fiber but using more capital/manufactured fiber (Morrison & Siegel, 1998; Shui et al., 1993). Increasing capital intensity of U.S. textile production systems have improved productivity and augmented labor efficiency, but decreased textile employment (Bala, 1979; Jablonski, 1995; Verret, 1991).

Morrison and Siegel (1998) stated that, from a long-term perspective, the U.S. textile industry’s technological and structural changes, cost reduction, and shifts in input composition have heavily shaped the industry’s production activities. The authors concluded that, if the contribution of capital factors is taken into account, very little price responsiveness remains, implying the dominant role of the industry’s technology, capital, and production-oriented competitive strategy in determining the industry’s production activities in the long run. The short-run nature of this analysis, however, does not allow for identifying the role of technology in the textile industry’s production activities during the post-NAFTA period.

Under current intensifying import competition, the industry’s reliance on production-oriented competitive strategies including the adoption of advanced production technology, long production runs, economies of scale, productivity, and low production costs as its sources of competitiveness are likely to continue only if the industry holds the bulk of domestic market share. If the industry’s domestic market share declines severely, the industry is not likely to maintain its production capacities at sufficiently large scale to achieve economies of scale and high productivity.

7.5 Discussion of Parameter Estimate of NAFTA Variable

The results of economic analysis showed the significant but negative effect of NAFTA on the U.S. textile industry’s profit performance in the early stage of the implementation. As identified in Part I of this research, the early success of NAFTA had been noticeable in regionalized and expanded U.S. trade in textile goods and increased domestic textile shipments up to 1997 until the Asian currency devaluation in late 1997/1998, and volatile macroeconomic environmental changes since have changed the pattern of U.S. trade and production. Although the U.S. textile industry’s increased shipments between 1992 and 1997 under NAFTA should have resulted in the positive growth of the industry’s profits, the significant but neg-
ative effect of NAFTA may reflect the net effects of the following environmental factors that either complemented or counterbalanced the effect of NAFTA: (a) a positive NAFTA effect on expanding U.S. trade of textiles and apparel with Mexico, U.S. textile shipments, capital investments, and upgrading of production systems; (b) intensified import competition from Mexico and other developing countries under NAFTA that have caused a downward pressure on the growth of U.S. textile output prices and the fall of real textile output prices; (c) the industry’s increased capital investments; (d) limited effect of NAFTA on reducing U.S. input material prices because of weak import competition from Mexico in fiber and yarn sectors; and (e) numerous closings of inefficient U.S. textile mills in response to intensified market competition under NAFTA.

The magnitude of the impact of NAFTA or any trade-liberalizing policy may also depend on the importance of trade partners involved in U.S. trade relationship and domestic market competition. If NAFTA had included larger U.S. trade partners, such as the EU or East Asia instead of Mexico, for example, the NAFTA dummy variable in the economic analysis may have appeared to be more significant than it is in this analysis. The NAFTA variable, on the other hand, is identified as less significant than those of variable input prices of material, labor, and electricity and maintenance expenditure in determining the industry’s profits. It may imply that input prices and business operating costs to support and maintain production activities may have affected U.S. textile producers’ profits more deeply than the NAFTA-induced changes in the industry’s production activities.

In the 2000s, the future of the U.S. textile industry’s production-oriented competitive strategy looks gloomy because of the following reasons. First, the textile industry’s aging process with increasing labor-capital substitution does not appear to have returned international price competitiveness and prosperity to the industry. Although the decades-long restructuring, modernization, increasing substitution of capital and synthetic fibers for labor and natural fibers, and textile lobby activities have improved the industry’s productivity and cost effectiveness in the early decades, the industry’s consequently increased labor-capital substitution is not likely to completely compensate for its disadvantage of high labor costs. The evidence comes from the industry’s situation in the 1980s when the industry faced difficult market conditions related to U.S. dollar appreciation, import surges, and many mill closings. Its production-oriented survival strategy such as restructuring, modernization, and improved productivity had helped the industry to recover its international competitiveness (Cline, 1990; Cooper, 2004; Lim, 2005) only in developed markets, but not in developing markets. In the 1990s, the industry’s continuous restructuring and the trade-promoting effect of NAFTA appear to have helped the industry maintain and improve its competitiveness up to 1997. Many textile producers believe their weakening competitiveness was due to their failure to re-capitalized, modernize, and change government policies (Giermanski & Lodge, 2002).

Secondly, textile technologies of mass production are easily accessible worldwide through trade of machinery, and currently present few technological barriers for developing countries to enter the textile business. Therefore, it cannot be a dominant determinant of the industry’s international competitiveness. Third, the importance of production capacity-related
variables, and output and input prices on determining the industry’s output supply and input demand pattern is likely to vary as the textile industry’s domestic market share changes. If the industry severely loses its domestic market share to imports as observed in the 2000s, U.S. textile producers are likely to become more responsive to changes in market demand (reflected in changing output prices), which will increase the importance of demand forecasting, marketing plans, and product differentiation to meet diverse demand pattern, and, in turn, would decrease the sizes of textile production-runs, the benefits from economies of scale and productivity, and, therefore, the importance of production capacities of mass production and production-oriented competitive strategy.

7.6 Policy Implications of NAFTA: Perspectives from Quantitative Approach

Policy implications are drawn from the results of the economic analysis. The significant but relatively limited impact of the NAFTA variable, compared to those of other variables, on the U.S. textile industry’s profit performance may reflect various factors: (a) the dominant effects of production-related variables on U.S. textile output supply and, therefore, the industry’s production-oriented competitive strategy; and (b) the relatively limited importance of Mexico in U.S. trade and consumption of textile goods. According to the outcomes of this analysis, the impact of any regional trade agreement (RTA) on determining the U.S. textile industry’s production activities is likely to be less significant than the industry’s production-related variables although the magnitude of the impact may vary depending on the size of the U.S. textile industry’s domestic market share and the level of the RTA signatory countries’ importance in U.S. trade, production, market competition, prices, and consumption of textile goods. In case of NAFTA, despite the initial rapid growth of U.S. textile trade with Mexico under the agreement, Mexico’s shares in U.S. textile trade and domestic production and consumption of textile goods had been relatively small and the growth of trade between these countries had been interrupted by the Asian currency devaluation in late 1997 before the trade volume and the Mexican textile complex grew to become dominant forces in the U.S. market, limiting the significance of NAFTA. If NAFTA had included trade partners such as East Asia, whose shares in U.S. textile trade and market had been far larger than those of Mexico, the parameter estimate of the policy variable in this analysis may have been more significant than the estimate obtained in this study.

The elasticity estimates suggest the dominant and negative role of production capacity-related variables (maintenance and capital expenditures) over prices of textile outputs and variable inputs on influencing U.S. textile output supply during the years examined. The result may be interpreted as a reflection of the industry’s tendency of emphasizing production-side rather than changing market demand, prices, or government policies on its production decision-makings. According to this measurement, under a normal market environment and as long as it maintains the large domestic market share, the industry’s emphasis on production-side is likely to play a more dominant role than any other demand change, envi-
The stronger impact of textile output prices on U.S. textile production activities than those of variable input prices may imply that the potentially more effective policy tool to influence the industry may be the one that most effectively influences the domestic market competition and market prices of textile outputs. Among production resource-related policies, a policy that can influence labor costs would be more effective than other resource-related policy on influencing the industry’s output supply. The elasticity estimates help policy makers better understand the potential impact of a policy they design on the U.S. textile industry. If they design a policy for the purpose of increasing or decreasing output prices or production resource prices, these elasticity estimates help them roughly gauge how much the industry’s output supply and input demand would change to adjust to the implementation of the policy, assuming that the industry does not undergo any structural changes.

The 1990s and 2000s have undergone dramatic political and macroeconomic environmental changes internationally and domestically, which make it difficult to assess the impact of NAFTA. A fair assessment of the impact of a government policy should be done under normal market environments. Under abnormal market environments, a new policy may not be as effective as originally designed by policy makers because of the intervening effects of the environmental factors. If a severe external shock occurs, this sudden shock may become a dominant factor over all other factors in determining the industry’s production activities. The example of the late 1990s and 2000s are volatile exchange rate changes and manipulation and the sudden rise of China as a dominant competitor in world trade in textile goods, which may have changed the U.S. textile industry’s reaction patterns to market environments. These dominant environmental factors appear to have dominated the industry’s production decision (if they had adjusted well) and have driven many ill-adjusted textile mills into bankruptcies. In this case, the importance of production capacity-related variables, output and input prices, and government policy decreased in determining the industry’s production activities, which would be measured as decreases in the statistical significance of the parameter estimates and the elasticity estimates of these variables in the economic analysis.

7.7 Limitations of Economic Analysis

This economic analysis has several limitations. The limited availability of consistent and detailed data for this analysis at the time of data analysis led to the use of census data, instead of annual data, and limited the selection of time points to 1992 and 1997 for this analysis. The economic analysis, therefore, employs the short-run profit model, and the results of this analysis provide only a short-term assessment of the impact of NAFTA on the U.S. textile industry’s production activities. The selected years represent a relatively short-run time span under the assumption that the average longevity of textile machinery is 10 years and five-year old textile machinery is considered a fixed input. Data used in this analysis do not cover the industry’s production activities under the Mexican Peso devaluation.
(1994-1995), the Asian Currency devaluation (1997-1998), and the turbulent U.S. market conditions since then through the 2000s that have severely interfered with the effect of NAFTA, and caused import surges and the rapid shrinking and restructuring of the U.S. textile industry, which have caused critical changes in the industry’s production activities since the late 1990s. Because of these reasons, this analysis is not able to make a full-term assessment of NAFTA. Because of its short-term nature, this analysis is not able to determine the effect of technological development on the industry’s production activities that have been significantly influenced by its production systems.

The economic model selected for the analysis does not allow for distinguishing the impact of NAFTA from the impact of other market environmental factors on the U.S. textile industry’s production activities. However, compared to other years, the selected years, 1992 and 1997, have been under the least influence of abnormal market environments and, therefore, are considered more suitable for a fair assessment of the impact of NAFTA. The next chapter presents conclusions, policy implications, current challenges for the U.S. textile industry, and the strategic adjustments of the textile industry.
Chapter 8

Conclusions

This research was aimed at accessing the impact of NAFTA on the U.S. textile industry’s production activities. Two approaches were used to achieve this goal. Part I of this research, a qualitative analysis, first investigates the major environmental factors that have intervened with the role of NAFTA and changes in the textile industry’s trade pattern, shipments, employment, capital investments, and production systems during the post-NAFTA period based on the review of literature and industry and trade data. The outcome of this analysis was used to make the qualitative evaluation of the impact of NAFTA on the U.S. textile industry’s trade and production activities and to draw policy implications.

Part II of this research was a quantitative analysis that employs a normalized restricted translog profit model to identify the textile industry’s output supply and input demand pattern, and to determine the significance of NAFTA on the industry’s production activities. The outcome of this analysis was also used to make a quantitative evaluation of the impact of the agreement on the industry’s production activities, and to draw policy implications. The outcomes of Part I and II are used in this chapter to draw the final assessments of NAFTA, implications, and future competitive strategies for the U.S. textile industry.

8.1 Impact of NAFTA on U.S. Textile Trade and Production: A Qualitative Assessment

NAFTA has been the most distinguished FTA signed by the U.S. government since its political shift from multilateralism to regionalism in the mid-1980. The agreement provided a barrier-free production and trade zone within North America to improve business environments for North American firms. More than ten years have passed since the implementation of the agreement. The outcome of the qualitative analysis (Part I) shows that U.S. trade in textile goods experienced fast expansion and regionalization within North America in the early years of NAFTA implementation, at the expense of the Asian, EU, sub-Saharan African, and Andean regions. The U.S. textile industry’s production activities also expanded during this period, with increasing shipments and capital investment up to 1997. The major
contributing factors to U.S. textile trade and production patterns in the 1990s are believed to be NAFTA, the expansion of Mexican apparel maquiladoras’ assembly activities and input demand for U.S. textile goods, the growth of the U.S. economy, and Mexico’s increased import tax on imports from non-NAFTA countries.

Since the late 1990s, however, changing macroeconomic and political environments appear to have severely limited the role of NAFTA by weakening the price discriminating effect of the agreement against imports from non-NAFTA countries. Under the influence of the Asian currency devaluation in late 1997/1998, China’s undervalued currency and WTO membership, the MFA phase-out, and U.S. and Mexico’s recessions; the pattern of U.S. textile trade in the 2000s has been mainly characterized by an import surge from China, relatively fast import growth from India / Pakistan, and moderate import growth from the EU at the expenses of Mexico, Caribbean Basin, CAFTA, sub-Saharan African, and ASEAN regions. The growth of U.S. apparel trade with the Caribbean Basin region had been sustained at a moderate level in the 1990s, and has greatly improved in the 2000s under CBTPA by partially filling the gap left by declining U.S. imports from Mexico. U.S. textile imports from Caribbean Basin countries, on the other hand, have declined. U.S. textile trade with the Andean region has increased under ATPDEA while, despite the implementation of AGOA in the 2000s, U.S. textile exports to sub-Saharan African countries have declined during the last two decades.

The effects of exchange rate adjustments, import surges, and difficult U.S. economic and political environments from the late 1990s through the 2000s have dominated the effect of NAFTA and have rapidly deteriorated U.S. textile production activities, reversing the changes in the industry’s production activities that occurred during the early years of NAFTA implementation. As a result, the industry’s condition was worse in the early 2000s than prior to NAFTA. Its shipments declined 18.2 percent during 1997-2003 and 5.5 percent during 1992-2003. The industry’s capital investments increased until 1997 but have declined since, and its employment and production systems have continued to shrink during the post-NAFTA period. NAFTA is known to have helped the industry maintain its employment. The principle contributing factors to shrinking textile employment are believed to be the industry’s adoption of labor-saving but capital-using production technologies, including the rapid replacement of old shuttle looms with advanced shuttleless, air-jet looms in the 1990s and volatile exchange rate-related import surges and mill closings.

Overall, the U.S. trade pattern during the last two decades appears to relatively conform to the design of U.S. trade policies with the dominant effect of NAFTA in the 1990s. In the 2000s, changes in international and domestic market environments and U.S. trade patterns have partially reversed the trade regionalization of U.S. textile trade shaped in the 1990s. As a result, the shares of East Asian, ASEAN, Andean, sub-Saharan African, and EU regions in U.S. textile exports have declined during the last two decades compared to the pre-NAFTA levels. A similar trend has happened to U.S. textile production activities that had been expanded in the early years of NAFTA up to 1997, but started deteriorating since. As a result, after the ten-year implementation of NAFTA, the industry’s condition has worsened compared to that of the pre-NAFTA period.
8.2 Impact of NAFTA on U.S. Textile Production Activities: A Quantitative Assessment

The results of economic analysis reveal that NAFTA had a significant but negative effect on the U.S. textile industry’s profit performance during the years examined, prior to the onset of abnormal market environments - despite the industry’s increased shipments, domestic market share and exports of the 1990s. This analytical result may indicate the net effects of intensified U.S. import and market competition from Mexico and other developing countries under NAFTA, fall of real textile output prices, the industry’s increased capital investments, and numerous textile mill closings. The magnitude of the impact of NAFTA or any trade-liberalizing policy may also depend on the importance of signatory countries in U.S. trade relationships and domestic market competition. For example, U.S. FTA with the EU or East Asia, instead of Mexico, would yield a more significant parameter estimate than that of the NAFTA dummy variable obtained in this economic analysis. The NAFTA variable, however, is estimated as less significant than those of variable input prices and fixed input costs related to maintaining and supporting textile production systems on influencing the industry’s profit performance. This result may imply that variable input prices and business operating costs in the short-run may have affected U.S. textile producers’ production activities more deeply than the NAFTA-induced changes have done.

The elasticity measurement suggests the more dominant role of fixed inputs (maintenance and capital expenditures) than output and input prices on influencing the pattern of textile output supply and input demand. This result may imply that, under normal market environments and as far as current production systems prevail, the textile industry’s focus on production side and production-oriented competitive strategy are likely to play a more important role than any other demand and market environmental factors and government policies in determining the industry’s production activities.

The elasticity measurement also shows that the industry’s output supply and input demand activities were sensitive to changes in textile output and variable input prices with a stronger impact of output prices than for variable input prices. The industry’s far higher than proportional increase in output supply and variable input demand with respect to changes in output prices may reflect either the industry’s high sensitivity to changes in market demand and prices or the negative consequence of the industry’s inflexible, long production-run systems aimed at achieving high scale economies that can not easily adjust to small changes in market demand and often lead to overproduction and inventory accumulation. The analytical result also suggests the importance of input material and labor costs in determining U.S. textile production activities. Assuming that the importance of input material costs in production costs does not greatly vary across borders and the availability of textile production technology does not pose significant entry barrier in engaging in textile production because of international trade of textile machinery, labor costs that vary greatly worldwide is considered a major determinant of international competitiveness of textile production.

Based on the elasticity measurement, the most effective government policy for influencing
the U.S. textile industry’s output supply and input demand activities would be the one that can most effectively affect textile output and input material prices. The second best may be the one that would affect labor and energy costs in that order. Under normal market environments and the current production structure, the impact of trade policy measures would be probably subordinate to those of textile production-side factors unless structural changes or abnormal market environments interfere with the industry’s production mechanism.

The economic analysis investigated the short-run pattern of the U.S. textile industry’s production activities under the influence of NAFTA. Because of the limited availability of data at the time of analysis, this analysis two time points to represent the pre- and post-NAFTA years, 1992 and 1997, during which market environments appear to have been most stable and normal compared to those of other years. This research did not cover the post-1997 period, although it was a critical period for the industry’s production activities because of volatile market environments. Also, the short-run nature of this economic analysis prevented identification of the effect of technological development on the industry’s production activities despite its known importance as a major determinant of the industry’s production activities.

8.3 Implications

The qualitative assessment of NAFTA suggests that the agreement was an effective policy tool in the early years of its implementation in terms of expanding, diverting, and regionalizing U.S. trades in textile goods and promoting domestic textile production activities until abnormal market environments started dominating the agreement in the late 1990s. The quantitative assessment of the agreement, however, indicates the negative and significant impact of the agreement on the U.S. textile industry’s profit performance. In this research, several factors have been identified to suggest that NAFTA has been a short-term, transitional policy measure, instead of being a long-term, viable one for the survival of the U.S. textile industry. These factors include unpredictable exchange rate fluctuations, the limited importance of Mexico in U.S. textile and apparel trade, the short period of NAFTA implementation before the disruption of macroeconomic and political environmental factors, on-going U.S. signings of multiple RTAs, the phase-out of MFA, and the re-emerging dominance of China in world trade in textile goods.

Furthermore, a trade policy is not likely to provide a long-term solution to the U.S. textile industry’s fundamental problems of aging and declining international competitiveness due to high labor costs. The industry’s competitiveness has been based on scale economies and high productivity based on the large size of U.S. market, technological development, and the industry’s production-oriented competitive strategy of specializing in mass production of standardized goods. The industry’s high substitution of labor with capital and high productivity, however, does not seem to have completely offset the negative effect of high labor costs in determining the industry’s international competitiveness. Labor costs vary to great extents across borders while advanced textile production technologies are accessible.
worldwide through trade of textile machinery and, therefore, do not pose significant barriers in entering textile business. Although there is no clear answer on whether high productivity based on high capital intensity of production systems can perfectly complement the disadvantage of high labor costs in determining the U.S. textile industry’s competitiveness, Lim (2005) and Cooper (2004) suggest that price competitiveness based on low labor costs may still outperform the one based on advanced technologies and productivity, ceteris paribus. As an example, the U.S. textile industry’s price competitiveness in the 1980s, that was based on severe restructuring, adopting new technologies, and high productivity, had been successful in competing with producers only in developed countries but not with those in developing countries with lower labor costs (Lim, 2003).

The importance of labor costs has also been proven by the decline of the textile industries in Western Europe and Japan as high cost producers in the last decades. Compared to the rapid decline of the textile industries in these advanced economies, that of the U.S. textile industry has been very gradual due to supports from government policies, technological developments, and scale economies from the large domestic market size. Even in the 1990s under NAFTA, the industry’s production-oriented competitive strategy may have been partially successful if there had not been sudden exchange rate changes, which have accelerated the industry’s pace of losing domestic market share since the late 1990s. By the mid-2000’s, in the face of a severe import surge from China and the rapid decline of domestic market share, the U.S. textile industry’s production-oriented strategy appears to have lost its momentum and can not be sustained any longer. The industry is not likely to fully recover its sudden loss of market share in the near future under the trade-liberalizing MFA phase-out and intensifying import competition and changing pattern of consumer demand for more diversified, differentiated products.

The impacts of NAFTA on the U.S. textile industry’s trade and production activities identified from the assessment outcomes of Part I and Part II may bring some insights into the potential impacts of other U.S. RTAs on the industry. The magnitude of the impacts of any trade policies, however, would depend on the significance of their signatory countries in U.S. trade relationship and domestic market competition, their levels of economic and industrial developments, and the size of the preferential trade, production, and/or economic zones they create. External market environmental factors will also take part in the process. If a severe external shock erodes the price discriminating effects of any RTAs and becomes a dominant factor in determining trade prices and domestic market competition and production activities, as the case of NAFTA since the late 1990s and 2000s, the significance of all other factors examined in this research may become less important. Therefore, a fair assessment of a policy should be done under normal market environments.

The types of domestic textile products that have faced severe import competition, and have been most affected by U.S. trade policies, are the ones in which labor costs matter most and the industry’s traditional competitiveness is fading away while those of developing countries are strengthening. The MFA phase-out is likely to strengthen the competitiveness of developing countries in determining the pattern of international production of and trade in these product domains while weakening the role of RTAs for empowering regional
8.4  Current and Future Strategies for the U.S. Textile Industry

The future of the U.S. textile industry is not clear at this point due to many foreseeable challenges and risks. Internationally, the industry faces increasing trade liberalization under the MFA phase-out, U.S. signings of multiple RTAs and the expansion of North American Free Trade Area, global spread of RTAs, and the rise of China as a major player in world trade in textile goods. Domestically, along with diversifying consumer demand, the industry undergoes disappearing apparel production, domestic textile and apparel manufactures and retailers’ increasing reliance on international sourcing, and increasing import penetration of traditional U.S. textile markets of mass-produced, standardized textile goods.

The U.S. textile industry at an aggregate level does not seem to have a bright future because of the conditions described earlier. At the individual firm level, however, the impact of NAFTA may have varied to great extents depending on the types of their product offerings, market positioning, competitive strategies, and sensitivity toward changing market environments. For progressive, export-oriented firms, NAFTA may have been an opportunity to tap into the Mexican market as observed in the rapidly increased U.S. textile exports to Mexico in the 1990s. To domestic market-oriented firms, NAFTA may have been a threat of empowering Mexican competitors in the U.S. market and reducing their market shares. Textile entrepreneurs’ shrewdness and strategic adaptability to changing domestic and global market environments will determine their future.

Facing its continuous shrinking size and possible delocalization in the future, the U.S. textile industry increasingly needs to shift away from traditional textile goods and production systems to the new generations of textile goods and production systems to avoid import competition, serve newly emerging market demands, and to sensitively accommodate small changes in market environments and demands. This research suggests three potential dimensions for future U.S. textile production activities: 1) liberation from the production-oriented competitive strategy, 2) shift to push and pull (niche) marketing, and 3) development of global textile and apparel supply Chain.

8.4.1  Beyond Production-Oriented Competitive Strategy

As examined earlier, the U.S. textile industry’s traditional competitiveness based on technological development and high productivity has faded away as many developing countries have reached this stage of industrialization. The industry’s production-oriented competitive strategy is believed to be effective only if the industry maintains its large domestic or foreign market share to take full advantage of high scale economies and productivity. Without experiencing volatile exchange rate changes and other environmental changes since the late 1990s, the industry may have continued to rely on production-oriented competitive strategy.
If the industry’s domestic market share declines severely without acquiring sufficient export markets, which seems to be the case of the U.S. textile industry in the 2000s, the industry’s production-oriented competitive strategy may not be a viable option as the industry would not be able to maintain its large-scale production systems. Furthermore, the diversifying nature of U.S. consumer demand has been decreasingly supportive of the industry’s current production systems of long production runs. The industry’s traditional production systems are not compatible with its need for adopting more sophisticated business operating systems, including accurate demand forecasting, marketing, and flexible, demand-driven just-in-time manufacturing, inventory management, and delivery systems to sensitively accommodate changing market demand. The shortcomings of the industry’s existing production systems and production-oriented competitive strategy urge its shift beyond them toward a market / consumer-oriented strategy and demand-driven, flexible marketing, manufacturing, inventory management, and delivery systems to survive in dynamic global market environments.

These needed strategic changes, on the other hand, increase the industry’s business operating costs and financial burden to adopt the necessary advanced information and production technologies, while intensifying import competition and decreasing real prices of textile outputs continue to squeeze the industry’s profits. Simply, obtaining a protective government policy would not easily reverse these tough business environments. How to navigate these challenging market environments would depend on individual entrepreneurs’ sensitive understanding of market and demand nature, production aspects, product appeals, and synergy among channel relationships to establish their unique competitive edges.

8.4.2 Shift to Push and Pull (Niche) Marketing

The U.S. textile industry’s pattern of specialization is shifting away from mass production of standardized products toward identifying and creating new market niches and consumer demand (push marketing) and/or differentiating existing products (pull, niche marketing). Consumers’ lifestyle, work environments, and consumption patterns are constantly evolving in terms of style preference, quality, functionality, and prices. Currently observed and/or expected changes in consumer market are the increasing acceptance of casual wear at the workplace and the changing nature of consumer demand for apparel, home textiles, and specialty textiles with expected demand growth for lightweight apparel fabrics, carpets, home furnishings, and decorative fabrics in response to the migration of suburban residents to cities and changing housing preferences and global climate change. Multiplying industrial usages of textiles in areas of medicine, automobiles, agriculture, construction, and packaging are increasing the industry’s opportunities to specialize in highly innovative, technical, differentiated, value-added, and quality textiles that can not be substituted by imports from developing or less developed countries. A recent example of promising niche marketing is Burlington Industries’ adoption of nanotechnology to improve its waterproof fabric.
quality (Parrish et al., 2004). The development of new profitable market niches with little import competition will be the most promising strategy for the survival of competitive, agile U.S. textile firms.

### 8.4.3 Development of Global Textile and Apparel Supply Chain

The future survival of the U.S. textile industry may partially reside with developing and integrating into the global core-peripheral supply channel of textiles and apparel. The U.S. textile and apparel industry has a competitive advantage in specializing in and serving as a core of providing expertise in designing, marketing, and distribution, and producing and supplying highly technical and innovative and high value-added niche products. In the meantime, the conventional U.S. manufacturing of mass, standardized textile and apparel goods is likely to continuously relocate to developing or less developed countries (Leamer & Storper, 2001; Lim et al., 2004). The process of relocation and selection of relocation sites and trade / sourcing partners will largely be guided by the rule of comparative advantage of low labor costs under the MFA phase-out and the designs of U.S. RTAs that have promoted U.S. foreign assemblies of labor-intensive products to take advantage of low labor costs of the signatory countries while maintaining U.S. manufacturing of intermediate goods to be used in these assembled goods.

The outcome of this research may help U.S. policy makers, textile entrepreneurs, and academicians to have a better understanding of the (potential) impacts of NAFTA and other RTAs, which have been signed or are in the process of being negotiated, on the U.S. textile industry’s production activities under the interactive influence of comparative advantage of endowed production resources and dynamic economic and political environmental factors. Further research is needed to assess the impact of NAFTA on the industry using a long-run economic model and to differentiate the impact of NAFTA on shaping the industry’s production activities from those of other environmental factors and the industry’s technological development. As different textile sectors may have been affected by NAFTA at different levels depending on extents of import competition and types, innovativeness, and value-added components of products, sectoral analyses may provide a more detailed understanding of the impact of NAFTA on the textile industry although detailed data for such analyses may not be available.
Chapter 9

Bibliography

References


128


USITC (1997). Likely impact of providing quota-free and duty-free entry to textiles and apparel from sub-Saharan Africa. Publication 3056, United States International Trade Commission, Washington, DC.


Appendix A

U.S. Bureau of Census Definition of Data

Value of Shipments

Value of shipments covers the received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all miscellaneous receipts, such as receipts for contract work performed for others, installation and repair, sales of scrap, and sales of products bought and resold without further processing. Included are all items made by or for the establishments from materials owned by it, whether sold, transferred to other plants of the same company, or shipped on consignment.

Production Workers

Production workers include workers up to the line-supervisor level that engaged in fabrication, processing, assembly, inspection, receiving, storing, handling, packing, warehousing, shipping (exclude delivery), maintenance, repair, janitorial and guard services, product development, auxiliary production for plant’s own use (e.g., power plant), recordkeeping, and other services closely associated with these production operations.

Payroll

Payroll includes the gross earnings of all employees on the payrolls of operating manufacturing establishments paid in a calendar year. It includes all forms of compensation, such as salaries, wages, commissions, dismissal pay, bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees’ Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. The total includes salaries of officers of corporations; it excludes payments to proprietors or partners of unincorporated concerns. Also excluded are payments to members of Armed Forces and pensioners carried on the active payrolls of manufacturing establishments. This definition does not include employers’ Social Security contributions.
or other nonpayroll labor costs, such as employees’ pension plans, group insurance premiums, and workers’ compensation

Production-worker Hours

Production-worker hours cover hours worked or paid for at the plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave

Costs of Materials

This item refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuel consumed, whether purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year. The major components of this cost item are (a) all raw materials, semi-finished goods, parts, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year, (b) electric energy purchased, (c) fuels consumed for heat, power, or the generation of electricity, (d) work done by others on materials or parts furnished by manufacturing establishments (contract work), and (e) products bought and resold in the same condition

New and Used Capital Expenditure

New expenditures cover (a) permanent additions and major alterations to manufacturing establishments, and (2) machinery and equipment used for replacement and additions to plant capacity if they were of the type. The total for new expenditures include expenditures leased from non-manufacturing concerns through capital leases. Excluded are new facilities owned by the Federal Government but operated under contract by private companies, plant and equipment furnished to the manufacturer by communities and nonprofit organizations, expenditures for used plant and equipment, expenditures for land, and cost of maintenance and repairs charged as current operating expenses.

Manufacturers also were requested to report the value of all used buildings and equipment purchased during the year at the purchase price. For any equipment or structure transferred for the use of the reporting establishment by the parent company or one of its subsidiaries, the value at which it was transferred to the establishment was to be reported. Expenditures include actual capital outlays during the year, rather than the final value of equipment put in place and buildings completed during the year.

Rental Payments

This item covers rental payments for the use of all items for which depreciation reserves would be maintained if they were owned by the establishment, e.g., structures and
buildings, and production, office, and transportation equipment. Excluded are royalties and other payments for the use of intangibles and depletable assets, and land rents where separable.

Cost of Purchased Services

This item includes the cost of purchased services for the repair of buildings and other structures, the repair of machinery, communication services, legal services, accounting and bookkeeping services, advertising, software and other data processing services, and refuse removal.

Included in the cost of purchased services for the repair of buildings and machinery are payments made for all maintenance and repair work on buildings and equipment, such as painting, roof repairs, replacing parts, and overhauling equipment. Such payments made to other establishments of the same company and for repair and maintenance of any leased property also are included. Repair and maintenance costs provided by an owner as part of a rental contract or incurred directly by an establishment in using its own work force also are excluded.

Included in the cost of purchased advertising services are payments for printing, media coverage, and other advertising services and materials. Included in the cost of purchased software and other data processing services are all purchased by the establishment from other companies. Included in the cost of purchased refuse removal services are all costs of refuse removal services paid by the establishment, including costs for hazardous waste removal or treatment.

Mikyung Lim’s research interests include the evolving pattern and shifting leadership of trade, sourcing, production, and distribution activities of the U.S. and global textile, apparel, and retailing industries under changing international trade policies, exchange rates, production resource mix, production technologies, and consumer demand. Her current research interests focus on the decline, restructuring, and transformation of the U.S. textile and apparel industry and their integration into international supply networks and the impacts of regional trade agreements on the shifting leadership of major players in international trades in textiles and apparel and the pattern of U.S. production and offshore sourcing of these goods.

List of Publications


Conference Activities


• Poster presentation at the 13th Annual Graduate Research Symposium, Virginia Polytechnic Institute and State University, VA, April 1997. *Analysis of U.S. Textile Exports in the 1980s.*

• Poster presentation at the 13th Annual Graduate Research Symposium, Virginia Polytechnic Institute and State University, VA, April 1997. *Constant-Market-Share Analysis of Textile Exports of the EC, Far East, and Emerging Textile Exporting Countries in the 1980s.*

**Awards**

• Research Fund from Graduate Research Development Project (GRDP) sponsored by Graduate Student Assembly, Virginia Polytechnic Institute and State University, spring 2001, $500.

• Travel Fund from Graduate Student Assembly, Virginia Polytechnic Institute and State University, fall 1997, $300.

**Research / Teaching Experience**

• Research Consultant for Investment Plan in Mexico, Modaprima America Inc., Division of Cheil Industries Inc., Samsung, fall 1999.

  Principal Research Contents: Investigation of Most Favored Nation tariff rates, NAFTA phase-out schedules of tariffs and quotas and tariff preference levels, and calculation of annual NAFTA tariff rates of wool apparel commodity groups for the period of 1999-2003 on the basis of NAFTA rules and Harmonized Tariff Schedule; investigation of NAFTA rules with respect to rules of origin criteria and valuation of regional value contents.

• Teaching Assistant, Department of Clothing and Textiles, Virginia Polytechnic Institute and State University, spring 1995- spring 1998.

• Research Assistant, Department of Textiles and Consumer Economics, University of Maryland, the United States Department of Agriculture (USDA), College Park, 1991-1993.