Legislated Incentives and Expectations

by

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Abstract

The United States Congress passes several pieces of legislation with the intent to improve the overall livelihood of Americans and assist other nations toward economic development. This collection of essays identifies three acts of Congress which attempt to i) enhance livelihood of Americans through free trade, ii) help the economic development of a poor nation, and iii) attempt to enhance employment opportunities of Americans who historically have low employment rates.

Chapter 1 considers the Korean-U.S. Free Trade Agreement (KORUS). The KORUS Free Trade Agreement was created with the intent to expand and secure each country's global competiveness. The U.S. import market for automotive wire harnesses is examined to evaluate the expected benefits to U.S. importers and South Korean exporters. The results suggest relatively small direct benefits from the removal of tariffs on wire harnesses, which may indicate similar results for other automotive component trade. However, indirect effects from the free trade agreement may give each side of the market greater benefits through flexibility to optimize cost structures.

Chapter 2 investigates U.S. efforts to develop the economy of Haiti through removal of tariffs on Haitian produced apparel. The analysis suggests tariff removal for cotton based apparel should be expected to be different from tariff removal for wool and synthetic based apparel. Results suggest potential increases in exports to the U.S., but with limited new opportunities for Haiti's existing production. A potential for negative impacts for Haitian

farmers is identified from separate legislation with the intent to enhance the Haitian apparel industry. In general, Haiti's own development of infrastructure may provide increased income for Haitians through internal transportation cost reductions and provide greater opportunities to more value-added apparel products.

The third chapter uses categorical analysis to measure impacts of the Work Opportunity Tax Credit (WOTC) employer hiring incentive program for employment conditions of U.S. veterans compared to their non-veteran counterparts. The results indicate disabled veterans may have gained versus their disabled non-veteran counterparts. Future benefits to disabled non-veterans may come from employment accommodations provided to disabled veterans through the WOTC. Employee reactions appear more influential to program success than reactions of employers.

Acknowledgments

"In my country, if you could get a job, you'd have to work every day and spend nothing you've earned for five years to buy a car, an old [bad] one. No food, no clothes, no cigarettes… I came to this country, worked at this place six months and was able to get my new car, and it's a good one. In this country you can have anything you want, all you have to do is work for it."

- *Srdjan Kliska, 3:00am in a factory parking lot, New Baltimore, MI (1999)*

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I also would like to take time to express genuine appreciation for the entire community of Auburn University and the idea of the land grant university. My time at Auburn has been full of great opportunities to attend several seminars on enlightening topics. Every week someone is speaking or presenting material that is open to the public. I have had the opportunity to meet

foreign dignitaries, civil rights leaders and other scholars most people simply do not have time or opportunities with which to interact.

Finally, I have been asked several times why I stopped what I was doing in the private sector to come back to school. I think of a few people and experiences I have come across in the past several years. My high school football coach Gary Steinhoff just mentioned to me one day during practice he thought I could play in college. I had always thought that was something out of my reach. If he would not have said that to me, I would not have even tried and have no regrets regarding it as a result. Srdjan Kliska, with whom I worked early in my career in Michigan, is a Serbian war refugee. He and his father were forced out of his house at gun point by the Serbian army when he was a young teenager, without opportunity to collect any belongings and contact his mother. He eventually managed to make his way to America and reunited with his mother. He is one of several refugees I met from the former Yugoslavia while in Michigan. Working and interacting with them gave me greater understanding of the vast fortunes and opportunities we have in the United States, along with some of our discrimination practices. I met Peter FaFord on my first trip to a small village and orphanage in Haiti. Peter is a Deacon in the Catholic Church, but also had a long career as a skilled project manager and civil engineer. Peter and his wife Linda could live very comfortably in the United States, but have chosen to dedicate a significant part of their lives in Haiti helping those who can offer nothing of tangible value in return. One of Peter's tasks was to remove standing water by laying a pipe with a ¼" drop for every one foot in length for several hundred feet until the pipe reached a small body of water, away from the orphanage. The task was considerable given the terrain, but also given he had to design the project keeping in mind scores of children between the ages of 2 and 6 years-old who love to run around and jump on things, including PVC pipe. The pipeline

removed many mosquitoes and disease-carrying bacteria from hundreds of people. It directly and efficiently reduced exposure of several contagious diseases. The resources which could be allocated toward education and other efforts toward developing the country, rather than correction of a disease condition, would be difficult to measure for any economist. Peter's experience and knowledge became very practical in a situation long after he gained them. I have come across several stories of efforts to assist Haitian development over the past few years, most of which were high level and abstract with varying degrees of success or failure, let alone feasibility. I cannot think of one with as much effectiveness as what Deacon FaFord offered. I met several people in my time working in the Detroit area who had years of experience and for whatever reason did not further develop their skills and technical knowhow to survive in the ever-changing industry. I can recall several times when someone's security badge suddenly would not work, which became known as notice of termination. Those who actively sought to improve their skill sets seemed to survive. I am not exactly sure why I decided to pursue a doctorate, but I believed I could, I had the opportunity to do it, I figured it would be practical to a situation somewhere down the road, I believe it is important to be ahead of the curve of practical work skills, and I did not want to be 80 years-old and have regrets about not even trying. Somewhere within all that, I decided take a few years on work on my doctorate.

War Eagle!

Table of Contents

List of Tables

List of Figures

List of Abbreviations

ADA08	Americans with Disabilities Act of 2008
ADA90	Americans with Disabilities Act of 1990
AIC	Akaike Information Criteria
AIDS	Almost Ideal Demand System Model
ARRA	American Recovery and Reinvestment Act of 2009
ATPRA	American Tax Payer Relief Act of 2012
CAFTA	Central America Free Trade Agreement
CBS	Central Bureau of Statistics Model
CBERA	Caribbean Basin Economic Recovery Act of 1983
CEPII	Centre d'Etudes Prospectives et d'Informations Internationales
	Prospective Studies and International Information Center
CIF	Cost Insurance Freight
CPS	Current Population Survey
CV	Custom Value
DDD	Difference-in-Difference-in-Difference
EIAP	Earned Import Allowance Program
FMVSS	Federal Motor Vehicle Safety Standards
FOB	Freight on Board
FTA	Free Trade Agreement

GAO	General Accounting Office / Government Accounting Office
GDP	Gross Domestic Product
HELP	Haitian Economic Lift Program
HOPE	Haitian hemispheric Opportunity through Partnership Encouragement Act
HMC	Hyundai Motor Company
HTS	Harmonized Tariff System
JIT	Just In Time
JIS	Just In Sequence
KORUS	Korean-U.S Free Trade Agreement
LDP	Landed Duty-Paid Value
LPI	Logistics Performance Index
NAFTA	North American Free Trade Agreement
NBR	National Bureau of Research Model
OEM	Original Equipment Manufacturer
OLS	Ordinary Least Squares
RHS	Right Hand Side
ROW	Rest of World
SSDI	Social Security Disability Insurance
SME	Square Meter Equivalent
SNAP	Supplemental Nutrition Assistance Program
USITC	United States International Trade Commission
VOW11	Vow to Hire Heroes Act of 2011
WOTC	Work Opportunity Tax Credit

ZINB	Zero-Inflated Negative Binomial
ZIP	Zero-Inflated Poisson

Chapter 1

Free Trade Agreements in the U.S. Automotive Subcomponent Import Market

1.1 Introduction

The U.S. automotive industry has shown considerable recovery since large volume declines between late 2008 and mid-2009. The recovery has driven increased demands for imported subcomponents, including automotive wire harnesses. Figure 1.1 shows the top 15 sources for wire harnesses imports in terms of quantity between 1989 and 2012. Mexico is by far the largest source with over 80 billion units imported over the time period.

As the demand for wire harness imports has increased, U.S. wire harness exports and employment have steadily declined, along with many other automotive subcomponents (Klier & Rubenstein). The U.S. Census Bureau indicates employment for automotive electrical component manufacturing declined as much as 40% between 1997 and 2007 (2011)[1]. The United States International Trade Commission (USITC) reports an automotive wire harness trade deficit with all partners grew from just under $5 billion to well over $8.7 billion between 2003 and 2012 Q3, a 75% increase (2012). A review of U.S. based wire harness manufacturers listed with the Wire Harness Manufacturers Association showed several manufacturers of wire harnesses in the United States, but mainly for industries other than automotive (2013). The ones with automotive capabilities were mostly geared toward small scale service production. These conditions indicate U.S. automotive sales growth will be supported through the wire harness import market, rather than domestic wire harness production.

Figure 1.1 can be segmented into three types of countries. Mexico stands by itself as the dominant market leader, taking advantage of its proximity and free trade status through NAFTA.

[1] North American Industry Classification System code 336332 includes wire harnesses. Employment in within this code is reported at 97,572 in 1997 and 58,823 in 2007.

Germany, Japan and South Korea are countries with passenger vehicle assembly companies located in the United States. South Korea has the distinction of being the lone country with assembly locations in the United States aided by a new free trade status for automotive components. All other countries can make up the rest of the supplier side of the wire harness market, and are for the most part low wage countries.

The United States and South Korea signed a free trade agreement (KORUS) in June of 2007 removing tariffs on 95% of industrial and consumer goods (U.S. - Korea Free Trade Agreement). The agreement took effect on March 15, 2012, with some adjustments since the 2007 agreement. A major segment of the agreement involves the automotive industry. KORUS phases out a tariff of 2.5% on vehicles from South Korea over the five years following the agreement's ratification, but removes tariffs immediately on several intermediate components entering the U.S. from South Korea for use in the growing South Korean automotive assembly plants in Alabama (Hyundai) and Georgia (Kia). KORUS contains a 'snapback' clause which permits the U.S. to reapply the 2.5% vehicle tariff should a surge of South Korean vehicles enter the U.S. market. Beyond tariff incentives, HMC[2] has also seen recent upward pressure on its domestic automotive labor costs (Woodyard 2012). The 2.5% tariff on assembled passenger vehicles with removal of tariffs on automotive components would seemingly encourage greater U.S. production of the HMC vehicles.

KORUS had been in negotiation, or at least feasibility analysis, from as early as 1999 (Cheong and Wang 1999). Lee and Lee use highly aggregated data and project a 2.8% increase in South Korean domestic automobiles and components in the short-term, and a 4.1% increase in the long-term (2005). Lee and Lee also project a 17.5% increase in employment in the South

[2] Hyundai Motor Manufacturing of Alabama (HMMA) and Kia Motor Manufacturing of Georgia (KMMG) are subsidiaries of Hyundai Motor Company (HMC).

Korean auto sector as a result of the then projected FTA. The present study estimates the expected change in imported components from removal of tariffs using disaggregated data for a single component, wire harnesses.

1.2 The Automotive Industry and Wire Harnesses

1.2.1 The Automotive Industry

A brief overview of the automotive industry may give insight to future expectations about procurement managers' reactions to price, regardless of the supplier's location and product. Original equipment manufacturers (OEM) coordinate hundreds of suppliers and thousands of components from across the globe for one vehicle. Suppliers that supply the OEM are considered Tier 1 suppliers. Suppliers that supply the Tier 1 suppliers are considered Tier 2 suppliers, and so on. Production forecasts can typically be 10 to 12 weeks, give or take a couple weeks depending on the OEM and commodity type. The production forecast is typically disseminated down through the supply chain on a weekly basis. As supply comes back up through the supply chain to the OEM, the commodity becomes more particular to the vehicle. This means each supplier along the Tier system may be the only facility in the world with production equipment and tooling built for the OEM's specific vehicle. Delays of supply to the OEM are simply not tolerable due to extensive labor and inventory costs that cannot be avoided through the supply chain. For instance, a vehicle cannot be sent to the dealer without a steering wheel. If the steering wheel supplier does not supply the steering wheel, the whole process eventually stops. Ultimately, the costs of delaying production at an OEM assembly plant can range up to and beyond $1000 per minute. A sense of urgency is passed down from the Tier 1 to the Tier 2 and so. Any procurement manager considering a new supplier, or new supplier location, must keep this in mind. Also, the OEMs control vehicle design and assembly, so

agreement from the OEM to change production process or location is often required, and not always granted.

A rule of thumb for automotive OEMs has traditionally been to keep roughly 60 days of finished goods inventory between the assembly plant and the dealership. At the same time, an emphasis on inventory reduction occurs from the OEM receiving dock back through the supplier tier system, or a just-in-time production (JIT) system, where delivery up through the supply chain occurs on weekly, daily or even less than hourly basis. Further, more complex components may require just-in-sequence (JIS). The JIT/JIS production system mandates reliability for delivery time and has very low tolerance for defects (Wagner and Silveira-Camargos 2011).

The U.S. auto industry had 1.25 million units sold in August of 2008. That number dropped to less than 750,000 by November before eventually bottoming out in January 2009 at 657,000 units (Automotive News Data Center 2012). This sudden drop in sales resulted in large inventory increases in terms of holding costs, as well as simple physical space. Components from overseas in Europe and Asia were particularly troublesome because of 8 to 12 lead times on deliveries. The eventual recovery of auto sales helped deplete inventory, but also left purchasing and procurement managers with a heightened sensitivity to inventory commitments.

1.2.2 Wire Harnesses

A wire harness has a unique role in a vehicle. It is a collection of electrical wires and plugs connecting occupant controls, and other equipment, to the vehicle's various mechanical functions. The wires are typically bundled together with a flexible tape or tube by hand, making it a very labor intensive product and appropriate for continued outsourcing to foreign countries. This makes the wire harness potentially atypical for analysis in the automotive component sector.

Wire harnesses interact with many sophisticated technologies, such as airbags, but they require rather low technology and labor costs to produce. This separates them from other components, such as stampings or molded products which require large capital investments. Wire harnesses require relatively low capital to set up, thus seemingly allowing for ease of production transfer.

However, due to the interaction of the wire harness with safety and key functional components, its production location can have some stickiness. Any vehicle must undergo numerous rounds of testing according to Federal Motor Vehicle Safety Standards (FMVSS), along with OEM and industry specific standards. Wire harnesses serve as the 'nerve' system of the vehicle in that they connect the driver controls to the various electrical components around the vehicle, and thus greatly affect vehicle conformance results. Delivery, production and regulatory requirements can be seen as entry barriers beyond competitive pricing for wire harness imports.

1.3 Model Specification Estimate

The reaction of wire harness quantity imported from the identified countries from a change in price of the imported wire harnesses is estimated with a form of Barten's Synthetic model (1993). The model nests four differential demand systems models with the use of two indicator variables. The Synthetic model is often used as an instrument to determine between four commonly used differential demand functional forms: the Rotterdam (Theil, 1965), Central Bureau of Statistics (CBS) model (Keller & van Driel, 1985), the NBR (Neves, 1994) model and the differential form of the Almost Ideal Demand System (AIDS) model (Deaton & Muellbauer, 1980). Matsuda (2005) uses the Synthetic model to estimate Japanese demand for non-durable

goods and services. As explained by Matsuda, the Synthetic model itself can be used to estimate the system, not just identify the functional form of the system.

As Matsuda explains Barten's Synthetic model, the expenditure share-weighted change in natural logarithm of q_i as represented in Equation 1.1),

1.1) $w_i dlnq_i = [\lambda w_i + \mathrm{B_i}]DQ + \sum_{j=1}^{3} \mu\left[\Gamma_{ij} - \mu w_i(\delta_{ij} - w_j)\right] dlnp_j$

where $\mathrm{B_i} = \lambda\beta_i + (1-\lambda)\beta_i$ and $\Gamma_{ij} = \gamma_{ij} + (1-\mu)\gamma_{ij}$. The expenditure share of wire harness is $w_i=(p_iq_i)/M$, where $M = \sum_{i=1}^{3} p_i q_i$ is total expenditure. The term *dln* is the change in the natural logarithm of quantity q_i or price p_j. *DQ* is the Divisia Volume index, $\sum_{i=1}^{3} w_i dlnq_i$, which is intended to represent the real expenditure (or real income in consumer terms) of the wire harness importers. The parameter δ_{ij} is the Kronecker delta where $\delta_{ij} = 1$ if $i=j$, and $\delta_{ij} = 0$ if $i \neq j$. B_i indicates the marginal change in expenditure on wire harnesses and Γ_{ij} indicates price effects. The indicator variables λ and μ determine the functional form of the estimation equation. For this paper, intercept and seasonality variables are added for estimation, along with a variable for the growth in U.S. assembly plants from Auto countries.

When λ=0, the Synthetic model system treats expenditure effects as a constant, as in the Rotterdam or NBR models. If λ is set to 1, the system allows marginal expenditure effect B_i to vary with expenditure share w_i, as with the CBS or AIDS models. If μ=0, the Synthetic system treats marginal substitution effects from price p_j as a constant, as with the Rotterdam or CBS models. If μ=1, price effects vary with expenditure shares w_i and w_j same as with the AIDS or NBR models. A summary of the nested models' functional forms is below:

Specified Model	Expenditure Effect $\mathrm{B_i}$	Substitution Effect Γ_{ij}
Rotterdam (λ=0, μ=0)	Constant	Constant
CBS (λ=1, μ=0)	Varies with Budget Share	Constant
NBR (λ=0, μ=1)	Constant	Varies with cross-Budget Share
AIDS (λ=1, μ=1)	Varies with Budget Share	Varies with cross-Budget Share

1.4 Data for Estimation

Data for estimation come from the USITC for each quarter from 1989 through the third quarter of 2012. Three variations of wire harnesses are aggregated from each country for use as the dependent variable. The USITC reports imports of wire harnesses according to Harmonized Tariff System (HTS) codes[3]. The reported custom value (CV) of each code serves as both the value of the wire harness and the quantity in the USITC report. In other words, wire harnesses are imported according to value, not weight, pieces or another quantitative measure. The landed duty paid-value (LDP) is the sum of customs value plus all other costs associated with bringing the wire harness from the exporting country to the U.S. port of entrance into the United States. This study assumes the law of one price as explained by Lamont & Thaler (2003) for wire harnesses, in that a wire harness imported from Brazil is the same price as one from India. The difference between the two sources is only the difference in the cost of transporting the wire harness from the respective countries, be they from labor- or capital-intensive production processes. Therefore, the price of a wire harness is considered the percentage above custom value made up from delivery costs paid by the importer,

$$1.2) \qquad p_{it} = \frac{\sum_{j=1}^{3}(LDP_{ijt} - CV_{ijt})}{CV_{ijt}}$$

where p_{it} represents the price of wire harnesses from country i at time t, and j represents each of the three wire harnesses. The custom value is treated as equal to the quantity q_{ijt} in the denominator of Equation 1.2) and throughout this study.

[3] HTS 8544300000 volume represents over 80% of the volume during the analyzed time period and was increased to a rate of 5.3% for 2013. USITC descriptions are somewhat vague and could apply to product for use in other than passenger vehicles. Figure A1 shows wire harness imports from Korea jump up near 2004 and 2009, in line with the opening of HMMA in 2004 and KMMG in 2008, signaling the proper HTS codes are used for estimation.

Three 'countries' are identified for estimation purposes. Mexico (Country 1) is by far the largest exporter of wire harnesses to the United States in terms of custom value with nearly 70% of the U.S. import market over the period from 1989 through 2012. However, its market share has dropped considerably over the past two decades. Figure 1.2 shows expenditure (p_{it} x q_{it}) growth in the U.S. wire harness import market. Total expenditure[4] grew 130% from slightly over $3 million to over $7 million between 1992 and 2012. Volume of wire harness imports increased nearly 600% over the same time period, reflecting the large reduction of cost to import a wire harness.

Foreign countries with companies assembling passenger vehicles in the United States are identified in the estimates as 'Auto' nations (Country 2). Japan, Germany and South Korea, account for 3.9%, 1.0% and 0.5% of wire harness imports, respectively. The rest of the world (ROW) countries (Country 3) are made up from all other countries exporting wire harnesses to the U.S. since 1989. Table 1.1 displays market share in terms of custom value for the analyzed period, along with summary statistics for the aggregated countries. Table 1.2 displays a breakdown of the three HTS codes imported from the top 15 exporters listed in Table 1.1 only for the year 2011 rather than the overall sample mean values. Note the countries do not change, just the ordering of ranks. The USITC also reports the dutiable amount of the CV for each code. Over half of all wire harness volume is brought into the United States through Mexico under the HTS 8544300000 code, which has the highest tariff, but is mostly brought in without tariff through the NAFTA agreement. Though, well over $1 billion worth of wire harnesses was subject to the 5% tariff.

[4] Expenditure refers to the expenditure toward importing wire harnesses, not the expenditure on wire harnesses themselves.

Equation 1.1) is estimated using SAS 9.2. Table 1.3 displays specification test results for the nested models, as well as, results for the Synthetic model. The homogeneity restriction is maintained in each of the nested models and the Synthetic model. Symmetry is not strongly rejected in any of the models with the homogeneity restriction imposed. The Synthetic model is also tested for various specifications for an indication of which nested model may most properly indicate the functional form of the estimating system of equations. These results indicate the CBS model specification to most closely match that of the unrestricted Synthetic model.

Estimation results of Equation 1.1) with homogeneity and symmetry restrictions are available in Table 1.4. As indicated from pre-estimation tests, the Synthetic model's λ and μ coefficients are estimated close to 1 and 0, respectively, resulting in similar estimates to the CBS specification. Three additional parameters are estimated for informational purposes. The α_i terms are intercepts, which would indicate a trend in importers' patterns if statistically significant. Estimation results indicate no particular trend of U.S. importers toward or away from any of the countries. The s_i coefficients are for quarterly seasonality considerations. Each of the model specifications indicates no seasonality effects, as expected due to the nature of the share-weighted dependent variable. The c_i parameters are used to indicate the impact of the growth of foreign-owned vehicle assembly plants. The number of assembly plants with headquarters in 'Auto' nations, also known as 'New Domestics', grew from 6 in 1989 to 16 in 2012. Each model estimates these parameters as not statistically significant. Finally, indicator variables (not reported) were used to control for the large downturn in the U.S. auto market from Q4 2008 through Q2 of 2009. These were estimated as not statistically significant.

1.5 Elasticity Estimations

Coefficients from Equation 1.1) and expenditure budget shares can be used to find compensated price-elasticities $\acute{\eta}_{ij}$ and expenditure- elasticities π_i (Matsuda, 2005) in Equation 1.3) and Equation 1.4), respectively,

1.3) $\acute{\eta}_{ij} = \Gamma_{ij}/w_i - \mu(\delta_{ij} - w_j)$

1.4) $\pi_i = B_i/w_i + \lambda$

Uncompensated price elasticities η_{ij} can be found through the Slutsky equation,

1.5) $\eta_{ij} = \acute{\eta}_{ij} - w_j\pi_i$.

Table 1.5 has compensated (Hicksian) own- and cross-price elasticities, calculated from the 1992 Q3, mean, and 2012 Q3 budget shares. The Synthetic and CBS models are considered to represent the functional forms of wire harness imports, based on estimations of the unrestricted nesting coefficients. All the own-price elasticities are in the expected direction. Cross-price elasticities show a tendency toward a complementary relationship for each country. The exception is the only consistently statistically significant substitutable relationship between Mexican and Auto wire harnesses.

The impact of model specification becomes apparent when reviewing across Table 1.5. Allowing the synthetic model's estimate of μ to be the true value suggests the Rotterdam and CBS specifications to be closest to the true model for price expectations. In comparison, the NBR and AIDS models would tend to overestimate the impact of prices on quantity. For the most part, the overestimation has minor impacts on expectations, with the above noted exception between Auto and Mexican wire harnesses, $\acute{\eta}_{12}$ and $\acute{\eta}_{21}$. The NBR and AIDS models suggest Mexican and Auto wire harnesses go from reasonably strong substitutes in 1992 to complements

in 2012. However, the models holding price effects constant, as in the Synthetic model, suggest the relationship remains at one of substitution.

Table 1.6 shows the long-term uncompensated (Marshallian) elasticities are more responsive to price changes, as expected compared to the short-term Hicksian elasticities. Most of the Marshallian elasticities between the three countries are statistically significant at the 5% level. Own-price elasticities are in the expected direction. The cross-price elasticities suggest wire harness imports are clearly complementary in nature. Own-price elasticities for Auto nations indicate minimal changes in quantity from changes in price. This result is consistent across model specifications and time.

Table 1.6 also indicates the complementary relationships change over time. For instance, the 1992 Synthetic model results show a 1% increase in the price of Auto wire harnesses decreased the amount of Mexican wire harnesses by 0.1%. Twenty years later, the estimate changes to an estimated decrease of only 0.04%. A similar change can be seen between Auto wire harnesses prices and ROW quantities. Further, the Synthetic model of 1992 shows Mexico's own-price has greater influence than the ROW price on Mexican quantity. However, this condition flips in the 2012 model, indicating Mexico's export quantity is affected more by the ROW price than it is by its own-price. This condition can be found across each nested model to varying degrees depending on whether price effects are allowed to vary with expenditure share. In general, this indicates Mexico's exports to the United States are growing more dependent on ROW pricing than it is on its own or that of Auto countries. This change can be seen with review of Figures 1.4 and 1.5. Mexico's price went from $4.23 to $1.51 per 100 wire harnesses from 1993 to 2012, a 64% decrease. Mexico's exports grew from nearly 433 million units to almost 1.5 billion over the same time, a 245% increase. ROW price went from $6.10 to $4.73, only a 22% decrease.

ROW quantity went from 144 million to almost 900 million in this same time, an increase of over 500%. All this could be a reflection of decreasing costs of doing business overseas.

Expenditure elasticities are in Table 1.7 and indicate near unitary relationships between percentage changes in expenditure and imported wire harnesses from ROW and Mexico. However, Auto countries see a relatively smaller increase in imports from increases in expenditure. The Rotterdam and NBR models, which hold expenditure share constant, shows Mexican expenditure elasticity is increasing and ROWs is decreasing, while they are more likely remaining constant over the past two decades.

1.6 Expected Changes in Korean Wire Harness Price and Imports

As noted in the introduction, automotive procurement managers cannot move production locations quickly simply due to price. Table 1.4 and Table 1.5 reflect this type of mindset and activity in the auto industry. Importers do not react much to price in the short-run, as reflected in Table 1.4 compensated elasticities. Price is not necessarily as important as reliability when considering a wire harness in a vehicle. Safety, traceability, durability and compatibility with other sophisticated, high-priced components are critical and represent barriers to entry for the automotive industry. After time and transfer of knowledge, managers can react to price, as reflected in Table 1.5, though the decision still seems not influenced greatly by price.

Based on information discussed in section 1.1, the U.S. effectively does not have a domestic wire harness supply of significant magnitude, and is not considered for supply. Using the Synthetic model results in Table 1.6, the estimated percentage change in Korean wire harness imports can be found by allowing it to follow the pattern of the Auto companies:

1.6) $D_K^* = \eta_{21} P_M^* + \eta_{22} P_K^* + \eta_{23} P_R^*$

where D_K is the demand for Korean wire harnesses. P_I is the respective price for Mexico, Auto and ROW, with South Korean price represented by the Auto country price. Percentage changes of both sides of the market are represented with (*)[5]. Assuming no change in Mexican or ROW pricing and permitting the average own-price elasticity from Table 1.6 as statistically significant results in:

1.6') $D_K^* = -.142P_K^*$

Table 1.2 shows South Korea exported nearly 119 million wire harnesses in 2011. Well over 87 million of them were already imported under the zero tariff HTS code. As a result, $1.27 million in tariffs represent 1.1% of the custom value, or $1.10 per 100 units. The minimum price for importing from Auto countries is 4.1% according to Table 1.1, or $4.10 per 100 units. Using this price point, removal of the tariff represents a 27% decrease in price, suggesting the average cost to South Korean exporters is $3.00 per 100 units, from other export costs. The mean share demand elasticity from Table 1.6 and some assumed supply elasticities can provide insights to which side of the market will benefit more from KORUS,

1.7) $$\frac{\delta P^*}{\delta T^*} = \frac{\eta}{(\varepsilon - \eta)}$$ 1.8) $$\frac{\delta P_K{}^*}{\delta T^*} = \frac{\varepsilon}{(\varepsilon - \eta)}$$

where P and P_K represent the changes in price from pre-KORUS equilibrium P_0 to the South Korean exporter (cost) and the decrease in price to the U.S. importer, respectively, and T is ad valorem tariff. From Equation 1.7) and Equation 1.8) the incidence of the price reduction for U.S. importers and South Korean exporters depends on the U.S. demand side elasticity η, as well as, the South Korean side supply elasticity ε. If $\varepsilon=|\eta|$, then the $1.10 per 100 units is split evenly between the supply and demand sides of the market. Otherwise, the less elastic side of the market gains the overall greater share of tariff removal. This is depicted below:

[5] Derivation available in Appendix A

Figure 1.7: Incidence Scenarios

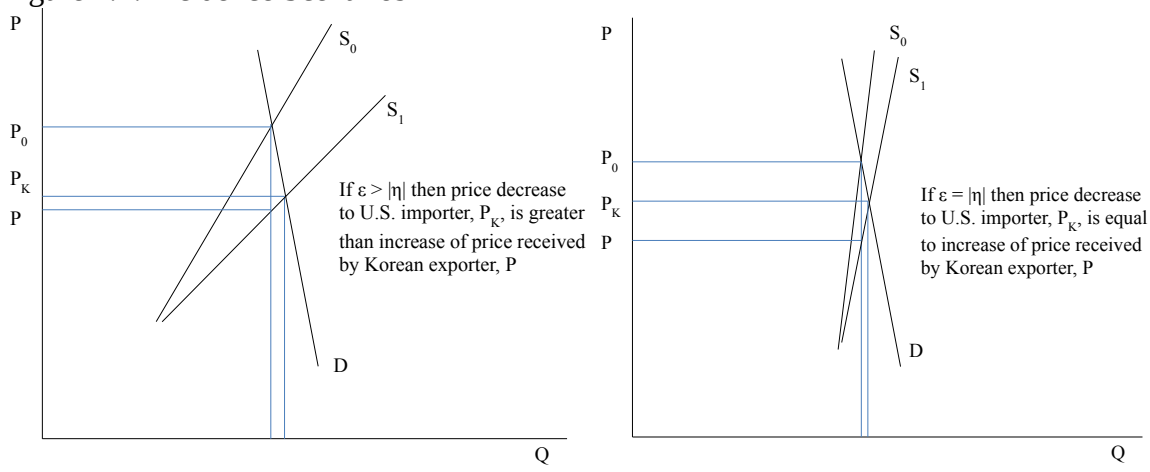


Table 1.8 displays the price wedge estimates of increasing supply elasticity estimates. Considering wage pressure in South Korea, the post-KORUS supply elasticity may be less than the absolute U.S. demand elasticity. Figure 1.7 exaggerates an estimate of South Korean supplier and U.S. importer welfares. The South Korean supplier appears to garner a greater portion of the total welfare, at least on the surface. In total, the surplus increases on either side of the market are relatively small considering the 2011 custom value of imports was nearly $8.5 billion. Table 1.7 suggests South Korean price decreases will increase supply from both Mexico and ROW, adding to U.S. importer surplus from the post-KORUS condition, *ceteris paribus*.

However, South Korean suppliers may gain more from KORUS than what is readily apparent as well. Reverting back to Table 1.2, Auto countries supply more wire harnesses under the 0% tariff code (HTS2040) than the 2.5% tariff code (HTS4040). HTS2020 and HTS2040 have similar descriptions. Speculatively, the difference in wire harnesses may only be the absence of a couple components on the HTS2040 wire harness that could be assembled to produce an HTS4040. If gross benefit to the South Korean supplier were less than 2.5%, the HTS4040 tariff amount, the tariff on HTS4040 discourages the value-added assembly process. After KORUS, the South Korean supplier can accept gross benefits less than 2.5% and export

under a potentially more preferable HTS code. Theoretically, this could also occur with the wire harness assigned a 5% tariff. These relatively quick changes may be of more immediate benefit to South Korea than the changes in U.S. demand suggested from the compensated elasticities in Table 1.5. And, since the elasticities in Table 1.6 were merely treated as statistically significant for the purposes of welfare analysis, these may be the only realized benefits by the South Korean exporter.

Some evidence of this change in production sequence may be apparent in Table 1.9 displaying exports to the U.S. through the first three quarters of 2011 and 2012 per HTS code for the three Auto countries. Japan and South Korean exports grew considerably, while Germany's decreased considerably. Between the two countries with export growth, South Korea redistributed toward the two HTS codes with tariffs removed after KORUS. At the same time, Japan may have handled growth by shifting toward the lower tariff HTS. This may be an indication of South Korean suppliers gaining further surplus through reorientation of the production process.

1.7 Summary and Comments

The Korean-U.S. FTA removes tariffs on several South Korean imported products effective May 2012. A 2.5% U.S. tariff on South Korean passenger vehicles will be phased out in the five years following May 2012. However, KORUS removes tariffs on imported South Korean automotive components immediately, including tariffs on automotive wire harnesses.

Three types of countries were used to differentiate U.S. importers' reactions to changes in price, and thus the removal of the wire harness tariff. A Synthetic differential demand system model suggests U.S. wire harness importers have quite inelastic reactions to prices, and thus wire

harness import quantities will grow only slightly as a direct result of the tariff removal. Much greater growth of South Korean exports will come due to overall growth of U.S. passenger vehicle production. This finding counters those of pre-agreement estimates for the auto industry, though are limited to only one particular commodity.

Welfare estimation using a South Korean supply elasticity less than the absolute value of the U.S. demand elasticity suggest both countries will have surplus gains, with slightly more going to the South Korean supplier, though both gains are rather negligible. However, each country may also have surplus gains indirectly from the KORUS FTA. South Korean suppliers may gain efficiency through a more flexible production system, while U.S. importers should realize benefits from Mexico and rest of world wire harness suppliers.

Wire harnesses represent only one of scores of automotive components imported for assembly in the U.S. passenger vehicle supply chain. This study may offer some indication of the impact KORUS has on the U.S. automotive market prior to the removal of tariff on South Korean completely assembled passenger vehicles. Increased exports from South Korea will come due to growth of the vehicles produced and sold in the U.S. by South Korean assembly companies, not due to price reductions from KORUS.

Table 1.1: Custom Value Market Share and Summary Statistics

	Country	Custom Value	Market Share
1	Mexico	83,302,476,367	67.90%
2	Philippines	6,343,494,957	5.17%
3	China	4,964,077,964	4.05%
4	Japan	4,744,072,878	3.87%
5	Taiwan	4,701,613,537	3.83%
6	Honduras	3,087,093,618	2.52%
7	Thailand	3,016,366,642	2.46%
8	Canada	2,736,330,374	2.23%
9	Nicaragua	1,786,510,378	1.46%
10	Indonesia	1,610,864,742	1.31%
11	Germany	1,184,468,535	0.97%
12	United Kingdom	830,654,860	0.68%
13	Vietnam	747,231,546	0.61%
14	France	745,184,875	0.61%
15	South Korea	667,922,357	0.54%

Summary Statistics

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
P_1	Mexico	95	3.26	1.7	1.5	8.9
P_2	AUTO	95	5.84	2.0	4.1	16.1
P_3	ROW	95	6.16	1.1	4.7	13.4
Q_1	Mexico	95	876,868,172	351,064,644	217,062,020	1,581,805,566
Q_2	AUTO	95	69,436,461	27,022,580	13,179,944	135,918,001
Q_3	ROW	95	345,063,459	221,457,437	57,509,344	904,435,328

P_i Price, Q_i Quantity

Table 1.2: 2011 Custom Value and Dutiable Percentage

2011 Rank	Mean Rank	Country	HTS 8512202040 (0% Tariff) Custom Value	HTS 8512202040 (0% Tariff) Dutiable Percent	HTS 8512204040 (2.5% Tariff) Custom Value	HTS 8512204040 (2.5% Tariff) Dutiable Percent	HTS 8544300000 (5% Tariff) Custom Value	HTS 8544300000 (5% Tariff) Dutiable Percent	Total Custom Value	Total Dutiable Percent
1	1	Mexico	312,638,884	0.0%	129,845,258	11.4%	4,734,933,466	2.8%	5,177,417,608	2.9%
2	3	China	140,798,868	0.0%	56,445,377	100.0%	472,008,465	85.9%	669,252,710	69.0%
3	5	Taiwan	290,814,561	0.0%	98,475,182	100.0%	8,425,636	99.1%	397,715,379	26.9%
4	6	Honduras	0	0.0%	0	0.0%	384,234,329	0.7%	384,234,329	0.7%
5	9	Nicaragua	0	0.0%	0	0.0%	349,986,728	4.9%	349,986,728	4.9%
6	2	Philippines	0	0.0%	1,999,291	100.0%	332,920,817	99.7%	334,920,108	99.7%
7	4	Japan	135,336,694	0.0%	24,555,735	99.6%	66,276,230	97.5%	226,168,659	39.4%
8	8	Canada	74,864,146	0.0%	57,072,666	3.5%	45,866,392	12.8%	177,803,204	4.4%
9	13	Vietnam	0	0.0%	0	0.0%	170,623,130	100.0%	170,623,130	100.0%
10	10	Indonesia	0	0.0%	0	0.0%	169,148,836	100.0%	169,148,836	100.0%
11	15	South Korea	87,309,885	0.0%	12,516,727	100.0%	19,159,115	100.0%	118,985,727	26.6%
12	7	Thailand	171,836	0.0%	249,941	70.9%	115,289,909	44.9%	115,711,686	44.9%
13	11	Germany	79,113,767	0.0%	5,918,696	100.0%	22,960,323	86.5%	107,992,786	23.9%
14	14	France	6,459,393	0.0%	1,668,955	100.0%	50,303,908	11.4%	58,432,256	12.7%
15	12	United Kingdom	2,589,096	0.0%	0	0.0%	31,822,760	25.6%	34,411,856	25.9%
		Total (%CV Total)	1,130,097,130	(13.3)	388,747,828	(4.6)	6,973,960,044	(82.1)	8,492,805,002	

HTS Code	Description	
8512.20.2040	Lighting equipment: For the vehicles of subheading 8701.20 or heading 8702, 8703, 8704, 8705 or 8711	0%
8512.20.4040	Visual signaling equipment: For the vehicles of subheading 8701.20 or heading 8702, 8703, 8704, 8705 or 8711	2.5%
8544.30.0000	Ignition wiring sets and other wiring sets of a kind used in vehicles, aircraft or ships	5%

Table 1.3: Model Restrictions

		Restriction Imposed	
		None	Homogeneity
Model	Null	Wald χ^2	Wald χ^2
Synthetic	Homogeneity	3.58 (0.1667)	-
	Symmetry	6.00 (0.0143)	3.12 (0.0774)
Rotterdam (λ=0, μ=0)	Homogeneity	1.70 (0.4268)	-
	Symmetry	4.62 (0.0316)	3.66 (0.0559)
CBS (λ=1, μ=0)	Homogeneity	3.43 (0.1799)	-
	Symmetry	5.96 (0.0147)	3.20 (0.0735)
NBR (λ=0, μ=1)	Homogeneity	2.60 (0.2724)	.
	Symmetry	5.09 (0.0241)	3.69 (0.0547)
AIDS (λ=1, μ=1)	Homogeneity	4.47 (0.1068)	-
	Symmetry	6.48 (0.0109)	3.31 (0.0687)

Unrestricted Synthetic	None
Null Specification[1]	Wald χ^2
Synthetic (λ=1)	0.32 (0.5740)
Synthetic (λ=0)	17.44 (<0.0001)
Synthetic (μ=1)	25.11 (<0.0001)
Synthetic (μ=0)	0.17 (0.6779)
Rotterdam (λ=0, μ=0)	17.64 (<0.0001)
CBS (λ=1, μ=0)	0.49 (0.7824)
NBR (λ=0, μ=1)	42.76 (<0.0001)
AIDS (λ=1, μ=1)	25.45 (<0.0001)

[1] Homogeneity and Symmetry imposed, λ and μ are unrestricted in each test

Table 1.4: Model Coefficient Results

N = 94	Synthetic			Rotterdam			CBS			NBR			AIDS		
Coeff.	Est.	Std Err		Est.	Std Err		Est.	Std Err		Est.	Std Err		Est.	Std Err	
α_1	-0.003	(0.013)		0.010	(0.013)		-0.001	(0.012)		0.005	(0.015)		-0.006	(0.014)	
α_3	-0.003	(0.012)		-0.017	(0.013)		-0.004	(0.011)		-0.013	(0.014)		-0.001	(0.013)	
B_1	-0.061	(0.151)		0.548	(0.042)	*	0.021	(0.039)		0.546	(0.046)	*	0.019	(0.043)	
B_2[a]	-0.040	(0.024)		0.045	(0.014)	*	-0.029	(0.013)	*	0.042	(0.015)	*	-0.032	(0.014)	*
B_3	-0.055	(0.116)		0.407	(0.040)	*	0.008	(0.036)		0.412	(0.043)	*	0.013	(0.040)	
Γ_{11}	-0.018	(0.048)		0.005	(0.013)		0.002	(0.012)		0.220	(0.014)	*	0.216	(0.013)	*
Γ_{12}	0.012	(0.009)		0.009	(0.004)		0.008	(0.004)	*	-0.030	(0.005)	*	-0.030	(0.005)	*
Γ_{13}	0.006	(0.040)		-0.014	(0.012)		-0.010	(0.011)		-0.190	(0.013)	*	-0.186	(0.012)	*
Γ_{21}[a]	0.012	(0.009)		0.009	(0.004)	*	0.008	(0.004)	*	-0.030	(0.005)	*	-0.030	(0.005)	*
Γ_{22}[a]	-0.014	(0.015)		-0.007	(0.007)		-0.007	(0.007)		0.065	(0.007)	*	0.064	(0.007)	*
Γ_{23}[a]	0.002	(0.009)		-0.002	(0.007)		-0.001	(0.006)		-0.035	(0.007)	*	-0.035	(0.007)	*
Γ_{31}	0.006	(0.040)		-0.014	(0.012)		-0.010	(0.011)		-0.190	(0.013)	*	-0.186	(0.012)	*
Γ_{32}	0.002	(0.010)		-0.002	(0.007)		-0.001	(0.006)		-0.035	(0.007)	*	-0.035	(0.007)	*
Γ_{33}	-0.008	(0.047)		0.016	(0.013)		0.011	(0.012)		0.225	(0.014)	*	0.221	(0.013)	*
s_1	0.000	(0.000)		0.000	(0.000)		0.000	(0.000)		0.000	(0.000)		0.000	(0.000)	
s_2	0.000	(0.000)		0.000	(0.000)		0.000	(0.000)		0.000	(0.000)	*	0.000	(0.000)	
s_3	0.000	(0.000)		0.000	(0.000)		0.000	(0.000)		0.000	(0.000)		0.000	(0.000)	
c_1	0.001	(0.001)		0.000	(0.001)		0.000	(0.001)		0.000	(0.001)		0.001	(0.001)	
c_3	0.001	(0.001)		0.002	(0.001)		0.001	(0.001)		0.002	(0.001)		0.001	(0.001)	
λ	1.156	(0.277)	*	0	-		1	-		0	-		1	-	
μ	-0.090	(0.218)		0	-		0	-		1	-		1	-	
	R^2	Adj-R^2	DW	R^2	Adj-R^2	DW	R^2	Adj-R^2	DW	R^2	Adj-R^2	DW	R^2	Adj-R^2	DW
wd1	0.707	0.687	2.22	0.654	0.635	2.23	0.703	0.686	2.24	0.590	0.567	2.25	0.649	0.629	2.278
wd3	0.632	0.606	2.27	0.539	0.513	2.22	0.625	0.603	2.28	0.459	0.429	2.26	0.551	0.526	2.336

a Coeffiencent calculated from adding up restriction, $\sum\beta i + \lambda = 1$.

1 1 Mexico, 2 Auto Countries (Japan, Germany, South Korea), 3 Rest of World

DW Durbin Watson, Critical Value = 1.71

* Statistically significant at 5%

Table 1.5: Compensated Elasticities

	Synthetic		Rotterdam (λ=0, μ=0)		CBS (λ=1, μ=0)		NBR (λ=0, μ=1)		AIDS (λ=1, μ=1)	
				1992 Share Compensated Price Elasticity						
$\acute{\eta}_{11}$	0.005	(0.021)	0.008	(0.021)	0.003	(0.020)	-0.025	(0.023)	-0.030	(0.022)
$\acute{\eta}_{12}$	0.010	(0.012)	0.014	(0.007) *	0.014	(0.007) *	0.057	(0.007) *	0.057	(0.007) *
$\acute{\eta}_{13}$	-0.015	(0.018)	-0.022	(0.020)	-0.016	(0.018)	-0.032	(0.021)	-0.026	(0.020)
$\acute{\eta}_{21}$	0.057	(0.068)	0.083	(0.041) *	0.080	(0.040) *	0.337	(0.044) *	0.335	(0.043) *
$\acute{\eta}_{22}$	-0.050	(0.078)	-0.066	(0.067)	-0.069	(0.064)	-0.274	(0.072) *	-0.280	(0.069) *
$\acute{\eta}_{23}$	-0.006	(0.060)	-0.016	(0.063)	-0.011	(0.059)	-0.063	(0.067)	-0.055	(0.064)
$\acute{\eta}_{31}$	-0.033	(0.041)	-0.051	(0.045)	-0.037	(0.041)	-0.072	(0.048)	-0.059	(0.044)
$\acute{\eta}_{32}$	-0.002	(0.023)	-0.006	(0.024)	-0.004	(0.023)	-0.024	(0.026)	-0.021	(0.025)
$\acute{\eta}_{33}$	0.035	(0.044)	0.057	(0.048)	0.041	(0.043)	0.096	(0.051)	0.080	(0.047)
				Mean Share Compensated Price Elasticity						
$\acute{\eta}_{11}$	0.008	(0.028)	0.010	(0.025)	0.003	(0.024)	-0.057	(0.027) *	-0.063	(0.026) *
$\acute{\eta}_{12}$	0.015	(0.008)	0.017	(0.008)	0.016	(0.008) *	0.022	(0.009) *	0.022	(0.009) *
$\acute{\eta}_{13}$	-0.024	(0.025)	-0.026	(0.023)	-0.019	(0.021)	0.034	(0.025)	0.041	(0.023)
$\acute{\eta}_{21}$	0.102	(0.054)	0.109	(0.055)	0.106	(0.053) *	0.147	(0.059) *	0.146	(0.057) *
$\acute{\eta}_{22}$	-0.091	(0.084)	-0.088	(0.089)	-0.091	(0.084)	-0.099	(0.095)	-0.107	(0.091)
$\acute{\eta}_{23}$	-0.011	(0.078)	-0.022	(0.083)	-0.015	(0.079)	-0.048	(0.088)	-0.039	(0.085)
$\acute{\eta}_{31}$	-0.031	(0.033)	-0.035	(0.031)	-0.026	(0.028)	0.045	(0.033)	0.054	(0.031)
$\acute{\eta}_{32}$	-0.002	(0.016)	-0.004	(0.017)	-0.003	(0.016)	-0.010	(0.018)	-0.008	(0.017)
$\acute{\eta}_{33}$	0.034	(0.034)	0.039	(0.033)	0.029	(0.030)	-0.036	(0.036)	-0.047	(0.032)
				2012 Share Compensated Price Elasticity						
$\acute{\eta}_{11}$	0.008	(0.035)	0.014	(0.035)	0.005	(0.032)	-0.041	(0.038)	-0.050	(0.035)
$\acute{\eta}_{12}$	0.025	(0.013)	0.023	(0.011) *	0.022	(0.011) *	-0.009	(0.012)	-0.009	(0.012)
$\acute{\eta}_{13}$	-0.033	(0.035)	-0.037	(0.032)	-0.027	(0.029)	0.050	(0.035)	0.059	(0.032)
$\acute{\eta}_{21}$	0.135	(0.071)	0.124	(0.062) *	0.121	(0.060) *	-0.048	(0.067)	-0.051	(0.065)
$\acute{\eta}_{22}$	-0.113	(0.098)	-0.100	(0.101)	-0.104	(0.096)	0.003	(0.108)	-0.005	(0.103)
$\acute{\eta}_{23}$	-0.022	(0.090)	-0.025	(0.094)	-0.017	(0.089)	0.045	(0.100)	0.056	(0.096)
$\acute{\eta}_{31}$	-0.023	(0.024)	-0.025	(0.022)	-0.018	(0.020)	0.035	(0.024)	0.041	(0.022)
$\acute{\eta}_{32}$	-0.003	(0.011)	-0.003	(0.012)	-0.002	(0.011)	0.006	(0.013)	0.007	(0.012)
$\acute{\eta}_{33}$	0.026	(0.026)	0.028	(0.024)	0.021	(0.021)	-0.040	(0.026)	-0.048	(0.023) *

Table 1.6: Uncompensated Elasticities

	Synthetic			Rotterdam (λ=0, μ=0)			CBS (λ=1, μ=0)			NBR (λ=0, μ=1)			AIDS (λ=1, μ=1)		
							1992 Share Marshallian Price Elasticity								
η_{11}	-0.652	(0.052)	*	-0.539	(0.047)	*	-0.639	(0.044)	*	-0.571	(0.052)	*	-0.671	(0.048)	*
η_{12}	-0.101	(0.014)	*	-0.078	(0.010)	*	-0.095	(0.009)	*	-0.035	(0.011)	*	-0.051	(0.010)	*
η_{13}	-0.304	(0.027)	*	-0.264	(0.027)	*	-0.300	(0.025)		-0.272	(0.030)	*	-0.308	(0.027)	*
η_{21}	-0.425	(0.119)	*	-0.185	(0.093)	*	-0.371	(0.091)	*	0.085	(0.100)		-0.099	(0.097)	*
η_{22}	-0.132	(0.079)		-0.111	(0.068)		-0.145	(0.064)	*	-0.317	(0.072)	*	-0.353	(0.069)	*
η_{23}	-0.219	(0.072)	*	-0.135	(0.073)		-0.211	(0.069)	*	-0.174	(0.078)	*	-0.247	(0.075)	*
η_{31}	-0.626	(0.122)	*	-0.974	(0.101)	*	-0.676	(0.091)	*	-1.006	(0.109)	*	-0.709	(0.100)	*
η_{32}	-0.102	(0.030)	*	-0.162	(0.028)	*	-0.112	(0.026)	*	-0.182	(0.030)	*	-0.131	(0.029)	*
η_{33}	-0.317	(0.234)	*	-0.350	(0.063)	*	-0.240	(0.057)	*	-0.316	(0.068)	*	-0.206	(0.062)	*
							Mean Share Marshallian Price Elasticity								
η_{11}	-0.536	(0.048)	*	-0.538	(0.049)	*	-0.541	(0.046)	*	-0.602	(0.054)	*	-0.606	(0.050)	*
η_{12}	-0.067	(0.010)	*	-0.066	(0.010)	*	-0.066	(0.010)	*	-0.060	(0.011)	*	-0.060	(0.011)	*
η_{13}	-0.436	(0.039)	*	-0.442	(0.040)	*	-0.432	(0.037)	*	-0.379	(0.044)	*	-0.370	(0.040)	*
η_{21}	-0.240	(0.106)	*	-0.190	(0.109)		-0.229	(0.105)	*	-0.133	(0.117)		-0.170	(0.113)	
η_{22}	-0.142	(0.084)		-0.133	(0.089)		-0.142	(0.084)		-0.141	(0.095)		-0.155	(0.091)	
η_{23}	-0.270	(0.103)	*	-0.248	(0.108)	*	-0.269	(0.104)	*	-0.261	(0.116)	*	-0.278	(0.112)	*
η_{31}	-0.564	(0.057)	*	-0.572	(0.061)	*	-0.560	(0.055)	*	-0.498	(0.066)	*	-0.486	(0.060)	*
η_{32}	-0.083	(0.017)	*	-0.086	(0.018)	*	-0.084	(0.017)	*	-0.092	(0.020)	*	-0.089	(0.019)	*
η_{33}	-0.370	(0.050)	*	-0.368	(0.052)	*	-0.376	(0.047)	*	-0.448	(0.056)	*	-0.456	(0.052)	*
							2012 Share Marshallian Price Elasticity								
η_{11}	-0.369	(0.065)	*	-0.534	(0.055)	*	-0.395	(0.051)	*	-0.587	(0.060)	*	-0.448	(0.055)	*
η_{12}	-0.044	(0.017)	*	-0.078	(0.014)	*	-0.051	(0.013)	*	-0.109	(0.015)	*	-0.082	(0.014)	*
η_{13}	-0.582	(0.091)	*	-0.832	(0.070)	*	-0.608	(0.065)	*	-0.743	(0.076)	*	-0.519	(0.070)	*
η_{21}	-0.086	(0.103)		-0.122	(0.100)		-0.103	(0.097)		-0.279	(0.107)	*	-0.258	(0.104)	*
η_{22}	-0.154	(0.098)		-0.145	(0.101)		-0.145	(0.096)		-0.039	(0.108)		-0.044	(0.103)	
η_{23}	-0.344	(0.141)	*	-0.382	(0.144)	*	-0.342	(0.139)	*	-0.290	(0.154)		-0.246	(0.149)	
η_{31}	-0.423	(0.044)	*	-0.305	(0.035)	*	-0.403	(0.032)	*	-0.249	(0.038)	*	-0.347	(0.035)	*
η_{32}	-0.076	(0.013)	*	-0.055	(0.013)	*	-0.073	(0.012)	*	-0.046	(0.014)	*	-0.064	(0.013)	*
η_{33}	-0.556	(0.063)	*	-0.379	(0.047)	*	-0.538	(0.042)	*	-0.452	(0.051)	*	-0.612	(0.046)	*

Table 1.7: Expenditure Elasticities

	Synthetic			Rotterdam (λ=0,μ=0)			CBS (λ=1, μ=0)			NBR (λ=0, μ=1)			AIDS (λ=1, μ=1)		
1992 Share Expenditure Elasticity															
π_1	1.058	(0.076)	*	0.882	(0.068)	*	1.034	(0.063)	*	0.878	(0.074)	*	1.030	(0.069)	*
π_2	0.775	(0.149)	*	0.431	(0.130)	*	0.727	(0.126)	*	0.405	(0.139)	*	0.699	(0.135)	*
π_3	0.955	(0.182)	*	1.486	(0.146)	*	1.028	(0.132)	*	1.504	(0.158)	*	1.046	(0.144)	*
Mean Share Expenditure Elasticity															
π_1	1.039	(0.075)	*	1.045	(0.081)		1.040	(0.075)	*	1.041	(0.088)	*	1.036	(0.082)	*
π_2	0.653	(0.167)	*	0.571	(0.172)		0.639	(0.166)	*	0.536	(0.184)	*	0.602	(0.179)	*
π_3	1.017	(0.090)	*	1.026	(0.101)		1.019	(0.091)	*	1.038	(0.109)	*	1.032	(0.100)	*
2012 Share Expenditure Elasticity															
π_1	0.995	(0.149)	*	1.444	(0.112)	*	1.055	(0.104)	*	1.439	(0.122)	*	1.050	(0.113)	*
π_2	0.584	(0.190)	*	0.648	(0.195)	*	0.590	(0.189)	*	0.609	(0.209)	*	0.548	(0.203)	*
π_3	1.056	(0.100)	*	0.739	(0.073)	*	1.014	(0.066)	*	0.748	(0.079)	*	1.023	(0.072)	*

Table 1.8: Tariff Removal Incidence Estimates

Elasticity		Price Wedge		Nominal Change	
ε_K	η_A	P_K	P_A	P_K	P_A
0.071	-0.142	67%	33%	- $0.74	- $0.36
0.142	-0.142	50%	50%	- $0.55	- $0.55
0.213	-0.142	40%	60%	- $0.44	- $0.66
1.0	-0.142	12%	88%	- $0.13	- $0.97

Table 1.9: Year Ending Q3 Wire Harness Exports to United States

2011	HTS Code	South Korea		Japan		Germany	
0% Tariff	8512202040	63,529,298	72.8%	96,167,398	59.7%	66,301,813	74.7%
2.5% Tariff	8512204040	9,164,612	10.5%	17,942,114	11.1%	4,402,778	5.0%
5.0%Tariff	8544300000	14,562,706	16.7%	46,975,155	29.2%	18,038,652	20.3%
	Total	87,256,616		161,084,667		88,743,243	

2012	HTS Code	South Korea		Japan		Germany	
0%	8512202040	80,788,951	71.2%	135,612,948	61.5%	35,845,601	68.2%
2.5%	8512204040	13,176,928	11.6%	28,120,821	12.8%	4,126,761	7.9%
5.0%	8544300000	19,529,538	17.2%	56,663,008	25.7%	12,557,182	23.9%
	Total	113,495,417		220,396,777		52,529,544	

Figure 1.1: Wire Harness Imports 1989-2012 (Custom Value)

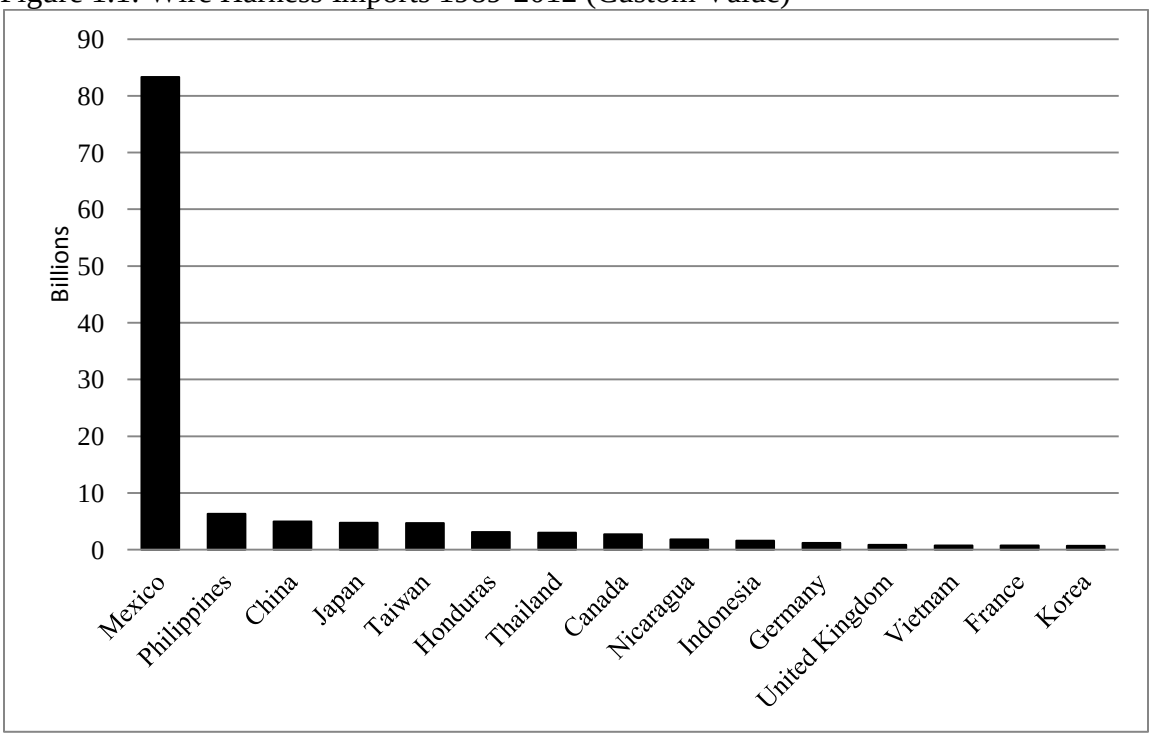


Figure 1.2: Wire Harness Total Expenditure (In $Millions)

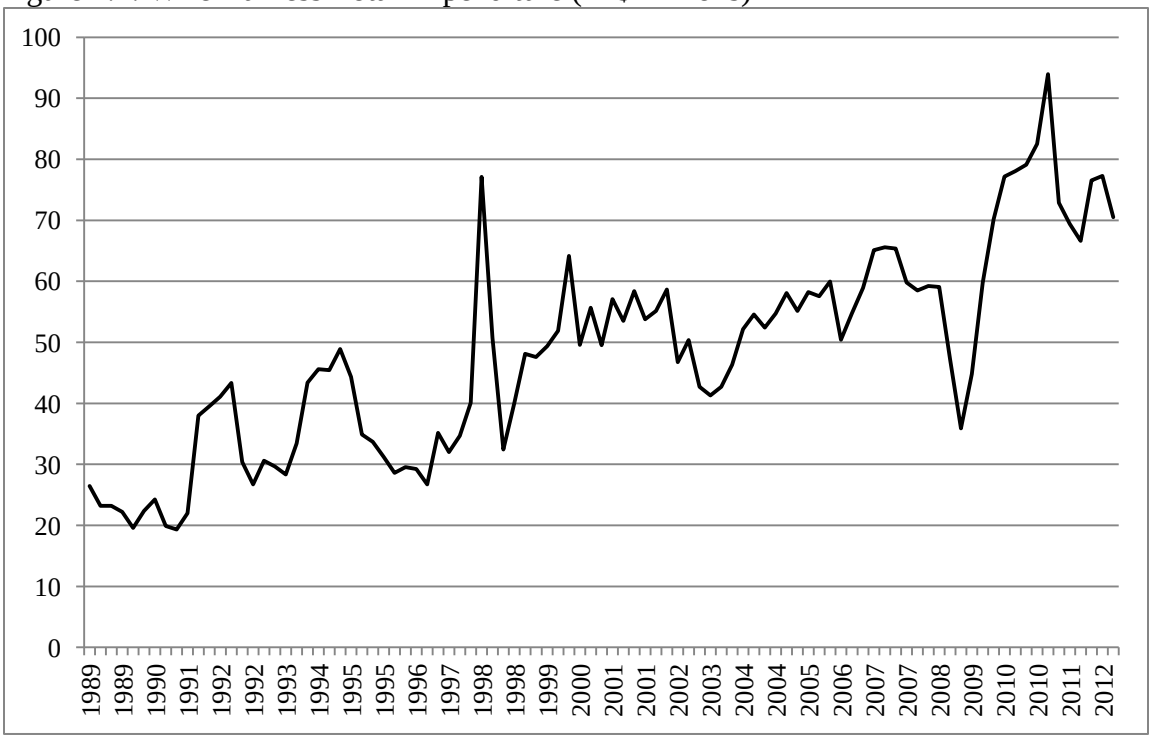


Figure 1.3: Wire Harness Market Share (Percent of Total Expenditure)

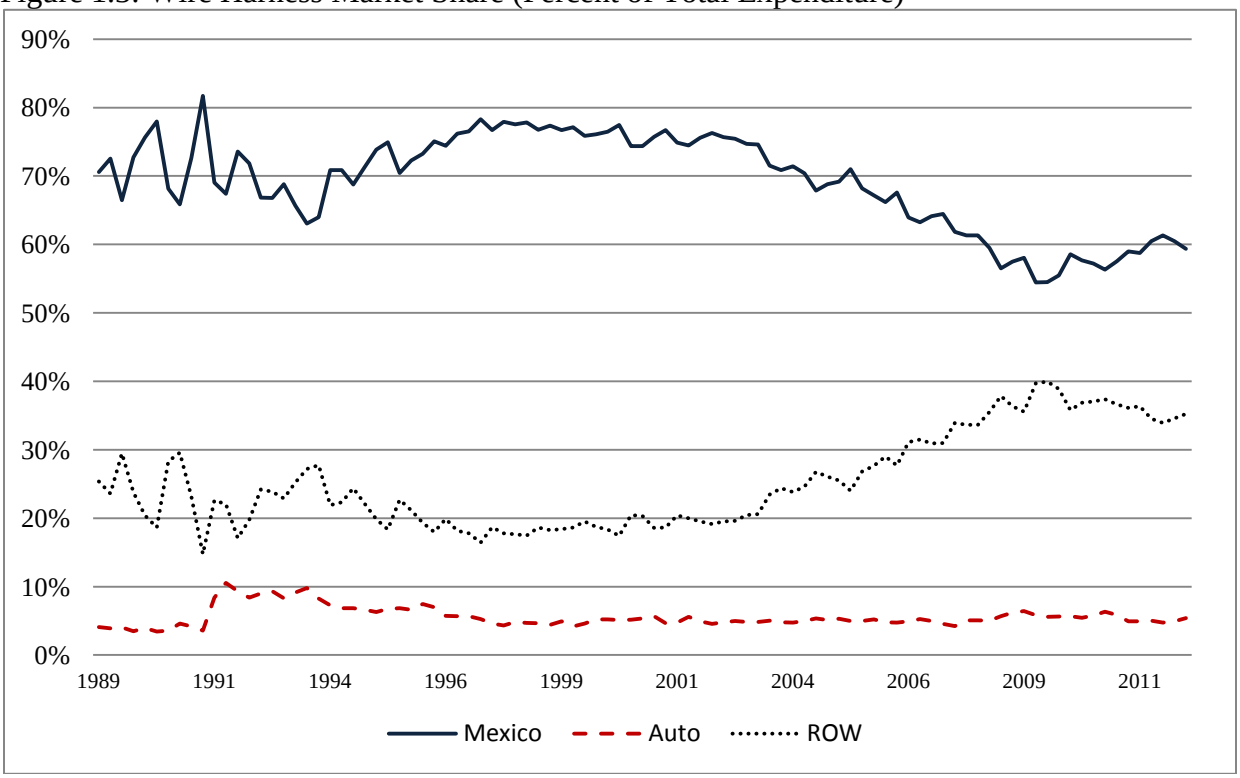


Figure 1.4: Wire Harness Quantity (In Billion Units)

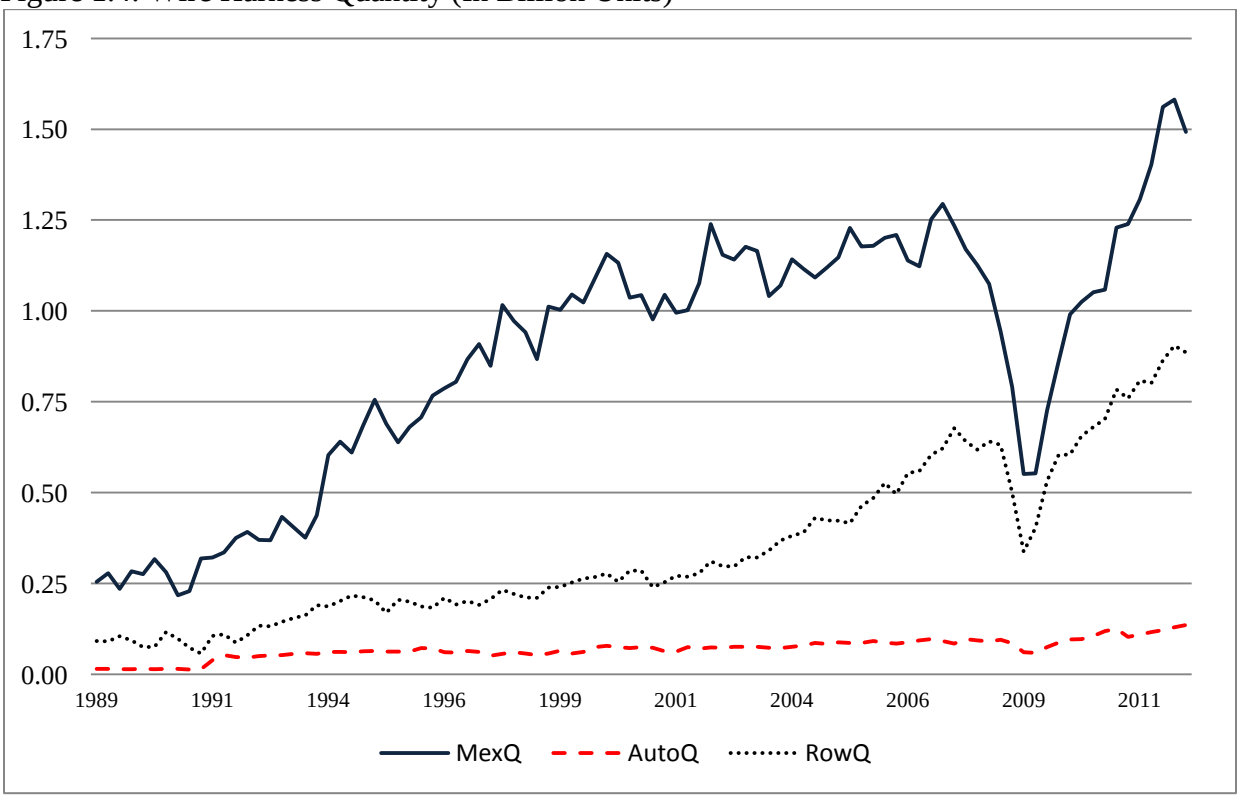


Figure 1.5: Wire Harness Price (USD per 100 Custom Value Units)

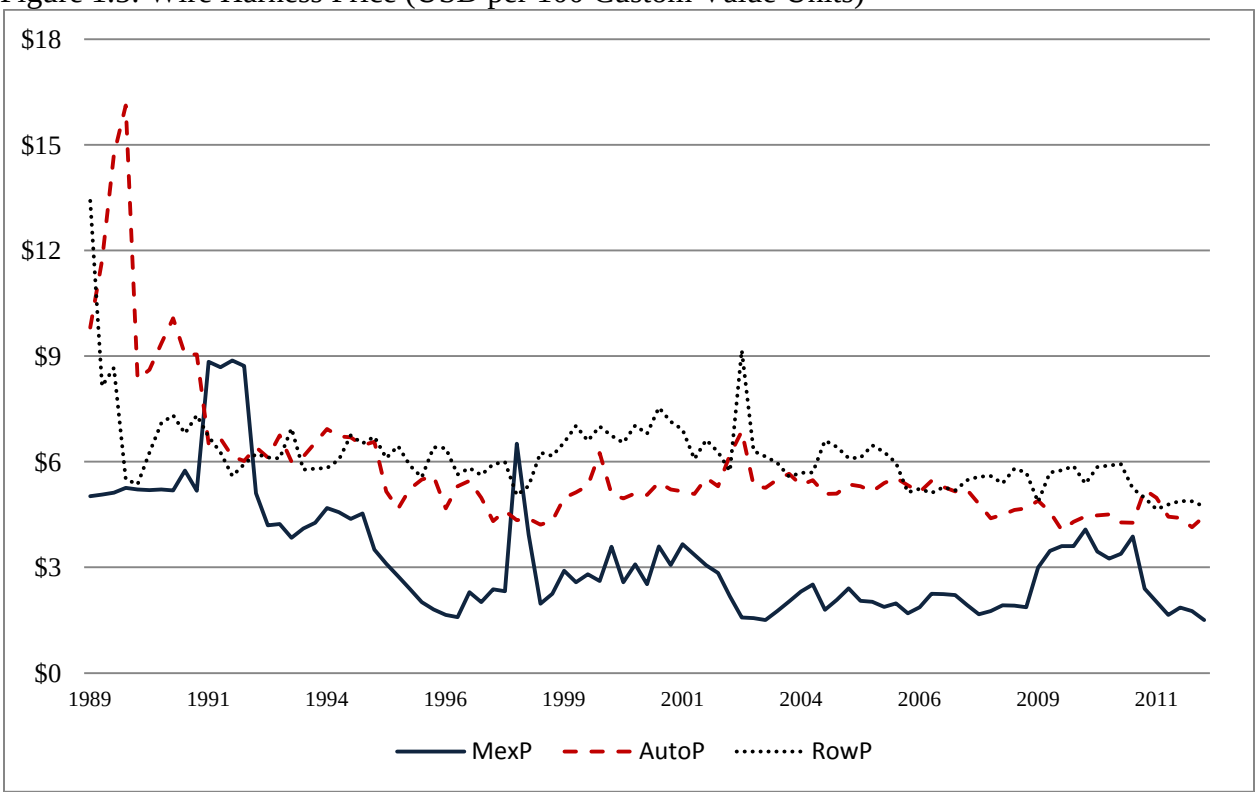
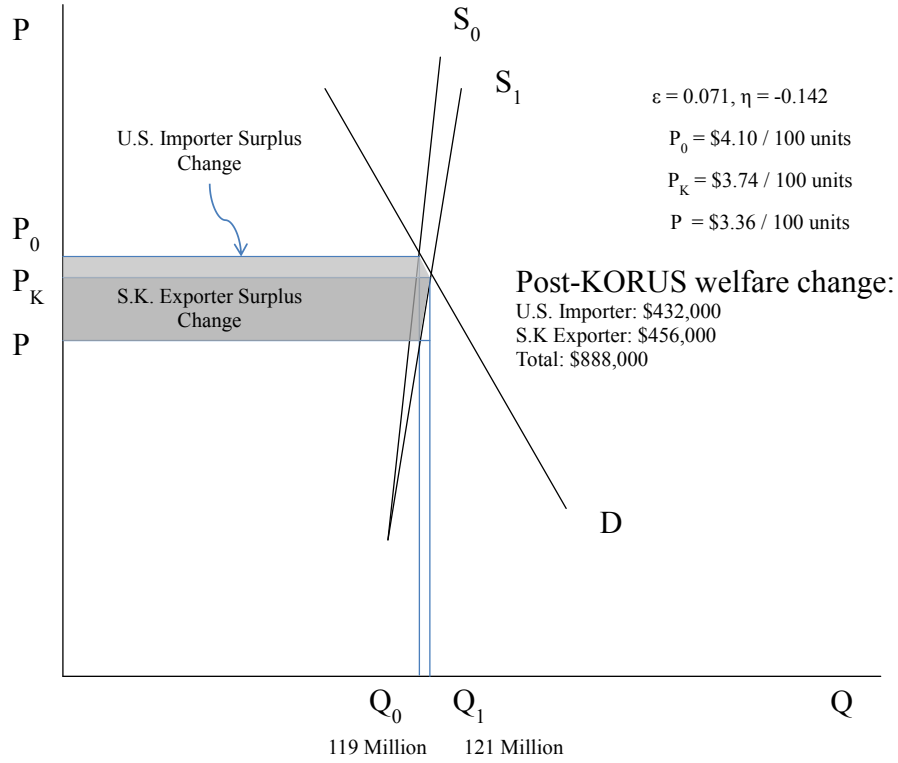


Figure 1.7: Change in Welfare



Chapter 2

Logistics Performance and Tariffs in the U.S. Apparel Import Market

2.1 Introduction

The objective of this study is to measure the effects of tariffs as compared to export country logistics and transportation in the United States apparel import market in order to gain insight on Haitian economic development. An OLS model, zero-inflated Poisson (ZIP) and Heckman Two-Step Selection model are used to analyze the impacts of tariffs and logistics on the potential of apparel products from Haiti to the United States. Logistics will be the primary focus of this study, with the assumption tariff relief will not have a positive impact if the product cannot be moved to the export market. Analysis is conducted in two phases. First, the U.S. apparel import market in general. Results from the general import market indicate tariffs do not affect import demand. In order to uncover the market activity hidden from general market analysis, the second phase of the study analyses imports for apparel made of cotton, since the U.S. is a major exporter of cotton to the world.

First, an ordinary least squares (OLS) model is used for initial evaluations of variable influences on imports. The OLS model presents a trade-off of two undesirable conditions of model assumption violation and an analytical problem, which leads to the use of the zero-inflated Poisson and the two-step Heckman selection models.

2.1.1 Haiti

The United States has offered assistance beyond program funding to Haiti over the past few decades. On May 5th, 2010, the United States Congress approved House Resolution 5160, also known as the Haitian Economic Lift Program, or HELP. H.R. 5160 allowed the free trade of

several apparel products from Haiti to the U.S. market through the extension of the Caribbean Basin Economic Recovery Act of 1983, or CBERA, through September 2020. Haiti has an existing apparel industry from which it can build. Three actions from the United States have occurred in an effort to help Haiti grow to a more developed country. Two of the actions are directed through the apparel industry. The first was the original CBERA legislation from 1983 removing the U.S. tariff on Haitian imports, which has been continued through the HELP legislation. The second was the more recent action of building the Haitian Apparel Center. The third, more general action is the focus on infrastructure improvements, such as, road developments and water management. This study focuses on the first and third actions with the intent to provide information for use by procurement managers and other decision makers who potentially would actually allocate resources toward the apparel industry.

2.2 Literature Review

Several studies are available regarding trade and its impact from tariffs and logistics. Baier and Bergstand (2006) used a gravity model to determine if free trade agreements actually increase the members' trade. Their study is focused on the endogeneity bias resulting from selection of countries to participate in the free trade agreement. They pointed out "free trade agreement" as a RHS variable is often found to be an inconsistent, and sometimes, an endogenous variable which is negatively correlated to the error term. Baier and Bergstrand determined free trade agreements double trade between the participant countries after 10 years.

The problem of selection bias is common in trade literature. Vandenbussche et al. (1999) used the Heckman Two-Step (Heckman) model to analyze trade flows of imports from countries named in European anti-dumping suits versus those which were not named as countries which

dump products. They found anti-dumping policies can have adverse or positive outcomes on welfare for the enforcing country depending on the commodity to which they are applied. Other two-step models found in the literature involve count models. Burger et al. (2009) use the logit model to select observations for Poisson and negative binomial count models to address problems of selection bias often found in gravity models.

Literature with respect to transportation costs and infrastructure are abundant. An enduring finding in the literature is landlocked countries are at a disadvantage in transport costs to non-landlocked countries. This disadvantage is often increased for landlocked countries with low infrastructure capabilities. Limão and Venables (2001) developed a transport cost factor from the ratio of cost, insurance and freight (CIF) to freight on board (FOB) of trade between countries. They found trade between countries had a cost elasticity of approximately -3.0 with this ratio. A similar ratio is used for this study by replacing freight on board with customs value.

Guasch and Kogan (2001) looked at inventory levels of raw material and finished goods in developing countries sourced from more developed nations. Their article involved analyzing the difficulties firms face when attempting to take advantage of free trade legislation, such as that provided by the HELP legislation. Using data compiled during the 1970s and 1980s, the authors estimate inventories in relation to GDP are two to three times larger for countries operating in developing countries as those operating in the U.S. They pointed out these increased inventories are held at interest rates of 15-20 per cent in developing countries. One of the theories driving their paper involves the term "stockout," which refers to firms running out of finished product needed to meet unexpected demands. Also, it can apply to firms' disabilities to deliver product on time to meet scheduled demand. Both of these are drivers for companies to increase inventories, and thus increase their costs. Gausch and Kogan's modeling approach is quite

simple as they only use an OLS regression to show higher inventories follow lower capable infrastructure systems. Also, they determined a single standard deviation decrease in infrastructure increased inventory costs up to 47%.

This study uses a nontraditional version of the gravity model for analysis of unilateral trade effects in a particular industry, apparel, at a relatively low aggregation level. The model used in this study has features of the traditional gravity model, but should be considered an alternative form of it. The typical gravity model uses geopolitical country characteristic variables such as common language as indicators of trade frictions. Also, economic variables, such as GDP and GDP per capita are common in gravity models. This study's model uses similar variables. The deviation from the traditional gravity model comes from the lack of multi-lateral trade considerations. Commodity and raw material types are of interest in this study, which leads to a need of substantially disaggregated data. Data sources for this level of disaggregation were found to be generally limited to developed countries. This type of limitation on data often results in studies involving relatively few countries (Chi and Kilduff 2010). A search for data from the World Trade Organization (WTO) limited to data aggregated to all clothes. Information from the UN Comtrade data set was limited to information at the 6-digit HTS level, which would result in a weighted average of tariff information and reduce unit tariff information. More importantly, Haiti is not an observed country in the UN Comtrade data for apparel commodities[6].

An additional intent of the study is to gain insight on country characteristics influence on if trade even occurs, let alone the value of the trade, which requires observations of zeros from several countries. Combined, restrictions of data result in some conflicts between the intent of

[6] A search for data in the UN Comtrade database under HTS codes 610210, 610220, 610230 and 610290 did not have information on Haiti, http://comtrade.un.org/db/mr/daCommodities.aspxy

this study and the traditional gravity model. As a result, this study employs a structural model similar to the gravity model, but is not in line with the traditional gravity model found in trade literature (Anderson, 2011).

2.3 OLS to Selection Model Progression

The gravity model is a commonly used instrument for trade analysis over the last several decades. Silva and Tenreyro (2006) credit its initial development to Nobel economist Jan Tinbergen. As Silva and Tenreyro explain, the basic concept of the gravity model is countries of large masses (such as GDPs) will be attracted to each other for trade, yet discouraged by the physical distance between them. Equation 2.1) shows the typical form:

2.1) $T_{ij} = \beta_0 G_i^{\beta_1} G_j^{\beta_2} D_{ij}^{\beta_3}$,

where T_{ij} is the total exports plus imports between the importing country *i*, and the exporting country *j*. G_i and G_j represent the GDPs of the two countries. The geographic distance between the two countries is represented by D_{ij}. The coefficient β_1 is the potential to generate trade for the importer, β_2 is the potential to attract trade for the exporter, and β_3 is a factor of trade deterred by the distance between countries. β_3 is expected to be negative theoretically, *ceterus peribus*.

A common procedure is to take the natural log version of both sides of Equation 2.1) to estimate the model with OLS. Estimating the natural log of the dependent variable is often necessary in order to maintain basic OLS assumptions. Figure 2.1 shows the distribution of the error term when the assumption of homoscedasticity is violated with the non-logged dependent variable, but maintained with the logged version. The normality assumption is also maintained with the logged version of the OLS model and lost with the non-logged version for the data in this article.

For this study, the model estimates only imports of apparel into the United States from other countries under Chapter 61 of the Harmonized Tariff Schedule (HTS61) from the USITC which are called out in the HELP legislation. Taking the natural log of both sides of Equation 2.1) and then adding controls for country characteristics results in a mixed model of log-log and log-level coefficients:

2.2) $lnI_{ij} = ln\beta_0 + \beta_1 lnG_i + \beta_2 lnG_j + \beta_3 lnD_{ij} + \alpha_1 C_i + \alpha_2 C_j + \alpha_3 D_{ij} + \varepsilon_{ij}$

Since the United States is the only importer, T_{ij} becomes I_{ij} to estimate the amount of imported HTS61 products by country *i* from country *j*. For this article, G_i and C_i are the GDP per capita and a vector of characteristics, respectively, for the importing country. Since the United States is the only importing country, C_i and G_i are essentially constants in the equation. G_j is the GDP per capita for the exporting country *j*. C_j represents a vector of characteristics of the exporting country. D_{ij} represents the distance in kilometers from the United States and the exporting country. This import version of the gravity model is similar to that used by Alam et al. (2009) and Chi and Kilduff, which use time series as opposed to cross-sectional data in this study.

A bit of a paradox is created with the logged version of the gravity model though. The natural log of zero is undefined, which removes any observations of zero imports from country *j* from the dataset. This condition leaves the analyst with a choice between selection bias or OLS assumption violations, as discussed in the model results section.

2.3.1 Zero-Inflated Count Model

Burger et al. (2009) used count models to address the Log-OLS paradox from the zero trade conditions. Wooldridge found count models, such as the negative binomial, can be used for estimated non-negative continuous data (2002). The zero-inflated negative binomial model

consists of two processes. The first process of the ZINB model is to determine if country *j* has a probability of no trade. This is determined with a binary logit outcome, where values of 0.5 and greater result in a value of 1, indicating no probability of exports. Values of less than 0.5 result in a 0 indicating country *j* is likely to export to the United States. Equation 2.3) shows the logit prediction model estimating the probability of trade:

2.3) $\lambda_j = \frac{e^{X'_j\beta}}{1+ e^{X_j\beta}}$

Since the exp($X'\beta$) is between 0 and 1 for any $X'\beta < 0$, Equation 2.3) is less than 0.50 for any negative coefficient. In other words, a negative coefficient signals an increased probability to export to the United States.

The second part of the ZINB is the count model, a negative binomial count model. The negative binomial regression estimator is based on the Poisson regression distribution and model. As explained by Cameron and Trivedi (2009), the Poisson model is represented by:

2.4) $\Pr[I_{ij}] = \frac{e^{(-\mu_{ij})}\ \mu_{ij}^{I_{ij}}}{I_{ij}!},\ I_{ij} = 0,1,2,3\ldots.$

where,

2.5) $\mu_{ij} = e^{(\beta_0 + \beta' X_{ij})}$

Equation 2.5) is the intensity or frequency at which the count would occur in a given time. For this study, the count is the import dollar amount (customs value), which fits with Wooldridge's finding of a continuous non-negative number. β_0 represents the constant proportion of the mass between the importing and exporting countries. $\beta' X_{ij}$ represents a vector of comparisons between the two countries along with their coefficients, as in the OLS model.

The important condition for accuracy of the Poisson distribution is the equality of the mean and variance of the dependent variable I_{ij}, or equidispersion, where $V[I_{ij}] = E[I_{ij}] = \mu$. Over-

dispersion occurs when the variance exceeds the mean, $V[I_{ij}] > E[I_{ij}]$, which leads to the excessive zero condition. The excessive zero condition refers to a greater amount of actual zeros in the data set than what the Poisson model estimates. This further leads to over estimates of trade because the zeros are under-represented.

The negative binomial model includes an additional term to modify the variance to account for the over-dispersion condition of the Poisson, $V[I_{ij}] = \mu_{ij} + \alpha g(\mu_{ij})$. If the α coefficient is significantly different from zero, the negative binomial model is preferable to the Poisson. Estimation results for α in the present study indicated it to be not significantly different from zero, leading to use of a zero-inflated Poisson.

2.3.2 Heckman Selection

The Heckman Selection model uses a probit regression analysis for prediction if the dependent variable will occur. An OLS regression simultaneously occurs using the probability the probit model predicted. A positive coefficient in the probit selecting model indicates the country is likely to export HTS61 products to the United States.

Cameron and Trivedi (2009) explain the model as a method to deal with left-truncated observations which should have been censored:

2.6) $y_{2i} = X_{2i}\beta_2 + \sigma_{12}\lambda(X_{1i}\beta_1) + \upsilon_i$

In equation 2.6), υ_i is an error term and β_1 is the coefficient estimate of the X_{1i} variable vector from the probit regression in step 1 of the Heckman. This portion of the equation predicts occurrence of the event, not magnitude. β_2 is the estimator for the second-step OLS regression of the X_{2i} variable vector. λ is the estimated inverse Mills ratio[7]. The key coefficient in the Heckman is σ_{12} which determines the correlation between the errors of the probit and OLS

[7] The Inverse Mills Ratio is the ratio of the normal probability density function to the cumulative density function,

model. If it is statistically different from zero, then selection bias is present in the basic OLS regression without using the first-step probit selection estimator. The resulting estimation model for country *j* is:

2.7) $lcv = \beta_0 + \beta_1 perc + \beta_2 unit + \beta_3 lpi + \beta_4 X + \sigma_{12}\lambda(\alpha_0 + \alpha_1 perc + \alpha_2 unit + \alpha_3 lpi + \alpha_4 Z) + \mu$

This model is estimated in Table 2.4 where X_j and Z_j represent a set of fixed effect country characteristics in the OLS regression model and probit selection model, respectively.

2.4 Data for Estimation

The customs value and tariff rates of apparel commodities from each country exporting to the United States from 2007 to 2011 provide the independent and dependent variables for the first analysis phase. The unit of analysis is the exporting country. Customs value data comes from the USITC. Tariff data is available from the USITC's Harmonized Tariff Schedule at the 8-digit code level, of Chapter 61 of the HTS (HTS61). These are described as knitted or crocheted articles of apparel and clothing accessories and limited to coats, suits, sweaters and t-shirts. The tariff data is broken into a unit rate (unit) and a percentage rate (perc). A common practice is to convert the unit tariff to a percentage. However, this would remove the variable from observation because it would be divided by zero in several cases. For this reason, the percentage and unit tariffs are left separated.

HTS Chapter 61 contains several 8-digit codes. Table 2.1 shows the top 20 countries involved in the import market for articles of clothing from the remaining data set. China is by far the leader in exports to the United States, followed by Vietnam and Honduras, as determined by customs value. Haiti supplies roughly 2% of the U.S. import market.

Logistics related variables come from the World Bank's Logistics Performance Index (LPI) components. The World Bank completed LPI assessments in 2006, 2009 and 2011, which were reported in 2007, 2010 and 2012 respectively. LPI ratings were linearly interpolated in order to fill in the missing years of data.

Distance and other country characteristics come from the 'Gravity Dataset' available from the Institute for Research on the International Economy (Centre d'Etudes Prospectives et d'Informations Internationales – CEPII). This information is important for consideration of countries' natural trade advantages and restrictions. Countries with distance not available in the CEPPI data set were estimated with consideration of their nearest geographical neighbor's distance. Disdier and Marette (2010) make use of common language and colonial ties as fixed effects for use with the gravity model. This study uses similar. Finally, the USITC is also the source for tariff-related information. The total matrix of observations includes 41 HTS codes from 164 countries over eac of five years for a total of 33,620. Descriptive statistics and coefficient correlations are available in Table 2.2 and Table 2.3.

2.5 General Apparel Imports

The OLS, ZINB and Heckman models are used progressively to review the impacts of logistic and tariff variables on a country's apparel imports to the United States. The dependent variable is the natural log of the customs value of HTS61 imported products, *lcv*. Two versions of the model are available for review and initial assessment of data with OLS. Each model shows the influence of different treatments of the data and variable considerations. Apparel made of animal byproducts (mainly wool) and cotton are compared against the base material,

synthetic or man-made materials. Dummy variables for the observation year are added using 2007 as the base year. Each model indicates no change in the intercept for a given year.

The first two columns of Table 2.4, OLS1 (truncated) and OLS2 (censored), show the effect the logged version of the dependent variable has on the results. Observations of zero trade ('zeros') from a country result in the natural log of zero, which is undefined. This removes the observation from the data set and leaves only positive observations. The difference between the truncated models and the censored models is the undefined dependent variables which are replaced with zeros in the censored. This is easily seen with the large reduction in observations at the bottom of Table 2.4 in columns 1 and 2. The large change in intercept shows the upward bias present from only considering observations in which trades occurred.

Two analytical concerns come from the results. First, the coefficient estimates can be exaggerated because they are over-influenced by the observations remaining in the restricted estimating model. Several of the variables change in magnitude and significance when including the zeros. The second analytical concern from the unobserved zeros is the reason for the lack of trade. Without the zero observations, all the analyst knows is trade did not occur. The lack of imports may have been due to the tariff rate or another cost condition, such as high labor rates. The understanding of cost variables is diminished without the zero observations.

The OLS model permits a cursory understanding of the impacts of the variables in the model. Tinbergen's original model assumed trade was discouraged by distance. The distance variable was initially found to be counter to this hypothesis indicating importers were encouraged to import more as distance increased. This is likely due to misspecification of the variable because it does not consider economies of size from ever increasing cargo ships. However, adding *distexcon* more accurately reflects an updated consideration for the cost of distance. The

distexcon variable is likely picking up some total factor productivity considerations from the exporting country. The percent of total imports variable *trade* is likely impacting similarly. The most notable result is the statistically significant backward percentage tariff.

The first and second analytic concerns create a paradox with the log-linear gravity model. Replacing the undefined value of ln(0) allows for consideration of zero trades, but it also brings back violation of the homoscedastic assumption. Replacement of the undefined ln(0) with a small number, such as 0.5 or 1, is a common practice. However, as Burger et al. (2009) suggest, this is arbitrary and potentially misleading. Further, in this instance, the estimated residuals remain heteroskedastic. Estimating the model without the zeros addresses the homoscedastic assumption concern, but removes the ability to fully assess the effects of the independent variables. This leads the use of the zero- inflated count model. The OLS gravity model estimates are of concern for analysis, but provide a baseline for the count model estimates.

Column 3 of Table 2.4 shows the results of the ZIP, which results from a statistically insignificant α estimate. Interpretation of the ZIP model is done with the inflated logit and the Poisson count model. In summary, the ZIP model confirms the direction of the OLS results. The percent of imports received in the U.S. from country *j trade* is still a strong determinate of whether the country will export HTS61. Increased ratios of CIF to CV, *tradcost*, decrease the likelihood of importing from the country and the amount of the imports if the decision is made to do so.

The tariff variables show mixed results, which are hinted toward in the OLS models. The logit model estimates an increase in the percent tariff will decrease the odds of having zero trade. Clearly, this is a problematic result of the model. The unit tariff coefficient is in the theoretically correct direction for predicting probability of trade.

The *lpi* coefficient is also in the unanticipated direction and statistically different from zero for predicting the odds of exporting to the United States. However, other logistics related measures are in the expected direction. The *exdocs* variable indicates additional documents necessary to arrange export will reduce the odds of export occurring. The *distexcon* variable has an effect on the probability of imports, and is influential on the amount of imports. Landlocked countries and countries with a English as a common language apparently have no disadvantage nor advantage, respectively.

The Heckman model in Column 4 of Table 2.4 uses the same independent variables as the ZIP. As for the tariff variables, they still show a similar condition as with the ZIP models. The percentage tariff coefficient *perc* is shown to be significant at the 1% probability level in the backward direction in probit part of the Heckman, but in the theoretically correct direction in the OLS portion. The unit tariff shows the same expected direction as well. The overall results from Table 2.4 shows percentage tariffs apparently increase imports of HTS61 products. The Heckman results in Table 2.4 are mostly consistent with the ZIP results. The Zero-Inflated Poisson and the Heckman models report similar coefficient estimates, indicating robustness to the results. Table 2.5 repeats estimation for the general apparel import market using the Heckman model. Table 2.5 further indicates robustness of the results and implications of estimating materials concurrently.

The percent and the unit tariff variables in this study were estimated in the unexpected direction by each model. This would indicate tariff reduction would hurt a country's chances of exporting to HTS61 products. This may be a case of endogeneity bias causing a "backward" coefficient, as noted previously from the Baier and Bergstand (2006) paper. The tariff variables

were tested with the Durbin-Wu-Hausman[8] test and found to show signs of endogeneity in the general apparel data.

The endogenous condition of the tariff variables is likely due to the aggregation level of the apparel import data. The data set includes imports made from material of cotton, man-made or synthetic materials, and animal-based products, most of which are wool. The U.S. does not impose a unit tariff on cotton products. A review of HTS Chapter 61 shows the U.S. only directs unit tariffs (assessed per kilogram) toward wool-based products. Considering the U.S. is major exporter to the world for cotton, a unit tariff on cotton would theoretically hurt its own cotton industry. Segmenting the data according to material can help uncover the actual reactions to tariffs, and by how much a country's LPI can override these reactions. This leads to analysis of the cotton apparel imports.

2.6 Cotton Apparel Imports

Analysis of the cotton import market is done with import data from the same sources noted previously. Summary statistics are available in Table 2.6 for cotton apparel imports and compare similarly with those for the general import data. Table 2.8 displays results for estimations in the same format as Table 2.4, but for only the cotton apparel imports. As a result, unit tariffs are not in the data set. The most notable change from segmenting out cotton-based apparel is the change in direction of the tariff variable. Also, the endogeneous condition of the percent tariff goes away when only considering cotton-based apparel. Using the percent tariff coefficient estimate from the Heckman model, a 1% decrease in the tariff rate results in a 0.23%[9] increase in expected average export custom value, should export occur.

[8] Test results in Appendix B
[9] $(e^{-0.26}) - 1 = -0.229$

Focusing on the infrastructure and transportation related variables, the logistics performance index is apparently not influential in the customs value an exporting country should expect. However, some variables related to the process of moving material from the exporting country to the U.S. are influential, but not all.

The *lpi* and *exdays* variables are essentially a measure of performance of moving product within the exporting country. These variables are estimated as statistically no different from zero. This is an indication the U.S. importer is not concerned with performance within the exporting country and may further indicate costs of inefficiency within the exporting country are not passed on to the U.S. importer, and would put downward pressure on wage rates. The number of days to move material from the producing facility to the exporting dock, *exdays,* would increase inventory holding costs on the exporter side of the market, for example.

The other transport related variables in Table 2.8 are the *exdocs* and *distexcon*. These two variables should reflect an interaction of the U.S. importer with the exporting country. Export documents, such as customs clearance and port authority related documents, would presumably require time from the U.S. importer. Additionally, the *distexcon* variable would be a measure of another inventory cost while the product is held on a cargo container. Depending on individual contract terms, the U.S. importer may take possession when the material leaves the exporting country's dock, thus the *distexcon* directly influences the importer's inventory turns. Considering the global trade of apparel, the U.S. importer has several options and may have a relatively strong elastic demand curve relative to supply, in particular to that of Haiti. As such, cost reductions from improvements within the exporting country's infrastructure and transportation system would be kept within the exporting country.

Table 2.9 repeats the Heckman model for each observation year in the same manner as Table 2.5. The overall results for Table 2.8 and Table 2.9 remain the same as those from Table 2.5, with some exceptions. Most importantly for this study, the tariff variable condition maintains the expected direction and a similar magnitude. In the cotton-based apparel market, removal of a tariff can thus be better understood than compared to tariff relief in the general material market.

As for transportation related variables, the *ldist* variable becomes statistically not different from zero, but the *distexcon* variable remains statistically significant for estimating the magnitude of export to the United States. The overall result from this condition may be further indication distance alone is not the same discouragement to trade it was when Tinbergen developed the gravity model. The cost of the distance needs to be considered directly as well.

Table 2.10 displays repeated results for the same model specification displayed in Table 2.9, except for animal-based material apparel only, mostly wool. The overall results are much different from those of the cotton apparel. The percent tariff variable is not statistically significant as in the cotton market. Also, the *distexcon* variable is not significant. Comparing Table 2.9 to Table 2.10 shows cost considerations in the cotton apparel market do not necessarily flow into the wool apparel market.

2.7 Concluding Analysis

Assessing the value of tariff relief through the 2010 HELP legislation in this study is limited to imported apparel made from cotton. Table 2.11 displays the top 10 sources of cotton-based apparel for the 2007-2011 period. China again is the market leader, but with less of the overall market compared to the general apparel market. Removal of the tariff gives Haiti an important advantage over established low-wage source countries with large economies, like China.

Removal of the tariffs for Haiti is advantageous for Haiti to lure market share from China and maybe Honduras, though Honduras has a zero tariff rate on most apparel products though the Central American Free Trade Agreement (CAFTA). However, countries like Mexico and Canada have zero tariffs, and better performing logistics indices. And moving forward, Haiti's free trade status must be re-approved in 2020. This results in a potential for a decrease in probability of trade if the 1983 CBERA legislation is not re-approved, continuing to put much of Haiti's fate in the hands of U.S. politicians.

Haiti has some opportunities in the cotton apparel market through improvements to its transportation system. The interactive variable *distexcon* from Table 2.8, which measures the ratio of distance to export container cost, indicates a 1.4% increase in custom value for a 10% increase in the ratio, provided trade occurs. Increasing the *distexcon* ratio will also increase the odds of exporting to the U.S. Table 2.12 provides the average export container costs and marginal effects of the *distexcon* variable from the probit selection model within the Heckman model for Haiti, compared to China and Honduras. The benefit to Haiti for an incremental increase in the ratio is more than double than what it is for China. None of the countries can do anything about the distance, but Honduras and Haiti have more room to work on the container cost than China. If Haiti were to reduce container costs to $990, roughly 5%, it would increase its probability of exporting by 4%. The incremental benefits would reduce thereafter, but would continue to provide greater exposure to other cotton apparel commodities for Haiti. However, at the same time, China's ratio would increase at a greater percentage from the same nominal decrease in container cost. Percentage decreases in container costs would provide more benefit to Haiti.

Table 2.13 displays a breakdown of the types of cotton apparel the U.S. imports from China, Honduras and Haiti for 2007-2011. Nearly all of Haiti's cotton apparel exports to the U.S. were t-shirts. China exported over $4.5 billion dollars in cotton coats and sweaters, which likely have much more room for wage growth. Table 2.14 provides regression results for the percent tariff and the *distexcon* ratio from the same Heckman specified model ran for the general and cotton apparel markets[10]. The estimates are further segmented to coats, sweaters and t-shirts. It also has marginal effects for the percentage tariff and *distexcon* variables for the probability of exporting to the United States from the probit model within the Heckman. Haiti has significant advantage in tariff relief compared to China in the cotton coat market. Since these are percentage tariffs based on customs value, it is reasonable Haiti would have considerable advantage in any percentage cost reduction compared to China. This condition does not flow into the sweater market. And apparently, Haiti has peaked for increased probability of exporting t-shirts to the U.S. through tariff relief. The relationship to China is opposite for what it is in the coats market for tariff marginal effects.

Section 2.8 Summary and Implications of Findings

The U.S. Congress has continued efforts toward Haitian economic development through support of infrastructure improvements and tariff removal on imported apparel from Haiti. Assessment of the efforts is conducted with a modified unilateral version of the gravity model. Regression results indicate the aggregation level of the imported product is quite influential for model specification. The differences between the general material and cotton material results indicate some underlying market activities based on commodity type. Most assessments of trade conditions are done with highly aggregated data. This study does not go in to depth of the

[10] Full model results available in Appendix B

underlying activities on the supply side of the market, but does suggest assumptions of the aggregated data may not be consistent at various aggregation levels on the demand side. In summary, Haiti apparently has some opportunities with cotton apparel from the removal of tariffs in the U.S. import market. The tariff removal provides opportunities, but the favorable conditions are time bound and out of control of Haiti. They are also limited to the production of cotton coats.

Continued growth through exports of cotton apparel to the U.S. should be expected to come from reductions of export costs. A subtle finding from this study may be logistic performance and capabilities within the exporting country are not considered by U.S. importers. As a result, cost reductions from logistic improvements within Haiti can apparently be kept within the Haitian economy. A more apparent result from this study is U.S. apparel importers act differently depending on the material type. In other words, tariff removal on cotton apparel does not necessarily have the same benefit to wool apparel products. And within cotton apparel coats may have more opportunities for growth than sweaters and certainly more than t-shirts. The consideration is important for companies expecting greater access to the U.S. apparel market. Cotton apparel producers expecting growth via the HELP legislation may need to consider producing coats, not t-shirts.

The consideration is also important for Haitian and U.S. officials using apparel as an instrument for Haitian economic development. Former U.S. President Clinton has acknowledged on multiple occasions a program he set up while Governor of Arkansas to provide low cost, or free, rice to Haiti while providing Arkansas farmers a channel to reduce excess supply (Gates and Clinton 2010) (O'Conner 2013). The program was intended to help U.S. farmers while

helping malnourished Haitian. The unintended consequence was crushing the Haitian rice farmer market.

The U.S. has had the Earned Import Allowance Program (EIAP) with Haiti since 2006 through the Haitian Hemispheric Opportunity through Partnership Encouragement Act (HOPE), passed by the same committee that passed the HELP legislation. The program provides Haitian producers to have tariff-free export of 1 square meter equivalent (SME) of apparel to the United States for every 2 SMEs of material imported from the United States (Evans 2012). This essentially encourages Haiti to import U.S. cotton at a discount, which benefits U.S. cotton producers and provides less expensive exports of non-U.S. raw material for Haitian apparel producers, for example material from China. The program had very little impact the first 5 years with only $350,000 worth of credits claimed from January through August 2011. However, credits jumped to $18 million for the same time period in 2012[11].

Haiti is estimated to supply 3.6% of the U.S. cotton apparel from this study's data set, which represents nearly $200 million in custom value per year from 2007 to 2011, or roughly 2.5% of Haiti's annual GDP. Cotton is also used in several other apparel types not considered in this study, so the comparison to Haiti's GDP is conservative. The unintended consequence here may be the market destruction of the market for Haitian domestic cotton supply. Haiti used to have a cotton industry supplying export material to Europe. The well-known erosion and other environmental and economic conditions caused near elimination of Haiti's cotton production by 1990. Expected benefits for HELP legislation should probably be tapered by the effects of the EIAP program. Employment growth may be horizontal from apparel material, but not vertical.

[11] The timing coincides with entrance of South Korean apparel producer SAE A Trading Company to the Carocol Industrial Park on Haiti's northern shore.

Table 2.1: USA Import Market for HTS Chapter 61 Apparel (in Millions)

Country	Total		2007		2008		2009		2010		2011	
China	$32,144	31.9%	$5,624.51	27.4%	$5,595.13	27.6%	$6,045.76	33.9%	$7,230.56	35.7%	$7,647.74	34.7%
Vietnam	$7,903	7.8%	$1,154.34	5.6%	$1,504.94	7.4%	$1,561.36	8.8%	$1,766.39	8.7%	$1,915.75	8.7%
Honduras	$6,900	6.8%	$1,405.69	6.8%	$1,509.67	7.4%	$1,082.58	6.1%	$1,327.91	6.6%	$1,573.96	7.1%
Indonesia	$5,832	5.8%	$868.62	4.2%	$1,027.75	5.1%	$1,144.19	6.4%	$1,319.40	6.5%	$1,472.35	6.7%
Mexico	$4,572	4.5%	$1,082.00	5.3%	$1,005.36	5.0%	$780.95	4.4%	$826.64	4.1%	$877.17	4.0%
El Salvador	$4,200	4.2%	$818.46	4.0%	$883.63	4.4%	$716.26	4.0%	$886.86	4.4%	$895.09	4.1%
Guatemala	$3,597	3.6%	$762.15	3.7%	$720.95	3.6%	$670.47	3.8%	$683.95	3.4%	$759.44	3.4%
Cambodia	$3,569	3.5%	$756.04	3.7%	$752.25	3.7%	$575.97	3.2%	$683.26	3.4%	$801.53	3.6%
India	$3,117	3.1%	$599.51	2.9%	$608.24	3.0%	$556.10	3.1%	$661.27	3.3%	$691.60	3.1%
Nicaragua	$2,877	2.9%	$452.00	2.2%	$498.28	2.5%	$534.01	3.0%	$596.56	2.9%	$796.08	3.6%
Pakistan	$2,655	2.6%	$513.70	2.5%	$526.45	2.6%	$485.11	2.7%	$532.80	2.6%	$597.41	2.7%
Bangladesh	$2,278	2.3%	$398.63	1.9%	$475.97	2.3%	$420.05	2.4%	$506.74	2.5%	$476.37	2.2%
Haiti	$2,019	2.0%	$371.39	1.8%	$328.56	1.6%	$394.99	2.2%	$396.95	2.0%	$526.75	2.4%
Peru	$1,979	2.0%	$452.07	2.2%	$418.25	2.1%	$346.14	1.9%	$365.25	1.8%	$397.18	1.8%
Jordan	$1,945	1.9%	$452.18	2.2%	$401.45	2.0%	$342.92	1.9%	$370.59	1.8%	$377.96	1.7%
Hong Kong	$1,825	1.8%	$896.46	4.4%	$743.13	3.7%	$91.52	0.5%	$51.11	0.3%	$42.49	0.2%
Philippines	$1,529	1.5%	$464.26	2.3%	$340.54	1.7%	$239.75	1.3%	$221.33	1.1%	$262.71	1.2%
Thailand	$1,265	1.3%	$338.58	1.6%	$311.27	1.5%	$193.00	1.1%	$215.55	1.1%	$206.19	0.9%
Dom. Rep.	$1,063	1.1%	$189.53	0.9%	$203.22	1.0%	$169.11	0.9%	$232.73	1.2%	$268.48	1.2%
Italy	$949	0.9%	$247.38	1.2%	$217.18	1.1%	$142.68	0.8%	$153.06	0.8%	$188.32	0.9%

Table 2.2: Descriptive Statistics for General Apparel Imports

Variable	Description	Obs	Mean	Std. Dev.	Min	Max	Source
CV	Custom value of apparel imports, in 1000 USD	33,558	3,007	44,326	0.0	3,402,162	USITC
		8,445	11,950,363	87,756,925	0.3	3,402,162	
lgdp	Natural log of GDP	33,358	24.3	2.2	19.5	29.6	World Bank
		8,445	25.9	2.0	19.7	29.6	
lgdpop	Natural log of GDP per Capita, proxy for wages	33,558	8.5	1.6	5.4	12.1	World Bank
		8,445	9.0	1.4	5.5	12.1	
tradcost	Custom insurance and freight (CIF) for all commodities from exporting country divided by custom value of all product by export country, tradcost = [(CIF/CV)-1]*100	33,558	5.3	5.4	0.2	51	USITC
		8,445	4.3	2.4	0.3	51	
dist	Distance in kilometers from exporting country to U.S.	22,187	8,791	3653	548	16,180	CEPII
		8,143	8,590	3,747	548	16,180	
excon	Cost in USD for export of 20' sea container from exporting country	33,558	1,232	726	0	4,285	World Bank
		8,445	1,015	456	0	4,285	
distexcon	Interactive variable: dist / excon	21,756	9.9	7.1	.3	36.9	
		8,029	10.5	7.6	0.3	36.9	
perc	Percent tariff on commodity	32,726	10.4	9.1	0	32	USITC
		8,445	13.4	10.0	0.0	32	
unit	Unit tariff on commodity per kilogram	33,558	5.4	16.6	0.0	64.4	USITC
		8,445	3.4	13.2	0	64.4	
trade	Percent of all U.S. imports from exporting country	33,348	0.6	2.2	0.0	19.2	USITC
		8,428	1.6	3.7	0	19.2	
exdays	The median time, in days, for shipment from the product origin (factory) to the port of loading (dock, airport)	32,214	22.2	14.5	0	89	World Bank
		8,166	16.4	9.1	5	89	
Exdocs	The number of documents required to export product	32,214	6.5	2.1	2.0	14.0	World Bank
		8,166	5.8	2.0	2.0	13.0	
lpi	Logistical Performance Index Rating - The average of six performance measurables involving transportation and logistics for a country; based on survey results from the private sector	29,190	2.8	0.7	0.7	4.2	World Bank
		8,166	3.1	0.6	0.7	4.2	

Top line reflects entire data set. Bottom line reflects only those observations with CV > 0.

Table 2.3: Variable Correlation Matrix (Full Data Set)

	lcv	lgdp	lgdpop	lpi	tradcost	dist	excon	distexcon	perc	unit	trade	exdays	exdocs
lcv	1.00												
lgdp	0.39	1.00											
	<.0001												
lgdpop	0.14	0.51	1.00										
	<.0001	<.0001											
lpi	0.27	0.70	0.72	1.00									
	<.0001	<.0001	<.0001										
tradcost	-0.10	-0.34	-0.24	-0.19	1.00								
	<.0001	<.0001	<.0001	<.0001									
dist	-0.01	-0.10	-0.26	-0.10	0.14	1.00							
	0.27	<.0001	<.0001	<.0001	<.0001								
excon	-0.18	-0.16	-0.41	-0.36	-0.13	-0.06	1.00						
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001							
distexcon	0.11	0.15	0.00	0.18	0.15	0.73	-0.57	1.00					
	<.0001	<.0001	0.96	<.0001	<.0001	<.0001	<.0001						
perc	0.21	-0.04	-0.03	-0.03	0.03	0.14	0.05	0.04	1.00				
	<.0001	<.0001	<.0001	<.0001	0.00	<.0001	<.0001	<.0001					
unit	-0.08	-0.01	-0.01	-0.01	0.01	0.04	0.01	0.01	0.17	1.00			
	<.0001	0.01	0.02	0.03	0.22	0.22	0.14	0.25	<.0001				
trade	0.29	0.45	0.18	0.30	-0.12	-0.11	-0.07	0.08	-0.09	-0.03	1.00		
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001			
exdays	-0.21	-0.37	-0.60	-0.54	0.05	0.27	0.75	-0.17	0.05	0.01	-0.16	1.00	
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.01	<.0001		
exdocs	-0.19	-0.36	-0.63	-0.59	0.11	0.27	0.50	-0.08	0.05	0.01	-0.17	0.67	1.00
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0239	<.0001	<.0001	

Table 2.4: General Apparel Regression Results

	1 OLS No Zeros			2 OLS with Zeros			3 Zero Inflated Count						4 Heckman					
Parameter	OLS	SE		OLS	SE		Pois	SE		Logit	SE		OLS	SE		Probit	SE	
Intercept	13.41	1.13	**	-5.45	1.20	**	2.70	0.11	**	4.43	0.56	**	14.46	1.28	**	-2.63	0.33	**
lgdp	0.17	0.03	**	0.84	0.03	**	0.02	0.00	**	-0.39	0.02	**	0.14	0.05	**	0.23	0.01	**
lgdpop	-0.55	0.06	**	-0.77	0.06	**	-0.05	0.01	**	0.26	0.02	**	-0.45	0.06	**	-0.16	0.01	**
LPI	-0.32	0.12	**	-0.17	0.12		-0.03	0.01	*	0.30	0.06	**	-0.31	0.12	*	-0.02	0.03	
ldist	-0.25	0.12	*	-0.63	0.13	**	-0.05	0.01	**	0.42	0.06	**	-0.41	0.13	**	-0.25	0.04	**
distexcon	0.09	0.01	**	0.06	0.01	**	0.01	0.00	**	-0.01	0.00	**	0.10	0.01	**	0.01	0.00	**
Perc	-0.08	0.01	**	0.01	0.01		-0.01	0.00	**	-0.06	0.00	**	-0.09	0.01	**	0.03	0.00	**
$Perc^2$	0.01	0.00	**	0.01	0.00	**	0.00	0.00		0.00	0.00		0.01	0.00	**	0.00	0.00	
Unit	0.01	0.01		0.00	0.01		0.00	0.00		0.01	0.00	*	0.01	0.01		0.00	0.00	*
$Unit^2$	0.00	0.00	*	0.00	0.00	**	0.00	0.00		0.00	0.00		0.00	0.00	*	0.00	0.00	
tradcost	-0.20	0.02	**	-0.05	0.02	**	-0.02	0.00	**	0.02	0.01		-0.19	0.02	**	-0.01	0.01	
lang	-0.03	0.10		-0.28	0.10	**				0.08	0.05					-0.05	(0.03)	
landlocked	-0.69	0.13	**	0.03	0.13					-0.08	0.06					0.04	(0.03)	
ExDays	0.05	0.01	**	0.01	0.01		0.00	0.00	*				0.03	(0.01)	**			
ExDocs	-0.16	0.03	**	-0.18	0.03	**				0.06	0.01	**				-0.04	(0.01)	**
Trade	0.15	0.01	**	0.28	0.02	**	0.01	0.00	**	-0.06	0.01	**	0.13	(0.01)	**	0.04	(0.01)	**
Animal	0.31	0.10	**	0.49	0.09	**	0.03	0.01	*				0.29	(0.10)	**			
Cotton	1.43	0.09	**	3.05	0.11	**	0.13	0.01	**				1.42	(0.09)	**			
Year 2008	0.17	0.11		-0.01	0.12		0.02	0.01					0.19	(0.11)				
Year 2009	-0.20	0.11		-0.26	0.12	*	-0.02	0.01					-0.17	(0.11)				
Year 2010	-0.10	0.11		-0.11	0.12		-0.01	0.01					-0.08	(0.11)				
Year 2011	-0.07	0.11	**	0.02	0.12		-0.01	0.01					-0.07	(0.11)				
Obs	7,436			17,657			1,692			17,657			2,332			17,977		
R^2	0.2586			0.2941														
Adj R^2	0.2565			0.2933														
AIC							57,302						57,627					
Sigma													3.03	(0.03)	**			
Vuong/Rho							158.76**									-0.15	**	

*Statistically significant at 5%, ** Statistically significant at 1% for all Tables.

Table 2.5: General Apparel Repeated Heckman Results

Parameter	2007	SE		2008	SE		2009	SE		2010	SE		2011	SE	
Intercept	14.47	2.90	**	13.99	2.87	**	3.38	3.24		14.97	2.82	**	15.92	2.68	**
lgdp	0.20	0.10	*	0.03	0.10		0.76	0.10	**	0.20	0.10	*	0.11	0.10	
lgdpop	-0.49	0.15	**	-0.44	0.12	**	-0.65	0.13	**	-0.29	0.15		-0.50	0.12	**
LPI	-0.43	0.35		0.13	0.27		-0.63	0.30	*	-0.97	0.39	*	-0.28	0.23	
ldist	-0.45	0.28		-0.12	0.29		-1.24	0.32	**	-0.59	0.28	*	-0.43	0.29	
distexcon	0.08	0.02	**	0.09	0.02	**	0.13	0.02	**	0.15	0.02	**	0.10	0.02	**
Perc	-0.07	0.02	**	-0.09	0.02	**	0.00	0.02		-0.10	0.02	**	-0.09	0.02	**
perc2	0.01	0.00	**	0.01	0.00	**	0.01	0.00	**	0.01	0.00	**	0.01	0.00	**
Unit	-0.01	0.03		-0.01	0.03		-0.03	0.03		0.05	0.02	*	0.05	0.03	
unit2	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	**	0.00	0.00	*
tradcost	-0.20	0.05	**	-0.18	0.05	**	-0.30	0.06	**	-0.24	0.06	**	-0.11	0.04	*
ExDays	0.02	0.02		0.04	0.02	*	0.05	0.02	**	0.03	0.02		0.01	0.02	
Trade	0.11	0.03	**	0.11	0.03	**	0.17	0.04	**	0.12	0.03	**	0.15	0.03	**
Animal	0.23	0.22		0.42	0.22		0.26	0.20		0.23	0.22		0.40	0.20	*
Cotton	1.56	0.21	**	1.40	0.21	**	1.24	0.21	**	1.28	0.21	**	1.43	0.21	**
Select Intercept	-2.26	0.76	**	-2.30	0.77	**	-2.68	0.73	**	-2.98	0.74	**	-2.33	0.74	**
Select lgdp	0.20	0.02	**	0.22	0.02	**	0.24	0.02	**	0.23	0.02	**	0.26	0.02	**
Select lgdpop	-0.17	0.04	**	-0.15	0.03	**	-0.15	0.03	**	-0.21	0.04	**	-0.16	0.03	**
Select LPI	0.15	0.10		-0.05	0.07		-0.09	0.07		0.09	0.12		-0.10	0.06	
Select ldist	-0.26	0.08	**	-0.24	0.09	**	-0.27	0.08	**	-0.18	0.08	*	-0.33	0.09	**
Select distexcon	0.01	0.01	*	0.01	0.01		0.02	0.01	**	0.00	0.01		0.01	0.01	
Select Perc	0.04	0.01	**	0.03	0.01	**	0.03	0.01	**	0.03	0.01	**	0.03	0.01	**
Select perc2	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Select Unit	0.00	0.01		0.00	0.00		0.00	0.00		-0.01	0.00	**	0.00	0.01	
Select unit2	0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00	
Select tradcost	-0.02	0.02		-0.02	0.01		-0.03	0.01	*	0.01	0.01		0.02	0.01	
Select lang	-0.09	0.07		-0.07	0.06		-0.14	0.05	**	0.04	0.07		0.01	0.06	
Select landlocked	0.08	0.09		0.06	0.08		0.09	0.06		-0.01	0.08		-0.01	0.08	
Select ExDocs	-0.02	0.02		-0.05	0.02	*	0.00	0.02		-0.05	0.02	*	-0.05	0.02	**
Select Trade	0.04	0.01	**	0.04	0.01	**	0.05	0.01	**	0.04	0.01	**	0.02	0.01	*
N (OLS / Select)	335 / 3,571			501 / 3,654			536 / 3,654			353 / 3,528			609 / 3,570		
AIC	11,759			11,650			11,312			11,276			11,747		

Table 2.6: Descriptive Statistics for Cotton Apparel Imports

Variable	Description	Obs	Mean	Std. Dev.	Min	Max	Source
CV	Custom value of apparel imports, in 1000 USD	5,593	4,833	35,351	0.0	708,121	USITC
		2,029	13,322	57,729	251	708,121	
lgdp	Natural log of GDP	5,593	24.3	2.2	19.5	29.6	World Bank
		2,029	25.7	2.0	19.7	29.6	
lgdpop	Natural log of GDP per Capita, proxy for wages	5,593	8.5	1.6	5.4	12.1	World Bank
		2,029	8.9	1.5	5.5	12.1	
tradcost	Custom insurance and freight (CIF) for all commodities from exporting country divided by custom value of all commodities from exporting country, tradcost = [(CIF/CV)-1]*100	5,593	5.3	5.4	0.2	51	USITC
		2,029	4.3	2.2	0.3	26.1	
dist	Distance in kilometers from exporting country to U.S.	3,700	8792	3,652	548	16,180	CEPII
		1,925	8,691	3,829	548	16,180	
excon	Cost in USD for export of 20' sea container from exporting country	5,593	1,232	726	0	4,285	World Bank
		2,029	1,028	483	0	4,285	
distexcon	Interactive variable: dist / excon	3,626	9.9	7.1	.3	36.9	
		1,892	10.5	7.7	0.3	36.9	
perc	Percent tariff on commodity	5,593	10.1	5.4	0	16.5	USITC
		2,029	10.5	6.3	0	16.5	
trade	Percent of all U.S. imports from exporting country	5,558	0.6	2.2	0.0	19.2	USITC
		2,025	1.3	3.2	0	19.2	
exdays	The median time, in days, for shipment from the product origin (factory) to the port of loading (dock, airport)	5,369	22.2	14.5	0	89	World Bank
		1,962	17.1	9.5	5	89	
Exdocs	The number of documents required to export product	5,369	6.5	2.1	2.0	14.0	World Bank
		1,962	5.9	2.0	2	13	
lpi	Logistical Performance Index Rating - The average of six performance measurables involving transportation and logistics for a country; based on survey results from the private sector	4,865	2.8	0.7	0.7	4.2	World Bank
		1,938	3.1	0.7	0.7	4.2	

Top line reflects entire data set. Bottom line reflects only those observations with CV > 0.

Table 2.7: Cotton Variable Correlation Matrix (Full Data Set)

	lcv	lgdp	lgdpop	lpi	tradcost	dist	excon	distexcon	perc	trade	exdays	exdocs
lcv	1.00											
lgdp	0.44	1.00										
	<.0001											
lgdpop	0.11	0.51	1.00									
	<.0001	<.0001										
lpi	0.28	0.70	0.72	1.00								
	<.0001	<.0001	<.0001									
tradcost	-0.13	-0.34	-0.24	-0.19	1.00							
	<.0001	<.0001	<.0001	<.0001								
dist	0.04	-0.11	-0.26	-0.10	0.14	1.00						
	0.03	<.0001	<.0001	<.0001	<.0001							
excon	-0.23	-0.16	-0.41	-0.36	-0.13	-0.06	1.00					
	<.0001	<.0001	<.0001	<.0001	<.0001	0.00						
distexcon	0.18	0.15	0.00	0.18	0.15	0.73	-0.57	1.00				
	<.0001	<.0001	0.98	<.0001	<.0001	<.0001	<.0001					
perc	0.09	-0.06	-0.04	-0.03	0.04	0.22	0.08	0.06	1.00			
	<.0001	<.0001	<.0001	<.0001	0.02	0.00	<.0001	0.00				
trade	0.28	0.45	0.18	0.30	-0.12	-0.11	-0.07	0.08	-0.15	1.00		
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001			
exdays	-0.24	-0.37	-0.60	-0.54	0.05	0.27	0.75	-0.17	0.08	-0.16	1.00	
	<.0001	<.0001	<.0001	<.0001	0.00	<.0001	<.0001	<.0001	<.0001	<.0001		
exdocs	-0.19	-0.36	-0.63	-0.59	0.11	0.27	0.50	-0.08	0.07	-0.17	0.67	1.00
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	

Table 2.8: Cotton Apparel Regression Results

	OLS No Zeros			OLS Zeros			Zero Inflated Poisson						Heckman					
Variable	OLS 1	SE		OLS 2	SE		Count	SE		Logit	SE		OLS	SE		Probit	SE	
Intercept	15.33	1.13	**	-2.36	1.22		2.19	0.25	**	10.82	1.47	**	12.50	2.64	**	-6.35	0.87	**
lgdp	0.15	0.03	**	0.82	0.04	**	0.04	0.01	**	-0.59	0.04	**	0.16	0.08		0.34	0.02	**
lgdpop	-0.58	0.06	**	-0.79	0.06	**	-0.07	0.01	**	0.53	0.06	**	-0.54	0.12	**	-0.32	0.04	**
LPI	-0.30	0.12	*	-0.18	0.12		-0.04	0.02		0.09	0.13		-0.35	0.24		-0.05	0.08	
ldist	-0.31	0.12	*	-0.85	0.14	**	-0.02	0.03		-0.22	0.17		0.00	0.25		0.17	0.10	
distexcon	0.09	0.01	**	0.07	0.01	**	0.01	0.00	**	-0.01	0.01		0.13	0.02	**	0.00	0.01	
Perc	-0.06	0.01	**	0.07	0.01	**	-0.02	0.00	**	0.17	0.02	**	-0.26	0.03	**	-0.10	0.01	**
perc2	0.00	0.00	**	0.01	0.00	**	0.00	0.00		-0.01	0.00	**	0.02	0.00	**	0.01	0.00	**
tradcost	-0.21	0.02	**	-0.06	0.02	**	-0.02	0.00	**	0.06	0.02	**	-0.14	0.05	**	-0.05	0.01	**
lang	-0.07	0.10		-0.31	0.10	**				0.14	0.12					-0.09	0.07	
landlocked	-0.74	0.14	**	-0.03	0.14				**	-0.23	0.14					0.05	0.08	
ExDays	0.04	0.01	**	0.00	0.01		0.00	0.00					0.02	0.01				
ExDocs	-0.15	0.03	**	-0.16	0.03	**				0.14	0.03	**				-0.09	0.02	**
Trade	0.14	0.01	**	0.28	0.02	**	0.01	0.00		-0.03	0.03		0.19	0.03	**	0.02	0.02	
Y08	0.18	0.11		0.02	0.12		0.00	0.02					0.06	0.21				
Y09	-0.20	0.11		-0.24	0.12	*	-0.02	0.02					-0.28	0.21				
Y10	-0.10	0.11		-0.09	0.12		-0.02	0.02					-0.26	0.21				
Y11	-0.10	0.11		0.03	0.12		-0.02	0.02					-0.20	0.21				
Obs	7,436			17,657			376			2,997			376			2,997		
R^2	0.2348			0.2614														
Adj R^2	0.2329			0.2606														
AIC							11,974						11,894					

Table 2.9: Cotton Apparel Repeated Heckman Results

	2007			2008			2009			2010			2011		
Parameter	Estimate	SE		Estimate	SE		Estimate	SE		Estimate	SE		Estimate	SE	
Intercept	3.08	6.15		10.70	5.75		21.80	6.55	**	-6.66	6.25		11.93	5.91	*
lgdp	0.71	0.20	**	0.05	0.17		-0.08	0.19		1.03	0.18	**	0.30	0.17	
lgdpop	-1.04	0.29	**	-0.52	0.22	*	-0.37	0.26		-1.13	0.31	**	-0.78	0.25	**
LPI	-0.21	0.66		0.12	0.51		-0.25	0.52		-0.57	0.86		-0.35	0.45	
ldist	-0.38	0.55		0.38	0.56		-0.66	0.60		-0.07	0.62		-0.09	0.57	
distexcon	0.14	0.03	**	0.12	0.04	**	0.14	0.04	**	0.16	0.04	**	0.12	0.04	**
Perc	-0.33	0.06	**	-0.27	0.06	**	-0.21	0.06	**	-0.44	0.06	**	-0.25	0.06	**
perc2	0.03	0.00	**	0.02	0.00	**	0.02	0.00	**	0.03	0.00	**	0.02	0.00	**
tradcost	-0.23	0.10	*	-0.16	0.09		-0.11	0.11		-0.22	0.12		-0.10	0.12	
ExDays	0.01	0.03		0.03	0.03		0.05	0.03		0.01	0.03		0.00	0.03	
Trade	0.16	0.07	*	0.16	0.07	*	0.17	0.07	*	0.18	0.07	*	0.21	0.06	**
Select Intercept	-3.98	1.97	*	-6.02	2.04	**	-10.88	2.07	**	-5.57	1.88	**	-6.77	1.96	**
Select lgdp	0.38	0.06	**	0.33	0.06	**	0.37	0.06	**	0.35	0.06	**	0.30	0.05	**
Select lgdpop	-0.36	0.09	**	-0.24	0.07	**	-0.27	0.08	**	-0.36	0.09	**	-0.38	0.08	**
Select LPI	0.02	0.24		-0.25	0.17		-0.31	0.17		0.13	0.27		0.15	0.16	
Select ldist	-0.25	0.21		0.17	0.22		0.69	0.23	**	-0.05	0.21		0.35	0.23	
Select distexcon	0.02	0.01		0.00	0.01		-0.02	0.02		0.01	0.01		-0.02	0.01	
Select Perc	-0.08	0.02	**	-0.11	0.03	**	-0.13	0.03	**	-0.10	0.02	**	-0.11	0.03	**
Select perc2	0.01	0.00	**	0.01	0.00	**	0.01	0.00	**	0.01	0.00	**	0.01	0.00	**
Select tradcost	-0.06	0.04		-0.07	0.03	*	-0.10	0.03	**	-0.03	0.03		-0.01	0.03	
Select lang	-0.15	0.16		-0.13	0.14		-0.24	0.16		0.02	0.14		-0.01	0.15	
Select landlocked	0.40	0.19	*	0.06	0.18		-0.28	0.18		0.27	0.17		-0.10	0.18	
Select ExDocs	-0.04	0.05		-0.08	0.04		-0.10	0.05	*	0.00	0.04		-0.13	0.05	**
Select Trade	-0.03	0.03		0.05	0.04		0.09	0.04	*	-0.01	0.03		0.02	0.03	
AIC	2,450			2,459			2,358			2,366			2,397		
N (OLS / Select)	55 / 596			81 / 609			77 / 609			55/ 588			99 / 595		

Table 2.10: Animal Apparel Repeated Heckman Results

Parameter	2007	SE		2008	SE		2009	SE		2010	SE		2011	SE	
Intercept	-15.67	5.62	**	-14.27	5.62	*	-16.90	5.40	**	-14.89	5.30	**	-16.83	5.21	**
lgdp	0.64	0.15	**	0.50	0.16	**	0.74	0.15	**	0.47	0.14	**	0.65	0.13	**
lgdpop	-0.21	0.27		0.00	0.18		-0.02	0.22		-0.28	0.25		-0.05	0.21	
LPI	0.52	0.70		0.03	0.45		0.12	0.50		0.75	0.75		0.17	0.46	
ldist	0.22	0.54		0.65	0.51		-0.04	0.55		0.65	0.54		0.27	0.53	
distexcon	0.00	0.03		0.00	0.03		0.00	0.04		-0.07	0.04	*	-0.04	0.03	
Perc	0.03	0.07		0.11	0.06		0.09	0.07		0.19	0.07	**	0.06	0.07	
perc2	0.02	0.00	**	0.01	0.00	*	0.01	0.00	**	0.01	0.00	**	0.02	0.00	**
Unit	0.00	0.03		-0.03	0.03		-0.03	0.03		-0.05	0.03	*	0.05	0.03	
unit2	0.00	0.00	.	0.00	0.00		0.00	0.00	.	0.00	0.00	.	0.00	0.00	.
tradcost	-0.02	0.10		-0.01	0.08		0.15	0.10		0.11	0.09		0.23	0.07	**
ExDays	0.01	0.02		0.04	0.02		0.05	0.02	*	-0.02	0.02		0.03	0.02	
Trade	0.35	0.07	**	0.31	0.06	**	0.30	0.06	**	0.40	0.06	**	0.32	0.06	**
Select Intercept	-7.02	1.33	**	-6.79	1.44	**	-5.70	1.35	**	-6.71	1.32	**	-5.87	1.34	**
Select lgdp	0.20	0.04	**	0.24	0.04	**	0.24	0.04	**	0.17	0.04	**	0.24	0.03	**
Select lgdpop	0.03	0.06		-0.06	0.05		-0.06	0.05		-0.03	0.06		-0.04	0.05	
Select LPI	0.04	0.17		-0.10	0.13		-0.07	0.12		0.09	0.19		0.01	0.12	
Select ldist	-0.01	0.14		0.06	0.16		-0.08	0.14		0.15	0.14		-0.12	0.14	
Select distexcon	0.00	0.01		0.00	0.01		0.00	0.01		-0.02	0.01	*	0.00	0.01	
Select Perc	0.04	0.02	*	0.02	0.02		0.02	0.02		0.04	0.02	*	0.02	0.02	
Select Perc2	0.00	0.00	**	0.00	0.00	**	0.00	0.00	**	0.00	0.00	**	0.00	0.00	**
Select Unit	0.00	0.01		0.00	0.01		0.00	0.01		-0.02	0.01	*	0.01	0.01	
Select Unit2	0.00	0.00	.	0.00	0.00		0.00	0.00	.	0.00	0.00	.	0.00	0.00	
Select tradcost	0.00	0.03		0.00	0.02		0.03	0.02		0.06	0.02	*	0.06	0.02	**
Select lang	0.05	0.07		-0.06	0.10		-0.14	0.08		0.00	0.08		0.12	0.07	
Select landlocked	0.05	0.09		0.23	0.13		0.26	0.11	*	0.07	0.09		0.17	0.09	
Select ExDocs	0.05	0.02	*	-0.02	0.03		-0.03	0.03		-0.02	0.02		-0.02	0.02	
Select Trade	0.08	0.02	**	0.08	0.02	**	0.09	0.02	**	0.11	0.02	**	0.05	0.02	**
N (OLS / Probit)	112	1190		62	1165		74	1165		22	1127		107	1140	
AIC	3184			3134			3162			3151			3210		

Table 2.11: Cotton Apparel Market by Source Country
2007-2011

Country	Custom Value	Share
China	$6,324,420,108	23.4%
Honduras	$2,877,968,809	10.6%
Mexico	$2,305,943,515	8.5%
El Salvador	$2,026,551,389	7.5%
Vietnam	$1,596,953,983	5.9%
Pakistan	$1,355,572,934	5.0%
Indonesia	$1,188,499,148	4.4%
India	$1,122,014,956	4.2%
Haiti	$974,719,506	3.6%
Cambodia	$882,247,968	3.3%

Table 2.12: Marginal Effect of Perc
In Cotton Apparel Market

Country	Perc	Marg. Eff.
China	11.16	-0.0073
Haiti	0	-0.0375
Honduras	0	-0.0255

Table 2.13: Export by Apparel Type

	China	Honduras	Haiti
Coat	$3,281,095,069	$78,260,905	$68,527
Suit	$10,985,292	$0	$0
Sweater	$1,362,239,645	$42,029	$19,116
Tshirt	$1,670,100,102	$2,799,665,875	$974,631,863
Total	$6,324,420,108	$2,877,968,809	$974,719,506

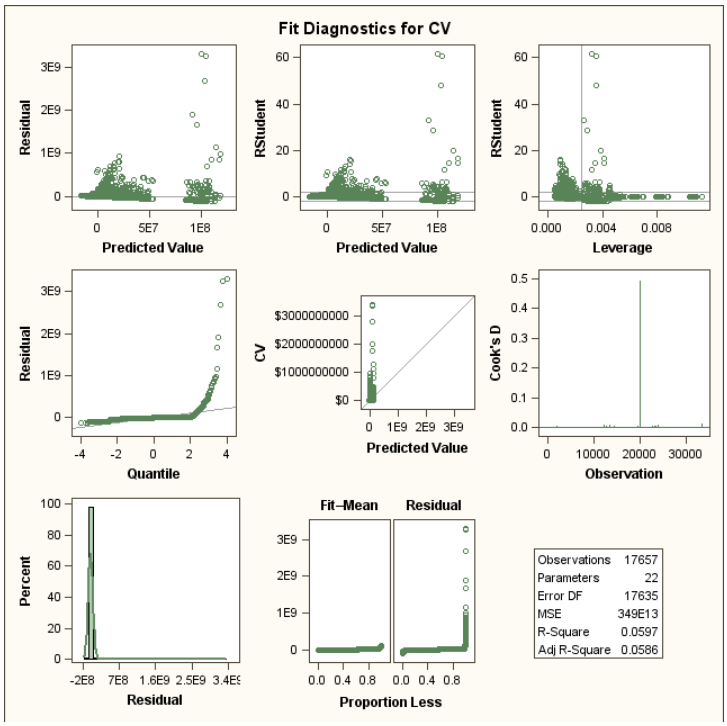
Table 2.14: Cotton Coats, Sweaters and T-Shirts Marginal Effects 2007-2011

	Coats				Sweaters				T-Shirts			
			Marginal Effect				Marginal Effect				Marginal Effects	
	Coeff.		China	Haiti	Coeff		China	Haiti	Coeff		China	Haiti
Perc	-0.19	**			-0.35	**			-0.30	**		
Select Perc	-0.09	**	-0.000	-0.034	0.01		-0.000	-0.004	-0.09	**	-0.031	-0.006
distexcon	0.16	**			0.06	**			0.18	**		
Select distexcon	0.07	**	0.000	0.028	-0.01		0.000	0.003	0.00		0.001	0.000
OLS Obs.	116				114				57			
Probit Obs.	857				856				428			
AIC	3487				3487				1968			

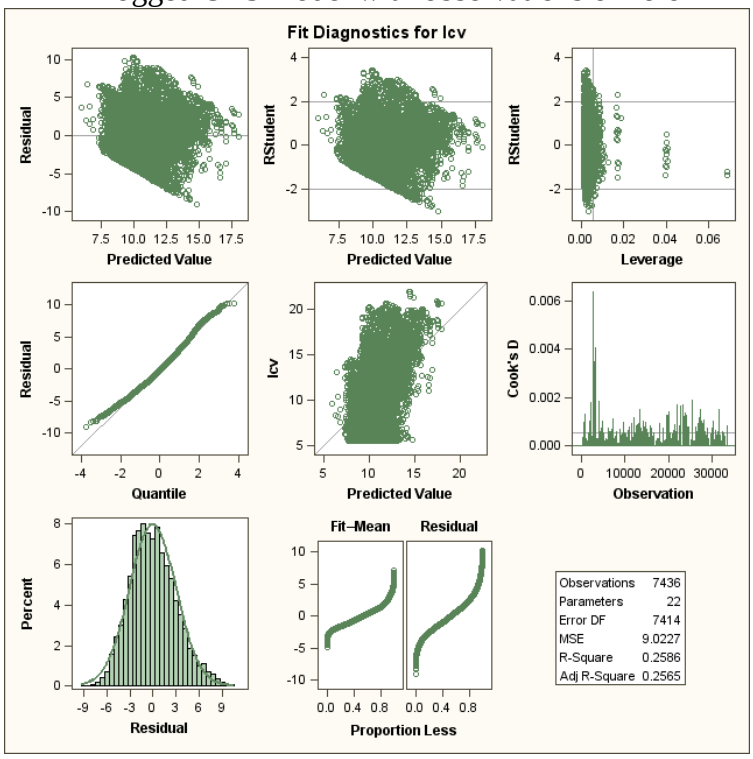
Marginal Effect taken from average value respective country's variable

Figure 2.1:

Panel A: Homoskedasticity check for
Level OLS model without observations of zero



Panel B: Homoskedasticity check for
Logged OLS model with observations of zero



Chapter 3

The Work Opportunity Tax Credit

3.1 Introduction

In January 2013, Walmart President and CEO Bill Simon announced a focused initiative to hire any U.S. veteran who is honorably discharged within the first 12 months of his or her separation from active duty. Walmart projects it will hire over 100,000 veterans over the next five years. The initiative is set to begin Memorial Day of 2013 (Walmart, 2013).

This announcement came less than two weeks after President Obama confirmed the latest extension of the Work Opportunity Tax Credit (WOTC) program when he signed the American Tax Payer Relief Act of 2012 (ATPRA). The WOTC is a tax credit to encourage employers to hire from targeted groups of people. Veterans are one of those groups. The WOTC was last extended through The Vow to Hire Heros Act of 2011 (VOW), but only for veteran groups. ATPRA brings back eligibility for non-veteran groups.

Several business and labor leaders have praised Walmart's commitment, while others have taken a more cynical approach toward the hiring pledge (Merrick, 2013). Commentators have projected these hires would have occurred anyway and Walmart is trying to gain social favor while receiving a windfall of subsidized labor (Matthews, 2013).

A key part of Walmart's pledge is the commitment to hire 'any' honorably discharged veteran, which would accordingly include disabled veterans. The largest tax credit offered by the WOTC legislation is targeted toward those with service-connected disabilities. This group, disabled veterans, is thus affected by multiple pieces of legislation and programs.

Veterans with service-related disabilities are eligible for the U.S. Department of Veteran Affairs' Disability Compensation. The compensation varies at 10% increments according to the

determined percentage disability of the veteran and the number of the veteran's dependents. The compensation ranges from $129 (10% disability, no dependents) to over $1000 per month for a veteran with dependents and 50% determined disability[12]. Autor and Duggan (2007) found an extension of benefits through this program to Vietnam Veterans in 2001 triggered early retirements, or exit from the labor force due to a newly-created, increased reservation wage. Similarly, Autor (2011) found disabled non-veterans have less incentive to enter the work force due to benefits from the U.S. Social Security Disability Insurance (SSDI) program, which he claims provides an average benefit of over $1000 per month. The other legislation for consideration is the Americans with Disabilities Act of 1990 (ADA90) and its amendments from 2008 (ADA08). The ADA90 and ADA08 give anti-discrimination protection to disabled Americans and require employers to make "reasonable accommodations" for disabled employees. Previous studies suggest employers may avoid hiring the disabled in order to avoid accommodation costs.

The WOTC is the subject of several studies and reports. In response to a U.S. Congressional request, the General Accounting Office[13] (GAO) conducted a survey (Wozny & Daly, 2001) of Texas and California companies to determine if employers intentionally replace employees to take advantage of the WOTC. The report concluded less than 10% of employers found more than a little cost effectiveness in of 'dismissing' or 'churning' employees to take advantage of the WOTC. However, the same report also found 20% of companies offered incentives to managers to hire WOTC eligible employees. Hamersma (2003) largely confirmed the GAO

[12] The benefit goes up to and beyond $3000 per month for those with 100% disability.

[13] Later changed to Government Accounting Office

report in a national study of the WOTC and the Welfare to Work Tax Credit[14] (WtWTC) concurrently using 1997 and 1999 data, finding low participation rates of employees in both credits.

Gunderson and Hotchkiss (2007) performed a study to determine differences of employment separation time between WOTC eligible employees and non-WOTC eligible employees. The study is unique in that it comes from a single, large employer's data and is narrowed to those working part-time in the same function between 1998 and 1999, two complete years. They found WOTC-eligible workers tend to stay slightly longer than non-WOTC workers, albeit by only a matter of days. The authors broke down reasons of separation by cause between the two classes of workers. An important finding of the report from summary statistics comes from the reason for separation. The average tenure of employment was 47 days[15] for all subject employees, 46 days among WOTC-eligible employees. The standard deviation for each reason of separation ranged from 36 to 59 days. Simply using the average separation time and a 250 day work year, results in an opportunity for the employer to hire a WOTC eligible employee five times per year, provided one applies for the position. Keeping in mind these were part-time employees working 4-5 hours per day, many times the employer was not able to meet the 120 hour minimum to receive any of the WOTC benefit.

Heaton (2012) found disabled veterans gained a roughly 2% increase in employment from the VOW legislation using a triple- and quadruple- difference approach, or DDD and DDDD. This increase in employment percentage translated to an estimated 32,000 jobs for disabled veterans. Those with cognitive disabilities were found to have benefits from the WOTC in DDD results, but no statistically significant change with the DDDD findings. Those with non-

[14] The WtWTC was eventually rolled into the WOTC

[15] Weighted-average of averages from Table 2, page 325 of Gunderson and Hotchkiss (2007)

cognitive disabilities saw near identical increases with both approaches. Further, Heaton found among disabled veterans, those receiving Social Security Disability Insurance (SSDI) benefits had no increase in employment, while those not receiving Social Security payments saw an increase of nearly 4% employment. Finally, the author found the employment increases of disabled veterans were in the full-time category rather than part-time.

The present study uses a DDD approach to estimate if the WOTC is simply a windfall profit opportunity for employers, such as Walmart, or if it assists veterans, in particular disabled-veterans, to gain income through increased employment, wages or both. The comparison will use empirical analysis based on the changes to the WOTC from VOW to estimate the expected changes in employment from the WOTC extension through ATPRA. The empirical analysis is done with the data in which the veteran and non-veteran have WOTC eligibility, 2010, and then non-veterans lose credit eligibility and veterans maintains credit eligibility, 2011. For clarification, this period will not show up with cursory view of future IRS records because employers are able to retroactively claim the credit for the brief time period in which it was not available for non-veterans hired who eventually became eligible. After passage of the ATPRA, much of the perceived advantage for the veteran from VOW is removed. This should give insight to how much of an advantage the veteran is now losing with the passage of ATPRA.

3.2 Legislative History

The Work Opportunity Tax Credit (WOTC) was originally authorized for one year, between October 1st, 1996 and September 30th, 1997 as part of the Small Business Job Protection Act of 1996. The WOTC targeted seven groups of the unemployed for assistance through tax credits to employers who hire them. The program was revised and extended eight times between 1997 and

2009 to eventually include 12 target groups through the American Recovery and Reinvestment Act of 2009 (ARRA), including two new group of veterans who are neither disabled from service nor receiving SNAP benefits qualify for a maximum credit $2400 or $5600 depending on their duration of unemployment.

VOW maintained a maximum credit of $2400 for veterans receiving SNAP[16] benefits. Veterans with a service-connected disability (DVET) qualified for a $4800 maximum credit to the employer, but VOW increased this amount to $9600 if the veteran was unemployed for 6 months or more. Finally, tax-exempt nonprofit (503(c)) organizations became eligible to receive the WOTC hiring credit when hiring qualified veterans. All these provisions were made effective for veterans hired November 22, 2011 through December 31, 2012 (Labor, 2012). ATPRA retroactively brought back the WOTC for targeted non-veteran groups, leaving both veterans and non-veterans eligible. A summary of this is in Table 3.1.

The WOTC is provided to employers as a percentage of wages paid to the qualified employee and is based on the time the employee is employed. For example, 25% of the first $24,000 worth of wages paid to a newly hired disabled veteran (DVET) who has been unemployed for 6 months is qualified for a federal credit if the DVET works at least 120 hours during the first year of employment. The percentage increases to 40% if the DVET works a minimum 400 hours. Companies are encouraged to hire WOTC-eligible employees early in the tax year in order to maximize the amount of qualified wages.

[16] Supplemental Nutrition Assistance Program

3.3 Theoretical Framework

Allowing *i* to represent the labor group, the competitive model put forth by Acemoglu and Angrist (2001) can be altered to consider the effects of hiring credits on disabled veterans from the WOTC under the VOW legislation. Equation 3.1) is the modified version of the Acemoglu and Angrist model:

3.1) $\text{Max } \Pi_{(D/V_t,\, N/V_t)} =$

$\sum \beta^t(F(N/V_t, eD/V_t,)$	*(a) Output*
$- w_{d,t}D_t - w_{dv,t}DV_t - w_{nv,t}NV_t - w_{n,t}N_t$	*(b) Wages*
$- aD_t - aDV_t + cDV_t + cV_t$	*(c) Accommodation costs and credits*
$- f_dsD_{t-1} - f_{dv}sDV_{t-1} - f_{nv}sNV_{t-1} - f_nsN_{t-1}$	*(d) Firing costs*
$- h_d\{D_F - [D_t - (1\text{-}s)D_{t-1}]\}$	*(e) Disabled applicant hiring costs*
$- h_{dv}\{DV_F - [DV_t - (1\text{-}s)DV_{t-1}]\}$	*(f) Disabled Veteran applicant hiring costs*
$- h_{nv}\{NV_F - [NV_t - (1\text{-}s)NV_{t-1}]\}$	*(g) NonDisabled Veteran applicant hiring costs*
$- h_n\{N_F - [N_t - (1\text{-}s)N_{t-1}]\})$	*(h) NonDisabled applicant hiring costs*

Acemoglu and Angrist (A&A) suggest firms need to replace non-productive workers with probability *s* each period *t*. Hiring costs consist of the probability of being sued p_i at the cost of v_i for not hiring an applicant who eventually sues for hiring discrimination. Hiring costs are thus $h_i = p_i * v_i$, the cost of not hiring applicant i_F. Firing costs are similarly developed from the probability of being sued for wrongful termination, $f_i = q_i * \varphi_i$. In this case q_i and φ_i are probability and cost, respectively, of a law suit for wrongful termination of the *s* non-productive employees.

Workers increasingly supply labor l_i according to the function $l_i(w_i)$, with w_i the wage received to the worker. Nondisabled workers *N* are assumed to represent 100% capacity of the individual labor function while disabled workers (D or DV) produce at some level *e* relative to *N* (or NV), so that a disabled employee is never more productive than a nondisabled employee, or where $e \leq 1$ and $eD/V \leq N$. Disabled or disabled veteran employees' marginal productivities can be increased amount *B* at cost A, up to 100% that of the nondisabled. The cost of the (reasonable) accommodation is voluntarily acceptable to the employer as long as $B > A$. Net

accommodation cost to the firm is $a = A - B$. The extension of the A&A model comes from consideration of the WOTC credit for disabled veterans, cDV_t and also for the nondisabled veterans, cNV_t. Finally, firms will enter the labor market provided profit Π, which is discounted at rate β, exceed entry costs Γ. This situation sets up a two-period[17] profit maximization for the firm, t and t_{+1}. For this study, t = 2011, t_{+1}=2012. The difference between these two periods should give insight to period t_{+2}, 2013.

The cost of a law suit for not hiring an applicant is automatically avoided when the applicant is hired by the employer. Also, since the firm is replacing non-productive employees s from period t-1 with productive employees in period t, hiring costs are considered subsidies and increase profit, or $f_i < w_i$, the condition which triggers employee replacement. Of course growth causes hiring, but for the purposes of this analysis, the hiring process is indifferent to the causes of hiring.

Setting the first order conditions from equation 3.1) to zero for each source of labor sets up an equilibrium condition to measure the hiring decision of the firm:

3.1') FOCs:

$F_D = w_d + \beta s f_d - [1-\beta(1-s)]h_d + a$ *(a) Disabled market clearing condition*

$F_{DV} = w_{dv} + \beta s f_{dv} - [1-\beta(1-s)]h_{dv} + a - c$ *(b) Disabled Veteran market clearing condition*

$F_{NV} = w_{nv} + \beta s f_{nv} - [1-\beta(1-s)]h_{nv} - c$ *(c) NonDisabled Veteran market clearing condition*

$F_N = w_n + \beta s f_n - [1-\beta(1-s)]h_n$ *(d) NonDisabled market clearing condition*

The General Rule of the ADA90 and ADA08 (Justice, 2009) requires employers to compensate employees equally without regard to disability status and provide reasonable accommodation which would permit the disabled (or disabled veteran) employee's productivity to equal that of the nondisabled. Using lines (a) and (d) in Equation 3.1'), this would require $w_n = w_d$. The ADA90 (and ADA08) provide hiring and firing protection for disabled, which requires $h_d(\bullet) >$

[17] Acemoglu and Angrist present an indefinite period model.

$f_d(\bullet)$ in an amount equal to the cost of accommodation *a*. Empirical results from nationally performed studies (DeLeire 2000; A&A 2001) suggest employers avoid the accommodation costs because the hiring and firing costs are not realistically high enough for employers to hire the disabled due to ADA90. In essence, many empirical results suggest

$$a > w_d + \beta s f_d - [1-\beta(1-s)]h_d$$

or, the cost to not hire a disabled worker is less than the cost of accommodation. The WOTC presents another consideration though. Line (b) and line (c) of equation 3.1') include a credit for employers, *c*. This sets up a situation for comparison of four groups of employees for employer reaction to accommodation costs and hiring credits.

The impact of the WOTC depends on how employers react to the wage subsidy in the short-term, as the credit applies to wages mostly during the 2012 calendar year. The credit is assumed as an attempt to shift the demand curve outward, since it is directed at the employer rather than the applicant as a wage subsidy, which would shift the labor supply curve out. A measure in the change of wages and labor hours should give insight into which side of the labor market gains more of the incidence from the tax credit, employers, through more labor at the same or reduced paid wage, or employees through increases in wages. Since the WOTC is not a permanent credit, employers would likely be hesitant to increase wages. However, a counter-argument to employer hesitation to increase wages is the continual renewal of the WOTC every 1-3 years.

As noted in the introduction, previous studies indicate employers avoid hiring the disabled in order to avoid accommodation costs. DeLeire, Acemoglu and Angrist and Jolls and Prescott (2004) found negative consequences for employment of the disabled due to new legal considerations for accommodation costs to employers. However, the WOTC brings with it a

credit for hiring veterans with service-related disabilities[18], creating four sources of labor for employers to consider:

1) Disabled (D)
2) Disabled Veterans (DV)
3) NonDisabled Veterans (NV)
4) NonDisabled (N)

Group 1 consists of members of the labor force who are disabled and without veteran status. Group 2 consists of members of the labor force who are disabled and with veteran status. Group 3 consists of members of the labor force who are not disabled and have veteran status. Group 4 consists of members of the labor force who are not disabled and are not veterans. No individual is a member of more than one group.

3.4 Data and Empirical Analysis

Data for analysis come from the Current Population Survey (CPS) available from the U.S. Census Bureau (2012). The CPS is a monthly survey consisting of several individual and household characteristics for income and demographics. The unit of observation is an individual between the ages of 25 and 55 years-old (inclusive). The WOTC legislation renewal became effective in late November 2011. The data set includes the five months from December 2011 through April 2012 while the increased hiring credits were available for hiring veterans, and newly unavailable for hiring non-veterans. Unemployment dropped from 8.5% to 8.1% during this time period. Accordingly, the data set also includes the five-month period December 2010

[18] The WOTC extension also does apply to veterans based on their participation in the SNAP who are not disabled, but they are not identified differently from other veterans.

through April 2011 as the time period prior to the hiring credit increases, when the unemployment rate dropped from 9.3% to 9.0%.

The VOW legislation was not approved until late 2011, so employers operated through most of 2011 without confirmed knowledge of the increases to credits for hiring veterans over non-veterans. Likewise, the ATPRA was not signed into law until January 2013, retroactive effect back into 2012. This indicates employers would be operating with similar knowledge of the WOTC extensions in both time periods.

Four outcomes are used as indicators of how employers react to the increased hiring credit, two for earnings and two for employment. Equation 3.2) represents the full empirical model for estimation:

3.2) $$y_{it} = \alpha_0 + \alpha_1 G_{it} + \alpha_2 E_{it} + \alpha_3 WOTC_t + \alpha_4 D_{it} WOTC_t + \alpha_5 E_{it} WOTC_t + \alpha_6 X_i$$

G represents the individual's group status through a categorical variable for group status. In line with the theoretical model, individuals are segmented as veterans *VET*, nondisabled *NON*, disabled *DIS* or disabled veterans *DVET*. *E* represents a categorical variable indicating the individual's highest level of completed education with levels of high school or less, an associate's degree, a bachelor's degree and a graduate degree.

The impact of unobserved factors between the two time periods is captured by the WOTC variable, set to 0 for the first time period and 1 for the time after the VOW was implemented. This is then interacted with the group and education variables to estimate the effects of the increased hiring credits. Finally, *X* represents a set of demographic variables for sex and race, along with a categorical variable for job sector as additional controls. Table 3.2 has demographic explanatory variables. *AGE* is normalized to 1 for a 25 year-old and 31 for a 55

year-old. This is done to avoid a negative intercept for earnings results and make interpretations more straight forward.

The CPS gives survey respondents seven options indicating employment status:

1 – Employed, At Work
2 – Employed, Absent
3 – Unemployed, On Layoff
4 – Unemployed, Looking
5 – Not In Labor Force, Retired
6 – Not In Labor Force, Disability
7 – Not In Labor Force, Other

For the purposes of this study, option 6 is considered unemployed and grouped with option 3 and option 4. Those who respond to the survey with option 5 or option 7 are not considered in the data set. Also, those who respond as unemployed are considered to work 0 hours per week for the *UslHrs* dependent variable. Those who respond to work less than 20 hours per week are considered unemployed for the employment outcome. The result is a larger labor force than used by the U.S. Bureau of Labor Statistics, and thus a higher unemployment rate than it would report.

Table 3.3 includes an educational summary for each group. Table 3.4 includes four panels of earnings and employment summary statistics for each group. The earnings statistics reflect only those observations in which the respondent was employed.

3.5 Regression Estimates

The impact of the VOW legislation is measured with a DDD approach. The differences of primary interest are group membership and educational attainment. Veterans have an educational bias due to enlistment requirements for the military. Segmenting by educational attainment provides for determination of employment increase due to veteran status, or because

of the education bias. An important assumption of the data is that employers hired in 2012 with the understanding the WOTC was only extended for veterans.

Four dependent variables are estimated to gain insight on how employers react to the hiring credits for veterans, with or without disabilities. Hourly and weekly wages are estimated as earnings rates. Employment is first measured according to a binary distribution of employed or unemployed. Then employment is estimated with a categorical approach where usual hours worked is broken into four categories. Categorical variables for group membership (Group) and educational attainment level (Educ) are estimated separately and interacted with each other. The WOTC term identifies the change in the relative dependent variable between time periods, the period December 2010 through April 2011 (before WOTC changes) to the period December 2011 through April 2012 (after WOTC changes). Age, sex, race and geographic location are also controlled for in the estimating models. The wage models also consider the industrial sector of employment. Age is the only continuous variable used in the estimating functions. The base individual for comparison is a 25 year-old non-white non-disabled female non-veteran, with a high school diploma or less, living in the South. This person is unemployed if estimating one of the employment measures, and this person is working the Trade industry if estimating wages. Due to the size of the data set, statistical significance is considered at 5%.

The hourly wages appear to follow close to a lognormal distribution, while weekly wages appear closer to a gamma distribution[19]. Both dependent variables were regressed under multiple distribution assumptions, including a negative binomial. Table 3.5 displays model fit criteria results for each distribution assumption. Based on the AIC comparisons, the gamma distribution is used for hourly wages and the negative binomial distribution is used for weekly wages.

[19] Distribution graphs are displayed in Appendix C

The Usual Hour distribution is centered around 40 hours, as would be expected, but it does not have a well-defined distribution. Therefore, employment is estimated as binary, employed or not employed, and then with four categories of employment status:

Unemployed: < 20 hours per week
Underemployed: 20 – 31 hours per week
Employed: 32 – 50 hours per week
Overemployed: 51+ hours per week

The more detailed analysis for employment status is done with a baseline categorical logit model, using 'Unemployed' as the base. Results are broken into the period before WOTC and the period after WOTC. A baseline logit model can be somewhat cumbersome for interpretation. The baseline is the base individual's log odds of the presented status versus being unemployed. The base individual thus has three intercepts, one for comparison of unemployment as a base to each other employment status category. Interpretation of the coefficient is done by taking its antilog. The result is the odds of the employment status category versus the base category of unemployment:

$$\log\left(\frac{Prob\ Status_j}{Prob\ Uemployment}\right) = \alpha_j + \beta_j X_i$$

where α_j is the intercept for the considered status, β_j is a vector of coefficients for the comparative category, and X_i is a vector of the *ith* individual's characteristics. For example, an intercept for employed may be -0.09. This would be interpreted as the baseline individual's probability of being employed is 91% of being unemployed. Adding any education makes the base individual much more probable of being employed versus unemployed.

3.5.1 Regression Results

Table 3.6[20] summarizes the regression results for wages and employment categories using statistically significant coefficients from the regression estimates. The weekly wages have more reporting observations, and are thus more robust than the hourly wages. However, the hourly wages do provide an indication of whether or not the credit passes through to the employee through earnings rate, or employment rate. In general, employment and income increase with education. Also, the disabled earn less than the non-disabled. An indication of disabled veterans with an associate's degree gaining in from the WOTC can be found in weekly wages. However, disabled non-veterans with the same education level apparently lost income. This may indicate disabled veterans gained from the WOTC from pulling employment away from disabled non-veterans.

Moving left to right in the employment sections of Table 3.6, the biggest increases of employment came from the veteran group, within the underemployed category displayed in Panel D. This would indicate some veterans moved from unemployed to underemployed. That movement may be an example of the marginal benefit to employers the WOTC was intended to provide in order to increase hiring.

A look within the employed category may provide some insight on employer reactions to the WOTC between the two disabled groups. The middle rows of Panel E contain the differences of employed compared to unemployed. The disabled veteran becomes more probable to be employed while the disabled non-veteran becomes less probable to be employed. This could be an indication of employer preference changes due to the WOTC changes. Disabled veterans saw employment increase, but at the cost of disabled non-veterans at each education level. Panel E of Table 3.6 also indicates the preference for veterans diminishes as education increases. Non-

[20] Coefficient estimates for the full models' results are available in Appendix C

veterans have lower probabilities of being employed at the lowest education level. This condition does not hold as education increases though, likely a condition from the previously noted upward education bias for veterans due to military entrance requirements.

In general, Table 3.6 suggests the WOTC changes may have helped increase employment of veterans, without a decrease of employment to non-disabled non-veterans. Disabled veterans gained employment after the WOTC changes, but these gains may have come at the expense of the non-veteran disabled.

3.6 Regression Estimates for Trade Industry Sector

Section 3.5 provides some insight on how employers reacted to the extension of the WOTC from the Vow to Hire Heros Act of 2011. In order to evaluate expectations of the most recent extension of the WOTC in regards to Walmart, the data set is narrowed to only those in the 'Trade' industrial sector, those employed in wholesale and retail trade. This changes somewhat how employment changes are evaluated. Section 3.5 included the entire dataset population. Respondents, who report to work any hours, also identify the industrial sector in which they work. This is what allows for segmentation of the 'Trade' industry. Of course, those who respond to working zero hours do not have an industrial sector to report, leading to an adjustment of the unemployment from less than 20 hours to greater than zero, but less than 20 hours[21].

Regression results are again collectively summarized for wages and employment categorical changes. A direct comparison to the overall economy results should be limited, because of the change to how 'Unemployed' is defined. However, similar overall hierarchal results for education and group membership are evident in regard to wages in the Trade industry as in the results from Section 3.5.

[21] A summary of the changes of employment categories is available in Appendix C.

Table 3.8 displays summary regression estimate results for differences within and between the group membership and education levels for each time period. Again using weekly wages as the more robust measure, income remains constant for the most part between time periods for each group and education level. The most noticeable difference from Table 3.8 is the large increase in odds to be employed for disabled veterans. Again, the point estimates of employment are of secondary concern. The estimated employment difference is of primary interest for this study. There is also an indication of some employment increases to disabled veterans coming at the cost of less employment for the disabled non-veteran, from the binary employment results in Panel C. The categorical results in Panel E show a gain in employment for disabled-veteran, but seem inconclusive if it was at the cost of disabled non-veterans. The large increase in odds of full-time employment for a disabled veteran in the 'After' period suggests the WOTC changes perhaps provided the marginal benefit to employers needed to hire more disabled veterans. The increase in full-time employment instead of part-time is in line with the noted findings from Heaton.

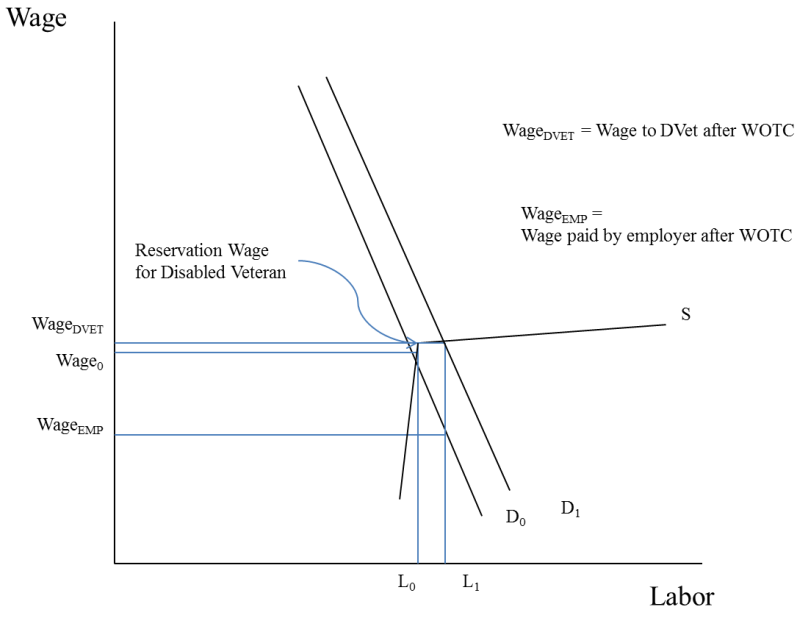
3.6.1 Regression Analysis

Speculatively, the increase in full-time employment for DVETs may also be the point at which disabled veterans become more willing to accept a job offer. Referring back to the Veterans Disability Compensation program noted in Section 3.1, a veteran without dependents and a determined 10% disability does not receive very much compensation on a monthly basis, and thus would only need a small increase in offered wage to accept an employer's job offer. Likewise, the WOTC amount for disabled veterans does not distinguish between percentage

increments of disability, so a 10% disabled veteran garners the same credit for the employer as a 60% disabled veteran.

From Equation 3.1), the necessary accommodation cost may be exceeded by the WOTC received by the employer. Prior to VOW, the WOTC credit difference to the employer for hiring a disabled veteran over non-disabled non-veteran target group member was $300 to $2400 in most cases over a one-year period. After VOW, the difference became at least $2400 and up to $9600, apparently creating a condition much more favorable to the disabled veteran in the Trade industry versus the general economy. The weekly wage results from Table 3.8 suggest stagnant wages in both periods of the study for disabled veterans. As a result, the employer should expect to capture the vast majority of the benefit from the WOTC, with only a small marginal increase in wage to the disabled veteran, but just enough to surpass the reservation wage and enter the employed category. This concept is depicted in Figure 3.1, where the employer demand curve moves out from equilibrium with an inelastic disabled veteran labor supply curve, beyond the reservation wage, and to an elastic supply curve.

Figure 3.1: Change in Wage Received and Wage Paid for Disabled Veterans



The distance between $Wage_0$ and $Wage_{EMP}$ represents what would be considered windfall profit to the employer. However, since the WOTC is only paid out once per hire, the windfall profit would be reduced each year by the difference between $Wage_{DVET}$ and $Wage_0$. In order for the employer to maintain the separation between $Wage_0$ and $Wage_{EMP}$, a new employee would need to be hired each year. Or, the employer could invest in the DVET to reduce exposure to labor turnover costs by keeping the wage to the DVET above the reservation wage.

3.7 Conclusions and Analysis

The Work Opportunity Tax Credit was extended through the American Tax Payer Relief Act of 2012, continuing a credit to employers who hire targeted veterans within their first five years of discharge from active service. The ATPRA also brings back the WOTC for targeted non-veteran groups. This study uses a difference-in-different approach with data from extension of the WOTC for veterans through the Vow to Hire Heros Act of 2011, but also removal for non-veteran groups, to estimate the impact this will have on earnings and employment of veterans and non-veterans according to disability status, creating four response groups. Each group is also evaluated with its educational attainment level to better narrow down those who will be affected by the WOTC extension. Additionally, estimations are narrowed to the retail and wholesale trade industry (Trade) and evaluated to estimate the effect Walmart will have on its announced efforts to hire recently discharged veterans.

Estimation results show an inherent hierarchy of earnings and employment according to veteran status, disability status and education level, as expected. For those with a high school education or less, the disabled earn less and are less-employed than the non-disabled. And, veterans earn and work more than their non-veteran counterparts. These tendencies diminish as

education increases. However, the regression results show clear evidence of two different labor market equilibriums, one for the non-disabled and one for the disabled, at each level of education.

In the general economy, increases for non-disabled veterans in the underemployment level between 20 and 31 hours per week, with growth in weekly income rates outpacing those of non-veterans occurred when the WOTC became eligible only for veterans. Disabled-veterans at the associate's degree education level also increased income and employment as a result of WOTC changes, but some of these gains may have come from disabled non-veterans.

Some potential of unintended consequences from VOW become apparent after review of regression results. The increases of employment of non-disabled veterans through the *underemployed* category may be an example of some games between veterans and employers, where a Nash equilibrium is reached. The WOTC is provided to employers based the number of hours the veteran works, with the maximum benefit reached at 400 hours. Veterans returning from service may need to establish civilian employment history, and earn a little income, while looking for a full-time job or attending college. If a windfall to the employer occurred, this is the situation where it could be most likely to have happened. At 40 hours per week, the 400 hour limit is reached in ten weeks with one employee. However, if the employer hires two veterans, each to work 20 hours per week (fitting the underemployed category), the employer has two opportunities hit the 400 hour limit within a 12 month period, and receive two credits. Since the WOTC would trigger hiring for employers who are at the margin of the hiring decision, reasonably only one full-time employee is needed. In this scenario, the first credit could take the employer to the point where marginal cost is equal to marginal benefit. The second credit would

then be windfall profit. Empirical evidence from this study and much of the existing literature indicate this scenario does not occur often, or at least not intentionally.

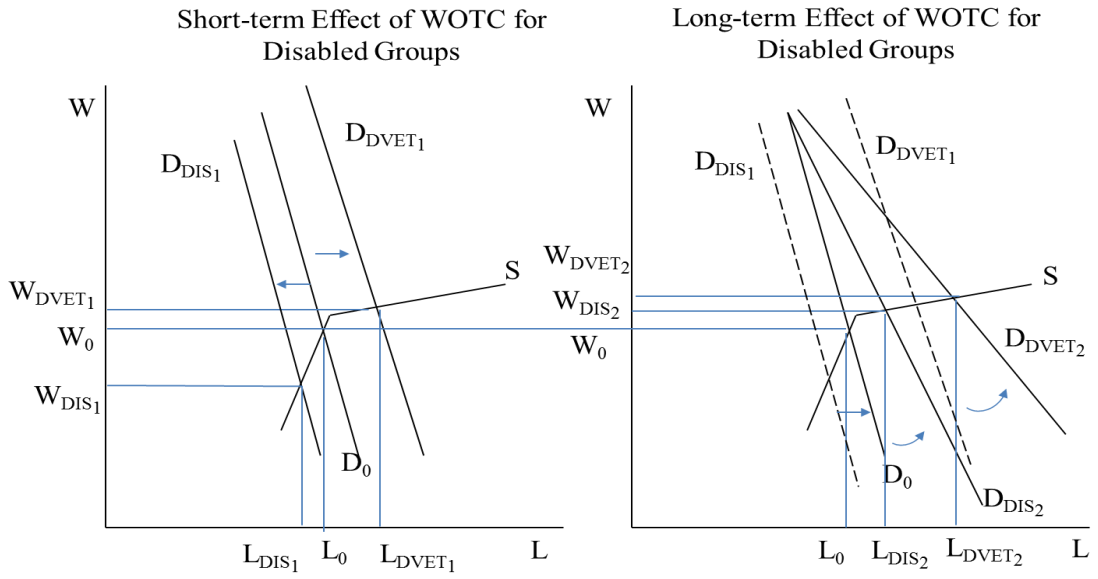
Of course, if this was happening, it was probably already happening before VOW. Hamersma (2010) noted evidence employers may act differently to retain WOTC employees who near the 400 hour maximization point for the credit. However, she also notes employers do not seem to have much influence over maximizing the available credit because that is more influenced by the individual employee. Much of the literature regarding employee retention agrees with Hamersma and indicates the employee has more influence over the windfall to the employer by choosing to show up for work or not. The changes from VOW would have simply decreased whatever influence employers had to only those who hire veterans, thus creating a more favorable situation for veterans versus non-veterans. The passage of ATPRA brings back the credit for non-veterans, at an equal or lesser value. This should move the relative demand for veterans back toward that of the non-veteran.

The Trade industry follows much the same initial patterns of the general economy for employment and earnings. Differences of wages for each evaluated group are estimated near zero, but disabled-veterans appear to have gained full-time employment after the WOTC changes. This finding is in line with Heaton (2012). The difference in this study is the evidence some of the gains may have come from employment of the disabled non-veteran, not through hourly wage increases. Nominally, the changes are small, so no noticeable changes in the labor market as a whole should be expected, but some changes in labor equilibrium should be expected for the two disabled groups.

The apparent decrease in employment for disabled non-veterans should be considered a negative unintended consequence in the short-term, but may also have positive results in the

long-term. Again referring back to the profit maximization considered in Equation 3.1), the employer will not differentiate between disabled and non-disabled employees provided accommodations can bring the disabled up to the productivity levels of the non-disabled. In the Trade industry, the WOTC may provide enough coverage of accommodation costs to incentivize employers enough to make the accommodations for disabled-veterans. Since the WOTC is a one-time credit per hire, the benefit to the employer may not come through the credit itself, but from the capital asset used to accommodate the disabled-veteran and bring her up to par with the non-disabled. This accommodating asset, presumably, could then also be used by others who are disabled, whether veteran or not. This is depicted below where the disabled applicant has a similarly increased reservation wage due to the SSDI program as the disabled-veteran with the Disability Compensation program.

Figure 3.2: Short-term and Long-term Potential Effects



Both the disabled-veterans and the disabled can initially be on the same labor supply curve, S. Both the disabled and the disabled-veteran start atW_0, where the equilibrium wage intersects with an inelastic labor supply curve, and employer demand D_0. After VOW, the demand curve

for disabled-veterans may initially shift right relative to the disabled, and over the reservation wage, taking the DVET to an increased W_{DVET1} at an increased labor rate, L_{DVET1}. The disabled, however, has the opposite reaction resulting at a lower wage and labor rate.

This is the short-term same scenario depicted in Section 3.5. However, if the employer uses the WOTC to purchase an accommodating asset, then she will be able to offer an increased wage to disabled employees due to increased productivity. In other words, her demand curve will rotate up and become more elastic. Thus, the DVET will benefit from a shift out and a reorientation of the supply and demand elasticity relation, arriving at an increased equilibrium wage and labor amount. The shift out is the veteran effect. The reorientation is the accommodation effect. The shift out depends on the continued extension of the WOTC, but the accommodation effect would hold as long as the accommodating asset is viable.

A disabled non-veteran should also see a benefit from the employer's newly oriented demand curve as well. The return of the WOTC through the ATPRA moves the disabled back to the original demand curve of D_0. The accommodating asset allows for the employer to accept an increased wage to the disabled because the accommodation is already in place from hiring the disabled-veteran. Both disabled groups arrive at a wage and labor rate above the reservation wage.

For the individual employer, this may require the DVET to be hired, transition away from the company, and then be replaced by a DIS. However, an employer who runs multiple shifts would be able to employ both the DVET and DIS concurrently. Theoretically, according to Equation 3.1), the disabled applicant could actually compete with the non-disabled applicant and enter the higher paying non-disabled labor market.

Analysis of the general economy in this study indicates veterans may have benefited from the WOTC with increases in part-time employment while non-veterans were not eligible for the WOTC. Disabled veterans may have found benefit in the retail and wholesale trade industry during this same time, with full employment. The return of the WOTC through ATPRA for non-veteran groups would apparently reduce these relative benefits. Walmart's commitment to hire veterans has drawn mixed reviews in the media, but its committed actions would apparently be beneficial to veterans beyond what itself would receive through the WOTC. If Walmart is representative of the 'Trade' industry, it was apparently already a particularly beneficial channel for disabled veterans and potentially disabled non-veterans, before its announced commitment.

This does not mean Walmart is not set up for a windfall profit via the WOTC, in fact it apparently has opportunities beyond just hiring veterans. Walmart may have the opportunity to gain from disabled non-veterans who are indirectly more productive due to VOW and now re-eligible for the WOTC through ATPRA. It may be the windfall comes indirectly through increased productivity, rather than a direct tax credit.

The WOTC has been in place to encourage employers to hire from targeted groups since 1996. Several studies have taken various angles of the WOTC. However, much of the literature eventually concludes with a speculation involving some sort of game between the employer and employee regarding the reservation wage and employee retention. Much of the literature shows employers do not necessarily react to the incentive, let alone benefit from it, because of the turnover from WOTC eligible employees. Windfalls from the WOTC seem more determined by legislation altering the reservation wage, such as unemployment insurance extension, than a direct consequence of WOTC changes. Referring back to Gunderson and Hotchkiss (2007), roughly one-third of WOTC eligible employees separated from the company within 20 days, or

within 100 hours, well under the 120 hours necessary for the employer to receive any benefit from the WOTC. Roughly 90% of the WOTC eligible employees terminated employment before the 400 hour maximization point[22]. The GAO survey (2001) reported average hiring costs to the employer for a WOTC eligible employee at $3800, and under $3300 for the non-eligible WOTC employee. Even if those costs to hire were halved, combined with the Gunderson and Hotchkiss findings, it would still likely be a questionable business practice for the employer to attempt to hire with much emphasis on the WOTC.

This study's contribution may be the speculative finding, with reasonable evidence to support profit maximization theory, employers will react to the more productive employee, not the temporarily lower wage. In order to make use of the WOTC funding, it may be a better policy to direct the funding to the employer in the form of a credit for work place accommodations, and to the employee in the form of a tax credit for remaining employed.

[22] Refer to Figure 1, page 324 of Gunderson and Hotchkiss (2007). Hour estimations based on 5-hour workday.

Table 3.1: Work Opportunity Tax Credit Summary

Target Groups & Wages	2011 ARRA Maximum Tax Credits 120 Hours Worked	2011 ARRA Maximum Tax Credits 400 Hours Worked	2012 VOW Maximum Tax Credits 120 Hours Worked	2012 VOW Maximum Tax Credits 400 Hours Worked	2013 ATPRA Maximum Tax Credits 120 Hours Worked	2013 ATPRA Maximum Tax Credits 400 Hours Worked
Veteran Receiving SNAP	$1,500	$2,400	$1,500	$2,400	$1,500	$2,400
Disabled Veteran hired within 1 year of discharge [a]	$0	$0	$3,000	$4,800	$3,000	$4,800
Disabled Veteran unemployed 6 months	$3,000	$4,800	$6,000	$9,600	$6,000	$9,600
Veteran unemployed 4 weeks	$1,500	$2,400	$1,500	$2,400	$1,500	$2,400
Veteran unemployed 6 months [a]	$0	$0	$3,500	$5,600	$3,500	$5,600
Short-Term TANF Recipient	$1,500	$2,400	$0	$0	$1,500	$2,400
Long-Term TANF Recipient	$5,625	$9,000 (over 2 yrs)	$0	$0	$5,625	$9,000 (over 2 yrs)
SNAP (food stamp) Recipient	$1,500	$2,400	$0	$0	$1,500	$2,400
Designated Community Resident	$1,500	$2,400	$0	$0	$1,500	$2,400
Vocational Rehabilitation Referral	$1,500	$2,400	$0	$0	$1,500	$2,400
Ex-Felon	$1,500	$2,400	$0	$0	$1,500	$2,400
SSI Recipient	$1,500	$2,400	$0	$0	$1,500	$2,400

Veteran:

- A member of a family that received Supplemental Nutrition Assistance Program (SNAP) benefits (food stamps) for at least a 3-month period during the 15-month period ending on the hiring date, **or**
- Entitled to compensation for a service-connected disability hired within one year of discharge or release from active duty, ***or***
- Entitled to compensation for a service-connected disability and unemployed for a period or periods totaling at least 6 months of the year ending on the hiring date, ***or***
- Unemployed for at least 4 weeks (but less than 6 months) during the one year period ending on the hiring date, ***or***
- Unemployed for at least 6 months during the one year period ending on the hiring date.

Source: http://www.doleta.gov/business/incentives/opptax/benefits.cfm
Source: http://www.doleta.gov/business/incentives/opptax/PDF/veterans_fact_sheet12_1_2011.pdf
Source: http://www.irs.gov/Businesses/Small-Businesses-&-Self-Employed/
[a] Source: Public Law 112-56 (Vow to Hire Heros Act)

Table 3.2: Demographic Variable Summary

	Independent Variables Code		Description	Mean	Std. Dev.
Demographic	AGE	Age	Years beyond the age of 24 Min: 1 = 25 year-old, Max: 31 = 55 year-old	16.5	9.022
	RACE	Race	1 = White only, 0 = Non White only	0.811	0.391
	SEX	Gender	1 = Male, 0 = Female	0.484	0.500
Industry Sector	INDUS	Industrial	1 = Respondent employed in Agriculture, Forestry, Fishing, Hunting, Mining, Construction, Manufacturing, Transportation or Utilities, 0 = Otherwise	0.250	0.433
	TRADE	Trade	1 = Respondent employed in Wholesale or Retail Trade, 0 = Otherwise	0.126	0.332
	INFO	Information	1 = Respondent employed in Information services, 0 = Otherwise	0.023	0.151
	PRFSNL	Professional	1 = Respondent employed in Financial, Professional/Business services, Education or Health services, 0 = Otherwise	0.426	0.495
	SRVCES	Services	1 = Respondent employed in leisure, hospitality or other services, 0 = Otherwise	0.118	0.323
	PUBADM	Public Administration	1 = Respondent employed in Public Administration, 0 = Otherwise	0.056	0.230
Geographic	NRTH	Northeast Region	Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania	0.199	0.400
	MIDW	MidWest Region	Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas	0.232	0.422
	SOTH	Southern Region	Deleware, Maryland, Washington D.C, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, Texas	0.315	0.465
	WEST	Western Region	Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, Hawaii	0.253	0.435

Employment and Sector Average and Standard Deviation based on those employed

Table 3.3: Educational Summary

Group		Associate	Bachelors	Graduate	No Degree	Total
Disabled Veterans	Frequency	459	301	132	2,187	3,079
	Percent	0.1%	0.1%	0.0%	0.4%	0.6%
	Row Pct	14.9%	9.8%	4.3%	71.0%	0.0%
	Col Pct	0.8%	0.2%	0.2%	0.7%	0.0%
Disabled	Frequency	3,196	3,372	1,347	26,528	34,443
	Percent	0.6%	0.6%	0.2%	4.8%	6.2%
	Row Pct	9.3%	9.8%	3.9%	77.0%	0.0%
	Col Pct	5.4%	2.7%	2.2%	8.5%	0.0%
Non Disabled	Frequency	52,133	114,798	57,275	266,047	490,253
	Percent	9.4%	20.7%	10.3%	48.0%	88.4%
	Row Pct	10.6%	23.4%	11.7%	54.3%	0.0%
	Col Pct	87.4%	93.3%	93.8%	85.5%	0.0%
Veteran	Frequency	3,853	4,548	2,330	16,383	27,114
	Percent	0.7%	0.8%	0.4%	3.0%	4.9%
	Row Pct	14.2%	16.8%	8.6%	60.4%	0.0%
	Col Pct	6.5%	3.7%	3.8%	5.3%	0.0%
Total		59,641	123,019	61,084	311,145	554,889
		10.8%	22.2%	11.0%	56.1%	100.0%

Table 3.4A: Disabled Veteran Employment and Earnings

Educ	Period	Obs	Variable	N	Mean	Std Dev	Median	Min	Max
Associate	After	256	HrWage	15	19.01	9.62	18.55	2.13	40
			WkWage	19	934.26	514.22	740	316.66	2045
			USLHRS	204	16.73	20.56	0	0	82
	Before	203	HrWage	13	17.33	6.56	17.5	8.25	28.75
			WkWage	20	765.93	423.05	681	247.5	1880
			USLHRS	166	17.87	21.68	0	0	90
Bachelors	After	145	HrWage	9	15.21	6.6	15	8.5	29.27
			WkWage	18	1025.69	774.96	961.53	32	2884.61
			USLHRS	119	23.15	19.78	30	0	80
	Before	156	HrWage	7	26.64	16.5	24.5	9.72	60
			WkWage	15	1400.76	885.95	1192	388.8	2884.61
			USLHRS	115	21.58	23.22	15	0	90
Graduate	After	69	HrWage	4	41.53	22.86	37	20	72.12
			WkWage	10	1404.6	916.22	1204.61	106	2884.61
			USLHRS	60	27.48	21.81	40	0	70
	Before	63	HrWage	0	.	.	.	.	.
			WkWage	8	1612.11	821.37	1634.46	438.46	2884.61
			USLHRS	57	25.58	22.52	40	0	60
No Degree	After	1078	HrWage	48	16.3	6.73	15.75	7.25	36.65
			WkWage	72	756.05	382.3	696	43.5	1865.38
			USLHRS	895	12.67	19.87	0	0	99
	Before	1109	HrWage	55	18.63	8.44	16	7	53
			WkWage	63	812.41	556.8	694.4	8	2884.61
			USLHRS	910	12.57	20.2	0	0	99

Table 3.4B: Disabled Employment and Earnings

Educ	Period	Obs	Variable	N	Mean	Std Dev	Median	Min	Max
Associate	After	1572	HrWage	105	15.88	7.65	13.97	3.01	45.75
			WkWage	138	683.09	486.47	600	19	2884.61
			USLHRS	1289	15.55	20.14	0	0	99
	Before	1624	HrWage	114	16.47	9.16	13.68	6	51.15
			WkWage	151	624.2	452.98	550	9.23	2307
			USLHRS	1360	15.83	19.61	0	0	99
Bachelors	After	1592	HrWage	85	19.78	12.92	15.75	2.35	72.12
			WkWage	192	1003.73	675.57	820.26	40	2884.61
			USLHRS	1258	21.09	21.41	18.5	0	91
	Before	1780	HrWage	91	19.96	12.76	15.15	7	77
			WkWage	195	982.8	702.81	843.75	0.23	2884.61
			USLHRS	1441	21.94	21.11	25	0	99
Graduate	After	681	HrWage	25	23.74	15.7	18	7.5	70
			WkWage	89	1114.5	716.14	961.53	30	2884.61
			USLHRS	563	26.03	20.95	35	0	80
	Before	666	HrWage	26	27.93	15.63	25.88	7.5	69
			WkWage	106	1223.08	722.89	1109.4	120	2884.61
			USLHRS	558	27.49	21.23	40	0	80
No Degree	After	13060	HrWage	567	13.2	6.59	11.25	1	65
			WkWage	743	554.96	412.15	480	0.23	2884.61
			USLHRS	10857	9.86	17.1	0	0	99
	Before	13468	HrWage	594	13.06	5.95	11.35	2.1	52
			WkWage	784	542.38	395	480	1	2884.61
			USLHRS	11239	10.25	17.61	0	0	99

Table 3.4C: Non-Disabled Employment and Earnings

Educ	Period	Obs	Variable	N	Mean	Std Dev	Median	Min	Max
Associate	After	25899	HrWage	3274	17.91	8.43	15.78	2.11	72.12
			WkWage	4949	807.17	476.22	708	0.03	2885
			USLHRS	22108	36.35	13.92	40	0	99
	Before	26234	HrWage	3484	17.89	8.75	15.8	2.13	96.15
			WkWage	5114	801.89	493.03	692.3	5.76	2885
			USLHRS	22330	36.34	13.58	40	0	99
Bachelors	After	57532	HrWage	3964	20.8	12.12	17.5	1.01	99
			WkWage	11075	1116.28	677.98	961.53	0.01	2885
			USLHRS	48295	38.67	12.89	40	0	99
	Before	57266	HrWage	3838	20.51	11.91	17.5	1.15	99
			WkWage	10892	1104.49	668.19	961	0.01	2885
			USLHRS	47936	38.48	13.3	40	0	99
Graduate	After	28893	HrWage	1118	27.89	16.74	23.81	4.29	99.99
			WkWage	5860	1406.96	742.1	1250	0.01	2885
			USLHRS	25313	40.81	12.88	40	0	99
	Before	28382	HrWage	1039	26.19	16.09	22	2.17	99.99
			WkWage	5681	1372.54	730.62	1211.53	0.01	2885
			USLHRS	24690	40.6	13	40	0	99
No Degree	After	130600	HrWage	15627	14.72	6.94	13	1.01	98.85
			WkWage	21835	680.3	442.71	576.92	0.01	2885
			USLHRS	103034	33.98	16.46	40	0	99
	Before	135447	HrWage	16230	14.6	7.08	13	1	99
			WkWage	22545	656.31	424.83	560	0.01	2885
			USLHRS	107023	33.47	16.58	40	0	99

Table 3.4D: Veteran Employment and Earnings

Educ	Period	Obs	Variable	N	Mean	Std Dev	Median	Min	Max
Associate	After	1930	HrWage	239	20.03	8.9	18	6	58
			WkWage	381	978.2	529.14	900	99	2885
			USLHRS	1688	38.38	14.81	40	0	96
	Before	1923	HrWage	242	21.42	10.97	19	2.34	82
			WkWage	383	973.74	537.2	900	100	2885
			USLHRS	1680	38.08	14.02	40	0	99
Bachelors	After	2194	HrWage	148	22.78	11.52	20	3.65	68
			WkWage	422	1312.42	685.68	1153.84	38.46	2885
			USLHRS	1877	39.05	13.85	40	0	99
	Before	2354	HrWage	180	22.46	12.52	20	1	72.12
			WkWage	501	1283.06	707.99	1145.83	1	2884.61
			USLHRS	2069	39.76	13.63	40	0	99
Graduate	After	1194	HrWage	56	30.78	18.44	27	8.35	99
			WkWage	253	1622.75	751.89	1509.61	0.01	2885
			USLHRS	1099	41.75	13.52	40	0	80
	Before	1136	HrWage	45	30.64	18.69	25.15	7	90
			WkWage	233	1617.55	719.07	1538.46	9	2885
			USLHRS	1017	41.81	13.63	40	0	99
No Degree	After	7979	HrWage	978	18.11	8.59	16.5	2.17	90
			WkWage	1451	912.81	525.9	800	0.01	2885
			USLHRS	6796	36.89	16.87	40	0	99
	Before	8404	HrWage	1069	18.05	8.68	16.51	2.1	99.99
			WkWage	1557	849.73	481.87	750	20	2885
			USLHRS	7208	35.51	17.24	40	0	99

Table 3.5: Model Fit Criteria

Hourly Wage	Model Distribution Assumption			
N = 53,289	Normal	Log Normal	Gamma	Negative Binomial
Deviance	3,721,363	3,701,695	9,745	51,831
Scaled Deviance	53,289	53,289	54,862	51,831
Pearson Chi-Square	3,721,363	3,701,695	11,468	61,889
Scaled Pearson χ^2	53,289	53,289	64,562	61,889
Log Likelihood	-188,749	-188,608	-174,657	1,681,416
Full Log Likelihood	-188,749	-188,608	-174,657	-175,875
AIC (smaller is better)	377,595	377,302	349,399	351,835
AICC (smaller is better)	377,595	377,303	349,399	351,835
BIC (smaller is better)	378,021	377,684	349,781	352,217

Weekly Wage	Model Distribution Assumption			
N = 95,755	Normal	Log Normal	Gamma	Negative Binomial
Deviance	25,756,542,240	25,469,200,992	33,236	101,173
Scaled Deviance	95,755	95,755	100,955	101,173
Pearson Chi-Square	25,756,542,240	25,469,200,992	31,881	98,103
Scaled Pearson χ^2	95,755	95,755	96,838	98,103
Log Likelihood	-734,454	-733,917	-715,357	512,619,943
Full Log Likelihood	-734,454	-733,917	-715,357	-715,022
AIC (smaller is better)	1,468,997	1,467,923	1,430,802	1,430,132
AICC (smaller is better)	1,468,997	1,467,923	1,430,802	1,430,132
BIC (smaller is better)	1,469,414	1,468,339	1,431,219	1,430,549

Employment Category N = 457,926	Intercept Only	Baseline Logit	Cumulative Logit	Cumulative Probit	Ordered Logit
AIC	1,086,164	1,015,220	1,039,500	1,039,269	1,023,461
SC	1,086,197	1,016,494	1,039,946	1,039,716	1,023,975
-2 Log L	1,086,158	1,014,992	1,039,420	1,039,189	1,023,369

Table 3.6: Wage and Employment Differences Summary

Panel A: Hourly Income Summary

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	$9.19	$9.19	$11.21	$11.21	$12.99	$12.99	$16.22	$17.18
DisVeteran	$10.39	$10.39	$9.31	$9.31	$12.67	$9.07	$18.32	$19.41
Disabled	$8.20	$8.20	$10.00	$10.00	$11.59	$11.59	$17.36	$14.21
Veteran	$10.02	$10.02	$12.22	$11.21	$12.55	$12.55	$17.68	$18.73

Panel B: Weekly Income Summary

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	$392	$408	$491	$510	$668	$694	$822	$854
DisVeteran	$392	$408	$358	$372	$668	$694	$822	$854
Disabled	$316	$328	$396	$346	$538	$559	$662	$662
Veteran	$428	$445	$536	$531	$655	$680	$816	$847

Panel C: Binary Odds of Employment

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	1.06	1.06	1.92	1.92	1.92	1.92	2.61	2.74
DisVeteran	0.13	0.13	0.24	0.24	0.24	0.24	0.32	0.34
Disabled	0.14	0.13	0.26	0.24	0.41	0.39	0.64	0.67
Veteran	1.06	1.06	1.92	1.66	1.92	1.45	2.61	2.74

Panel D: Odds UnderEmployed Compared to Unemployed Summary

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	0.16	0.16	0.26	0.26	0.20	0.20	0.25	0.25
DisVeteran	0.03	0.03	0.10	0.10	0.03	0.03	0.04	0.04
Disabled	0.04	0.04	0.07	0.07	0.05	0.05	0.10	0.10
Veteran	0.12	0.15	0.19	0.23	0.15	0.18	0.19	0.22

Panel E: Odds Employed Compared to Unemployed Summary

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	0.91	0.91	1.66	1.66	1.58	1.64	1.98	2.09
DisVeteran	0.11	0.11	0.20	0.20	0.19	0.20	0.24	0.26
Disabled	0.11	0.11	0.21	0.19	0.34	0.32	0.45	0.44
Veteran	1.00	1.00	1.56	1.56	1.72	1.36	1.68	1.77

Panel F: Odds OverEmployed Compared to Unemployed Summary

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	0.02	0.02	0.03	0.04	0.05	0.05	0.09	0.11
DisVeteran	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02
Disabled	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01
Veteran	0.02	0.02	0.03	0.04	0.04	0.02	0.06	0.07

Table 3.7: Trade Industry Wage Distributions Fit

Hourly Wage	Model Distribution Assumption			
N = 7708	Normal	Log Normal	Gamma	Negative Binomial
Deviance	331,568	331,963	1,132	7,189
Scaled Deviance	7,708	7,708	7,892	7,189
Pearson Chi-Square	331,568	331,963	1,493	9,457
Scaled Pearson χ^2	7,708	7,708	10,410	9,457
Log Likelihood	-25,434	-25,439	-23,190	175,409
Full Log Likelihood	-25,434	-25,439	-23,190	-23,531
AIC (smaller is better)	50,943	50,952	46,466	47,136
AICC (smaller is better)	50,943	50,952	46,467	47,136
BIC (smaller is better)	51,200	51,209	46,765	47,393

Weekly Wage	Model Distribution Assumption			
N = 12,373	Normal	Log Normal	Gamma	Negative Binomial
Deviance	3,093,923,175	3,052,102,695	4,822	13,126
Scaled Deviance	12,373	12,373	13,121	13,126
Pearson Chi-Square	3,093,923,175	3,052,102,695	4,845	13,254
Scaled Pearson χ^2	12,373	12,373	13,183	13,254
Log Likelihood	-94,451	-94,367	-91,009	55,077,843
Full Log Likelihood	-94,451	-94,367	-91,009	-90,996
AIC (smaller is better)	188,976	188,808	182,104	182,078
AICC (smaller is better)	188,977	188,808	182,105	182,078
BIC (smaller is better)	189,251	189,083	182,424	182,397

Employment Category N = 54,078	Intercept Only	Baseline Logit	Cumulative Logit	Cumulative Probit	Ordered Logit
AIC	109,125	104,647	108,135	108,114	105,929
SC	109,152	105,768	108,527	108,506	106,320
-2 Log L	109,119	104,395	108,047	108,026	105,841

Table 3.8: Trade Industry Wage and Employment Differences Summary

Panel A: Hourly Income Summary

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	$9.92	$9.92	$10.51	$10.51	$11.84	$11.84	$15.32	$15.32
DisVeteran	$9.92	$9.92	$10.51	$28.13	$11.84	$11.84	$15.32	$15.32
Disabled	$8.65	$8.65	$8.65	$8.65	$10.32	$6.44	$6.96	$6.96
Veteran	$9.92	$9.92	$10.51	$10.51	$11.84	$11.84	$15.32	$15.32

Panel B: Weekly Income Summary

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	$363.29	$363.29	$414.76	$414.76	$619.93	$619.93	$778.99	$778.99
DisVeteran	$363.29	$363.29	$414.76	$414.76	$619.93	$619.93	$778.99	$778.99
Disabled	$255.83	$255.83	$292.07	$292.07	$604.20	$604.20	$158.44	$158.44
Veteran	$363.29	$363.29	$414.76	$414.76	$619.93	$619.93	$778.99	$778.99

Panel C: Binary Odds of Employment

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	2.46	2.46	3.19	2.69	3.46	3.46	3.35	3.35
DisVeteran	0.43	1.62	0.55	1.77	0.60	0.41	0.58	2.20
Disabled	0.96	0.96	1.25	1.05	1.35	1.35	1.31	1.31
Veteran	2.46	2.46	3.19	2.69	3.46	1.27	3.35	3.35

Panel D: Odds UnderEmployed Compared to Unemployed Summary

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	0.70	0.70	0.87	0.87	0.70	0.70	0.70	0.70
DisVeteran	0.70	0.70	0.87	0.87	0.70	0.70	0.70	0.70
Disabled	0.70	0.70	0.87	0.87	0.70	0.70	0.70	0.70
Veteran	0.47	0.47	0.59	0.59	0.47	0.47	0.47	0.47

Panel E: Odds Employed Compared to Unemployed Summary

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	1.97	1.97	2.47	2.47	2.53	2.53	2.44	2.44
DisVeteran	0.32	1.61	0.40	2.02	0.41	2.07	0.39	2.00
Disabled	0.69	0.69	0.87	0.87	0.89	0.89	0.89	0.89
Veteran	1.97	1.97	2.47	2.47	2.53	0.90	2.44	20.44

Panel F: Odds OverEmployed Compared to Unemployed Summary

	No Degree		Associates		Bachelors		Graduate	
	Before	After	Before	After	Before	After	Before	After
NonDisabled	0.03	0.03	0.05	0.05	0.09	0.09	0.08	0.08
DisVeteran	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01
Disabled	0.01	0.01	0.02	0.10	0.02	0.02	0.02	0.02
Veteran	0.03	0.03	0.04	0.04	0.06	0.06	0.06	0.06

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Appendix A:

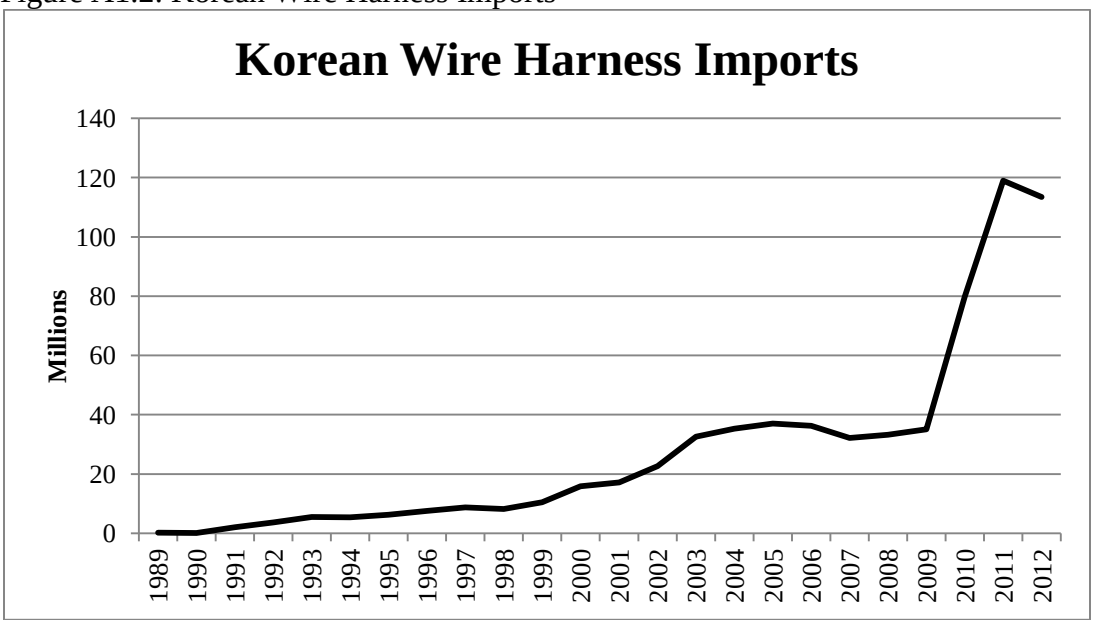
Table A1.1: Automotive Wire Harness Related HTS Codes

HTS Code	Description	Tariff
8512.20	Electrical lighting or signaling equipment (excluding articles of heading 8539), windshield wipers, defrosters and demisters, of a kind used for cycles or motor vehicles; parts thereof: Other lighting or visual signaling equipment:	
8512.20.2040	Lighting equipment: For the vehicles of subheading 8701.20 or heading 8702, 8703, 8704, 8705 or 8711	0%
8512.20.4040	Visual signaling equipment: For the vehicles of subheading 8701.20 or heading 8702, 8703, 8704, 8705 or 8711	2.5%
8544.30.0000	Ignition wiring sets and other wiring sets of a kind used in vehicles, aircraft or ships	5%^
8701.20	Road tractors for semi-trailers	
8702	Motor vehicles for the transport of ten or more persons, including the driver	
8703	Motor cars and other motor vehicles principally designed for the transport of persons (other than those of heading 8702), including station wagons and racing cars	
8704	Motor vehicles for the transport of goods	
8705	Special purpose motor vehicles, other than those principally designed for the transport of persons or goods (for example, wreckers, mobile cranes, fire fighting vehicles, concrete mixers, road sweepers, spraying vehicles, mobile workshops, mobile radiological units)	
8711	Motorcycles (including mopeds) and cycles fitted with an auxiliary motor, with or without side-cars; side-cars	

^ Increased to 5.3% in 2013

Figure A1.1: Wire Harness Example (Driver Side Door)

Figure A1.2: Korean Wire Harness Imports



Equilibrium Change:

A1) $D_K = D(P_K)$

A2) $S_K = S(P)$

A3) $P_K = P \cdot T$,
$T = 1 + \tau$, τ = Percent Tariff

A4) $D_K = S_K$

A1') $\frac{dD_K}{D_K} = \left(\frac{\delta D_K}{\delta P_K} \cdot \frac{P_K}{D_K}\right)\frac{dP_K}{P_K}$

A1'') $D_K^* = \eta P_K^*$

A2') $\frac{dS_K}{S_K} = \left(\frac{\delta S_K}{\delta P} \cdot \frac{P}{D_K}\right)\frac{dP}{P}$

A2'') $S_K^* = \varepsilon P^*$

A3') $\frac{dP_K}{P_K} = \frac{dP}{P} + \frac{dT}{T}T$

A3'') $P_K^* = P^* + T^*$

A4'') $D_K^* = S_K^*$

A5) $\eta(P^* + T^*) = \varepsilon P^*$

A6) $\varepsilon(P_K^* - T^*) = \eta P_K^*$

Importer and Exporter Surplus Changes:

P_0: \$4.10 / 100 Q_0: 119 Million

P_A: \$3.74 / 100 Q_1: 121 Million

P: \$3.36 / 100

$P_0 - P_A$ = \$0.36 / 100

$P_A - P$ = \$0.38 / 100

$Q_1 - Q_0$ = 2 Million

ΔIS = (\$0.0036*119M) + (\$0.0036*2M*0.5)

ΔIS = \$432,000

ΔES = (\$0.0038*119M) + (\$0.0038*2M*0.5)

ΔES = \$456,000

ΔWelfare = \$888,000

Appendix B:

Table B2.1: HTS Aggregation Level Example

6102	Women's or girls' overcoats, carcoats, capes, cloaks, anoraks (including ski-jackets), windbreakers and similar articles, knitted or crocheted, other than those of heading 6104:		
6102.30	Of man-made fibers:		
6102.30.05 00		Containing 25 percent or more by weight of leather (635).	5.3%
Other:			
6102.30.10 00		Containing 23 percent or more by weight of wool or fine animal hair (435).	64.4¢/kg +18.8%
6102.30.20		Other..	28.2%
		10 Women's (635).	
		20 Girls' (635).	

Table B2.2: Endogeneity Tests

	Percent Tariff		Unit Tariff	
Commodity	F Stat	Prob > F	F Stat	Prob > F
General	52.23	0.0000	8.45	0.0037
Cotton	1.50	0.2200	-	-
Animal	5.53	0.0187	3.58	0.0586

Table B2.3: Cotton Apparel by Commodity Type

Parameter	Coat	SE		Sweater	SE		T Shirt	SE	
Intercept	12.49	3.52	**	-3.87	3.47		21.44	4.04	**
lgdp	0.39	0.10	**	0.50	0.14	**	0.76	0.10	**
lgdpop	-1.37	0.17	**	-0.22	0.18		-1.47	0.17	**
LPI	0.03	0.31		-0.47	0.34		-0.38	0.38	
ldist	0.11	0.36		0.32	0.33		-1.30	0.43	**
distexcon	0.16	0.02	**	0.06	0.02	**	0.18	0.03	**
Perc	-0.18	0.03	**	-0.34	0.08	**	-0.30	0.03	**
$perc^2$	0.01	0.00	**	0.09	0.01	**	0.01	0.00	**
tradcost	0.01	0.07		-0.12	0.06		-0.40	0.07	**
ExDays	0.00	0.02		0.02	0.02		0.03	0.02	
Trade	0.21	0.04	**	0.23	0.04	**	0.04	0.06	
Y08	0.33	0.28		-0.21	0.27		0.21	0.36	
Y09	-0.09	0.29		-0.46	0.28		-0.59	0.37	
Y10	-0.50	0.29		-0.12	0.28		-0.63	0.37	
Y11	-0.29	0.29		-0.13	0.28		-0.52	0.38	
Select Intercept	-7.19	2.06	**	-4.75	2.02	*	1.23	.	.
Select lgdp	0.56	0.06	**	0.41	0.05	**	0.40	.	.
Select lgdpop	-0.54	0.08	**	-0.40	0.07	**	-0.71	0.40	
Select LPI	-0.58	0.17	**	0.16	0.16		0.22	0.43	
Select ldist	0.13	0.25		-0.19	0.22		-0.05	0.52	
Select distexcon	0.07	0.02	**	-0.01	0.01		0.00	0.10	
Select Perc	-0.09	0.02	**	0.01	0.04		-0.09	0.03	**
Select $perc^2$	0.01	0.00	**	0.01	0.01		0.00	0.00	
Select tradcost	-0.14	0.03	**	-0.05	0.03		0.02	0.10	
Select lang	-0.53	0.15	**	-0.03	0.15		0.00	0.91	
Select landlocked	0.18	0.16		0.13	0.17		0.83	1.24	
Select ExDocs	-0.18	0.04	**	-0.07	0.04		-0.40	0.33	
Select Trade	0.08	0.05		0.06	0.07		-0.16	0.06	**
N (OLS / Probit)	116 / 857			114 / 856					
AIC	3486			3413					
Sigma	2.47	0.11	**	2.09	0.09	**			
Rho	-0.75	0.10	**	-0.22	0.30				

Appendix C:

Table C3.1: Hourly Wages (Primary Control Variables)

Parameter			Estimate	SE	Pr > χ^2
Intercept			2.22	0.01	<.0001
GROUP	DisVeter		0.12	0.06	0.0324
GROUP	Disabled		-0.11	0.02	<.0001
GROUP	Veteran		0.09	0.01	<.0001
Educ	Associate		0.20	0.01	<.0001
Educ	Bachelors		0.35	0.01	<.0001
Educ	Graduate		0.57	0.01	<.0001
GROUP*Educ	DisVeter	Associate	-0.31	0.13	0.0179
GROUP*Educ	DisVeter	Bachelors	0.04	0.17	0.8122
GROUP*Educ	DisVeter	Graduate	0.25	0.22	0.2511
GROUP*Educ	Disabled	Associate	0.01	0.04	0.8272
GROUP*Educ	Disabled	Bachelors	0.07	0.05	0.1712
GROUP*Educ	Disabled	Graduate	0.18	0.09	0.0328
GROUP*Educ	Veteran	Associate	-0.01	0.03	0.7583
GROUP*Educ	Veteran	Bachelors	-0.12	0.03	0.0005
GROUP*Educ	Veteran	Graduate	-0.06	0.07	0.3675
WOTC			0.02	0.02	0.1119
WOTC*GROUP	DisVeter		-0.14	0.08	0.085
WOTC*GROUP	Disabled		0.00	0.03	0.9841
WOTC*GROUP	Veteran		0.00	0.02	0.9778
WOTC*Educ	Associate		0.00	0.01	0.6757
WOTC*Educ	Bachelors		0.01	0.01	0.3108
WOTC*Educ	Graduate		0.06	0.02	0.0026
WOTC*GROUP*Educ	DisVeter	Associate	0.28	0.18	0.1255
WOTC*GROUP*Educ	DisVeter	Bachelors	-0.48	0.23	0.035
WOTC*GROUP*Educ	DisVeter	Graduate	0.00	0.00	.
WOTC*GROUP*Educ	Disabled	Associate	-0.04	0.06	0.5508
WOTC*GROUP*Educ	Disabled	Bachelors	-0.04	0.07	0.5282
WOTC*GROUP*Educ	Disabled	Graduate	-0.26	0.12	0.0345
WOTC*GROUP*Educ	Veteran	Associate	-0.09	0.04	0.0503
WOTC*GROUP*Educ	Veteran	Bachelors	-0.02	0.05	0.731
WOTC*GROUP*Educ	Veteran	Graduate	-0.05	0.09	0.5546

Table C3.1 Hourly Wages (Secondary Control Variables)

Parameter		Estimate	SE	Pr > χ^2
WOTC*Sector	Industrial	-0.03	0.01	0.0127
WOTC*Sector	Informatio	0.00	0.03	0.8842
WOTC*Sector	Profession	-0.01	0.01	0.2498
WOTC*Sector	PublicAdm	0.00	0.02	0.8909
WOTC*Sector	Services	-0.02	0.01	0.1025
AGE		0.01	0.00	<.0001
WOTC*AGE		0.00	0.00	0.7045
RACE		0.06	0.01	<.0001
WOTC*RACE		-0.01	0.01	0.1289
SEX		0.16	0.01	<.0001
WOTC*SEX		0.02	0.01	0.0307
Region	Midwe	0.02	0.01	0.0026
Region	North	0.09	0.01	<.0001
Region	West	0.09	0.01	<.0001
WOTC*Region	Midwe	0.00	0.01	0.9337
WOTC*Region	North	-0.01	0.01	0.3515
WOTC*Region	West	0.02	0.01	0.0555

Table C3.2: Weekly Wages (Primary Control Variables)

Parameter			Estimate	SE	$Pr > \chi^2$
Intercept			5.97	0.01	<.0001
GROUP	DisVeter		0.03	0.07	0.7009
GROUP	Disabled		-0.22	0.02	<.0001
GROUP	Veteran		0.09	0.02	<.0001
Educ	Associate		0.22	0.01	<.0001
Educ	Bachelors		0.53	0.01	<.0001
Educ	Graduate		0.74	0.01	<.0001
GROUP*Educ	DisVeter	Associate	-0.32	0.15	0.031
GROUP*Educ	DisVeter	Bachelors	0.06	0.16	0.7013
GROUP*Educ	DisVeter	Graduate	0.01	0.21	0.9448
GROUP*Educ	Disabled	Associate	-0.09	0.05	0.0758
GROUP*Educ	Disabled	Bachelors	0.06	0.05	0.1657
GROUP*Educ	Disabled	Graduate	0.06	0.06	0.3094
GROUP*Educ	Veteran	Associate	-0.07	0.03	0.0407
GROUP*Educ	Veteran	Bachelors	-0.11	0.03	0.0003
GROUP*Educ	Veteran	Graduate	-0.09	0.04	0.0209
WOTC			0.04	0.02	0.0197
WOTC*GROUP	DisVeter		-0.13	0.10	0.1748
WOTC*GROUP	Disabled		-0.01	0.03	0.7829
WOTC*GROUP	Veteran		0.03	0.02	0.1251
WOTC*Educ	Associate		-0.02	0.01	0.0617
WOTC*Educ	Bachelors		-0.02	0.01	0.0699
WOTC*Educ	Graduate		-0.01	0.01	0.6049
WOTC*GROUP*Educ	DisVeter	Associate	0.38	0.21	0.0704
WOTC*GROUP*Educ	DisVeter	Bachelors	-0.31	0.22	0.1658
WOTC*GROUP*Educ	DisVeter	Graduate	-0.13	0.29	0.6572
WOTC*GROUP*Educ	Disabled	Associate	0.11	0.07	0.1491
WOTC*GROUP*Educ	Disabled	Bachelors	0.01	0.07	0.8853
WOTC*GROUP*Educ	Disabled	Graduate	-0.09	0.09	0.3050
WOTC*GROUP*Educ	Veteran	Associate	-0.05	0.05	0.3119
WOTC*GROUP*Educ	Veteran	Bachelors	-0.03	0.04	0.4776
WOTC*GROUP*Educ	Veteran	Graduate	-0.05	0.06	0.3928

Table C32: Weekly Wages (Secondary Control Variables)

Parameter		Estimate	SE	$Pr > \chi^2$
Sector	Industrial	0.16	0.01	<.0001
Sector	Informatio	0.22	0.02	<.0001
Sector	Profession	0.09	0.01	<.0001
Sector	PublicAdm	0.21	0.01	<.0001
Sector	Services	-0.16	0.01	<.0001
WOTC*Sector	Industrial	-0.01	0.01	0.5932
WOTC*Sector	Informatio	-0.01	0.03	0.5843
WOTC*Sector	Profession	-0.01	0.01	0.3659
WOTC*Sector	PublicAdm	-0.02	0.02	0.3398
WOTC*Sector	Services	-0.03	0.02	0.0954
AGE		0.01	0.00	<.0001
WOTC*AGE		0.00	0.00	0.4711
RACE		0.08	0.01	<.0001
WOTC*RACE		-0.01	0.01	0.5203
SEX		0.31	0.01	<.0001
WOTC*SEX		0.00	0.01	0.5488
Region	Midwe	-0.04	0.01	<.0001
Region	North	0.05	0.01	<.0001
Region	West	0.03	0.01	<.0001
WOTC*Region	Midwe	0.00	0.01	0.7536
WOTC*Region	North	-0.01	0.01	0.4052
WOTC*Region	West	0.02	0.01	0.1158

Table C3.3: Binary Unemployment (Primary Control Variables)

Parameter			Estimate	SE	$Pr > \chi^2$
Intercept			0.05	0.01	0.0001
GROUP	DisVeter		-2.10	0.07	<.0001
GROUP	Disabled		-2.00	0.02	<.0001
GROUP	Veteran		0.05	0.03	0.0629
Educ	Associate		0.60	0.02	<.0001
Educ	Bachelors		0.60	0.01	<.0001
Educ	Graduate		0.90	0.02	<.0001
GROUP*Educ	DisVeter	Associate	0.00	0.16	0.9919
GROUP*Educ	DisVeter	Bachelors	0.06	0.18	0.7404
GROUP*Educ	DisVeter	Graduate	0.37	0.26	0.1611
GROUP*Educ	Disabled	Associate	0.06	0.06	0.3386
GROUP*Educ	Disabled	Bachelors	0.46	0.05	<.0001
GROUP*Educ	Disabled	Graduate	0.59	0.08	<.0001
GROUP*Educ	Veteran	Associate	-0.15	0.06	0.0183
GROUP*Educ	Veteran	Bachelors	0.00	0.06	0.9973
GROUP*Educ	Veteran	Graduate	-0.21	0.09	0.0152
WOTC			0.04	0.02	0.0733
WOTC*GROUP	DisVeter		0.01	0.10	0.8865
WOTC*GROUP	Disabled		-0.06	0.03	0.0448
WOTC*GROUP	Veteran		0.02	0.04	0.6722
WOTC*Educ	Associate		-0.03	0.02	0.2629
WOTC*Educ	Bachelors		0.03	0.02	0.1104
WOTC*Educ	Graduate		0.05	0.02	0.0396
WOTC*GROUP*Educ	DisVeter	Associate	-0.14	0.22	0.5233
WOTC*GROUP*Educ	DisVeter	Bachelors	0.36	0.26	0.1679
WOTC*GROUP*Educ	DisVeter	Graduate	0.16	0.37	0.6684
WOTC*GROUP*Educ	Disabled	Associate	-0.04	0.09	0.6273
WOTC*GROUP*Educ	Disabled	Bachelors	-0.11	0.08	0.1701
WOTC*GROUP*Educ	Disabled	Graduate	-0.08	0.12	0.5104
WOTC*GROUP*Educ	Veteran	Associate	-0.06	0.09	0.5361
WOTC*GROUP*Educ	Veteran	Bachelors	-0.28	0.08	0.0009
WOTC*GROUP*Educ	Veteran	Graduate	0.14	0.12	0.2644

Table C3.3: Binary Unemployment (Secondary Control Variables)

Parameter		Estimate	SE	$Pr > \chi^2$
AGE		0.01	0.00	<.0001
WOTC*AGE		0.00	0.00	0.0476
RACE		0.22	0.01	<.0001
WOTC*RACE		-0.03	0.02	0.053
SEX		0.59	0.01	<.0001
WOTC*SEX		0.06	0.01	<.0001
Region	Midwe	0.11	0.01	<.0001
Region	North	0.00	0.01	0.9165
Region	West	-0.10	0.01	<.0001
WOTC*Region	Midwe	0.01	0.02	0.4305
WOTC*Region	North	0.01	0.02	0.5265
WOTC*Region	West	0.00	0.02	0.9765

Table C3.4: Employment Category (Primary Control Variables - Before)

Parameter			Status	Estimate	SE	Pr > χ^2
Intercept			Employed	-0.09	0.01	<.0001
Intercept			OverEmploy	-4.09	0.04	<.0001
Intercept			UnderEmplo	-1.81	0.03	<.0001
GROUP	DisVeter		Employed	-2.11	0.08	<.0001
GROUP	DisVeter		OverEmploy	-1.93	0.19	<.0001
GROUP	DisVeter		UnderEmplo	-1.87	0.23	<.0001
GROUP	Disabled		Employed	-2.08	0.03	<.0001
GROUP	Disabled		OverEmploy	-2.04	0.08	<.0001
GROUP	Disabled		UnderEmplo	-1.37	0.05	<.0001
GROUP	Veteran		Employed	0.08	0.03	0.0014
GROUP	Veteran		OverEmploy	0.08	0.05	0.1235
GROUP	Veteran		UnderEmplo	-0.29	0.07	<.0001
Educ	Associate		Employed	0.60	0.02	<.0001
Educ	Associate		OverEmploy	0.63	0.04	<.0001
Educ	Associate		UnderEmplo	0.47	0.03	<.0001
Educ	Bachelors		Employed	0.55	0.01	<.0001
Educ	Bachelors		OverEmploy	1.02	0.02	<.0001
Educ	Bachelors		UnderEmplo	0.22	0.02	<.0001
Educ	Graduate		Employed	0.77	0.02	<.0001
Educ	Graduate		OverEmploy	1.73	0.03	<.0001
Educ	Graduate		UnderEmplo	0.42	0.03	<.0001
GROUP*Educ	DisVeter	Associate	Employed	-0.17	0.19	0.3812
GROUP*Educ	DisVeter	Associate	OverEmploy	0.07	0.42	0.869
GROUP*Educ	DisVeter	Associate	UnderEmplo	0.94	0.37	0.0115
GROUP*Educ	DisVeter	Bachelors	Employed	0.01	0.20	0.9431
GROUP*Educ	DisVeter	Bachelors	OverEmploy	-0.33	0.47	0.4816
GROUP*Educ	DisVeter	Bachelors	UnderEmplo	0.52	0.51	0.3116
GROUP*Educ	DisVeter	Graduate	Employed	0.47	0.29	0.1015
GROUP*Educ	DisVeter	Graduate	OverEmploy	-0.30	0.57	0.6046
GROUP*Educ	DisVeter	Graduate	UnderEmplo	-5.89	17.69	0.739
GROUP*Educ	Disabled	Associate	Employed	0.08	0.07	0.2231
GROUP*Educ	Disabled	Associate	OverEmploy	0.01	0.20	0.9456
GROUP*Educ	Disabled	Associate	UnderEmplo	0.04	0.12	0.7547
GROUP*Educ	Disabled	Bachelors	Employed	0.53	0.06	<.0001
GROUP*Educ	Disabled	Bachelors	OverEmploy	0.24	0.16	0.1353
GROUP*Educ	Disabled	Bachelors	UnderEmplo	0.30	0.12	0.0143
GROUP*Educ	Disabled	Graduate	Employed	0.59	0.09	<.0001
GROUP*Educ	Disabled	Graduate	OverEmploy	0.26	0.20	0.1958
GROUP*Educ	Disabled	Graduate	UnderEmplo	0.51	0.18	0.0041
GROUP*Educ	Veteran	Associate	Employed	-0.15	0.07	0.0213
GROUP*Educ	Veteran	Associate	OverEmploy	-0.21	0.12	0.0885
GROUP*Educ	Veteran	Associate	UnderEmplo	-0.22	0.15	0.144
GROUP*Educ	Veteran	Bachelors	Employed	0.01	0.06	0.8791
GROUP*Educ	Veteran	Bachelors	OverEmploy	-0.26	0.11	0.013
GROUP*Educ	Veteran	Bachelors	UnderEmplo	-0.02	0.15	0.8741
GROUP*Educ	Veteran	Graduate	Employed	-0.25	0.09	0.0047
GROUP*Educ	Veteran	Graduate	OverEmploy	-0.47	0.13	0.0002
GROUP*Educ	Veteran	Graduate	UnderEmplo	-0.24	0.21	0.2694

Table C3.4: Employment Category (Primary Control Variables - After)

Parameter			Status	Estimate	SE	$Pr > \chi^2$
WOTC			Employed	0.03	0.02	0.2073
WOTC			OverEmploy	0.11	0.05	0.0388
WOTC			UnderEmplo	0.07	0.04	0.0834
WOTC*GROUP	DisVeter		Employed	0.05	0.11	0.6238
WOTC*GROUP	DisVeter		OverEmploy	-0.27	0.29	0.3467
WOTC*GROUP	DisVeter		UnderEmplo	-0.32	0.35	0.3573
WOTC*GROUP	Disabled		Employed	-0.08	0.04	0.0329
WOTC*GROUP	Disabled		OverEmploy	-0.30	0.12	0.0103
WOTC*GROUP	Disabled		UnderEmplo	0.03	0.07	0.6491
WOTC*GROUP	Veteran		Employed	-0.02	0.04	0.6537
WOTC*GROUP	Veteran		OverEmploy	0.08	0.07	0.2365
WOTC*GROUP	Veteran		UnderEmplo	0.18	0.09	0.0437
WOTC*Educ	Associate		Employed	-0.02	0.02	0.3994
WOTC*Educ	Associate		OverEmploy	-0.03	0.05	0.5964
WOTC*Educ	Associate		UnderEmplo	-0.03	0.04	0.4825
WOTC*Educ	Bachelors		Employed	0.04	0.02	0.039
WOTC*Educ	Bachelors		OverEmploy	-0.10	0.03	0.0033
WOTC*Educ	Bachelors		UnderEmplo	0.06	0.03	0.0624
WOTC*Educ	Graduate		Employed	0.05	0.02	0.0277
WOTC*Educ	Graduate		OverEmploy	-0.02	0.04	0.5537
WOTC*Educ	Graduate		UnderEmplo	0.07	0.04	0.1348
WOTC*GROUP*Educ	DisVeter	Associate	Employed	0.06	0.25	0.8177
WOTC*GROUP*Educ	DisVeter	Associate	OverEmploy	-0.60	0.65	0.3541
WOTC*GROUP*Educ	DisVeter	Associate	UnderEmplo	-0.41	0.58	0.4815
WOTC*GROUP*Educ	DisVeter	Bachelors	Employed	0.41	0.28	0.1465
WOTC*GROUP*Educ	DisVeter	Bachelors	OverEmploy	-0.16	0.78	0.8359
WOTC*GROUP*Educ	DisVeter	Bachelors	UnderEmplo	1.08	0.68	0.1112
WOTC*GROUP*Educ	DisVeter	Graduate	Employed	0.05	0.40	0.9009
WOTC*GROUP*Educ	DisVeter	Graduate	OverEmploy	0.44	0.81	0.5895
WOTC*GROUP*Educ	DisVeter	Graduate	UnderEmplo	7.05	17.70	0.6906
WOTC*GROUP*Educ	Disabled	Associate	Employed	-0.08	0.10	0.4168
WOTC*GROUP*Educ	Disabled	Associate	OverEmploy	0.40	0.28	0.1451
WOTC*GROUP*Educ	Disabled	Associate	UnderEmplo	-0.11	0.18	0.5198
WOTC*GROUP*Educ	Disabled	Bachelors	Employed	-0.15	0.09	0.0972
WOTC*GROUP*Educ	Disabled	Bachelors	OverEmploy	0.43	0.23	0.0627
WOTC*GROUP*Educ	Disabled	Bachelors	UnderEmplo	-0.34	0.19	0.0658
WOTC*GROUP*Educ	Disabled	Graduate	Employed	-0.01	0.13	0.9429
WOTC*GROUP*Educ	Disabled	Graduate	OverEmploy	0.16	0.28	0.5624
WOTC*GROUP*Educ	Disabled	Graduate	UnderEmplo	0.00	0.24	0.9909
WOTC*GROUP*Educ	Veteran	Associate	Employed	-0.03	0.09	0.7579
WOTC*GROUP*Educ	Veteran	Associate	OverEmploy	-0.03	0.17	0.8758
WOTC*GROUP*Educ	Veteran	Associate	UnderEmplo	-0.42	0.22	0.0631
WOTC*GROUP*Educ	Veteran	Bachelors	Employed	-0.23	0.09	0.0069
WOTC*GROUP*Educ	Veteran	Bachelors	OverEmploy	-0.42	0.15	0.0056
WOTC*GROUP*Educ	Veteran	Bachelors	UnderEmplo	-0.33	0.21	0.1152
WOTC*GROUP*Educ	Veteran	Graduate	Employed	0.14	0.13	0.2603
WOTC*GROUP*Educ	Veteran	Graduate	OverEmploy	0.08	0.18	0.6409
WOTC*GROUP*Educ	Veteran	Graduate	UnderEmplo	-0.02	0.30	0.9492

Table C3.4: Employment Category (Secondary Control Variables)

Parameter		Status	Estimate	SE	Pr > χ^2
AGE		Employed	0.01	0.00	<.0001
AGE		OverEmploy	0.02	0.00	<.0001
AGE		UnderEmplo	0.00	0.00	<.0001
WOTC*AGE		Employed	0.00	0.00	0.0355
WOTC*AGE		OverEmploy	0.00	0.00	0.2908
WOTC*AGE		UnderEmplo	0.00	0.00	0.0054
RACE		Employed	0.15	0.01	<.0001
RACE		OverEmploy	0.65	0.03	<.0001
RACE		UnderEmplo	0.27	0.02	<.0001
WOTC*RACE		Employed	-0.02	0.02	0.3046
WOTC*RACE		OverEmploy	-0.10	0.04	0.0087
WOTC*RACE		UnderEmplo	-0.07	0.03	0.0319
SEX		Employed	0.57	0.01	<.0001
SEX		OverEmploy	1.63	0.02	<.0001
SEX		UnderEmplo	-0.44	0.02	<.0001
WOTC*SEX		Employed	0.06	0.01	<.0001
WOTC*SEX		OverEmploy	0.12	0.03	<.0001
WOTC*SEX		UnderEmplo	0.04	0.03	0.1281
Region	Midwe	Employed	0.08	0.01	<.0001
Region	Midwe	OverEmploy	0.13	0.03	<.0001
Region	Midwe	UnderEmplo	0.31	0.02	<.0001
Region	North	Employed	-0.02	0.01	0.0564
Region	North	OverEmploy	-0.08	0.03	0.0043
Region	North	UnderEmplo	0.26	0.02	<.0001
Region	West	Employed	-0.13	0.01	<.0001
Region	West	OverEmploy	-0.16	0.03	<.0001
Region	West	UnderEmplo	0.22	0.02	<.0001
WOTC*Region	Midwe	Employed	0.01	0.02	0.4001
WOTC*Region	Midwe	OverEmploy	-0.02	0.04	0.5942
WOTC*Region	Midwe	UnderEmplo	0.03	0.03	0.3196
WOTC*Region	North	Employed	0.02	0.02	0.3351
WOTC*Region	North	OverEmploy	-0.03	0.04	0.4070
WOTC*Region	North	UnderEmplo	0.01	0.03	0.6959
WOTC*Region	West	Employed	-0.01	0.02	0.6460
WOTC*Region	West	OverEmploy	-0.02	0.04	0.6470
WOTC*Region	West	UnderEmplo	0.04	0.03	0.2446

Table C3.5: Trade Industry Hourly Wages

Parameter			Estimate	SE	Pr > χ^2
Intercept			2.30	0.02	<.0001
GROUP	DisVeter		0.14	0.14	0.3392
GROUP	Disabled		-0.14	0.03	<.0001
GROUP	Veteran		0.05	0.03	0.1283
Educ	Associate		0.06	0.02	0.0046
Educ	Bachelors		0.18	0.02	<.0001
Educ	Graduate		0.43	0.04	<.0001
GROUP*Educ	DisVeter	Associate	-0.52	0.30	0.089
GROUP*Educ	DisVeter	Bachelors	-0.54	0.41	0.1867
GROUP*Educ	DisVeter	Graduate	0.00	0.00	.
GROUP*Educ	Disabled	Associate	-0.06	0.09	0.5133
GROUP*Educ	Disabled	Bachelors	0.29	0.15	0.051
GROUP*Educ	Disabled	Graduate	-0.65	0.23	0.0038
GROUP*Educ	Veteran	Associate	-0.04	0.09	0.6517
GROUP*Educ	Veteran	Bachelors	-0.05	0.10	0.6487
GROUP*Educ	Veteran	Graduate	-0.56	0.38	0.1454
WOTC			0.04	0.03	0.1589
WOTC*GROUP	DisVeter		-0.34	0.26	0.1966
WOTC*GROUP	Disabled		-0.02	0.05	0.7083
WOTC*GROUP	Veteran		-0.07	0.05	0.1181
WOTC*Educ	Associate		0.01	0.03	0.6487
WOTC*Educ	Bachelors		0.09	0.03	0.0022
WOTC*Educ	Graduate		0.02	0.06	0.7257
WOTC*GROUP*Educ	DisVeter	Associate	0.98	0.46	0.0329
WOTC*GROUP*Educ	DisVeter	Bachelors	0.10	0.53	0.8516
WOTC*GROUP*Educ	DisVeter	Graduate	0.00	0.00	.
WOTC*GROUP*Educ	Disabled	Associate	0.11	0.16	0.4696
WOTC*GROUP*Educ	Disabled	Bachelors	-0.47	0.19	0.0139
WOTC*GROUP*Educ	Disabled	Graduate	0.08	0.29	0.7737
WOTC*GROUP*Educ	Veteran	Associate	0.11	0.13	0.3952
WOTC*GROUP*Educ	Veteran	Bachelors	-0.22	0.15	0.1473
WOTC*GROUP*Educ	Veteran	Graduate	-0.03	0.47	0.9443
AGE			0.01	0.00	<.0001
WOTC*AGE			0.00	0.00	0.2334
RACE			0.06	0.02	0.0002
WOTC*RACE			-0.04	0.02	0.0625
SEX			0.16	0.01	<.0001
WOTC*SEX			0.03	0.02	0.0495
Region	Midwe		0.02	0.02	0.2078
Region	North		0.10	0.02	<.0001
Region	West		0.09	0.02	<.0001
WOTC*Region	Midwe		-0.03	0.02	0.2565
WOTC*Region	North		-0.06	0.03	0.0276
WOTC*Region	West		-0.02	0.02	0.4898

Table C3.6: Trade Industry Weekly Wages

Parameter			Estimate	SE	Pr > χ^2
Intercept			5.90	0.03	<.0001
GROUP	DisVeter		-0.26	0.21	0.2199
GROUP	Disabled		-0.35	0.05	<.0001
GROUP	Veteran		-0.02	0.04	0.6148
Educ	Associate		0.13	0.03	<.0001
Educ	Bachelors		0.53	0.02	<.0001
Educ	Graduate		0.76	0.04	<.0001
GROUP*Educ	DisVeter	Associate	-0.61	0.48	0.2045
GROUP*Educ	DisVeter	Bachelors	-0.62	0.48	0.1982
GROUP*Educ	DisVeter	Graduate	0.00	0.00	.
GROUP*Educ	Disabled	Associate	0.07	0.14	0.6269
GROUP*Educ	Disabled	Bachelors	0.33	0.16	0.0484
GROUP*Educ	Disabled	Graduate	-1.24	0.36	0.0005
GROUP*Educ	Veteran	Associate	0.06	0.11	0.6077
GROUP*Educ	Veteran	Bachelors	-0.20	0.12	0.0965
GROUP*Educ	Veteran	Graduate	0.21	0.22	0.3361
WOTC			0.02	0.04	0.6741
WOTC*GROUP	DisVeter		0.03	0.33	0.9354
WOTC*GROUP	Disabled		0.01	0.07	0.8392
WOTC*GROUP	Veteran		0.08	0.06	0.1817
WOTC*Educ	Associate		0.01	0.04	0.8834
WOTC*Educ	Bachelors		0.02	0.03	0.4501
WOTC*Educ	Graduate		-0.03	0.05	0.6263
WOTC*GROUP*Educ	DisVeter	Associate	0.95	0.64	0.1382
WOTC*GROUP*Educ	DisVeter	Bachelors	-1.31	0.69	0.059
WOTC*GROUP*Educ	DisVeter	Graduate	0.00	0.00	.
WOTC*GROUP*Educ	Disabled	Associate	0.31	0.20	0.1229
WOTC*GROUP*Educ	Disabled	Bachelors	-0.25	0.22	0.2651
WOTC*GROUP*Educ	Disabled	Graduate	0.56	0.44	0.2044
WOTC*GROUP*Educ	Veteran	Associate	-0.13	0.16	0.4313
WOTC*GROUP*Educ	Veteran	Bachelors	-0.01	0.17	0.9371
WOTC*GROUP*Educ	Veteran	Graduate	-0.31	0.32	0.3316
AGE			0.01	0.00	<.0001
WOTC*AGE			0.00	0.00	0.7727
RACE			0.14	0.02	<.0001
WOTC*RACE			0.00	0.03	0.9254
SEX			0.36	0.02	<.0001
WOTC*SEX			0.03	0.02	0.1989
Region	Midwe		-0.02	0.02	0.3431
Region	North		0.03	0.02	0.1374
Region	West		0.03	0.02	0.1742
WOTC*Region	Midwe		-0.03	0.03	0.2678
WOTC*Region	North		0.00	0.03	0.9641
WOTC*Region	West		0.01	0.03	0.8522

Table C3.7: Binary Unemployment (Primary Control Variables)

Parameter			Estimate	SE	Pr > χ^2
Intercept			0.90	0.05	<.0001
GROUP	DisVeter		-1.75	0.26	<.0001
GROUP	Disabled		-0.94	0.08	<.0001
GROUP	Veteran		-0.15	0.09	0.0842
Educ	Associate		0.26	0.06	<.0001
Educ	Bachelors		0.34	0.04	<.0001
Educ	Graduate		0.31	0.09	0.0004
GROUP*Educ	DisVeter	Associate	1.61	0.80	0.044
GROUP*Educ	DisVeter	Bachelors	-0.24	0.60	0.688
GROUP*Educ	DisVeter	Graduate	0.00	0.00	.
GROUP*Educ	Disabled	Associate	0.14	0.24	0.5403
GROUP*Educ	Disabled	Bachelors	-0.46	0.22	0.0347
GROUP*Educ	Disabled	Graduate	0.39	0.67	0.563
GROUP*Educ	Veteran	Associate	0.00	0.24	0.9853
GROUP*Educ	Veteran	Bachelors	0.54	0.32	0.0865
GROUP*Educ	Veteran	Graduate	-0.36	0.44	0.411
WOTC			0.08	0.07	0.2428
WOTC*GROUP	DisVeter		1.33	0.44	0.0025
WOTC*GROUP	Disabled		0.10	0.11	0.3715
WOTC*GROUP	Veteran		0.10	0.13	0.413
WOTC*Educ	Associate		-0.17	0.08	0.0392
WOTC*Educ	Bachelors		-0.09	0.06	0.1317
WOTC*Educ	Graduate		0.05	0.12	0.6744
WOTC*GROUP*Educ	DisVeter	Associate	-1.74	1.01	0.0858
WOTC*GROUP*Educ	DisVeter	Bachelors	-1.70	0.85	0.0449
WOTC*GROUP*Educ	DisVeter	Graduate	0.00	0.00	.
WOTC*GROUP*Educ	Disabled	Associate	-0.36	0.33	0.2813
WOTC*GROUP*Educ	Disabled	Bachelors	0.16	0.32	0.6205
WOTC*GROUP*Educ	Disabled	Graduate	0.26	0.88	0.7658
WOTC*GROUP*Educ	Veteran	Associate	-0.08	0.34	0.8092
WOTC*GROUP*Educ	Veteran	Bachelors	-1.00	0.38	0.0082
WOTC*GROUP*Educ	Veteran	Graduate	2.10	1.11	0.0588

Table C3.7: Binary Unemployment (Secondary Control Variables)

Parameter		Estimate	SE	Pr > χ^2
AGE		0.01	0.00	<.0001
WOTC*AGE		0.00	0.00	0.0872
RACE		0.30	0.04	<.0001
WOTC*RACE		-0.12	0.06	0.0356
SEX		0.51	0.03	<.0001
WOTC*SEX		-0.02	0.04	0.6056
Region	Midwe	-0.09	0.04	0.0407
Region	North	-0.17	0.04	0.0001
Region	West	-0.07	0.04	0.0809
WOTC*Region	Midwe	0.20	0.06	0.0009
WOTC*Region	North	0.13	0.06	0.0475
WOTC*Region	West	0.08	0.06	0.1702

Table C3.8: Trade Industry Employment Category (Primary Control Variables - Before)

Parameter			Status	Estimate	SE	Pr > χ^2
Intercept			Employed	0.68	0.05	<.0001
Intercept			OverEmploy	-3.39	0.11	<.0001
Intercept			UnderEmplo	-0.36	0.08	<.0001
GROUP	DisVeter		Employed	-1.83	0.28	<.0001
GROUP	DisVeter		OverEmploy	-1.69	0.61	0.0055
GROUP	DisVeter		UnderEmplo	-0.88	0.48	0.0699
GROUP	Disabled		Employed	-1.05	0.08	<.0001
GROUP	Disabled		OverEmploy	-1.28	0.20	<.0001
GROUP	Disabled		UnderEmplo	-0.19	0.11	0.0873
GROUP	Veteran		Employed	-0.10	0.09	0.2762
GROUP	Veteran		OverEmploy	-0.30	0.15	0.0506
GROUP	Veteran		UnderEmplo	-0.39	0.18	0.0294
Educ	Associate		Employed	0.23	0.06	0.0001
Educ	Associate		OverEmploy	0.48	0.10	<.0001
Educ	Associate		UnderEmplo	0.22	0.09	0.0118
Educ	Bachelors		Employed	0.25	0.05	<.0001
Educ	Bachelors		OverEmploy	0.93	0.07	<.0001
Educ	Bachelors		UnderEmplo	0.06	0.07	0.3936
Educ	Graduate		Employed	0.22	0.09	0.0168
Educ	Graduate		OverEmploy	0.85	0.13	<.0001
Educ	Graduate		UnderEmplo	0.05	0.14	0.6899
GROUP*Educ	DisVeter	Associate	Employed	1.31	0.85	0.1245
GROUP*Educ	DisVeter	Associate	OverEmploy	-11.89	609.40	0.9844
GROUP*Educ	DisVeter	Associate	UnderEmplo	3.03	0.94	0.0013
GROUP*Educ	DisVeter	Bachelors	Employed	-1.85	1.12	0.0979
GROUP*Educ	DisVeter	Bachelors	OverEmploy	0.06	0.94	0.9505
GROUP*Educ	DisVeter	Bachelors	UnderEmplo	1.26	0.86	0.1432
GROUP*Educ	DisVeter	Graduate	Employed	0.00	.	.
GROUP*Educ	DisVeter	Graduate	OverEmploy	0.00	.	.
GROUP*Educ	DisVeter	Graduate	UnderEmplo	0.00	.	.
GROUP*Educ	Disabled	Associate	Employed	0.22	0.25	0.3843
GROUP*Educ	Disabled	Associate	OverEmploy	-0.72	0.77	0.3459
GROUP*Educ	Disabled	Associate	UnderEmplo	0.18	0.33	0.578
GROUP*Educ	Disabled	Bachelors	Employed	-0.28	0.23	0.217
GROUP*Educ	Disabled	Bachelors	OverEmploy	-0.34	0.47	0.4726
GROUP*Educ	Disabled	Bachelors	UnderEmplo	-1.52	0.54	0.005
GROUP*Educ	Disabled	Graduate	Employed	0.47	0.71	0.5053
GROUP*Educ	Disabled	Graduate	OverEmploy	-9.47	149.90	0.9497
GROUP*Educ	Disabled	Graduate	UnderEmplo	0.80	0.84	0.3414
GROUP*Educ	Veteran	Associate	Employed	0.01	0.25	0.9757
GROUP*Educ	Veteran	Associate	OverEmploy	0.04	0.37	0.9197
GROUP*Educ	Veteran	Associate	UnderEmplo	-0.92	0.64	0.1535
GROUP*Educ	Veteran	Bachelors	Employed	0.59	0.32	0.0669
GROUP*Educ	Veteran	Bachelors	OverEmploy	-0.59	0.51	0.244
GROUP*Educ	Veteran	Bachelors	UnderEmplo	0.75	0.51	0.1424
GROUP*Educ	Veteran	Graduate	Employed	-0.57	0.46	0.2131
GROUP*Educ	Veteran	Graduate	OverEmploy	-0.04	0.58	0.9471
GROUP*Educ	Veteran	Graduate	UnderEmplo	-0.62	1.09	0.571

Table C3.8: Trade Industry Employment Category (Primary Control Variables - After)

Parameter			Status	Estimate	SE	$Pr > \chi^2$
WOTC			Employed	0.14	0.08	0.0614
WOTC			OverEmploy	-0.05	0.16	0.7746
WOTC			UnderEmplo	-0.12	0.11	0.2783
WOTC*GROUP	DisVeter		Employed	1.63	0.46	0.0004
WOTC*GROUP	DisVeter		OverEmploy	-9.08	82.43	0.9123
WOTC*GROUP	DisVeter		UnderEmplo	-0.24	1.16	0.8379
WOTC*GROUP	Disabled		Employed	0.13	0.12	0.2894
WOTC*GROUP	Disabled		OverEmploy	-0.17	0.32	0.6022
WOTC*GROUP	Disabled		UnderEmplo	0.09	0.17	0.598
WOTC*GROUP	Veteran		Employed	0.03	0.13	0.7968
WOTC*GROUP	Veteran		OverEmploy	0.30	0.21	0.1534
WOTC*GROUP	Veteran		UnderEmplo	0.40	0.24	0.1003
WOTC*Educ	Associate		Employed	-0.16	0.08	0.0572
WOTC*Educ	Associate		OverEmploy	-0.27	0.14	0.0513
WOTC*Educ	Associate		UnderEmplo	-0.06	0.12	0.6276
WOTC*Educ	Bachelors		Employed	-0.10	0.06	0.129
WOTC*Educ	Bachelors		OverEmploy	-0.18	0.10	0.0616
WOTC*Educ	Bachelors		UnderEmplo	-0.09	0.10	0.3763
WOTC*Educ	Graduate		Employed	-0.02	0.13	0.8562
WOTC*Educ	Graduate		OverEmploy	0.25	0.18	0.1686
WOTC*Educ	Graduate		UnderEmplo	0.18	0.18	0.3325
WOTC*GROUP*Educ	DisVeter	Associate	Employed	-1.58	1.06	0.1363
WOTC*GROUP*Educ	DisVeter	Associate	OverEmploy	11.74	625.90	0.985
WOTC*GROUP*Educ	DisVeter	Associate	UnderEmplo	-1.18	1.57	0.4499
WOTC*GROUP*Educ	DisVeter	Bachelors	Employed	-10.84	86.26	0.9
WOTC*GROUP*Educ	DisVeter	Bachelors	OverEmploy	-2.43	237.40	0.9918
WOTC*GROUP*Educ	DisVeter	Bachelors	UnderEmplo	0.19	1.45	0.8937
WOTC*GROUP*Educ	DisVeter	Graduate	Employed	0.00	.	.
WOTC*GROUP*Educ	DisVeter	Graduate	OverEmploy	0.00	.	.
WOTC*GROUP*Educ	DisVeter	Graduate	UnderEmplo	0.00	.	.
WOTC*GROUP*Educ	Disabled	Associate	Employed	-0.53	0.36	0.1356
WOTC*GROUP*Educ	Disabled	Associate	OverEmploy	1.90	0.89	0.0335
WOTC*GROUP*Educ	Disabled	Associate	UnderEmplo	-0.85	0.51	0.097
WOTC*GROUP*Educ	Disabled	Bachelors	Employed	0.14	0.34	0.6659
WOTC*GROUP*Educ	Disabled	Bachelors	OverEmploy	0.64	0.66	0.3316
WOTC*GROUP*Educ	Disabled	Bachelors	UnderEmplo	0.67	0.71	0.3454
WOTC*GROUP*Educ	Disabled	Graduate	Employed	0.11	0.93	0.9045
WOTC*GROUP*Educ	Disabled	Graduate	OverEmploy	-0.44	219.80	0.9984
WOTC*GROUP*Educ	Disabled	Graduate	UnderEmplo	0.37	1.05	0.7276
WOTC*GROUP*Educ	Veteran	Associate	Employed	-0.06	0.34	0.8609
WOTC*GROUP*Educ	Veteran	Associate	OverEmploy	0.14	0.51	0.7822
WOTC*GROUP*Educ	Veteran	Associate	UnderEmplo	0.75	0.75	0.3204
WOTC*GROUP*Educ	Veteran	Bachelors	Employed	-1.03	0.39	0.0078
WOTC*GROUP*Educ	Veteran	Bachelors	OverEmploy	-0.34	0.60	0.5793
WOTC*GROUP*Educ	Veteran	Bachelors	UnderEmplo	-0.54	0.62	0.3859
WOTC*GROUP*Educ	Veteran	Graduate	Employed	2.13	1.13	0.0603
WOTC*GROUP*Educ	Veteran	Graduate	OverEmploy	1.34	1.26	0.2883
WOTC*GROUP*Educ	Veteran	Graduate	UnderEmplo	3.00	1.55	0.0531

Table C3.8: Trade Industry Employment Category (Primary Control Variables)

Parameter		Status	Estimate	SE	Pr > χ^2
AGE		Employed	0.01	0.00	<.0001
AGE		OverEmploy	0.04	0.00	<.0001
AGE		UnderEmplo	-0.01	0.00	<.0001
WOTC*AGE		Employed	-0.01	0.00	0.0246
WOTC*AGE		OverEmploy	0.00	0.00	0.8352
WOTC*AGE		UnderEmplo	0.00	0.00	0.6602
RACE		Employed	0.26	0.04	<.0001
RACE		OverEmploy	0.75	0.09	<.0001
RACE		UnderEmplo	0.09	0.06	0.1648
WOTC*RACE		Employed	-0.14	0.06	0.0165
WOTC*RACE		OverEmploy	-0.07	0.12	0.5476
WOTC*RACE		UnderEmplo	-0.06	0.09	0.5103
SEX		Employed	0.49	0.03	<.0001
SEX		OverEmploy	1.66	0.06	<.0001
SEX		UnderEmplo	-0.64	0.05	<.0001
WOTC*SEX		Employed	-0.03	0.05	0.4855
WOTC*SEX		OverEmploy	0.05	0.09	0.5969
WOTC*SEX		UnderEmplo	-0.08	0.07	0.2962
Region	Midwe	Employed	-0.07	0.04	0.0983
Region	Midwe	OverEmploy	-0.30	0.08	<.0001
Region	Midwe	UnderEmplo	-0.08	0.07	0.2715
Region	North	Employed	-0.19	0.05	<.0001
Region	North	OverEmploy	-0.24	0.08	0.0016
Region	North	UnderEmplo	-0.01	0.07	0.8514
Region	West	Employed	-0.05	0.04	0.2092
Region	West	OverEmploy	-0.28	0.07	0.0002
Region	West	UnderEmplo	0.04	0.06	0.5173
WOTC*Region	Midwe	Employed	0.17	0.06	0.0078
WOTC*Region	Midwe	OverEmploy	0.28	0.11	0.0081
WOTC*Region	Midwe	UnderEmplo	0.41	0.10	<.0001
WOTC*Region	North	Employed	0.13	0.07	0.0556
WOTC*Region	North	OverEmploy	0.00	0.11	0.9734
WOTC*Region	North	UnderEmplo	0.21	0.10	0.0401
WOTC*Region	West	Employed	0.05	0.06	0.4472
WOTC*Region	West	OverEmploy	0.02	0.11	0.8272
WOTC*Region	West	UnderEmplo	0.27	0.09	0.0035

Table C3.9: Employment Category Comparisons Between Overall Economy and Trade
Panel A: Overall Economy

		Overall Economy Before					Overall Economy After				
Status		DisVeter	Disabled	NonDisab	Veteran	Total	DisVeter	Disabled	NonDisab	Veteran	Total
Employed	Frequency	315	3,237	132,953	8,183	144,688	358	2,898	131,601	7,710	142,567
	Overall %	0.1%	1.2%	50.1%	3.1%	54.5%	0.1%	1.1%	50.6%	3.0%	54.8%
	Row %	0.2%	2.2%	91.9%	5.7%		0.3%	2.0%	92.3%	5.4%	
	Column%	21.0%	18.7%	56.8%	63.1%		23.6%	17.4%	57.4%	62.2%	
OverEmployed	Frequency	46	298	12,602	947	13,893	35	278	13,089	1,045	14,447
	Overall %	0.0%	0.1%	4.7%	0.4%	5.2%	0.0%	0.1%	5.0%	0.4%	5.6%
	Row %	0.3%	2.1%	90.7%	6.8%		0.2%	1.9%	90.6%	7.2%	
	Column%	3.1%	1.7%	5.4%	7.3%		2.3%	1.7%	5.7%	8.4%	
UnderEmployed	Frequency	38	731	16,360	438	17,567	34	696	15,861	450	17,041
	Overall %	0.0%	0.3%	6.2%	0.2%	6.6%	0.0%	0.3%	6.1%	0.2%	6.6%
	Row %	0.2%	4.2%	93.1%	2.5%		0.2%	4.1%	93.1%	2.6%	
	Column%	2.5%	4.2%	7.0%	3.4%		2.2%	4.2%	6.9%	3.6%	
Unemployed	Frequency	1,102	13,021	71,994	3,396	89,513	1,092	12,773	68,936	3,194	85,995
	Overall %	0.4%	4.9%	27.1%	1.3%	33.7%	0.4%	4.9%	26.5%	1.2%	33.1%
	Row %	1.2%	14.6%	80.4%	3.8%		1.3%	14.9%	80.2%	3.7%	
	Column%	73.4%	75.3%	30.8%	26.2%		71.9%	76.7%	30.0%	25.8%	
Total		1,501	17,287	233,909	12,964	265,661	1,519	16,645	229,487	12,399	260,050
		0.57	6.51	88.05	4.88	100	0.58	6.4	88.25	4.77	100

Table C3.9: Employment Category Comparisons Between Overall Economy and Trade
Panel B: Trade Industry

	Trade Industry Before					Trade Industry After				
Status	DisVeter	Disabled	NonDisab	Veteran	Total	DisVeter	Disabled	NonDisab	Veteran	Total
Employed	29	476	16,404	866	17,775	49	413	15,830	817	17,109
	0.1%	1.7%	59.8%	3.2%	64.8%	0.2%	1.6%	59.4%	3.1%	64.2%
	0.2%	2.7%	92.3%	4.9%		0.3%	2.4%	92.5%	4.8%	
	32.2%	46.3%	65.4%	70.8%		55.7%	47.2%	64.8%	65.2%	
OverEmployed	6	37	1,784	98	1,925	0	38	1,776	130	1,944
	0.0%	0.1%	6.5%	0.4%	7.0%	0.0%	0.1%	6.7%	0.5%	7.3%
	0.3%	1.9%	92.7%	5.1%		0.0%	2.0%	91.4%	6.7%	
	6.7%	3.6%	7.1%	8.0%		0.0%	4.3%	7.3%	10.4%	
UnderEmployed	15	144	2,363	52	2,574	12	121	2,291	87	2,511
	0.1%	0.5%	8.6%	0.2%	9.4%	0.1%	0.5%	8.6%	0.3%	9.4%
	0.6%	5.6%	91.8%	2.0%		0.5%	4.8%	91.2%	3.5%	
	16.7%	14.0%	9.4%	4.3%		13.6%	13.8%	9.4%	6.9%	
Unemployed	40	371	4,551	208	5,170	27	304	4,519	220	5,070
	0.2%	1.4%	16.6%	0.8%	18.8%	0.1%	1.1%	17.0%	0.8%	19.0%
	0.8%	7.2%	88.0%	4.0%		0.5%	6.0%	89.1%	4.3%	
	44.4%	36.1%	18.1%	17.0%		30.7%	34.7%	18.5%	17.5%	
Total	90	1,028	25,102	1,224	27,444	88	876	24,416	1,254	26,634
%	0.3%	3.8%	91.5%	4.5%	100.0%	0.3%	3.3%	91.7%	4.7%	100.0%

Figure C3.1: Hourly Wage Distribution

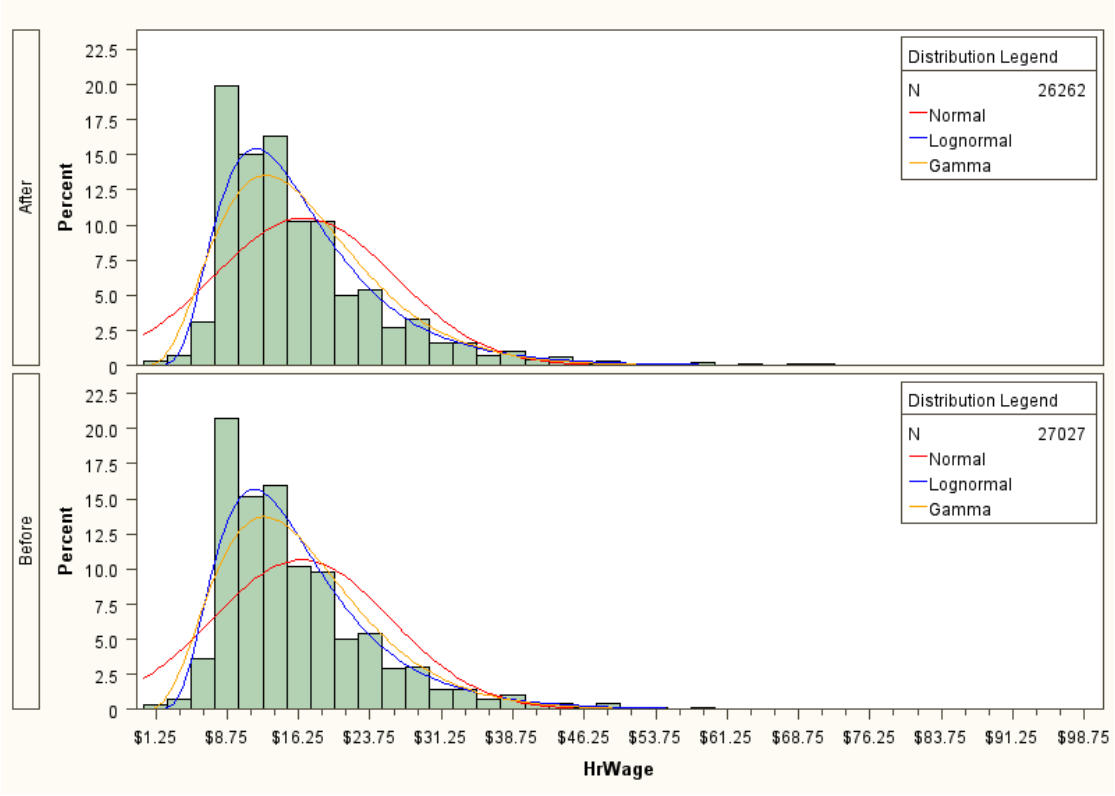


Figure C3.2: Weekly Wage Distribution

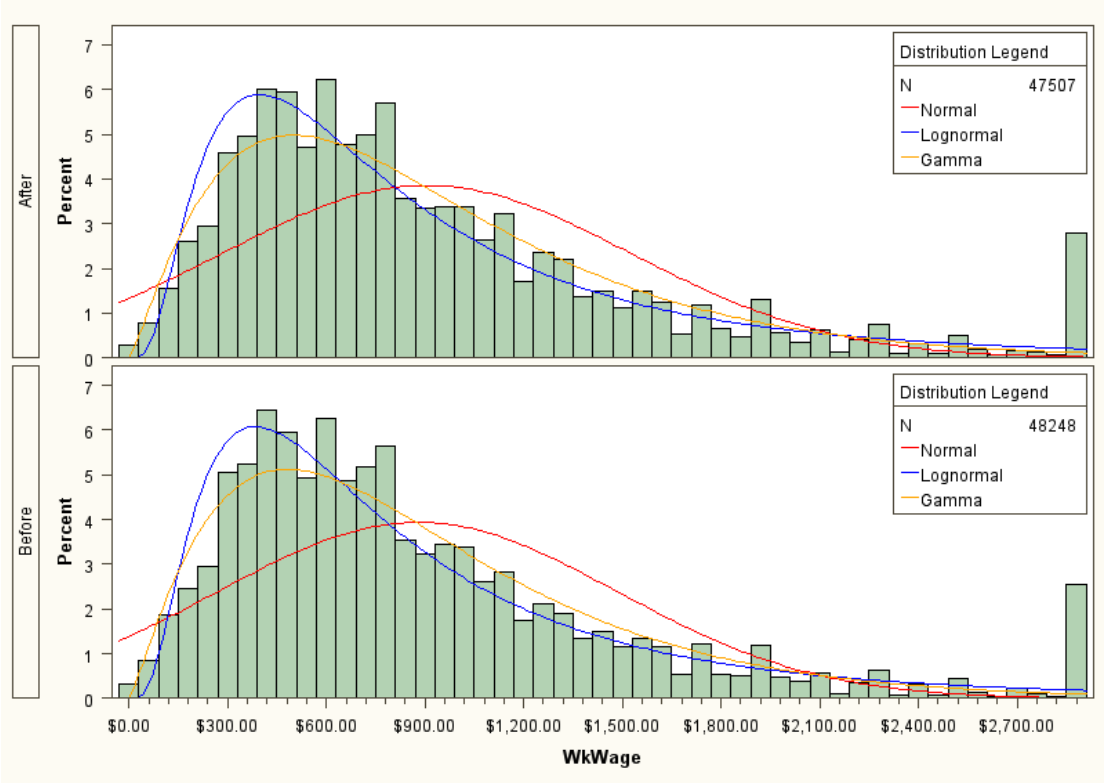


Figure C3.3: Usual Hours per Week

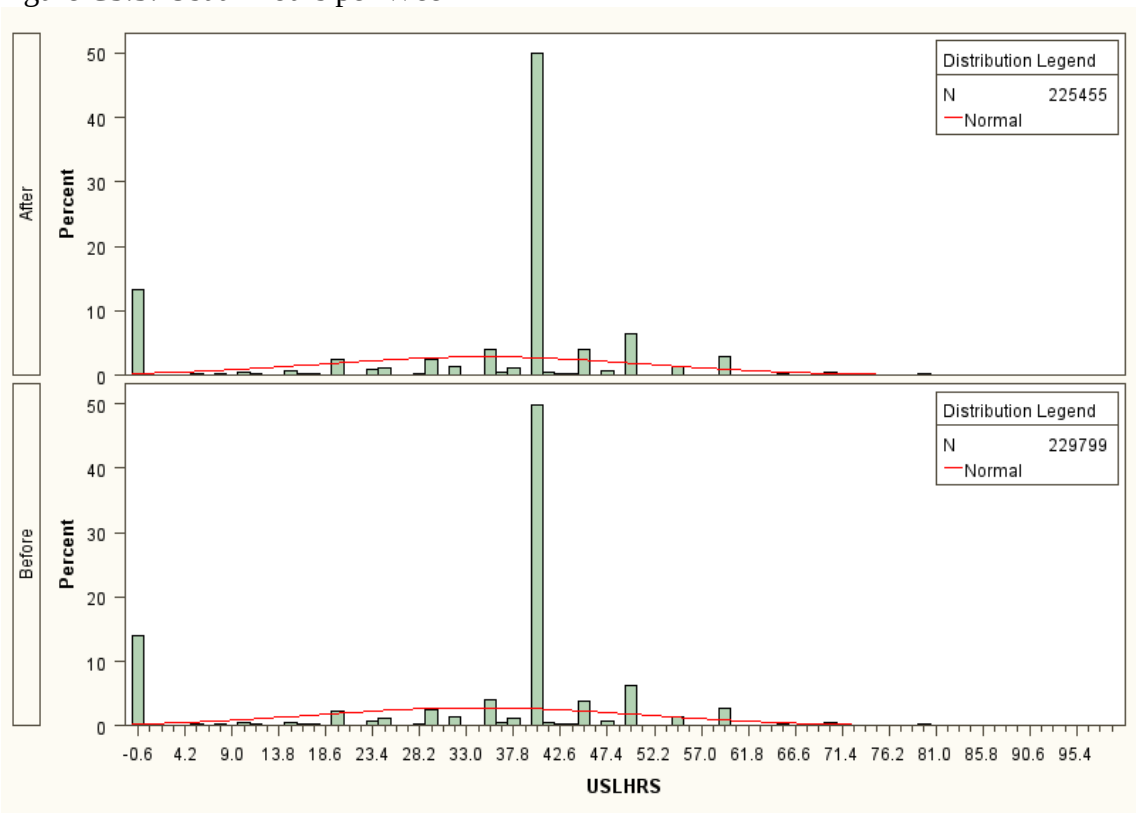


Figure C3.4: Employment