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EXTENDING "PROTECTION FOR SALE" WITH HETEROGENEOUS SECTORAL POLITICAL ORGANIZATION

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Abstract

EXTENDING "PROTECTION FOR SALE" WITH HETEROGENEOUS SECTORAL POLITICAL ORGANIZATION

by

Robert Brian Baden

The Grossman and Helpman (1994) "Protection for Sale" literature assumes a binary sectoral political organization; lobbies do or do not exist for each industry. By extending the theory to encompass heterogeneity, I argue that sectors are politically organized to heterogeneous degrees.

The "Protection for Sale" empirical papers use country-by-country idiosyncratic methods to determine the binary sectoral political organization. I use a consistent method based on Principal Component Analysis, valid for many countries, to generate the country-specific heterogeneous sectoral political organization vector. Using the "Trade, Production and Protection Database, 1976-2004" (Nicita and Olarreaga, 2006) covering one-hundred countries, a common set of trade-focused sectoral political organization characteristics are proposed.

With this consistent methodology and the common set of characteristics, this new approach is applied to many Latin American countries, uncovering the intertemporal Government Weight on Population Welfare (GWPW) for each country. GWPW conveys the importance an incumbent government places on

population welfare, and is shown to be highly correlated with the Trade Openness Index and key political and economic events for these countries. GWPW may be used by international development organizations to negotiate country-specific political and economic goals, and to potentially better measure progress.

To my wife Jan Schwartz
a very, very patient person
who enables dreams to come true

Acknowledgments

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Chapter 1

Introduction and Overview

The Grossman and Helpman (1994)[1] "Protection for Sale" model postulates that import tariffs are a function of (1) lobbying activity on the part of politically organized sectors, and (2) the welfare of the population. Since trade policy can be used to increase domestic prices over world prices, import-competing producers organize politically into lobbies and lobbies pay the government to distort prices by using nontariff barriers and tariffs on imports. The equilibrium tariffs are the result of the government and lobbies maximizing their respective objectives. The authors develop a factor, "a", to balance the welfare of the population and the special interest groups (lobbies). "a" is the ratio of the government weights on population welfare and lobby contributions.

Interpreting "a" is difficult. There is computational general equilibrium (CGE) evidence that "a" is small (on the order of magnitude 10^{-3}) for United States' sugar and dairy sectors in 1983, yet Gawande and Bandhopadhyay (2000)[2] find "a" to be large (on the order of magnitude 10^{+3}). If lobbies and the general population are equally influential and balanced, then "a" should be approximately '1', consistent with Bombardini (2008). Since extreme variations from balance would intuitively cause a change in the government, either revolution or strong support of the opposition, it is fair to expect only small changes, both weights reflecting small deviations around '1'. Then, the CGE evidence, interpreted as changes from balance, would be reasonable.

[1] Henceforth GH94
[2] Henceforth GB

Another challenge in the empirical analysis of GH94 is determining if sectors are politically organized into lobbies. There are a plethora of data regarding industry associations, not just in the United States, but in most countries of the world. Durand and Silva (1998) detail the formation of national, encompassing business associations (EBAs), which aggregate business interests as a whole in the formulation of monetary policy, trade liberalization, labor relations, health and social security, and other policy areas, in eight Latin American countries over a fifty year period. In the United States, the existence of a PAC, in and of itself, and the variation in activity are evidence of heterogeneous sectoral political organization. Some recent papers, Mitra et al. (2006) and Gawande et al. (2009), assume that all sectors are politically organized to the same degree. All other papers in this empirical literature use widely differing methodologies to determine the binary vector of sectoral political organization. A common methodology to determine the sectoral political organization vector is not defined, nor is there an appropriate methodology accepted in the literature.

The sectoral political organization vector, as demonstrated in Mitra et al. (2006), strongly influences the parameters of interest. Specifically, in Goldberg and Maggi (1999)[3] and GB, identical underlying sectoral political organization information (Political Action Committee (PAC) contributions) is used. The authors

[3]Henceforth GM

uniquely analyze and interpret the information such that there are major sectoral political organization differences yielding values for the parameters of interest that are also significantly different (see Appendix A).

The concluding section of Mitra et al. (2006) states:

> We end this paper with a note of caution. Owing to our inability to observe or infer the extent of contributions made to influence the government specifically on trade policy issues, it is not possible to be fully confident of any classification of sectors into organized and unorganized. The fact that Goldberg and Maggi (1999) and Gawande and Bandyopadhyay (2000) differ in their classification of sectors for the United States exactly proves this point. Therefore, it is important to subject the theory to as many classification possibilities as we can. Thus, in our minds the previous literature remains important. On the other hand, even the mere possibility, shown in this paper, that the true parameter combinations can be more realistic gives greater credibility to the 'Protection for Sale' theory.

GH94 requires binary information or binary assumptions about the political organization of sectors, i.e., are sectors politically organized, '1', or are they not politically organized, '0'? Sectoral political organization information is difficult to find. Some authors have researched business organization reports (Mitra et al., 2002), while others have researched government board meeting minutes (McCalman, 2004). Still other authors, GB and GM, have used contribution information from PACs in the United States. These methods cannot be generalized for multiple countries. Since an indicator representing the political organization of sectors is required to determine the GWPW in the GH94 model, I propose a uniform methodology to determine the presence or lack thereof. Most sectors make some

political contribution, legal or not, to a government entity. Thus, the sectoral political organization would be best addressed as a heterogeneous variable. To my knowledge, a GH94-based model with a heterogeneous sectoral political organization variable has not been previously developed.

The remainder of this chapter outlines the main findings and contributions of the dissertation. Chapter 2 provides an overview of related theoretical literature on the political economy of trade, contrasting three strands of literature: regulatory policy, an election between two political parties, and GH94 "Protection for Sale." Chapter 2 also examines related empirical literature on GH94, identifying the lack of a definitive method for the determination of sectoral political organization. Chapter 3 presents a new extension to the GH94 theoretical literature that reflects the reality of a heterogeneous degree of sectoral political organization. Chapter 4 explores the use of principal component analysis (PCA) as an element of the new methodology. I apply PCA to the GB dataset, contrasting the use of the binary sectoral political organization variable, used by GB, with the heterogeneous sectoral political organization variable generated by PCA, and find the heterogeneous sectoral political organization variable generated by PCA to be an improvement. Chapter 5 examines the GB dataset using Quantile Regression to determine if different datasets used in this literature come from the same probability distribution. The hypothesis that some of the data agrees with a World Bank dataset cannot be rejected, but other data questions raised

by GB themselves are not resolved. Chapter 6 proposes the use of a new set of sectoral political organization characteristics which are tested in Chapter 7, where the new methodology is applied to Latin American countries. Chapter 8 concludes.

1.1 Main Contributions

I extend the GH94 "Protection for Sale" model to reflect the reality of a heterogeneous degree of sectoral political organization. Implementation of the heterogeneous degree of sectoral political organization requires a combination of several indicators of sectoral political organization. I identify a set of these indicators drawn from the theory of organization; many of these are correlated. I develop a methodology using PCA (to my knowledge PCA has not previously been used in this manner in economics), to generate the heterogeneous degree of sectoral political organization for the GB dataset. Using this methodology, I create the intertemporal government weight on population welfare (GWPW) for twelve Latin American countries.

1.2 Main Findings

I find that the binary sectoral political organization variable in the GH94 "Protection for Sale" model should be restructured to more realistically reflect a

heterogeneous degree of sectoral political organization. The heterogeneous degree of sectoral political organization, generated by PCA, is empirically tested and yields a statistical improvement measured in multiple orders of magnitude. I find a consistent level of GWPW around '1'. Variation below '1' favors the welfare of the lobbies while variation above '1' favors the welfare of the general population. The intertemporal results highly correlate (no causality is inferred) with the Trade Openness Index and significant political and economic events for each of the twelve Latin American countries studied.

Chapter 2

The "Protection for Sale" Literature

I begin by positioning the GH94 literature with regard to its precedents, United States Regulatory Policy and an Election between two parties representing protectionist and free-trade interests. To establish the basis for my unique extension presented in Chapter 3, I then contrast the result of the GH94 "Protection for Sale" model with GB and GM extensions, which provide an introduction to the heterogeneous sectoral political organization argument. The exclusive use of the binary sectoral political organization vector is demonstrated in the other relevant extensions, grouped naturally into imperfect substitutability, oligopoly, and heterogeneous firms.

2.1 Positioning "Protection for Sale"

There are two germane strands in the literature that precede GH94, and an abundant literature on GH94 itself. The first strand emanates from United States regulatory policy (see Figure 2.1), begins with Stigler (1971) and continues

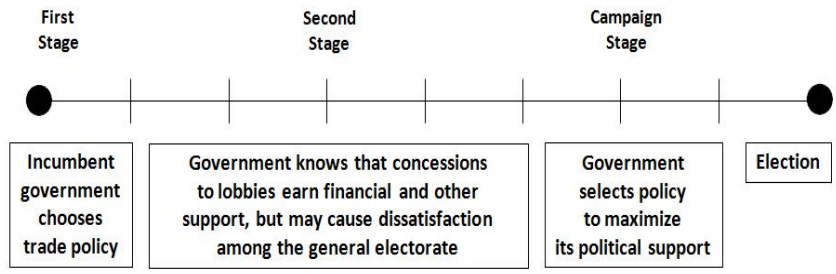

Figure 2.1: United States Regulatory Policy

with Peltzman (1976) and Hillman (1982). In the first stage, the incumbent government chooses its trade policy. In the second stage, the government is aware that concessions granted to special-interest groups earn financial and other support, but may also cause dissatisfaction among the general electorate. Therefore, the government selects trade policy to maximize political support, which depends on the exogenous rents accruing to special interests and the deadweight loss affecting voters. Campaign contributions do not enter directly into the analysis, and an election is second order. In summary, trade policies are set by the incumbent government to maximize its political support.

The second strand in the literature begins with Brock and Magee (1978), who focus on an election between two political parties, one representing protectionist interests and the other representing free-trade interests (see Figure 2.2). In the first stage, the parties commit to their trade policy. Free trade benefits

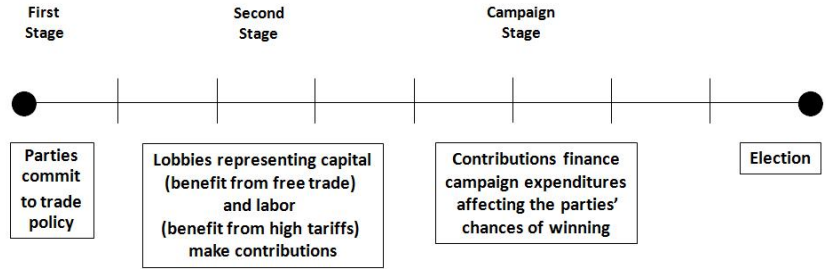

Figure 2.2: Election Between Protectionist and Free-trade Interests

lobbies representing capital, and high tariffs benefit those representing labor. In the second stage, lobbies make contributions that finance campaign expenditures

and affect the political parties' chances of winning the election. Brock and Magee explore the Nash equilibrium that emerges when the political parties act as Stackelberg leaders with regard to the lobbies. This is a 2-stage, sequential game where the political parties move first and the lobbies observe the parties' trade policy and make their contribution offers in the second stage. In this case, the motivation for political contributions is clearly to influence the election outcome.

The GH94 model stems from theoretical work by Findlay and Wellisz (1982), Becker (1983), and Hillman (1989). In the first stage (see Figure 2.3), lobbies confront the incumbent government with a campaign contribution schedule.

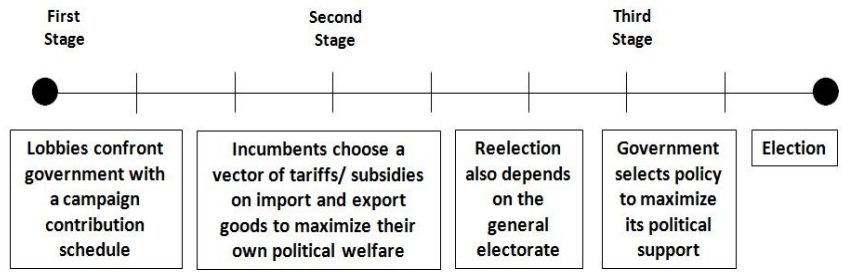

Figure 2.3: Equilibrium Actions of Profit-Maximizing Lobbies

In the second stage, the government chooses tariffs and subsidies on import and export goods to maximize their own political support. The government is also aware that reelection depends on the general electorate. This strand of the literature is different; first the lobbies set contribution schedules, then, depending directly on policies which affect voter well-being, and indirectly on policies which affect the endogenously developed rents accruing to special interests, the government's

political support function is determined.

Eicher and Osang (2002) compare the GH94 Influence Driven model with its origins in the Tariff Formation Function model (Findlay and Wellisz, 1982) to determine if contributions or organization matters. They find that both models perform well in predicting tariffs. However, the organization variable in the Influence Driven model adds significant information, and provides a better fit than the Tariff Formation Function model based on contribution levels. Eicher and Osang's fundamental conclusion is that the step function in GH94 performs better than the continuous contribution variable in estimating the influence of lobbies on protection. These evaluations do not consider heterogeneous sectoral political organization.

Table 2.1 summarizes thirteen empirical papers published between 1999 and 2009, that are widely cited, focus on different countries, use different methods for determining the sectoral political organization variable, provide interesting extensions to the GH94 theory, and result in a variety of measures for "a". Four conclusions can be put forward:

1. The level of sectoral political organization is binary/discrete throughout the literature. The reasonable expectation of heterogeneous political sectoral organization has not been developed.

Paper Author(s) (Year)	**Country**	**Method for determining Political Organization**	**Organization Measure***	**"a"****
Goldberg and Maggi (1999)	U.S.A.	$100M Cutoff of Political Action Committee Contributions	$I = 0$ or $I = 1$	70
Gawande and Bandhopadhyay (2000)	U.S.A.	Regression based procedure (2-digit SIC)	$I = 0$ or $I = 1$	3175
Mitra et al. (2002)	Turkey	Turkish Industrialists' & Businessmen's Association Membership	$I = 0$ or $I = 1$	76
Eicher and Osang (2002)	U.S.A.	GM method with GB data	$I = 0$ or $I = 1$	49
McCalman (2004)	Australia	Australian Tariff Board Reports 1960-68 Number of politically organized classes divided by number of classes in a group	I is Discrete between zero and one	41
Gawande et al. (2005)	Brazil Argentina	Total Imports and/or Exports above the Sample Mean	$I = 0$ or $I = 1$	NA
Facchini et al. (2006)	U.S.A.	GM method with GB data and alternative thresholds	$I = 0$ or $I = 1$	82
Belloc (2007)	E.U.	Priors from E.C. DG-Trade & validation	$I = 0$ or $I = 1$	148
Cadot et al. (2007)	India	Endogenously Derived	$I = 0$ or $I = 1$	3.09
Bombardini (2008)	U.S.A.	Uses Gawande and Bandhopadhyay (2000), Federal Election Commission Data Firm-level Contribution Heterogeneity	$I = 0$ or $I = 1$	1
Imai et al. (2008)	U.S.A.	Randomly determined	$I = 0$ or $I = 1$	73-335
Jones et al. (2008)	Egypt Kenya Tanzania Tunisia	Number of establishments, number of employees, or ratio of employees to establishments greater than a threshold	$I = 0$ or $I = 1$	9 200 49 104
Gawande et al. (2009)	***	Assumes all Sectors Organized and 100 percent of the population represented by lobbies	$I = 1$	***

*Organized is $I = 1$, Not Organized is $I = 0$
**"a" is the ratio of population welfare weight to lobby contributions weight
***See Gawande et al. (2009), Table 2

Table 2.1: Empirical Methods Used for determining Organization Measure

2. The methods for generating the sectoral political organization vector are essentially different, one from the other, leading to the conclusion that a well accepted method does not exist.

3. The characteristics of sectoral political organization for trade purposes are specific to a country (Australia, Turkey, the United States). However, the collection of characteristics from Facchini et al. (2006) shown in Table 6.1, or their proxies, are commonly used to predict political organization, and are available for many countries.

4. With the exception of Gawande et al. (2009), it is difficult to compare results across countries, time, and political regimes.

2.2 Theoretical and Empirical Extensions

The "Protection for Sale" model has a straightforward extension provided by GB that adds a single intermediate input. This version of the model is extended for heterogeneous sectoral political organization in Chapter 3[4], and is used in Chapter 4 to compare the binary and the heterogeneous sectoral political organization vectors.

GH94, Proposition 2 (Equilibrium Policies), describes a modified Ramsey

[4]The GH94 and GM versiond of the model have also been extended for heterogeneous sectoral political organization, and are available upon request.

rule:

$$\frac{t_i}{1+t_i} = \frac{I_i - \alpha_L}{a + \alpha_L} \frac{z_i}{e_i}, \tag{2.1}$$

where t_i is the ad valorem tariff on good i, I_i is the binary sectoral organization variable for good i, α_L is the fraction of the population represented by lobbies, "a" is the population welfare ratio (including GWPW), $z_i = \frac{y_i}{m_i}$ is the equilibrium ratio of domestic output (y_i) to imports (m_i) for good i, and e_i is the import demand elasticity of final good i. GWPW is the relative importance to an incumbent government of population welfare, greater than '1' favors population welfare, while less than '1' does not favor population welfare.

The extension for a single intermediate input provided by GB is

$$\frac{t_i}{1+t_i} = \frac{I_i - \alpha_L}{a + \alpha_L} \frac{y_i}{m_i} \frac{1}{e_i} + t_q \frac{\partial m_{n+1}}{\partial p_i} \frac{q^*}{m_i} \frac{1}{e_i}, \tag{2.2}$$

where t_q is the ad valorem tariff on the intermediate input. Equation (2.2) extends Equation (2.1) through the addition of the second term, $t_q \frac{\partial m_{n+1}}{\partial p_i} \frac{q^*}{m_i} \frac{1}{e_i}$, which accounts for the effect of the single intermediate input.

GM moves the import demand elasticity to the lefthand side to eliminate classical measurement error:

$$\frac{t_i}{1+t_i} e_i = \frac{I_i - \alpha_L}{a + \alpha_L} z_i + \varepsilon_i, \tag{2.3}$$

where ε_i is the error term.

According to the strict version of the GH94 model, the set of politically organized sectors should be inferred simply by looking at contribution levels; if the sectoral contribution level is positive, the sector should be organized. In the PAC data used by GM, sectoral contribution levels are positive for all 3-digit SIC sectors, so a literal interpretation would imply that all sectors in the economy are

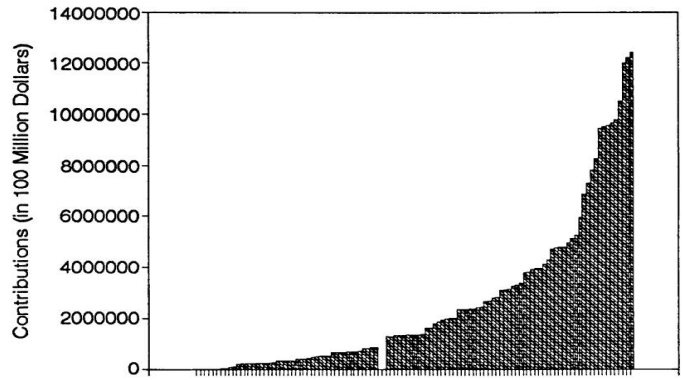

Figure 2.4: Political Action Committee Contributions by SIC3 (Goldberg and Maggi, 1999)

organized. However, this implication would be valid only if contributions were made exclusively to influence trade policies. We already know that lobbying expenditures are an order of magnitude greater than total PAC expenditures, and are not made exclusively to influence trade policies (Ludema et al., 2011). The presence of extraneous contributions calls for a more flexible criterion in assigning the sectoral political organization values. GM adopted the following intuitive method: if the contribution level was below the threshold level of $100,000,000, the binary

sectoral political organization value was set to zero; if contributions exceeded the threshold, the value was set to one. This threshold was chosen because there seems to be a natural break in the histogram of PAC contributions as indicated in Figure 2.4. The sectors that GM considered not organized can be found in their Appendix B, Table-B1. The GM dataset is not available. Hence, detailed analysis will focus on the GB dataset, generously provided by Kishore Gawande.

GB also relied on PAC contributions, and estimated an auxiliary regression to predict trade-related PAC spending using purely trade-related variables. A full description of the GB methodology is in the Data Section and Appendix A3 of Gawande and Bandhopadhyay (2000). As a result of GB's approach, all four-digit SIC codes, within a two-digit code, have the same level of binary sectoral political organization. Also, the approach to the correction for the errors-in-variables problem, described in Appendix A4 of Gawande and Bandhopadhyay (2000), leads to the same elasticities for all four-digit SIC codes within a three-digit code.

As stated earlier, GB and GM used the same underlying data, but used different approaches to arrive at the sectoral political organization vectors, which,

	Sectors Agree	**Agree Percent**	**Sectors Disagree**	**Disagree Percent**
GM vs. GB	9	37.5	15	62.5
GB used an auxilliary regression GM used the Corporate PAC spending Cutoff level of $100 Million (1981)				

Table 2.2: Comparison of Gawande and Bandhopadhyay (2000) and Goldberg and Maggi (1999) Organization Vectors

not surprizingly, are quite different. The comparison of the organization vectors is summarized in Table 2.2 at the three-digit SIC level.

2.3 Other Methods to Determine Organization

Cadot et al. (2007) adds Multiple Intermediate Inputs and Duty-Drawbacks for the case of India. Sectors are endogenously partitioned into organized vs. not organized using an iterative procedure[5]. The first stage estimates a standard GH94 equation with all sectors not organized. This regression determines endogenous tariffs as functions of import penetration rates. The second stage uses the first stage residuals to rank industries, those with high residuals being more likely to be organized than others. On the basis of this ranking, a cutoff value is set, above which industries are considered to be organized. Next, a "GM/GB" equation is evaluated, which generates a new vector of residuals. This procedure is repeated until the sum of squared residuals is minimized, and then the cutoff value that yields the absolute minimum of the sum of squared residuals is chosen, resulting in a binary sectoral political organization vector. Their conclusion states that "The weight on welfare in the government's objective function implied by our estimates is 3.09, well below recent estimates ranging between forty and three thousand. This number is still implausibly high in that it implies that a lobby should contribute three rupees to the government for each rupee of deadweight loss." This is another indication that "a" should be close to '1'.

[5]In a later version, the authors use the EM algorithm in place of the iterative procedure.

Mitra et al. (2002) studied Turkey under a democratic versus an autocratic political regime. Because data on trade-related (or other) political contributions were not available, the political organization variable was constructed in two steps. In the first step, membership data for the Turkish Industrialists and Businessmen's Association (TUSIAD) were obtained, and an initial determination of organized sectors was made. In the second step, discriminant analysis methods were used to statistically validate the binary choice made in the first step. After mapping individual members of TUSIAD to their respective sectors, the members per sector were counted. Using a cutoff of at least five members, twelve of the thirty-seven sectors were classified as organized. This list was then augmented by an additional four sectors with fewer than five members each, but whose members were well known for their political and economic influence (based on national newspaper reports). Because this choice of organized sectors contains elements of subjective judgment, a determination was made as to whether the chosen sectors could somehow be statistically validated. Two alternative methods were examined: discriminant analysis and probit regressions. The sectors which were ex-ante misclassified were identified and the classification error was calculated. This is a country specific methodology, yielding a binary sectoral political organization vector, with an "a" value of seventy-six.

McCalman (2004) examined Australia, and studied seven relatively similar industry groups. Political contributions data are not available at a sufficiently

disaggregated level to allow an organizational assignment to particular industries, including determination of the extent to which the contributions are trade related. An industry was defined as politically organized if it was able to initiate a request for tariff revision to the Australian Tariff Board, since over 90 percent of the inquiries were requested by industries (Glezer, 1982). The construction of the sectoral political organization variables employed the following procedure: an industry was defined as politically organized if a Tariff Board report was prepared on it between 1960 and 1969. The number of politically organized classes within a group was totalled and divided by the number of total classes within that group. This construction of the sectoral political organization variable reflects an effort to capture some of the additional information that was available in the data. The resulting index is discrete between zero and one, and reflects a discrete degree of sectoral political organization within an industry. Again, this is a country specific methodology, yielding a discrete sectoral political organization vector, with an "a" value of forty-one.

Gawande et al. (2005) used Grossman and Helpman (1995a) to examine trade negotiations and tariffs for Mercosur, and did not examine "a". They assumed that industries in which total imports and/or total exports were above the sample mean were politically organized, specifically for Brazil and Argentina. The authors state that this method of determining the sectoral political organization variable is "simple." To demonstrate robustness of the results to different mea-

sures of political organization, four other methods were analyzed to statistically validate the binary partitioning of organized and unorganized sectors;

1. All industries were assumed to be organized, to the same degree, in both countries,

2. Industries in which total imports from the world exceeded the 85th percentile in the sample were considered politically organized and a similar cutoff was defined for exporting industries,

3. Industries in which total imports from the world exceed the 90th percentile in the sample were considered politically organized and a similar cutoff was defined for exporting industries,

4. A combination of a mean cutoff on imports and exports (as above), and a 25th percentile cutoff on output per firm (as a proxy for concentration) was used to define political organization.

This methodology could be applied to many countries, but yields a binary sectoral political organization vector.

In Jones et al. (2008), the political organization variable represents lobbying access to African policy-makers. Since obtaining data on political organization is difficult, the authors use a number of alternative proxy measures to determine characteristics of sectoral political organization (Chapter 6). The first proxy is

based on the number of establishments within each sector (unfortunately there are no data on industrial concentration.) Following the same logic as the number of establishments, an alternative measure of sector size (as a proxy for political influence) is employees per sector; the larger the number of employees, the more likely it is that the sector has political influence on policy makers. The third measure takes advantage of data on establishments and employment. The greater the ratio of employees to establishments, the more likely it is that the sector includes large firms and therefore potential political influence (and the potential for collective lobbying). For each country, thresholds are set based on the mean, median and upper quartile of the distribution. If the measure is greater than these thresholds, the sector is classified as politically organized. This methodology could be applied to many countries, but yields a binary sectoral political organization vector, and an "a" value between nine and two-hundred, depending on the country.

Belloc (2007) identifies European Union (as a single entity) sectors that are organized in lobbies with regard to trade policy. First, priors are constructed from the Civil Society Dialogue-External Trade (European Commission DG-Trade). Second, the identification is validated by discriminant function analysis, cluster analysis and probit estimation techniques. This methodology, only applicable at the level of the European Union, yields a binary sectoral political organization vector, and an "a" value of one-hundred-forty-eight.

Gawande et al. (2009) assume that all sectors are politically organized. This is true of industrial sectors in most advanced countries, where political action committees (U.S.) or industry associations (Europe and Latin America) lobby their governments. Such industry coalitions are prevalent in developing countries as well. Since the analysis is conducted at the aggregation level of 3-digit ISIC industries, the authors state that the assumption that all industries are organized is an empirically reasonable one. In the U.S., significant contributions to the political process are reported by all 3-digit industries (and at much finer levels of disaggregation). The authors use the model in Grossman and Helpman (1996), driven by an electoral competition game. By assuming that all sectors are politically organized, the authors are able to compare the "welfare-mindedness" ("a") of fifty-four countries (see their Table 2). Clearly, this approach can be used across many countries, but assumes that all sectors are politically organized to the same degree across all countries. It would be interesting to perform this analysis using the country specific heterogeneous levels of sectoral political organization.

Imai et al. (2008), using a simulation approach, presents a new test for the GH94 model with the data from GB. They show that the quantile regression of the protection measure on the inverse import penetration ratio divided by the import demand elasticity should yield a positive coefficient for quantiles close to one. They test this prediction and the results do not provide any evidence favoring the GH94 model. This could reflect an issue with the model, but more probably

this indicates an issue with the GB dataset based on my outlier study in Chapter 5.

For the research described above, goods are assumed to be perfect substitutes, firms operate under perfect competition, and the firms within sectors are assumed to be identical. However, there are two modifications to these basic "Protection for Sale" assumptions: imperfect substitutability and firm heterogeneity. The following research by Facchini et al. (2007), Long and Soubeyran (1996), and Chang and Willmann (2006) is not listed in Table 2.1.

2.4 Imperfect Substitutability

Facchini et al. (2007) explore the trade policy response of Latin American policy-makers to growing Chinese and Indian imports. The authors extend the GH94 model to allow for imperfect substitution between domestically produced goods and imported goods. The model suggests that as the elasticity of substitution between domestic goods and imported goods increases, the incentives to lobby also increase, and the resulting equilibrium tariff is higher. Facchini et al. use a complete set of organization characteristics (Chapter 6, Table 6.1) to determine a binary sectoral political organization vector, but calculate extended "a" values of 1.12 for Central America, 4.73 for the Andean countries, and 3.16 for Latin America.

2.5 Firm Heterogeneity

Long and Soubeyran (1996) examine firm heterogeneity, defined as variable unit costs, to determine if the degree of heterogeneity within a lobby is an important determinant of the lobby's influence. The authors utilize a model where the lobby consists of domestic firms in an oligopolistic industry facing competition from foreign oligopolists. Long and Soubeyran show that the degree of heterogeneity of a lobby has important implications for the lobby's total expenditure and its level of success. The basic conclusions are that (1) total expenditure depends on the degree of heterogeneity of the industry, and on the curvature of the demand curve, and (2) larger firms do not necessarily contribute more than smaller firms. The authors generally find the same result in both the cooperative and non-cooperative lobbying cases. Sectoral political organization is not discussed nor is "a" computed.

Chang and Willmann (2006) start with the Melitz (2003) model of heterogeneous firms that self-select into purely domestic producers, domestic and exporting producers, or those that exit the market. Tariff setting is treated as a multilateral trade policy choice, and thus setting a tariff applies to the domestic rate, and implies that the same rate will be set by other countries. In the standard GH94 model, the political organization variable for an industry reflects the lobbying or non-lobbying, binary, state of the sector, but in this model there are other

possibilities at the firm level: neither domestic nor exporting firms are organized, both groups are organized, only domestic firms lobby, or only exporters lobby. In all cases, there is a binary group organizational vector. The authors provide a potential answer to the long-standing puzzle of the empirical literature, namely why estimates for "a" are very high, and conclude that the model gives rise to an upward bias in the estimate since a sector may not obtain a tariff due to the counter lobbying efforts of domestic and exporting firms. The authors do not take the theory to the data, thus, "a" is not calculated.

Bombardini (2008) builds a model of heterogeneous firms, measured by firm size, where, in the presence of a fixed cost of channeling political contributions, it is efficient for a lobby to be formed by the largest firms in a sector. This paper is conceptually different from GH94. A continuous measure of firm organization, between zero and one, is developed where the equilibrium share of total output is the continuous measure that characterizes firms. However, the author assumes that contributions and welfare are equally weighted, and focuses on the impact of the size of firms on propensity to lobby. The critical econometric model continues to include the binary sectoral political organization variable. The government places equal weights on welfare and contributions, hence, "a" is calculated to be '1'.

2.6 Literature Summary

In their empirical analysis, GB state "Our estimates of "a" suggest that PAC contributions are greater than deadweight costs, on average." Intuitively, this is not reasonable from the perspective of the firms that provide the PAC contributions, because there would be negative benefits, costs exceed revenues. GB go on to say, "On the other hand, if the estimates of "a" from the CGE studies are representative, then it points to deficiencies in measuring z, e, and I in the econometric work." I will further examine these data issues in Chapter 5.

The argument that all sectors are organized to heterogeneous degrees is supported by the evidence presented in this chapter and the beginning of the next chapter, where the GH94 theory is extended to include the heterogeneous degree of sectoral political organization.

Chapter 3

Heterogeneous "Protection for Sale"

There are a plethora of data regarding industry associations, not just in the United States, but in most countries of the world. Durand and Silva (1998) detail the formation of national, encompassing business associations (EBAs), which aggregate business interests as a whole in the formulation of monetary policy, trade liberalization, labor relations, health and social security, and other policy areas, in eight Latin American countries over a fifty year period. Table 3.1 summarizes the influence of these EBAs on economic policy and the political regime, and provides additional information for another eleven Latin American countries. As evidence of heterogeneous sectoral political organization in the United States, Figure 2.4 shows that all sectors have some level of PAC contribution activity. The existence of a PAC, in and of itself, and the levels of activity are evidence of heterogeneous sectoral political organization.

PAC data is used by GB, who provide a single intermediate input extension to the GH94 "Protection for Sale" model. A further extension to the GB model is required to embody heterogeneous sectoral political organization.

Following GH94, the incumbent government's objective is to maximize a weighted sum of total political contributions from organized sectors and aggregate population welfare

$$G = \sum_{i \in L} C_i(\mathbf{p}) + aW(\mathbf{p}),$$

Country	Year Formed	Encompasing Business Association	Supports Democracy	Economic Policy Determined by
Argentina	1952	Disbanded	Yes	Ministry of Economy
Bolivia	1962[1]	-	-	
Brazil	1986	Fragmented	Yes	State officals/experts
Chile	1935[2]	Strong	Ambivalent	CPC AND Government consensus
Columbia	1992[3]	-	-	
CostaRica	1973[4]	-	-	
Dominican Republic	1978	Fragmented	Yes	Lack of long-term economic planning
Ecuador	1980	-	-	
El Salvador	1966[5]	Weak	Yes	Ministry of Economy and multiple EBAs
Guatemala	1957	-	-	
Honduras	1967	-	-	
Jamaica	1958	-	-	
Mexico	1975[6]	Weak	Ambivalent	CCE direct participation
Nicaragua	1972[7]	Weak	Yes	Ministry of Economy and multiple EBAs
Panama	1964	-	-	
Paraguay	1951	-	-	
Peru	1977[8]	Strong	Yes	Ministry of Economy/CONFIEP experts
Uruguay	1978	-	-	
Venezuela	1944	-	-	

1-Confederatión de Empresarios Privados de Bolivia
2-Confederatión de la Producción y el Comercio - CPC
3-Consejo Gremial Nacional
4-Unión Constaricense de Cámaras y Asociacionas de la Empresa Privada
5-Asociación Nacional de la Empresa Privada - ANEP
6-Business Coordinating Council (Consejo Coordinator Empresarial - CCE)
7-Consejo Superior de la Empresa Privada-COSEP
8-Confederatión de Empresarios Privados - CONFIEP
Italicized Countries are not discussed in (Durand and Silva, 1998)

Table 3.1: Nineteen Latin American Countries, Organized Business, 1940s - 1990s

where L is the collection of organized sectors, $C_i(\mathbf{p})$ represents the political contributions of sector i as a function of the price vector, $W(\mathbf{p})$ represents aggregate population welfare as a function of the price vector, and "a" respresents, to an incumbent government, the relative importance of population welfare versus organized sector (lobby) contributions. GH94 concludes that each lobby has a truthful contribution schedule, i.e., a contribution schedule that reflects the true preferences of the lobby such that the lobby pays the government the excess (if any) of the lobby's gross welfare relative to some base level of welfare. In other words (note that there are now $n+1$ specific factors, n final goods and one intermediate good):

$$G = \sum_{i \in L} W_i(\mathbf{p}, p_{n+1}) + aW(\mathbf{p}, p_{n+1}), \tag{3.1}$$

where population welfare, $W(\mathbf{p}, p_{n+1})$, equals income (labor plus profit from $n+1$ specific factors) plus trade tax revenues plus total consumer surplus:

$$W(\mathbf{p}, p_{n+1}) = \underbrace{l + \sum_{i=1}^{n} \pi_i(p_i, p_{n+1}) + \pi_{n+1}(p_{n+1}) +}_{\text{labor \& specific factor profits}}$$

$$\underbrace{\sum_{i=1}^{n} (p_i - p_i^*) m_i(p_i) + (p_{n+1} - p_{n+1}^*) m_{n+1}(p_i, p_{n+1}) +}_{\text{tariff revenue}} \quad \underbrace{Ns(\mathbf{p})}_{\text{consumer surplus}} \quad . \tag{3.2}$$

In Equation (3.2), l represents earnings to labor, $\pi_i(p_i, p_{n+1})$ represents earnings to the specific factor used in producing good i, $\pi_{n+1}(p_{n+1})$ represents earnings to the intermediate good, $m_i(p_i)$ represents imports of good i, $m_{n+1}(p_i, p_{n+1})$ repre-

sents imports of the intermediate good, and $s(\mathbf{p}) \equiv \Sigma_j u_j[d_j(p_j)] - \Sigma_j p_j d_j(p_j)$ is the consumer surplus derived from these goods, where the demand function $d_j(\cdot)$ is the inverse of $u^{'}(x_i)$, the first derivative of a quasilinear utility function.

For sector i:

$$W_i(\mathbf{p}, p_{n+1}) = \underbrace{l_i + \pi_i(p_i, p_{n+1})}_{\text{labor \& profit}} + \alpha_i \left[\underbrace{\sum_{i=1}^{n} (p_i - p_i^*) m_i(p_i) + (p_{n+1} - p_{n+1}^*) m_{n+1}(p_i, p_{n+1})}_{\text{tariff revenue}} \right] + \alpha_i \underbrace{Ns(\mathbf{p})}_{\text{consumer surplus}}, \tag{3.3}$$

where α_i represents the fraction of the population that owns specific factor i.

For the intermediate input sector, $n+1$:

$$W_{n+1}(\mathbf{p}, p_{n+1}) = \underbrace{l_{n+1} + \pi_{n+1}(p_{n+1})}_{\text{labor \& profit}} + \alpha_{n+1} \left[\underbrace{\sum_{i=1}^{n} (p_i - p_i^*) m_i(p_i) + (p_{n+1} - p_{n+1}^*) m_{n+1}(p_i, p_{n+1})}_{\text{tariff revenue}} \right] + \alpha_{n+1} \underbrace{Ns(\mathbf{p})}_{\text{consumer surplus}}. \tag{3.4}$$

Substituting Equations (3.2), (3.3), and (3.4) into Equation (3.1) gives

$$G = \sum_{i \in L} W_i(\mathbf{p}, p_{n+1}) + W_{n+1}(\mathbf{p}, p_{n+1}) + aW(\mathbf{p}, p_{n+1}). \tag{3.5}$$

To maximize Equation (3.5), take the partial derivatives of Equations (3.2) (multiplied by a), (3.3) and (3.4) with respect to p_j.

For population welfare, using Equation (3.2)

$$a\frac{\partial W}{\partial p_j} = a\pi_j^{'}(p_j) + a(p_j - p_j^*)m_j^{'}(p_j) + am_j(p_j) + a(p_{n+1} - p_{n+1}^*)m_{n+1}^{'}(p_j) + aNs^{'}(p_j). \tag{3.6}$$

For lobby welfare, using Equation (3.3)

$$\frac{\partial W_i}{\partial p_j} = \delta_{ij}\pi_j^{'}(p_j) + \alpha_i m_j(p_j) + \alpha_i(p_j - p_j^*)m_j^{'}(p_j) + \alpha_i(p_{n+1} - p_{n+1}^*)m_{n+1}^{'}(p_j) + \alpha_i Ns^{'}(p_j),$$

where δ_{ij} is the indicator variable, from GH94, that equals 1 (an organized sector) if $i = j$ and 0 otherwise.

At this point, I introduce the heterogeneous degree of sectoral political organization. The existence of the Tariff Board in Australia, the EBAs in Latin America, the Turkish Industrialists' & Businessmen's Association in Turkey, and PACs in the United States, establish that all sectors are organized to some heterogeneous degree. Hence, if $i = j$, then $\delta_{ij} = \delta_j$ (not 1). If each sector is politically

organized to some heterogenous degree, for trade purposes, then δ_j, $0 \leq \delta_j \leq 1$, is the degree of sectoral political organization for sector j. Because sectoral lobby contributions are not made exclusively to influence trade policy, the determinants of δ_j will need to be carefully selected with trade in mind. Sectoral lobby contributions for trade purposes represent some portion of the total welfare achieved by each sector. Sectors that perceive zero welfare (benefits) from supporting a lobby would logically not organize in a sectoral political organization. Here, contributions would be zero and the degree of organization would also be zero. Sectors that perceive low welfare from supporting a lobby would intuitively organize only slightly, and their contributions and degree of organization would be low. Sectors that perceive large benefits from supporting a lobby would organize strongly, and their degree of organization would approach one, i.e., these sectors would limit their contributions to the welfare received. Given these assumptions, it would be reasonable to expect that a change in sectoral profit relative to a change in sectoral price would be affected by the heterogenous degree of sectoral political organization, δ_j. Given the evidence that all sectors are organized to some heterogeneous degree, δ_{ij} is now equal to δ_j (not 1) and 0 otherwise.

Let $\sum_i \alpha_i = \alpha_L$. Then, summing over i

$$\sum_{i=1}^{n} \frac{\partial W_i}{\partial p_j} = \delta_j \pi_j^{'}(p_j) + \alpha_L m_j(p_j) +$$

$$\alpha_L(p_j - p_j^*)m_j^{'}(p_j) + \alpha_L(p_{n+1} - p_{n+1}^*)m_{n+1}^{'}(p_j) + \alpha_L N s^{'}(p_j). \tag{3.7}$$

For the intermediate input, using Equation (3.4)

$$\frac{\partial W_{n+1}}{\partial p_j} = \alpha_{n+1} m_j(p_j) + \alpha_{n+1}(p_j - p_j^*)m_j^{'}(p_j) +$$

$$\alpha_{n+1}(p_{n+1} - p_{n+1}^*)m_{n+1}^{'}(p_j) + \alpha_{n+1} N s^{'}(p_j). \tag{3.8}$$

Then combining and rearranging Equations (3.6), (3.7) and (3.8) gives

$$\frac{\partial G}{\partial p_j} = (\delta_j + a)\pi_j^{'}(p_j) + (a + \alpha_L + \alpha_{n+1})\times$$

$$\left[m_j(p_j) + (p_j - p_j^*)m_j^{'}(p_j) + (p_{n+1} - p_{n+1}^*)m_{n+1}^{'}(p_j) + N s^{'}(p_j)\right]. \tag{3.9}$$

For good i, let output be $y_i(p_i)$, imports be $m_i(p_i) = N d_i(p_i) - y_i(p_i)$, the change in earnings be $\pi_i^{'}(p_i) = y_i(p_i)$, and the change in consumer surplus be $s_i^{'}(p_i) = -d_i(p_i)$. Substituting, rearranging and simplifying gives the new GB result with the heterogeneous degree of sectoral political organization

$$\frac{t_j}{1 + t_j} = \frac{(\delta_j - \alpha_L - \alpha_{n+1})}{(a + \alpha_L + \alpha_{n+1})}\left[\frac{z_j(p_j)}{e_j}\right] + \left[\frac{p_{n+1}^* m_{n+1}^{'}(p_j)}{e_j m_j(p_j)}\right] t_{n+1}. \tag{3.10}$$

The original GB result is :

$$\frac{t_j}{1 + t_j} = \frac{(I_j - \alpha_L - \alpha_{n+1})}{(a + \alpha_L + \alpha_{n+1})}\left[\frac{z_j(p_j)}{e_j}\right] + \left[\frac{p_{n+1}^* m_{n+1}^{'}(p_j)}{e_j m_j(p_j)}\right] t_{n+1}, \tag{3.11}$$

where I_j represents the binary sectoral political organization variable for sector j. At the boundaries, when all sectors are completely organized, $I_j = 1$ and $\delta_j = 1$ for all j, and when all sectors are completely not organized, $I_j = 0$ and $\delta_j = 0$ for all j, the GB result with the heterogeneous degree of sectoral political organization is equivalent to the original GB result. Hence, in the degenerate case, we have equivalence.

Chapter 4

Creating Heterogeneous Organization using Principal Component Analysis

Given the heterogeneous GB theory, the next step is to develop a methodology for combining trade oriented sectoral political organization characteristics into a single heterogeneous sectoral political organization variable, δ_i. The GB dataset, including GB's many trade oriented sectoral political organization characteristics, is appropriate for this task.

GB identified politically organized industries by regressing corporate PAC spending per contributing firm divided by value added on bilateral import penetration by a partner (France, Germany, Italy, Japan, and the U.K.) interacted with twenty two-digit SIC dummies. Those two-digit industries with positive coefficients were considered organized in the trade arena vis-a-vis that partner. The union of the organized two-digit industries was taken. For these industries, $I_i = 1$. This approach results in generating the same value of the organization variable for all four-digit sectors within a two-digit sector group.

GM stated "we treat I_i as *econometrically* endogenous, and specify a reduced-form equation for it."

$$I_i^* = \xi_2 \mathbf{Z}_{2i} + \mathbf{u}_{2i} \qquad \text{and} \qquad I_i = \begin{cases} 1 \text{ if } I_i^* > 0 \\ 0 \text{ if } I_i^* \leq 0 \end{cases}$$

"In the right-hand side of this reduced-form equation we include a set of traditional political-economy regressors (concentration indices, minimum efficient scale, union-

ization, geographic concentration, etc.) which are natural instruments for contributions and organization dummies, as well as the exogenous variables..." Many of these regressors are potentially correlated, leading to bias in the GM estimate of I_i.

Neither of these approaches can be generalized for many countries, nor do they resolve the potential correlation issues. Another approach relies on Principal Component Analysis.

PCA is preferred for three reasons; (1) it provides a standardized methodology for creating the unknown variable value, δ_i, (2) it transforms a number of possibly correlated variables, the trade oriented characteristics that determine sectoral political organization, into a number of uncorrelated variables, the Principal Components (PCs), and (3) it accounts for as much of the variability/information in the data as possible in the first PC. Furthermore, finding and rating the influence of outliers in data of high dimension can be difficult, and PCA is an efficient approach.

Table 4.1 presents the nine GB sectoral political organization characteristics. For the first characteristic, GB used gross output to import ratio. Intuitively, this should be inverted; sectors want government assistance to restrict imports. Thus, when imports are small relative to output, sectors would be indifferent and not organize, but when imports are relatively large, sectors would organize.

Therefore, the gross output to import ratio should be inversely related to the het-

Characteristic	**Data Year**
Gross import to output ratio	1983
Log of corporate PAC spending per contributing firm ($100M) divided by value added ($B)	1977-1984 1983
Log of Herfindahl index of firm concentration	1982
U.S. total imports across all partners divided by U.S. consumption ($B)	1983
Fraction of employees classified as scientists and engineers	1982
Fraction of employees classified as managerial	1982
Fraction of employees classified as unskilled	1982
Four-firm concentration ratio	1982
Measure of industry scale: Value added per firm ($B/firm)	1982

Table 4.1: Gawande and Bandhopadhyay (2000) Sectoral Political Organization Characteristics

erogeneous degree of sectoral political organization, and has been inverted in Table 4.1 for use as a trade oriented sectoral political organization characteristic[6].

The results of the PCA are displayed in Table 4.2; the first column represents PC1 which contains almost all of the variance. Hence, the most influential characteristic of sectoral political organization is gross imports as a proportion of output. Then, the heterogeneous sectoral political organization vector is computed by multiplying the dataset of sectoral political organization characteristics by the first PC (a 242 $\times$ 9 matrix multiplied by a 9 $\times$ 1 vector) and normalizing the elements of the resulting organization vector between zero and one. An important question is "does the heterogeneous sectoral political organization vector better

[6]It is possible that imports are low because sectors are organized. Since the GB data and study focus on the United States, which has relatively low tariffs and NTBs, I assume the inverted gross output to import ratio.

	Principal Component (Eigenvectors)								
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Gross import to output ratio	1.0000	0.0002	-0.0001	0.0000	-0.0000	0.0000	-0.0000	0.0000	-0.0001
Log of corporate PAC spending per contributing firm divided by value added	0.0002	-0.7772	0.6292	0.0037	0.0070	-0.0022	-0.0011	0.0051	0.0000
Log of Herfindahl index of firm concentration	0.0001	-0.6195	-0.7643	-0.1784	0.0125	0.0117	0.0060	0.0041	0.0001
U.S. total imports across all partners divided by U.S. consumption	0.0001	-0.0000	-0.0000	0.0003	-0.0003	-0.0011	-0.0014	-0.0024	1.0000
Fraction of employees classified as scientists and engineers	-0.0000	-0.0035	-0.0117	0.0239	0.4061	-0.6656	-0.6181	-0.0965	-0.0017
Fraction of employees classified as managerial	-0.0000	0.0029	0.0017	0.0325	0.3057	0.7423	-0.5952	-0.0134	0.0000
Fraction of employees classified as unskilled	-0.0000	-0.0049	0.0031	-0.0771	-0.8566	-0.0507	-0.5068	-0.0286	-0.0011
Four-firm concentration ratio	0.0000	-0.1104	-0.1407	0.9779	-0.0862	-0.0065	0.0015	-0.0649	-0.0004
Measure of industry scale	-0.0000	-0.0011	-0.0103	0.0651	0.0132	-0.0566	-0.0826	0.9927	0.0022
Variance (Eigenvalue)	5014318	1.529948	0.9692157	0.0058904	0.0027988	0.0013970	0.0010852	0.0002209	0.0000001
Individual Percent Variance	100%	0%	0%	0%	0%	0%	0%	0%	0%
Cumulative Percent Variance	100%	100%	100%	100%	100%	100%	100%	100%	100%

Table 4.2: Principal Components (Eigenvectors) and Variances (Eigenvalues) of the Sectoral Political Organization Characteristics

represent the political organization than does the binary sectoral political organization vector?" By construction, the heterogeneous sectoral political organization vector has more variation than the binary vector. Comparing the F-statistics of the two vectors favors the heterogeneous sectoral political organization vector. The binary sectoral political organization vector has an F-statistic of 0.154, which is not significant, while the heterogeneous sectoral political organization vector has an F-statistic of 1.461, a critical value at about the 7.5 percent significance level (see Table 4.5), indicating somewhat better but not strong representation (i.e., more variation), of the sectoral political organization by the heterogeneous sectoral political organization vector.

Before proceeding with the GB analysis, it is important to examine the GB characteristics dataset for outliers. One visual approach to finding outliers is through the use of paired plots. The first column of Figure 4.1 shows the plots for PC1 versus the other PCs; the second column shows the plots for PC2 versus the other PCs, continuing until the ninth column. Clearly, some observations are outliers. Looking specifically at the elements of PC1, Figure 4.2, shows one very significant outlier.

In addition to creating the heterogenous sectoral political organization vector, PCA can be used to detect influential outliers, such as in Figure 4.2. In a multivariate setting, an observation that is not extreme on any of the original

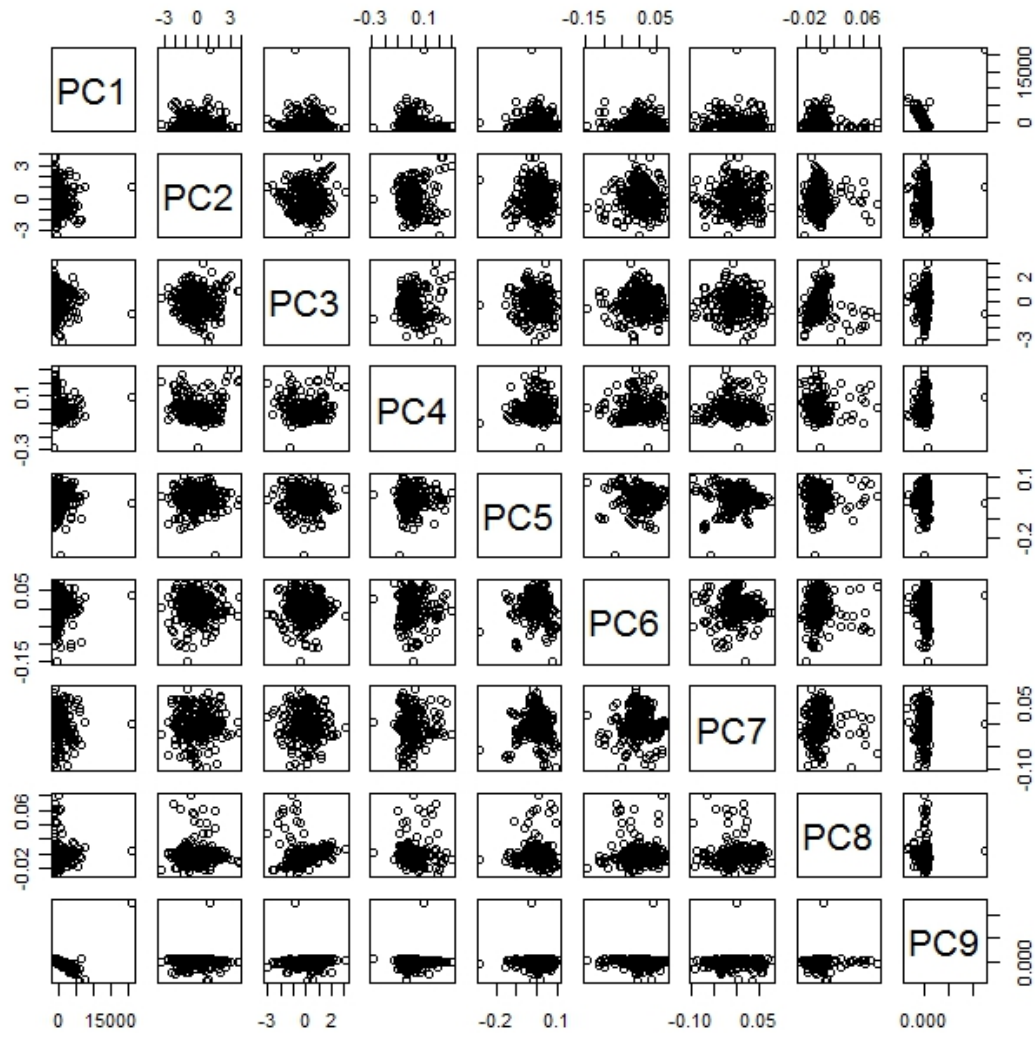

Figure 4.1: Principal Component Plots Displaying Outliers

variables may not conform with the correlation structure of the remainder of the data. This observation may be an outlier that is a problem to detect (Jolliffe, 2002). It is impossible to detect such outliers by examining the original variables individually, or by viewing plots of pairs of the original variables. The last few

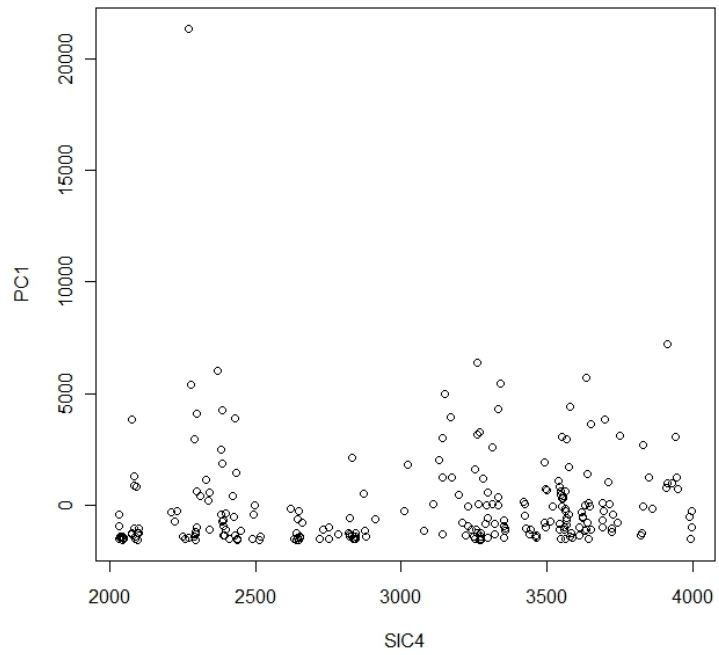

Figure 4.2: Heterogeneous Vector with Significant Outlier

PCs are more likely to provide additional information not available in plots of the original variables.

Outlying observations are determined to be influential if their deletion leads to different results, such as different variances (see Table 4.3). In this instance, the largest changes in variance due to deletion of a sector occur in the last PC, and are listed in Table 4.3.

The plot of the elements of the heterogeneous sectoral political organi-

	Percent Change in Percentage of Variance								
	Principal Component								
ISIC	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**
2271	1.83	-1.37	-1.23	-0.97	2.39	-1.11	-0.51	-0.12	-61.13
2299	-0.28	0.44	-0.24	-0.08	0.33	-0.08	-0.19	0.01	5.90
2369	-0.41	0.78	-0.36	0.22	-0.40	-0.10	-0.05	0.09	8.76
2823	0.37	0.86	-0.68	-1.38	-1.97	-1.12	4.12	-1.58	-0.15
2841	-0.13	0.01	-0.05	-0.17	-0.05	-0.01	0.47	5.85	-0.16
3263	1.53	-0.03	-1.01	-2.02	-0.73	1.09	-1.07	0.00	37.99
3544	0.34	-0.46	0.53	-0.46	-0.24	-0.22	-0.43	5.36	-0.10
3743	0.06	-0.18	-1.34	-0.53	4.70	-2.00	0.01	-0.21	0.14

Black cells represent significant influence
Gray cells represent some influence
White cells represent no significant influence

Table 4.3: Influential Principal Components

zation vector, omitting sector 2271[7] (Figure 4.3), shows the positions of the other sectoral political organization elements, none of which appear to be significant outliers. As shown in Table 4.4, with the exclusion of sector 2271, the percentage change to the variances is not altered materially.

The second most significant outlier, identified in Tables 4.3 and 4.4, is sector 3263[8]. As a declining industry, sector 3263 might warrant protection, but

[7]Sector 2271, Woven Carpets and Rugs, is identified in Table 4.3 as a significant outlier (significant change in variance), distinguished in the data by having the highest import value and a low domestic output value. The Nontariff Barrier (NTB) coverage ratio is low at 0.028, and the Most Favored Nation (MFN) Tariff is also low at 0.113. Both the binary and heterogeneous sectoral political organization vectors categorize sector 2271 as organized, $I = 1$ and $\delta_{2271} = 1$. Woven Carpets and Rugs tends to be a cottage industry not based in the United States. As a result, this sector will be isolated in the analysis.

[8]Sector 3263, Fine Earthenware (Whiteware) Table and Kitchen Articles, is primarily made up of establishments manufacturing fine (semivitreous) earthenware table and kitchen articles for preparing, serving, or storing food or drink. This sector does not appear as an outlier in any of the plots, and is distinguished by having a high import value and a low domestic output value. The NTB coverage ratio is 0, and the MFN Tariff is low at 0.109. The binary sectoral political organization vector positions sector 3263 as organized, $I = 1$, but the heterogeneous sectoral political organization vector positions sector 3263 in the third quantile with $\delta_{3263} = 0.346$. The primary sources of these products are Japan, Taiwan, China, and England. Based on the 1977

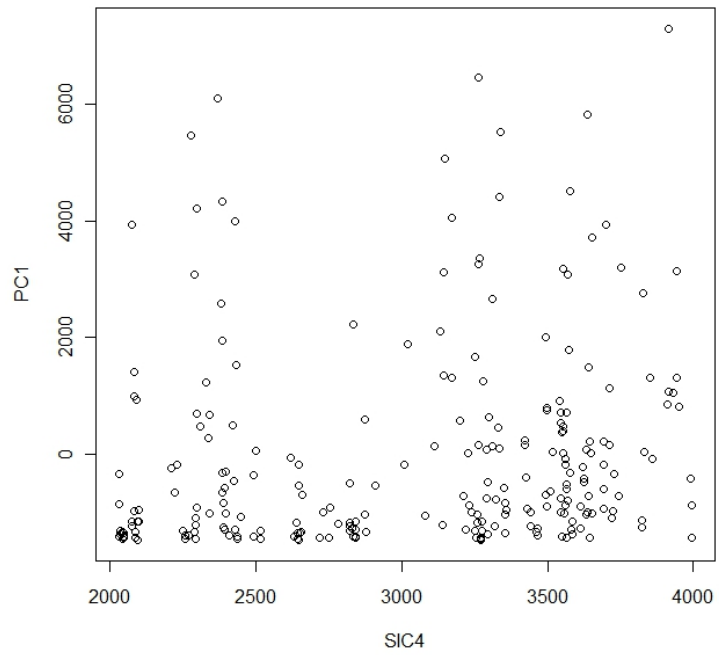

Figure 4.3: Heterogeneous Vector Omitting Significant Outlier

	Percent Change in Percentage of Variance								
ISIC	**PC1**	**PC2**	**PC3**	**PC4**	**PC5**	**PC6**	**PC7**	**PC8**	**PC9**
2299	-0.34	0.49	-0.28	-0.19	0.65	-0.11	-0.21	0.00	5.05
2369	-0.53	0.84	-0.42	0.30	-0.30	0.00	-0.07	0.02	7.14
2823	0.51	0.73	-0.71	-1.35	-2.06	-1.09	4.16	-1.63	-0.22
2841	-0.15	0.03	-0.06	-0.16	-0.08	-0.01	0.46	5.98	-0.24
3263	1.52	0.47	-1.33	-1.86	-1.64	1.07	-1.09	0.16	37.35
3544	0.26	-0.44	0.87	-0.61	-0.28	-0.40	-0.42	5.34	0.59
3743	-0.01	-0.19	-1.03	-0.67	4.95	-2.32	0.01	-0.19	0.86

Black cells represent significant influence
Gray cells represent some influence
White cells represent no significant influence

Table 4.4: Second-Level Influential Principal Components

- 1992 Bureau of the Census data, establishments in this sector numbered between 23 and 44, while employees steadily fell from 4700 to 900.

the number of establishments and the number of employees are low. Intuitively, sector 3263 would be classified as not organized. However, as a result of its outlier status, sector 3263 will also be excluded.

Recalculating the heterogeneous sectoral political organization vector, and again comparing the F-statistics in Table 4.5, shows significantly stronger evidence that this is a better representation of sectoral political organization. The binary sectoral political organization vector has an even lower critical value, and the heterogeneous sectoral political organization vector is demonstrably more significant without the two most influential outliers. Without all eight influential outliers, these results are further polarized. This validates the conclusion that the heterogeneous sectoral political organization better represents the sectoral political organization.

	Binary	**Heterogeneous**
All Data	0.154	1.461
Without 2 High Influence Outliers	0.124	6.530
Without 8 Influential Outliers	0.021	10.280

Table 4.5: F-Statistics for Binary and Heterogeneous Sectoral Political Organization

The GB analysis is conducted using the Kelejian (1971) two-stage least squares regression employed by GB. Since sectoral political organization is the fo-

cus, only the Protection Equation will be examined. The Lobby and the Imports equations are minimally impacted by the heterogeneous sectoral political organization vector and the excluded outliers. The original GB results are displayed in column 1[9] of Table 4.6, and my reproduction of the GB results using the full dataset are displayed in column 2[10]. These two results are almost identical; the

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
"a"	**3175**	**3172**	**12.45**	**3110**	**33.28**	**3038**	**30.95**
Protection Equation							
Inverse Import-Output Ratio ÷ Import Demand Elasticity	-3.088** (1.532)	-3.096** (1.547)	-0.041 (0.249)	-3.155** (1.550)	-0.040 (0.249)	-3.249** (1.537)	-0.066 (0.244)
Organization × Inverse Import-Output Ratio ÷ Import Demand Elasticity	3.145** (1.575)	3.152* (1.591)	803.262* (710.024)	3.214** (1.594)	300.483* (272.142)	3.291** (1.585)	323.066* (273.541)
Average tariff on intermediate goods used in an industry	0.780** (0.242)	0.780** (0.244)	0.901** (0.241)	0.796** (0.245)	0.918** (0.242)	0.857** (0.251)	0.981** (0.248)
Average NTB coverage of intermediate goods used in an industry	0.362** (0.062)	0.362** (0.063)	0.329** (0.061)	0.362** (0.063)	0.328** (0.061)	0.367** (0.064)	0.332** (0.061)
Intercept	-0.042** (0.017)	-0.042** (0.018)	-0.071** (0.030)	-0.042** (0.018)	-0.071** (0.030)	-0.046** (0.018)	-0.077** (0.030)
N	242	242	242	240	240	234	234
Degrees of Freedom	237	237	237	235	235	229	229
k	5	5	5	5	5	5	5
SSR		3.530	3.538	3.515	3.522	3.432	3.435
MSE		0.015	0.015	0.015	0.015	0.015	0.015
RMSE		0.122	0.122	0.122	0.122	0.122	0.122
R^2	0.234	0.234	0.232	0.235	0.234	0.247	0.246
Adj R^2		0.221	0.219	0.222	0.221	0.234	0.233
Model F	18.10**	18.61**	17.94**	18.66**	17.96**	19.36**	18.69**
AIC	-1.369	-1.355	-1.346	-1.386	-1.377	-1.349	-1.341
SIC	0.648	0.642	0.637	0.656	0.651	0.638	0.633
Ln L	170.7	168.97	167.92	167.16	166.08	162.89	161.86

(1) Original GB Results - Binary Organization
(2) Author's Reproduction of GB Results - Binary Organization
(3) Heterogeneous Organization
(4) Binary Organization without 2 High Influence Outliers
(5) Heterogeneous Organization without 2 High Influence Outliers
(6) Binary Organization without 8 Influential Outliers
(7) Heterogeneous Organization without 8 Influential Outliers
s.e. shown in (), ** denotes $|t| \geq 2$, * denotes $2 > |t| \geq 1$
For the Model F, ** and * denote statistical significance
at 1 percent and 5 percent respectively.
AIC = Akaike Information Criterion = -2(ln L - k)/N.
SIC = Schwarz Information Criterion = ln L/N - 0.5(k(ln N)/N).

Table 4.6: Analysis of Heterogeneous Organization and Outliers

[9]GB used LIMDEP

[10]I used the "systemfit" command in Revolution R Enterprise for Windows with the original GB data.

signs agree, all of the values agree to at least 2-digits[11], including the standard errors, and with the exception of the interaction term, Organization $\times$ Inverse Import-Output Ratio $\div$ Import Demand Elasticity, all of the significance levels match. For the interaction term, the t value is 1.981, 2, as reported by GB. In all, this is a fair representation that my results reproduce the GB results.

In column 3 of Table 4.6, the heterogeneous sectoral political organization vector is analyzed with the full dataset. R^2 is slightly smaller than in column 2, but the F-statistics from Table 4.5 demonstrate that the heterogeneous sectoral political organization model is the more useful model. There are similar results from the analyses in columns 4 and 5 (binary versus heterogeneous) and columns 6 and 7 (binary versus heterogeneous) of Table 4.6; again, the F-statistics from Table 4.5 provide a strong indication that the heterogeneous sectoral political organization model is more useful.

The parameter of interest in the GH94 literature is "a." The heterogeneous degree of sectoral political organization delivers an improvement in the value of "a," the popluation welfare ratio. Smaller values of "a," closer to the CGE studies referenced below, are considered to be better. GB states:

> This estimate of a [3175] is in conflict with the empirical evidence from computational general equilibrium studies that have attempted to assess the welfare loss from protection. They indicate that efficiency

[11]These small differences are most likely due to differences in the computers and statistical analysis software used.

> losses are many-fold greater than what lobbies spend to obtain protection. Hufbauer et al. (1986) estimate that the sugar quota of 1983 imposed $550 million in welfare losses, while Stern (1988) estimates that the highly concentrated sugar lobby contributed $1 million during that year. This suggests a value for a of approximately 0.0018. Similarly, the dairy subsidy is estimated to have caused $1.6 billion in welfare losses in 1984, while the dairy PACs contributed $3.3 million that year, yielding a value of a of approximately 0.0026. Our estimates of a suggest that PAC contributions are greater than deadweight costs, on average. On the other hand, if the estimates of a from the CGE studies are representative, then it points to deficiencies in measuring z [Output/Imports], e [Own Price Elasticity], and I [Organization] in the econometric work. [Brackets added]

From Table 4.6, using the full dataset, the value of "a," has been improved from 3172 to 12.45, and omitting the outliers, from 3038 to 30.95, a reduction of between two and two-and-one-half orders of magnitude.

Clearly, removing influential outliers, and creating the heterogeneous degree of sectoral political organization, δ_i, addresses some of the deficiencies in the elements of the data. Even employing the same indicators used by GB, there may remain additional sources of potential deficiencies in the choice of characteristics of heterogeneous sectoral political organization. The GB dataset will be further examined in the next chapter, and another set of sectoral political organization characteristics will be discussed in Chapter 6.

Chapter 5

Data Questions

Given GB's data questions and those raised in Chapter 4 regarding the sectoral political organization, elasticity and other variables, a further examination of the GB dataset is warranted. Continuing the focus on protection equation variables, Table 5.1, the GB dataset is compared with the broadly used World Bank Trade, Production and Protection dataset (Nicita and Olarreaga, 2006). Using the summary statistics, a coarse comparison is drawn, and a clearer view is created using quantile-quantile (Q-Q) analysis, including outliers. Analytical comparisons, using t-tests, show mixed results.

The simplest method for comparing datasets uses the summary statistics: the mean, standard deviation, minimum, maximum, and number of observations.

Variable	**N**	**Mean**	**Variance**	**Min**	**Max**
Non-Tariff Barriers	242	0.08384	0.01912	0.00000	0.50000
Import/Output (I/O)	242	0.15676	0.05014	0.00014	2.29358
Own Price Elasticity	242	1.50274	0.13725	0.54911	2.16470
Organization Variable	242	0.68182	0.21784	0.00000	1.00000
1/Elasticity	242	0.72461	0.06579	0.46197	1.82110
I/O ÷ Elasticity	242	0.11017	0.02501	0.00012	1.39241
Organization Variable x I/O	242	0.07621	0.02364	0.00000	1.39241
Controls					
Intermediate Goods Tariff	242	0.06120	0.00129	0.01160	0.17234
Intermediate Goods NTB	242	0.22914	0.02008	0.02260	0.67847

Original data courtesy of Kishore Gawande

Table 5.1: Gawande and Bandhopadhyay (2000) Regression Variables Summary Statistics

The GB summary statistics, Table 5.1, present a picture of a highly concentrated dataset, whose variables have small variance and one very significant outlier, Im-

port/Output (see Figure 5.1), as found in Chapter 4.

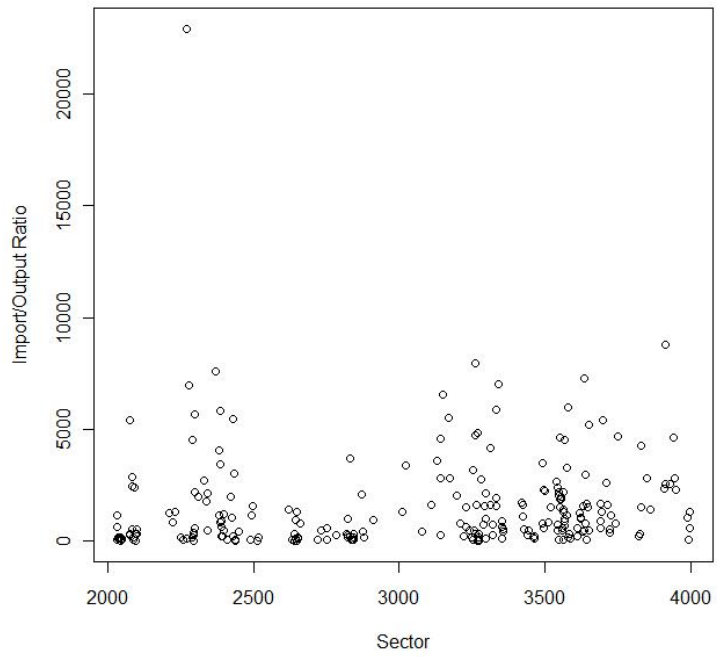

Figure 5.1: One Clear Gawande and Bandhopadhyay (2000) Outlier

Examining the World Bank dataset (Nicita and Olarreaga, 2006) presents a similar picture, Table 5.2; a highly concentrated dataset, whose variables have small variance with one very significant outlier (see Figure 5.2). Based on this

Variable	**N**	**Mean**	**Variance**	**Min**	**Max**
Tariffs	25	0.05068	0.00058	0.01720	0.11871
Import/Output	26	0.10915	0.01052	0.00106	0.46652
Own Price Elasticity	26	1.15121	0.24432	0.13665	2.53717
1/Elasticity	26	1.17388	1.63384	0.39414	7.31795
Import/Output ÷ Elasticity	26	0.11893	0.01887	0.00104	0.68051

Table 5.2: World Bank 1983 United States Summary Statistics

evidence, at a coarse level these datasets appear to be similar.

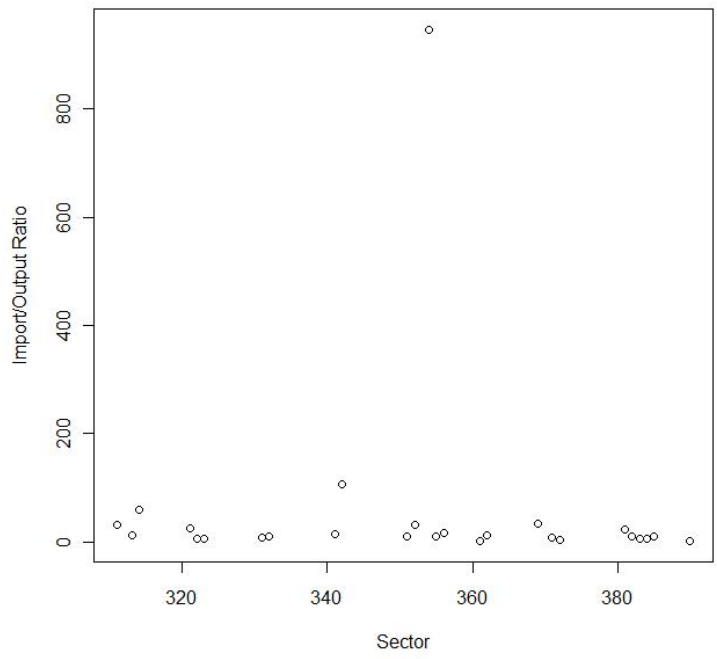

Figure 5.2: (Nicita and Olarreaga, 2006) World Bank 1983 United States Import/Output by Sector

A more detailed picture can be provided by a Q-Q plot, a non-parametric method of comparing two datasets where the dataset sizes may be unequal, as in this instance. Differences between the entire distributions are examined, as well as the means (Olsen, 2008). The plot will be a straight line only if the datasets are from the same underlying distribution. Three of the comparison points will be further examined with Q-Q plots.

First, the World Bank tariff and the GB NTB data are found to be from different distributions; they are not on a straight line in the Q-Q plot in Figure 5.3.

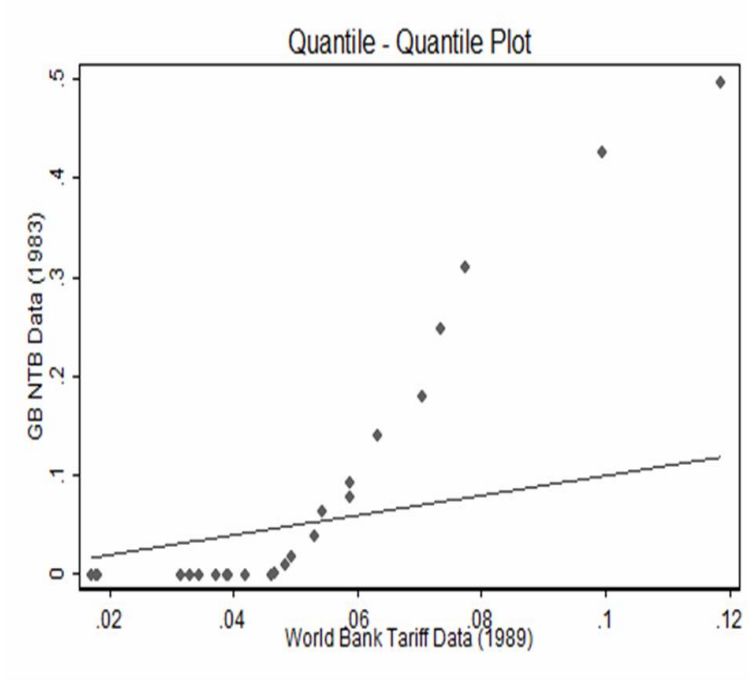

Figure 5.3: Quantile-Quantile Plot of U.S. NTBs (1983) versus World Bank U.S. Tariffs (1989)

More specifically, there are 113 sectors in the GB dataset with zero NTB coverage, which does not align with the tariff structure[12] as reported by the World Bank. The GH94 theory calls for the use of tariffs. As a result of using NTBs, additional data deficiencies may have been introduced.

The World Bank Import/Output ratio and the GB Import/Output ratio

[12]Since the GB data are used by GM, the same comment applies to the GM results.

are not from the same distribution, Figure 5.4. The Q-Q plot of the Import/Output ratios appears to be close at low levels, but diverges significantly as the ratio ex-

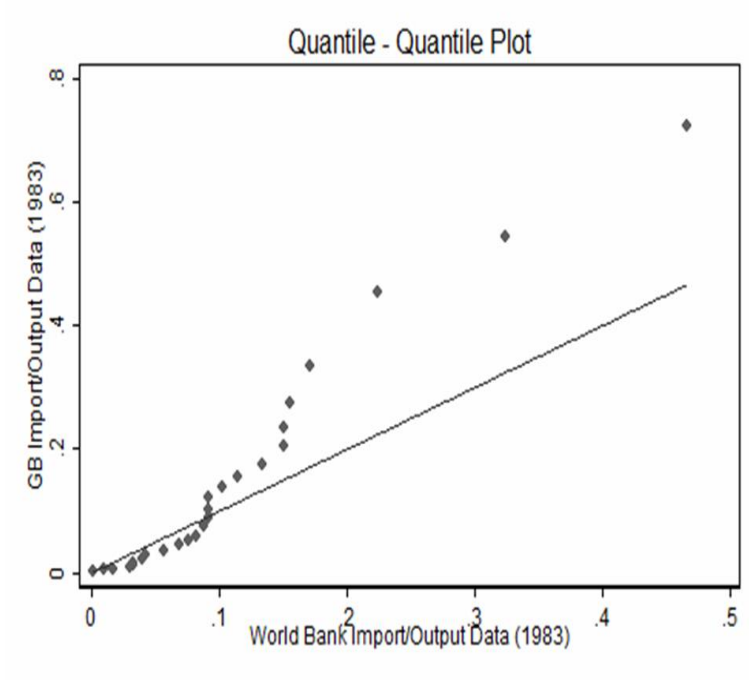

Figure 5.4: Quantile-Quantile Comparison Plot of Import/Output Ratios (1983)

ceeds ten percent. This difference is attributed to the different underlying data sources. The World Bank dataset has been used in more recent analyses and more frequently, and thus, is the preferred choice. Also, the World Bank dataset is available for many countries and for most years through 2001.

The World Bank and the GB import demand elasticities are not from the same distribution, Figure 5.5. For GB, the import demand elasticites were esti-

mated in Shiells et al. (1986) at SIC3, which GB replicated at SIC4. GB addressed

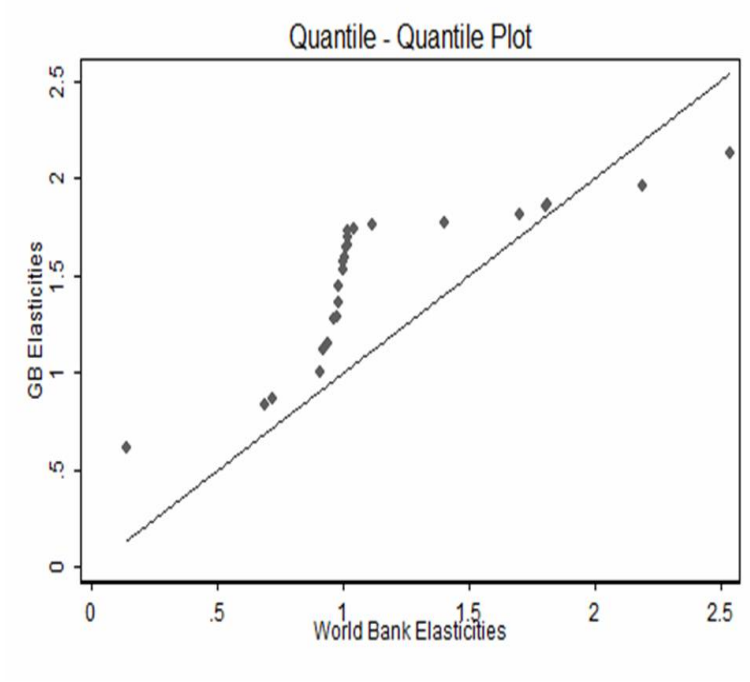

Figure 5.5: Quantile-Quantile Comparison Plot of Elasticities

an errors-in-variables problem (see the GB appendix) due to the high standard errors and estimated values associated with the estimated price and cross-price elasticities. For the World Bank, the import demand elasticities were developed in Kee et al. (2008), which provides a systematic estimation for a broad group of countries at a very disaggregated level of detail, and is recommended for use with the World Bank dataset. These elasticities are calculated using data from various sources during the period 1988-2003.

As a further check, the t-test is used to provide an analytical comparison of the common variables in these datasets. The GB dataset has 242 observations, while the World Bank dataset has only 28 observations. Thus, a paired t-test is not appropriate, but a standard t-test provides an applicable method to test the null hypothesis that the means are the same.

	Welch Two Sample t-test					Null
Variable	**t**	**df**	**p-value**	**95% conf int**		**Hypothesis**
Tariffs/NTBs	-3.282	216.658	0.0012	-0.0531	-0.0132	Reject
Import/Output (1/z)	-1.925	55.660	0.0594	-0.0972	0.0019	Fail to Reject
Own Price Elasticity	-3.522	28.098	0.0015	-0.5560	-0.1471	Reject
1/Elasticity	1.788	25.217	0.0857	-0.0679	0.9664	Fail to Reject
1/z ÷ Elasticity	0.304	32.558	0.7631	-0.0499	0.0674	Fail to Reject

Table 5.3: World Bank Data Compared with Gawande and Bandhopadhyay (2000)

The speculation by GB that there may be deficiencies in measuring z (Output/Imports), is questionable due to the Welch Two Sample t-test's failure to reject the null hypothesis. The speculation regarding e (Elasticity) and I (Organization) remains. With these uncertainties regarding the dataset, particularly I, I now focus on the variables that should be considered as determinants of sectoral political organization.

Chapter 6

Characteristics of Sectoral Political Organization

Creation of the heterogeneous degree of sectoral political organization requires a set of trade oriented characteristics. This chapter focuses on identifying those characteristics.

The country-specific empirical literature (Australia, Turkey and the United States) from Chapter 2 uses some trade specific characteristics of the data (imports, exports, tariffs, etc.) GB, and the empirical papers that employ the GB dataset, use some of these trade oriented variables, along with additional variables (e.g., PAC contributions, value added, composition of employees and firm concentration) that are not strictly trade oriented.

In building the GB dataset, Gawande (1998) compares five political-economic theories of protection; (1) special-interest-group behavior, (2) the adding-machine model, (3) the comparative-cost/comparative-advantage model, (4) the status-quo model, and (5) the public interest model. Many of the GB non-trade oriented characteristics (see Table 4.1) that emanate from these political-economic theories are listed in Table 6.1. Baldwin (1986), Caves (1976), Ray (1981), and Trefler (1993) are the sources for these non-trade oriented characteristics.

Baldwin (1986) describes a world where a trading nation's nontariff barriers have three components: (1) a self-interested political component, which is a response to protectionist pressures, influenced by the lobbying efforts of pri-

Characteristic	Description
Political Organization Predictors	
Buyer concentration	Weighted Average Four Firm Concentration Ratios among Buyers of Industry Output (Consumers and Downstream Industries)
Seller concentration	Weighted Average of Four Firm Concentration Ratios in Supplier (Upstream) Industries
Seller number of firms	Number of Companies Scaled by Industry Sales
Buyer number of firms	Number of Companies Scaled by Industry Sales
Geographic concentration	Measure of the Difference between Population and Industry Production Patterns across the 50 States
Minimum efficient scale	Caves (1976) Minimum Efficient Plant Size (percent) of Industry Sales Supplied by the Median Plant
Unionization	Percentage of Workers Unionized
Tenure	Average Years of Tenure by Industry Workers
Comparative Advantage Predictors	
Engineers and Scientists	Percent Employees Classified Scientists and Engineers
White Collar Skilled	Percent Employees Classified White Collar Skilled
Semi-skilled	Percent Employees Classified Semi-Skilled
Unskilled	Percent Employees Classified Unskilled
Employment Size	Number of Employees
Physical capital	
Cropland	
Pasture	
Forest	
Coal	
Petroleum services	
Mineral	

Source: Facchini et al. (2006)

Table 6.1: Sectoral Political Organization Characteristics to Determine Lobby Formation

vate agents, (2) an altruistic political component, which is influenced by welfare-oriented motives of the government, and (3) a comparative (dis)advantage component, all of which appear in Table 6.1. A fourth component, based on the theoretical development in Baldwin (1990), is (4) a retaliatory component, which serves as a strategic deterrent against undesirable protectionist policies of trade partners.

For Canada, Caves (1976) identifies the list of sectoral political organization

Determinant	**Definition**
Buyer concentration	Percentage of sales made by an industry to other industries that individually account for more than 5 percent of its total sales to sectors other than itself
Seller concentration	Percentage of industry shipments accounted for by the largest four enterprises
Dispersion of enterprises	Weighted average of rail and truck shipping costs per dollar of product between Cleveland and Chicago
Decentralization	Percentage of employees outside Quebec and Ontario
Minimum efficient scale	Average plant size (average shipments/plant)
Growth	Value of industry shipments in 1967 divided by value of industry shipments in 1958
Diversification	One minus the industry's enterprise specialization ratio defined as total added in establishments whose primary output is in the industry, divided by value added in all establishments which belong to the enterprises in the industry
Total factor productivity	Value added per worker in a foreign industry divided by value added per worker in the counterpart domestic industry
Non-production workforce	Compensation of non-production workers divided by total employees
Value added per worker	Inverse measure of labor intensity
Depth in Industrial Processes	Value added in an industry divided by the value of its shipments

Table 6.2: Caves (1976) Characteristics of Sectoral Political Organization

characteristics in Table 6.2, which he uses to explain the variation of Canadian tariff rates. He finds a negaive relationship between concentration and protection. From the trade perspective, Ray (1981) finds that seller concentration has an ambiguous effect, and nontarrif barriers are significantly and negatively related to both seller

and geographic concentration. In determining the characteristics of sectoral political organization, with a focus on trade oriented characteristics, the concentration variables will be omitted.

Trefler (1993), using comparative advantage and political self-interest, provides the list of sectoral political organization characteristics in Table 6.3, which

Determinant	**Definition**
Seller concentration	Four-firm concentration ratio
Buyer concentration	Weighted average of the four-firm concentration ratios among buyers of an industry's output (consumers and downstream industries)
Seller number of firms	Number of companies scaled by industry sales
Buyer number of firms	Weighted average of the number of firms among buyers of an industry's output, scaled by industry sales
Scale	Caves's (1976) minimum efficient plant size, defined as the percentage of industry sales supplied by the median plant
Capital stock	Value of depreciable assets such as physical plant and machinery
Geographic concentration	Measure of the difference between population and industry production patterns across the 50 states
Unions	Percentage of workers unionized
Employment size	Number (unscaled) of workers in an industry
Tenure	Number of years the average worker in the industry has been with his or her current employer
Industry growth	Growth in industry sales, 1979-83
Occupation	Proportion of the industry work force in each occupation
Import penetration	Imports scaled by domestic consumption (domestic production plus net imports)
Δ(import penetration)	Import penetration in 1983 minus import penetration in 1980
Exports	Exports scaled by domestic consumption

Table 6.3: Trefler (1993) Characteristics of Sectoral Political Organization

he terms "an a priori reasonable list," of criteria relevant to predicting whether an industry will achieve sectoral political organization and obtain favorable legislation. He has gathered his information from Baldwin and Lewis (1978), Bhagwati (1989), Cline et al. (1978), Deardorff and Stern (1986), Leamer (1988), and Whalley (1985).

Gawande (1998)	**World Bank Data**	**Description**
Firm concentration Firm size	Firm size	Proxy for the ability to overcome the free-riding problem and measure special interest group behavior
Geographic concentration Number of employees Unionization	Number of employees	Voting strength and legislative representation of industries, the status-quo model
Percent of scientists and engineers Percent of managers Percent of unskilled workers	Indirect measures see World Bank Characteristics below	Comparative advantage, protectionism position, the comparative-cost/ comparative-advantage model
Average earnings Earnings growth Employment growth Growth of imports	Average earnings Earnings growth Employment growth Growth of imports	Extent of government rescues for declining industries, represents the public interest for protection according to need rather than lobbying power
Exchange rate elasticity Cross price elasticity	Import demand elasticity	Capture differential exchange rate pass through effects in the cross-section of industries

Table 6.4: Proposed Sectoral Political Organization Characteristics to Determine Lobby Formation

With the foregoing as background, sectoral political organization char-

acteristics should overcome the free-riding problem, address special-interest pressures, represent comparative advantage, recognize the public-interest component (rescue declining industries), and reflect differential exchange rate pass through effects. Gawande (1998) identifies such characteristics in the first column of Table 6.4.

The World Bank dataset on Trade, Production and Protection (Nicita and Olarreaga, 2006) includes 36 variables for each of 100 countries covering the years from 1976 to 2004 (not all variables are present for all countries for all years.) As shown in Table 6.5, these variables can be used individually or in combination,

Sectoral Political Organization Characteristic	**World Bank Variables Combined**
Firm Size	Output ÷ No. of Establishments No. of employees ÷ No. of Establishments Value Added ÷ No. of Establishments Gross Fixed Capital ÷ No. of Establishments
Number of Employees	Directly in the Data
Percentage of Scientists and Engineers, Managers, and Unskilled Workers	Gross Fixed Capital ÷ No. of Employees Output ÷ No. of Employees Value Added ÷ No. of Employees Wage Bill ÷ No. of Employees
Average Earnings	Wage Bill ÷ No. of Employees
Earnings Growth	Wage Bill for Year n Minus Wage Bill for Year $n-1$ ÷ Wage Bill for Year $n-1$
Employment Growth	No. of Employees in Year n Minus No. of Employees in Year $n-1$ ÷ No. of Employees in Year $n-1$
Growth of Imports	Imports for Year n Minus Imports for Year $n-1$ ÷ Imports for Year $n-1$
Exchange Rate Pass Through	Import Demand Elasticity

Table 6.5: Computng Organization Characteristics using World Bank Trade Variables

to provide the sectoral political organization characteristics in the second column of Table 6.4. In Chapter 7, with a focus on trade, these potentially correlated, common characteristics are used to determine the heterogeneous sectoral political organization vector for multiple Latin American countries.

Chapter 7

Validating Intertemporal Government Weight on Population Welfare in Latin America

Finding a correlation of intertemporal GWPW with the Trade Openness Index (TOI) (Gwartney and Lawson, 2001) is one approach to validating this new methodology. It is also interesting to observe the close relationship of intertemporal GWPW with significant, country-specific political and economic events. A causal relationship is not implied nor intended.

Following GM, GWPW is imputed using the coefficients resulting from the extended heterogeneous regression equation:

$$\frac{t_i}{1+t_i}e_i = \alpha_1 z_i + \alpha_2 \delta_i z_i + \varepsilon_i \tag{7.1}$$

as

$$GWPW = \frac{1+\alpha_1}{1+\alpha_1+\alpha_2}.$$

For sector i, t_i represents the tariff, e_i represents the import demand elasticity, z_i represents the inverse import output ratio, δ_i represents the heterogeneous degree of organization, and ε_i represents the residual. Standard errors are calculated using the delta method.

During the period of the World Bank dataset, Latin America (Argentina, Bolivia, Chile, Columbia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Panama, Peru, and Venezuela) experienced many tariff changes, and country-specific political and economic events. As such, Latin America is a reasonable, if

not ideal, laboratory in which to examine intertemporal GWPW. When taken to the data, this new methodology identifies inflection points and trends which correlate with the TOI and significant, country-specific political and economic events. The new methodology categorizes these events as positive or negative population welfare effects. To my knowledge, intertemporal GWPW within a country has not been previously studied.

The methodology follows that used in Chapter 4. First, outliers are identified using PCA. I find that the annual country datasets, and the GWPW results, with and without outliers, are not statistically different. Furthermore, with fewer than 29 observations for each year, all data should be retained in the analyses. Then, GWPW is imputed using the coefficients from Equation 7.1. All imputed values of GWPW are highly statistically significant. Intertemporal GWPW is plotted with the TOI for each country. Significant, political and economic events, with their positive and negative population welfare effects, are identified with the intertemporal GWPW inflection points.

Several sectoral political organization characteristics listed at the conclusion of Chapter 6, and in Table 6.4, have been extracted from the Nicita and Olarreaga (2006) World Bank dataset for these twelve Latin American countries. All of the characteristics are not consistently available for each country. Thus, the dataset is limited to those characteristics listed in Table 7.1. Specifically, character-

World Bank Data	**Description**
Number of employees	Measured directly in the data
Percent of managers and unskilled workers	Ratio of output to number of employees Ratio of value added to number of employees
Average earnings	Ratio of wage bill to number of employees
Earnings growth	Ratio of wage bill for year n minus wage bill for year $n-1$ to wage bill for year $n-1$
Employment growth	Ratio of number of employees in year n minus number of employees in year $n-1$ to number of employees in year $n-1$
Growth of imports	Ratio of imports for year n minus imports foryear $n-1$ to imports for year $n-1$
Exchange rate pass through	Import demand elasticity

Table 7.1: World Bank Country Common Characteristics

istics associated with number of establishments and gross fixed capital are omitted.

The format for each country includes 1) a table of the regressions and imputed value of GWPW for each year data is available, 2) a comparison plot of GWPW with the TOI, and 3) a plot of GWPW annotated with significant, country-specific, economic and political events.

ARGENTINA	Years			
	1985	**1986**	**1987**	**1988**
GWPW	1.0001***	1.0001***	1.0002***	1.0001***
	(0.0002)	(0.0001)	(0.0004)	(0.0003)
Output/Imports (z)	0.0000	0.0000	0.0000	0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Organization × z	-0.0001	-0.0001	-0.0002	-0.0001
	(0.0002)	(0.0001)	(0.0004)	(0.0003)
Intercept	-0.1326***	-0.1333***	-0.1323***	-0.1316***
	(0.0178)	(0.0178)	(0.0177)	(0.0178)
RSE	0.0892	0.0890	0.0890	0.0887
Degrees of Freedom	24	24	24	24
$\mathbf{R^2}$	0.0465	0.0502	0.0507	0.0564
F-statistic	0.585	0.634	0.642	0.717
Degrees of Freedom	2,24	2,24	2,24	2,24
	1989	**1990**	**1994**	**1995**
GWPW	0.9993***	1.0001***	1.0060***	1.0056***
	(0.0006)	(0.0003)	(0.0015)	(0.0013)
Output/Imports (z)	-0.0006	-0.0000	-0.0000	-0.0000
	(0.0006)	(0.0001)	(0.0001)	(0.0001)
Organization × z	0.0007	-0.0001	-0.0060***	-0.0056***
	(0.0006)	(0.0003)	(0.0015)	(0.0013)
Intercept	-0.1376***	-0.1287***	-0.0815**	-0.0834**
	(0.0186)	(0.0210)	(0.0233)	(0.0223)
RSE	0.0886	0.0903	0.0921	0.0901
Degrees of Freedom	24	24	24	24
$\mathbf{R^2}$	0.0586	0.0223	0.4049	0.4313
F-statistic	0.747	0.273	8.166	9.102
Degrees of Freedom	2,24	2,24	2,24	2,24
	1996	**1997**	**1998**	**1999**
GWPW	1.0054***	0.9911***	0.9905***	0.9907***
	(0.0011)	(0.0035)	(0.0038)	(0.0032)
Output/Imports (z)	-0.0001	-0.0102***	-0.0111***	-0.0105***
	(0.0001)	(0.0019)	(0.0018)	(0.0016)
Organization × z	-0.0054***	0.0089*	0.0095*	0.0093*
	(0.0011)	(0.0035)	(0.0038)	(0.0033)
Intercept	-0.0891***	-0.1104***	-0.1319***	-0.1321***
	(0.0201)	(0.0209)	(0.0205)	(0.0192)
RSE	0.0851	0.0763	0.0770	0.0727
Degrees of Freedom	24	16	16	16
$\mathbf{R^2}$	0.5049	0.6735	0.7374	0.7667
F-statistic	12.240	16.500	22.470	26.300
Degrees of Freedom	2,24	2,16	2,16	2,16

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.2: Argentina's Government Weighted Population Welfare and Regressions

Figure 7.1 presents evidence supporting the effectiveness of the new methodology. With the exception of the late 1990s Asian crisis, GWPW tracks the significant changes in the TOI.

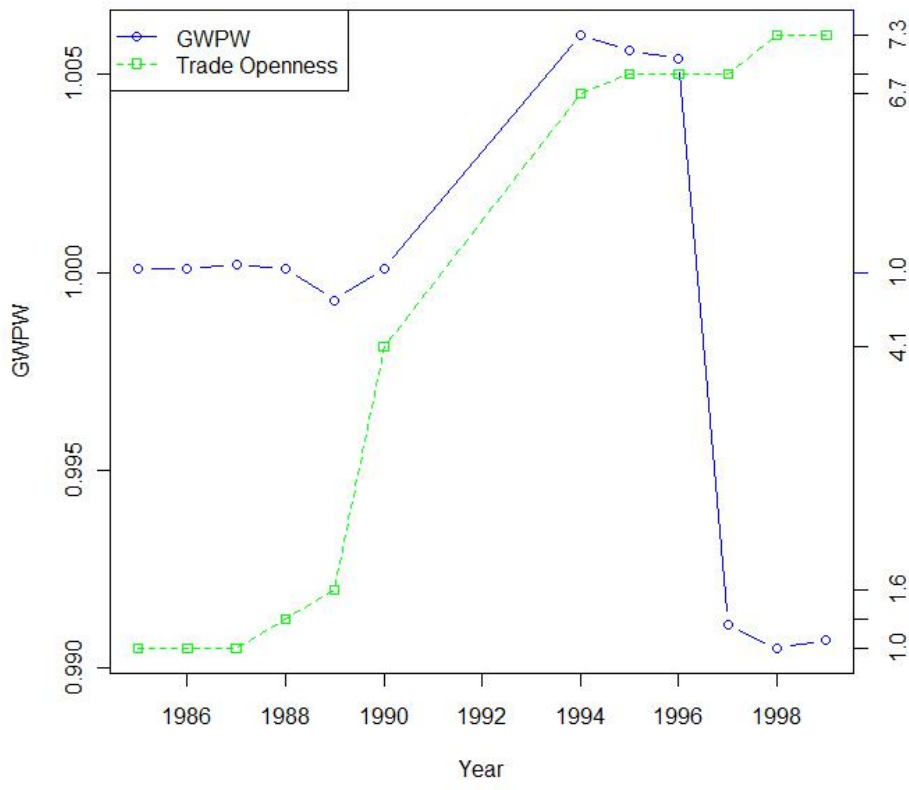

Figure 7.1: Argentina's Trade Openness versus Weighted Population Welfare

The 1980s produced many initiatives and IMF supported plans, which failed. GWPW was relatively flat at '1'. Carlos Menem liberalized trade, privatized many state resources and eliminated bureaucracy to encourage industrial growth. The program initially failed, undermined by politics and hyperinflation that reached 12,000 percent per year. However, liberalizing trade included reducing tariffs; therefore, GWPW increased. From 1991-94, Argentina's economic

output expanded by an average of 7.7 percent a year. By this time, Argentina was

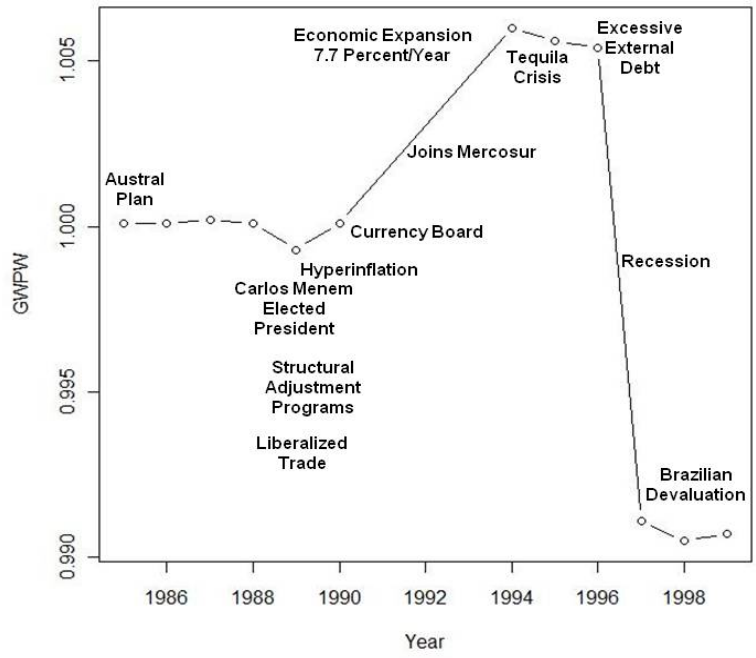

Figure 7.2: Argentina's Intertemporal Government Weighted Population Welfare

strongly tied to Brazil as a major participant in Mercosur, which provided lower tarrifs and a higher value of GWPW, above '1' and steadily improving. While Argentina was able to avoid the effects of the mid-1990s Mexican currency collapse, the Asian currency crisis was not avoided (Wijnholds, 2003). Figure 7.2 shows GWPW falling significantly below '1'.

BOLIVIA	**Years**					
	1978	**1979**	**1980**	**1981**	**1982**	**1983**
GWPW	0.9986***	1.0012***	1.0000***	1.0014***	0.9990***	1.0000***
	(0.0030)	(0.0025)	(0.0022)	(0.0009)	(0.0007)	(0.0002)
Output/Imports (z)	-0.0018	0.0007	0.0002	0.0010	-0.0000	0.0000
	(0.0028)	(0.0023)	(0.0021)	(0.0008)	(0.0002)	(0.0002)
Organization × z	0.0014	-0.0012	-0.0000	-0.0014	0.0010	0.0000
	(0.0030)	(0.0025)	(0.0022)	(0.0009)	(0.0007)	(0.0002)
Intercept	-0.0928***	-0.0929***	-0.0982***	-0.0949***	-0.0981***	-0.0959***
	(0.0045)	(0.0043)	(0.0044)	(0.0044)	(0.0043)	(0.0045)
RSE	0.0192	0.0187	0.0189	0.0184	0.0185	0.0196
Degrees of Freedom	22	22	22	23	22	22
$\mathbf{R^2}$	0.0554	0.0977	0.0567	0.0923	0.0911	0.0065
F-statistic	0.646	1.191	0.662	1.169	1.103	0.072
Degrees of Freedom	2,22	2,22	2,22	2,23	2,22	2,22
	1984	**1985**	**1986**	**1987**	**1988**	**1989**
GWPW	0.9989***	0.9999***	1.0004***	1.0009***	1.0005***	1.0006***
	(0.0007)	(0.0003)	(0.0004)	(0.0006)	(0.0003)	(0.0004)
Output/Imports (z)	-0.0000	0.0000	0.0003	0.0003	0.0004	0.0004
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
Organization × z	0.0011	0.0001	-0.0004	-0.0009	-0.0005	-0.0006
	(0.0007)	(0.0003)	(0.0004)	(0.0006)	(0.0003)	(0.0004)
Intercept	-0.0992***	-0.0969***	-0.0964***	-0.0955***	-0.0962***	-0.0956***
	(0.0048)	(0.0044)	(0.0042)	(0.0045)	(0.0041)	(0.0045)
RSE	0.0189	0.0197	0.0188	0.0186	0.0187	0.0186
Degrees of Freedom	21	21	22	21	22	22
$\mathbf{R^2}$	0.0965	0.0118	0.0896	0.1271	0.1039	0.1048
F-statistic	1.122	0.125	1.083	1.529	1.275	1.287
Degrees of Freedom	2,21	2,21	2,22	2,21	2,22	2,22
	1990	**1991**	**1992**	**1993**	**1994**	**1995**
GWPW	1.0005***	1.0009***	1.0024***	1.0031***	1.0033***	1.0029***
	(0.0004)	(0.0005)	(0.0010)	(0.0013)	(0.0015)	(0.0012)
Output/Imports (z)	0.0003	0.0004	0.0011*	0.0016*	0.0021*	0.0016*
	(0.0002)	(0.0003)	(0.0005)	(0.0007)	(0.0010)	(0.0007)
Organization × z	-0.0005	-0.0009	-0.0024*	-0.0031*	-0.0033*	-0.0029*
	(0.0004)	(0.0005)	(0.0010)	(0.0013)	(0.0015)	(0.0012)
Intercept	-0.0952***	-0.0945***	-0.0920***	-0.0918***	-0.0926***	-0.0913***
	(0.0045)	(0.0042)	(0.0040)	(0.0042)	(0.0041)	(0.0040)
RSE	0.0187	0.0182	0.0174	0.0176	0.0178	0.0174
Degrees of Freedom	22	22	22	21	22	22
$\mathbf{R^2}$	0.1034	0.1492	0.2166	0.2142	0.1693	0.1976
F-statistic	1.268	1.929	3.042	2.862	2.242	2.709
Degrees of Freedom	2,22	2,22	2,22	2,21	2,22	2,22
	1996	**1997**	**1998**	**1999**	**2000**	
GWPW	1.0023***	1.0055***	1.0047***	1.0030***	1.0039***	
	(0.0016)	(0.0040)	(0.0036)	(0.0022)	(0.0037)	
Output/Imports (z)	0.0022	0.0053	0.0045	0.0028	0.0036	
	(0.0015)	(0.0038)	(0.0034)	(0.0021)	(0.0035)	
Organization × z	-0.0023	-0.0055	-0.0047	-0.0030	-0.0039	
	(0.0016)	(0.0040)	(0.0036)	(0.0022)	(0.0037)	
Intercept	-0.0962***	-0.0959***	-0.0955***	-0.0957***	-0.0920***	
	(0.0040)	(0.0040)	(0.0040)	(0.0040)	(0.0046)	
RSE	0.0187	0.0187	0.0190	0.0190	0.0204	
Degrees of Freedom	21	21	21	21	21	
$\mathbf{R^2}$	0.0917	0.0854	0.0786	0.0808	0.0617	
F-statistic	1.060	0.981	0.896	0.923	0.691	
Degrees of Freedom	2,21	2,21	2,21	2,21	2,21	

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.3: Bolivia's Government Weighted Population Welfare and Regressions

Figure 7.3 presents evidence supporting the effectiveness of the new methodology. Here, the similar trends for GWPW and for the TOI are clearly visible. Thus, a trade tax (tariff) reduction improves population welfare by potentially

reducing prices, thereby increasing consumer surplus.

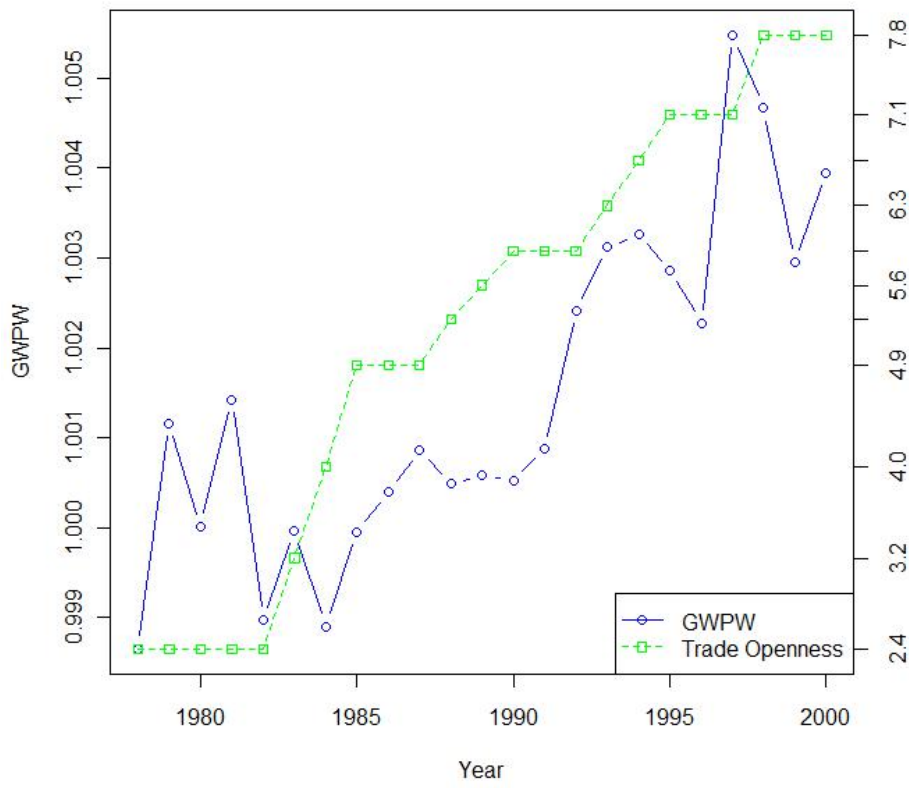

Figure 7.3: Bolivia's Trade Openness versus Weighted Population Welfare

It is also interesting to observe the significant economic and political events occuring in proximity to the inflection points, Figure 7.4. Bolivia, a founding member of the Andean Group (1969), participated in trade organizations that reduced tariffs, and hence raised GWPW. The group created a free trade area, the Andean Pact, in 1992, further increasing GWPW. In 1995, foreign investment

in Bolivia was stimulated by privatization, which favored the elite and lowered

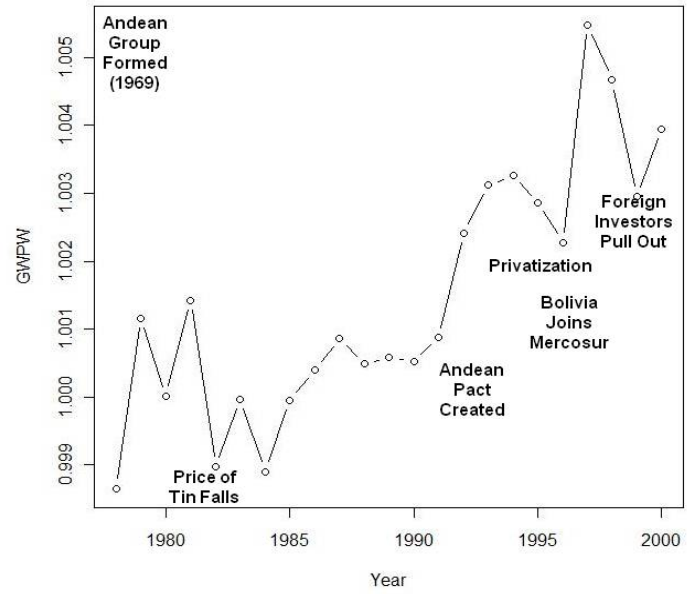

Figure 7.4: Bolivia's Intertemporal Government Weighted Population Welfare

GWPW. In 1997, GWPW was raised again when Bolivia became an associate member of Mercosur. Investment in mining and natural gas extraction increased, as did investment in the banking sector, increasing the influence of industry and reducing GWPW (Crabtree et al., 1987).

CHILE	Years					
	1984	**1985**	**1986**	**1987**	**1988**	**1989**
GWPW	1.0000***	1.0000***	1.0000***	1.0001***	1.0000***	1.0002***
	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0003)	(0.0004)
Output/Imports (z)	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000
	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0001)	(0.0001)
Organization × z	0.0000	-0.0000	-0.0000	-0.0001	0.0000	-0.0002
	(0.0003)	(0.0003)	(0.0004)	(0.0004)	(0.0003)	(0.0004)
Intercept	-0.1055***	-0.1054***	-0.1045***	-0.1031***	-0.1056***	-0.1030***
	(0.0080)	(0.0081)	(0.0086)	(0.0085)	(0.0085)	(0.0086)
RSE	0.0360	0.0359	0.0360	0.0359	0.0359	0.0359
Degrees of Freedom	25	25	25	25	25	25
$\mathbf{R^2}$	0.0038	0.0040	0.0019	0.0066	0.0039	0.0070
F-statistic	0.048	0.500	0.023	0.084	0.049	0.088
Degrees of Freedom	2,25	2,25	2,25	2,25	2,25	2,25
	1990	**1991**	**1992**	**1993**	**1994**	**1995**
GWPW	1.0007***	1.0006***	1.0009***	1.0014***	1.0011***	1.0012***
	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0005)	(0.0006)
Output/Imports (z)	0.0000	0.0000	0.0000	0.0001	-0.0000	0.0000
	(0.0001)	(0.0000)	(0.0001)	(0.0001)	(0.0000)	(0.0003)
Organization × z	-0.0007	-0.0006	-0.0009	-0.0014*	-0.0011*	-0.0012
	(0.0004)	(0.0004)	(0.0005)	(0.0005)	(0.0005)	(0.0006)
Intercept	-0.0959***	-0.0973***	-0.0953***	-0.0936***	-0.0949***	-0.0951***
	(0.0081)	(0.0080)	(0.0079)	(0.0073)	(0.0077)	(0.0079)
RSE	0.0338	0.0342	0.0333	0.0316	0.0329	0.0331
Degrees of Freedom	25	25	25	25	25	25
$\mathbf{R^2}$	0.1198	0.0946	0.1418	0.2289	0.1645	0.1514
F-statistic	1.701	1.307	2.065	3.710	2.462	2.230
Degrees of Freedom	2,25	2,25	2,25	2,25	2,25	2,25
	1996	**1997**	**1998**	**1999**	**2000**	
GWPW	1.0016***	1.0015***	1.0010***	1.0010***	1.0015***	
	(0.0005)	(0.0005)	(0.0004)	(0.0005)	(0.0005)	
Output/Imports (z)	-0.0000	-0.0000	0.0000	0.0000	-0.0000	
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	
Organization × z	-0.0016**	-0.0015**	-0.0010*	-0.0010*	-0.0015**	
	(0.0005)	(0.0005)	(0.0004)	(0.0005)	(0.0005)	
Intercept	-0.0931***	-0.0941***	-0.0969***	-0.0889***	-0.0784***	
	(0.0068)	(0.0068)	(0.0070)	(0.0067)	(0.0057)	
RSE	0.0301	0.0306	0.0322	0.0303	0.0254	
Degrees of Freedom	25	25	25	25	25	
$\mathbf{R^2}$	0.3027	0.2792	0.1987	0.1601	0.2877	
F-statistic	5.425	4.842	3.100	2.383	5.050	
Degrees of Freedom	2,25	2,25	2,25	2,25	2,25	

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.4: Chile's Government Weighted Population Welfare and Regressions

Figure 7.5 shows that GWPW closely tracks the significant changes in the TOI.

Chile, in the 1980s, governed by the Pinochet military dictatorship, and under the economic influence of the Chicago Boys, implemented policies to address (1) hyperinflation, that climbed to 700 percent in 1973, (2) the lack of foreign reserves, and (3) falling GDP. Their plan had three main objectives: (1) stabilization

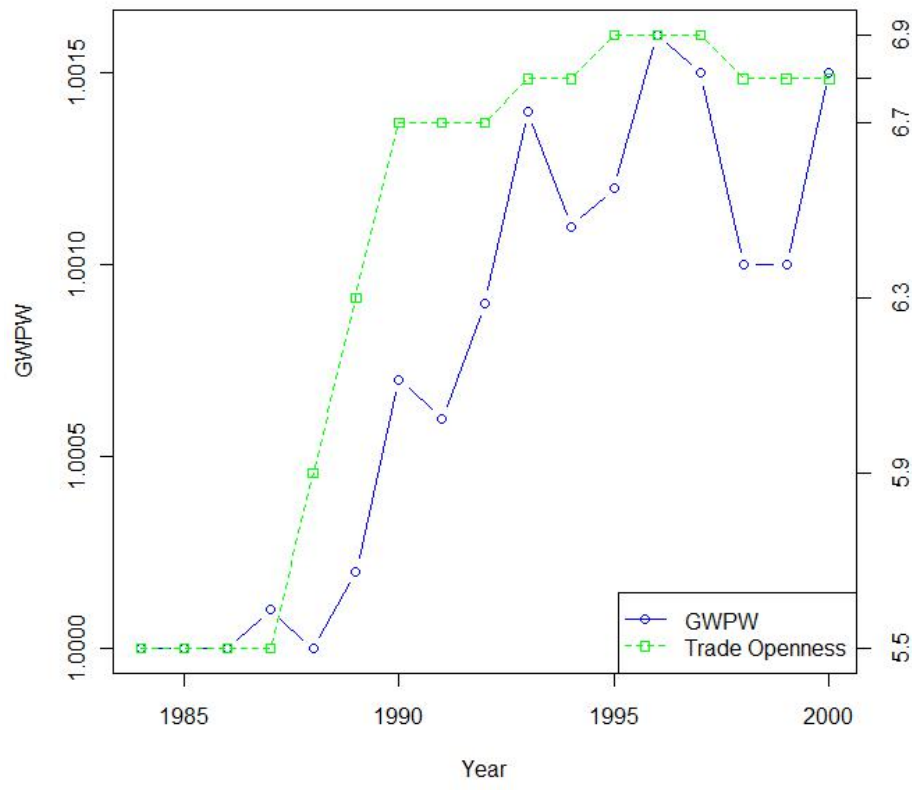

Figure 7.5: Chile's Trade Openness versus Weighted Population Welfare

of inflation, (2) economic liberalization, and (3) privatization of state-owned companies. In 1984-85, a depreciated and highly competitive real exchange rate was implemented. This combination and low tariffs had a significant positive impact on Chile's economic structure, and stabilized GWPW. Productivity in tradable sectors grew substantially, and exports became highly diversified. Chile signed free trade agreements with Canada, Mexico, and Central America, preferential trade agreements with Venezuela, Colombia, and Ecuador, and an association agreement

with Mercosur (Hudson, 1994). These agreements reduced tariff rates and hence

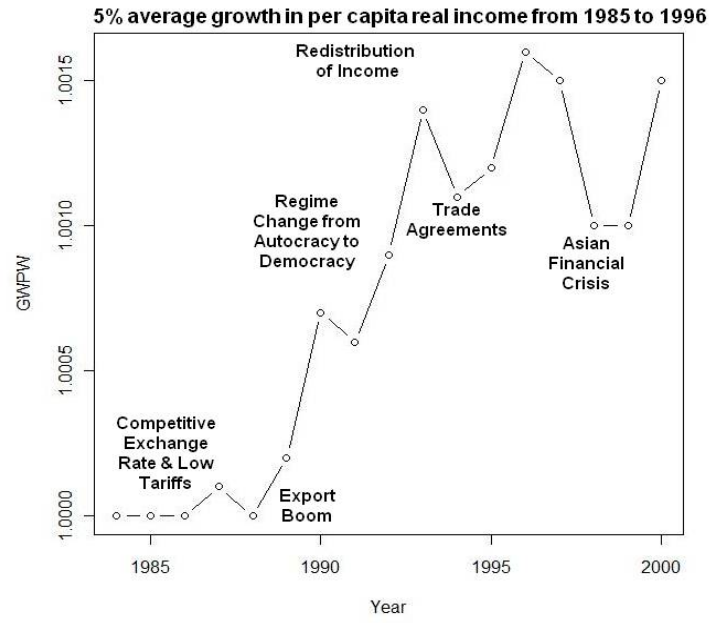

Figure 7.6: Chile's Intertemporal Government Weighted Population Welfare

increased GWPW.

COLUMBIA	Years					
	1979	**1980**	**1981**	**1982**	**1983**	**1984**
GWPW	1.0035***	0.9972***	0.9997***	1.0001***	1.0004***	1.0008***
	(0.0011)	(0.0035)	(0.0010)	(0.0006)	(0.0007)	(0.0005)
Output/Imports (z)	0.0007**	-0.0038	-0.0005	-0.0001	-0.0000	0.0003
	(0.0002)	(0.0032)	(0.0009)	(0.0004)	(0.0004)	(0.0003)
Organization × z	-0.0035**	0.0028	0.0003	-0.0001	-0.0004	-0.0008
	(0.0011)	(0.0035)	(0.0010)	(0.0006)	(0.0007)	(0.0005)
Intercept	-0.0601***	-0.0516***	-0.0676***	-0.0689***	-0.0684***	-0.0703***
	(0.0091)	(0.0109)	(0.0110)	(0.0113)	(0.0112)	(0.0111)
RSE	0.0409	0.0417	0.0484	0.0485	0.0477	0.0462
Degrees of Freedom	23	23	23	23	23	23
$\mathbf{R^2}$	0.3279	0.3034	0.0591	0.0560	0.0849	0.1426
F-statistic	5.611	5.009	0.723	0.682	1.067	1.913
Degrees of Freedom	2,23	2,23	2,23	2,23	2,23	2,23
	1985	**1986**	**1987**	**1988**	**1989**	**1990**
GWPW	1.0005***	1.0005***	1.0005***	1.0000***	1.0003***	1.0001***
	(0.0002)	(0.0003)	(0.0003)	(0.0001)	(0.0002)	(0.0001)
Output/Imports (z)	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000
	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Organization × z	-0.0005*	-0.0005	-0.0005	0.0000	-0.0003	-0.0001
	(0.0002)	(0.0003)	(0.0003)	(0.0001)	(0.0002)	(0.0001)
Intercept	-0.0701***	-0.0675***	-0.0682***	-0.0774***	-0.0712***	-0.0758***
	(0.0107)	(0.0103)	(0.0100)	(0.0107)	(0.0093)	(0.0095)
RSE	0.0453	0.0465	0.0467	0.0492	0.0459	0.0463
Degrees of Freedom	23	23	23	23	23	23
$\mathbf{R^2}$	0.1763	0.1326	0.1241	0.0265	0.1560	0.1382
F-statistic	2.461	1.758	1.629	0.314	2.126	1.845
Degrees of Freedom	2,23	2,23	2,23	2,23	2,23	2,23
	1991	**1992**	**1993**	**1994**	**1995**	**1996**
GWPW	1.0073***	1.0049***	1.0066***	1.0054***	0.9994***	0.9967***
	(0.0052)	(0.0020)	(0.0029)	(0.0031)	(0.0041)	(0.0052)
Output/Imports (z)	0.0070	-0.0006	0.0004	-0.0013	-0.0031	-0.0059
	(0.0051)	(0.0006)	(0.0009)	(0.0010)	(0.0025)	(0.0038)
Organization × z	-0.0073	-0.0049*	-0.0066*	-0.0053	0.0006	0.0033
	(0.0052)	(0.0020)	(0.0028)	(0.0031)	(0.0041)	(0.0052)
Intercept	-0.0717***	-0.0964***	-0.1006***	-0.0960***	-0.1119***	-0.0988***
	(0.0110)	(0.0110)	(0.0127)	(0.0123)	(0.0151)	(0.0151)
RSE	0.0476	0.0460	0.0513	0.0497	0.0546	0.0536
Degrees of Freedom	23	23	23	23	23	23
$\mathbf{R^2}$	0.0893	0.4500	0.3213	0.3638	0.1507	0.2159
F-statistic	1.127	9.410	5.444	6.576	2.041	3.166
Degrees of Freedom	2,23	2,23	2,23	2,23	2,23	2,23
	1997	**1998**	**1999**	**2000**		
GWPW	0.9981***	0.9955***	0.9991***	1.0033***		
	(0.0046)	(0.0056)	(0.0078)	(0.0052)		
Output/Imports (z)	-0.0045	-0.0079*	-0.0051	-0.0014		
	(0.0028)	(0.0036)	(0.0066)	(0.0039)		
Organization × z	0.0019	0.0045	0.0009	-0.0033		
	(0.0046)	(0.0056)	(0.0078)	(0.0051)		
Intercept	-0.1015***	-0.0966***	-0.0975***	-0.1035***		
	(0.0151)	(0.0150)	(0.0167)	(0.0164)		
RSE	0.0542	0.0574	0.0651	0.0628		
Degrees of Freedom	23	23	23	20		
$\mathbf{R^2}$	0.1976	0.4302	0.2680	0.3501		
F-statistic	2.832	8.681	4.210	5.386		
Degrees of Freedom	2,23	2,23	2,23	2,20		

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.5: Columbia's Government Weighted Population Welfare and Regressions

Figure 7.7 presents evidence supporting the effectiveness of the new methodology. GWPW closely tracks the significant changes in the TOI, with the exception of the fall in GWPW due to privatization, which increased the power of the elites.

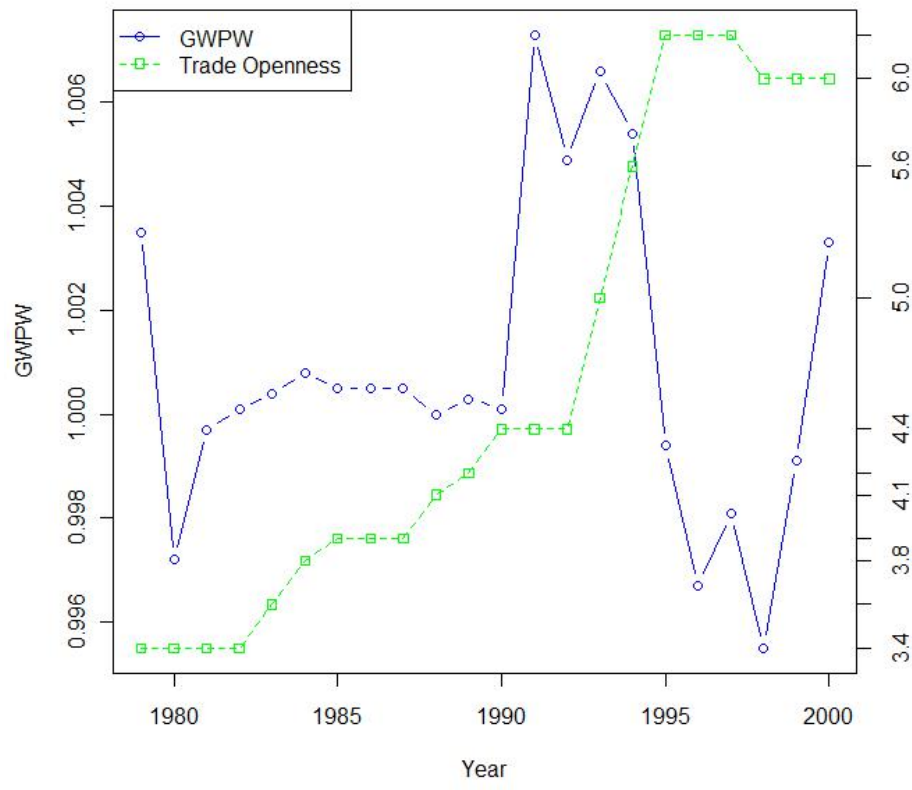

Figure 7.7: Columbia's Trade Openness versus Weighted Population Welfare

Colombia's economy began to struggle in the early 1980s due to the 1981 global recession. The domestic gains of the 1970s and foreign aid enabled Colombia to survive relatively unscathed, with GWPW varying only slightly from '1'. By the late 1980s, the outlook improved as coffee production boomed and prices increased. In 1990, Columbia began a liberalization program, including tariff reductions, financial deregulation, privatization of state-owned enterprises, and adoption

of a more liberal foreign exchange rate. The initial tariff changes caused GWPW to increase, but privatization gave more power to elites, returning GWPW to its former level. A severe recession occurred, including labor unrest and problems

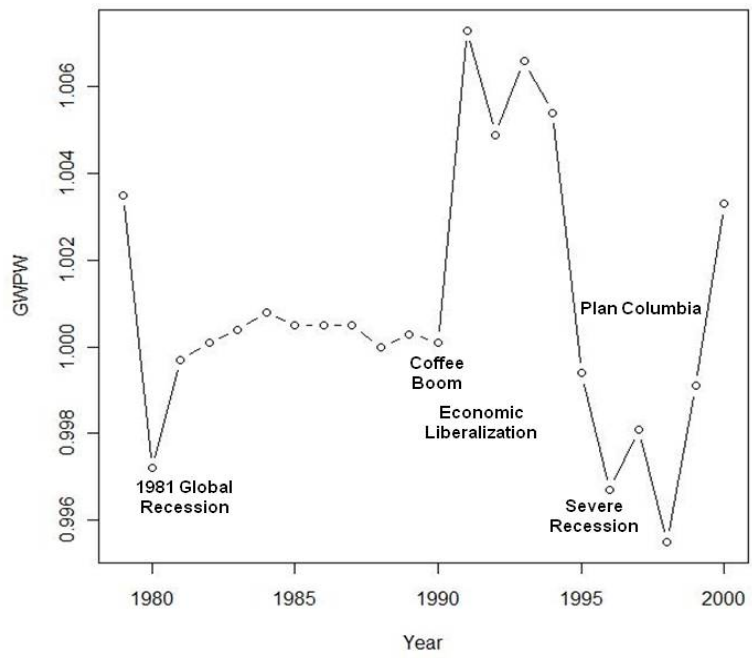

Figure 7.8: Columbia's Intertemporal Government Weighted Population Welfare

related to the drug trade, all of which are reflected in the severe drop in GWPW. Plan Colombia, an integrated strategy to deal with these problems (Stokes, 2005), showed some success through the increase in GWPW.

COSTA RICA	Years				
	1987	**1988**	**1989**	**1990**	**1991**
GWPW	1.0008***	1.0015***	1.0003***	0.9998***	0.9991***
	(0.0005)	(0.0018)	(0.0023)	(0.0025)	(0.0023)
Output/Imports (z)	-0.0000	-0.0002	-0.0005	-0.0008	-0.0037**
	(0.0000)	(0.0002)	(0.0006)	(0.0009)	(0.0011)
Organization × z	-0.0008	-0.0015	-0.0003	0.0002	0.0009
	(0.0005)	(0.0018)	(0.0023)	(0.0025)	(0.0023)
Intercept	-0.0969***	-0.0964***	-0.0963***	-0.0958***	-0.0784***
	(0.0101)	(0.0100)	(0.0099)	(0.0097)	(0.0082)
RSE	0.0453	0.0453	0.0446	0.0438	0.0349
Degrees of Freedom	23	22	22	22	24
R^2	0.1575	0.1373	0.1663	0.1969	0.4855
F-statistic	2.150	1.750	2.194	2.697	11.320
Degrees of Freedom	2,23	2,22	2,22	2,22	2,24
	1992	**1993**	**1994**	**1995**	**1996**
GWPW	0.9975***	0.9913***	0.9838***	1.0086***	1.0211***
	(0.0021)	(0.0053)	(0.0106)	(0.0048)	(0.0055)
Output/Imports (z)	-0.0054***	-0.0093*	-0.0118	0.0030	0.0086***
	(0.0012)	(0.0036)	(0.0077)	(0.0017)	(0.0023)
Organization × z	0.0025	0.0087	0.0163	-0.0085	-0.0208***
	(0.0021)	(0.0053)	(0.0107)	(0.0048)	(0.0054)
Intercept	-0.0756***	-0.0810***	-0.0972***	-0.0920***	-0.0542***
	(0.0079)	(0.0079)	(0.0090)	(0.0098)	(0.0088)
RSE	0.0328	0.0350	0.0454	0.0447	0.0390
Degrees of Freedom	24	24	25	25	25
R^2	0.5445	0.4803	0.1503	0.1778	0.4635
F-statistic	14.340	11.090	2.210	2.704	10.800
Degrees of Freedom	2,24	2,24	2,25	2,25	2,25
	1997	**1998**	**1999**	**2000**	
GWPW	1.0139***	1.0071***	1.0217***	1.0005***	
	(0.0053)	(0.0073)	(0.0201)	(0.0186)	
Output/Imports (z)	0.0030*	-0.0017	0.0052	-0.0074	
	(0.0014)	(0.0065)	(0.0136)	(0.0106)	
Organization × z	-0.0137*	-0.0070	-0.0213	-0.0005	
	(0.0052)	(0.0072)	(0.0197)	(0.0185)	
Intercept	-0.0607***	-0.0592***	-0.0546***	-0.0484***	
	(0.0093)	(0.0101)	(0.0093)	(0.0086)	
RSE	0.0432	0.0402	0.0384	0.0324	
Degrees of Freedom	25	23	22	22	
R^2	0.3398	0.2946	0.3431	0.3029	
F-statistic	6.434	4.803	5.745	4.780	
Degrees of Freedom	2,25	2,23	2,22	2,22	

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.6: Costa Rica's Government Weighted Population Welfare and Regressions

Figure 7.9 presents evidence supporting the effectiveness of the new methodology. GWPW and the TOI have approximately the same slope.

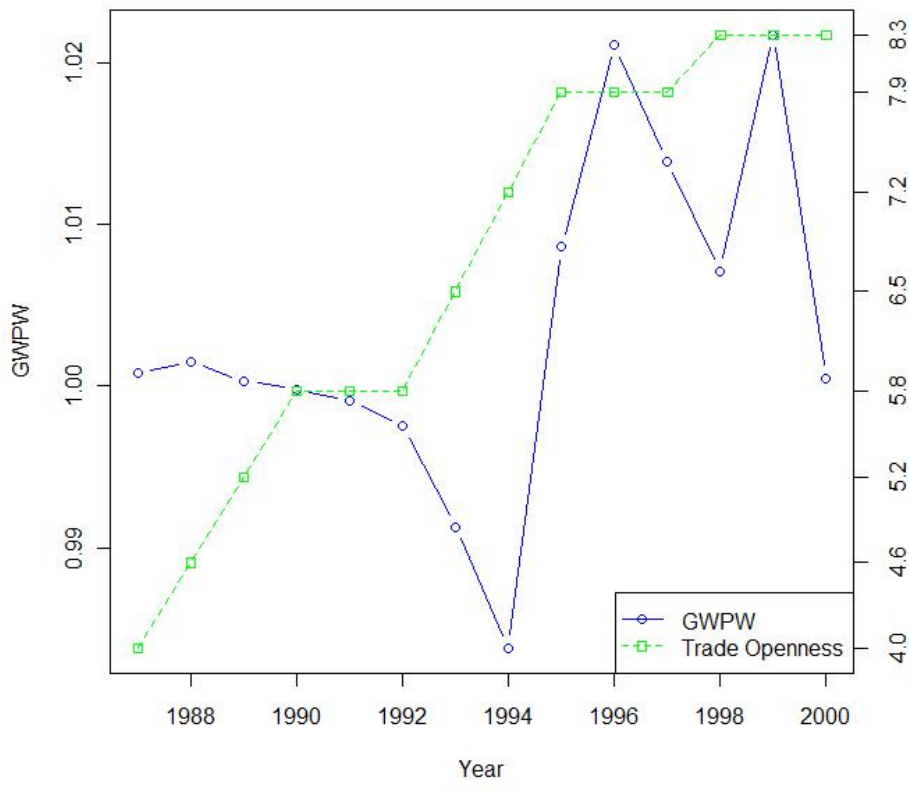

Figure 7.9: Costa Rica's Trade Openness versus Weighted Population Welfare

In the early 1980s, there was an economic crisis in Costa Rica due to inflation, currency devaluation, high oil prices, low prices for coffee, bananas, and sugar, high costs of welfare, and the disruption caused by the war in Nicaragua. The United States and the IMF provided US$3 billion in aid, and by the mid-1980s the World Bank initiated a debt structural adjustment program. In 1990, there was reform of the tax code. The internal debt grew steadily in the early 1990's due to tax breaks, subsidies, and other costs of the government's promotion of

the export sector and GWPW fell to below '1' since these activities favored the elites. In 1994, policies were begun to attract direct foreign investment in high technology, and in 1998, Intel opened a manufacturing complex. These activities

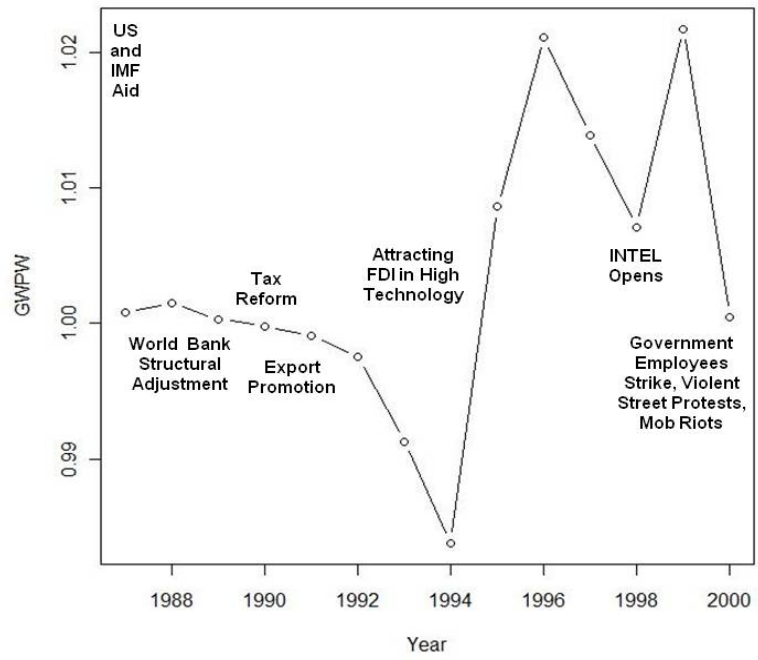

Figure 7.10: Costa Rica's Intertemporal Government Weighted Population Welfare

increased GWPW until, in April 2000, the government attempted to privatize the country's power and telecommunications sectors, when GWPW fell again (*Costa Rica Economic History*, 2012).

EL SALVADOR	Years				
	1994	**1995**	**1996**	**1997**	**1998**
GWPW	1.0074***	1.0540***	1.1033***	1.0079***	0.9625***
	(0.0071)	(0.0306)	(0.0279)	(0.0250)	(0.0251)
Output/Imports (z)	-0.0077	0.0389	0.0931**	-0.0034	-0.0395
	(0.0043)	(0.0287)	(0.0252)	(0.0216)	(0.0241)
Organization × z	-0.0073	-0.0532	-0.1023**	0.0078	0.0375
	(0.0069)	(0.0301)	(0.0275)	(0.0247)	(0.0251)
Intercept	-0.0838***	-0.0880**	-0.0825***	-0.0622***	-0.0599***
	(0.0087)	(0.0080)	(0.0104)	(0.0090)	(0.0133)
RSE	0.0379	0.0362	0.0488	0.0404	0.0559
Degrees of Freedom	21	24	24	24	23
$\mathbf{R^2}$	0.5446	0.5633	0.3784	0.5882	0.1384
F-statistic	12.560	15.480	7.304	17.140	1.847
Degrees of Freedom	2,21	2,24	2,24	2,24	2,23

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.7: El Salvador's Government Weighted Population Welfare and Regressions

Figure 7.11 presents evidence supporting the effectiveness of the new methodology. With the exception of the negative GWPW effects of privatizing electrical energy distribution, telecom and pensions, GWPW tracks the significant changes in the TOI.

The civil war peace settlement committed the government to large expenditures for transition programs, privatization, and social services. The process of privatization, begun in 1989 with nationalized banks, was intended to reduce the size of government, decrease the fiscal deficit, deliver better services, provide immediate resources to cancel the short-term debt, and invest in social infrastructure. 1990-93 saw the sale of the enterprises that did not provide strictly public services, including cement factories, hotels and sugar refineries. The industrial sector shifted, beginning in 1993, from a domestic orientation to free trade zone

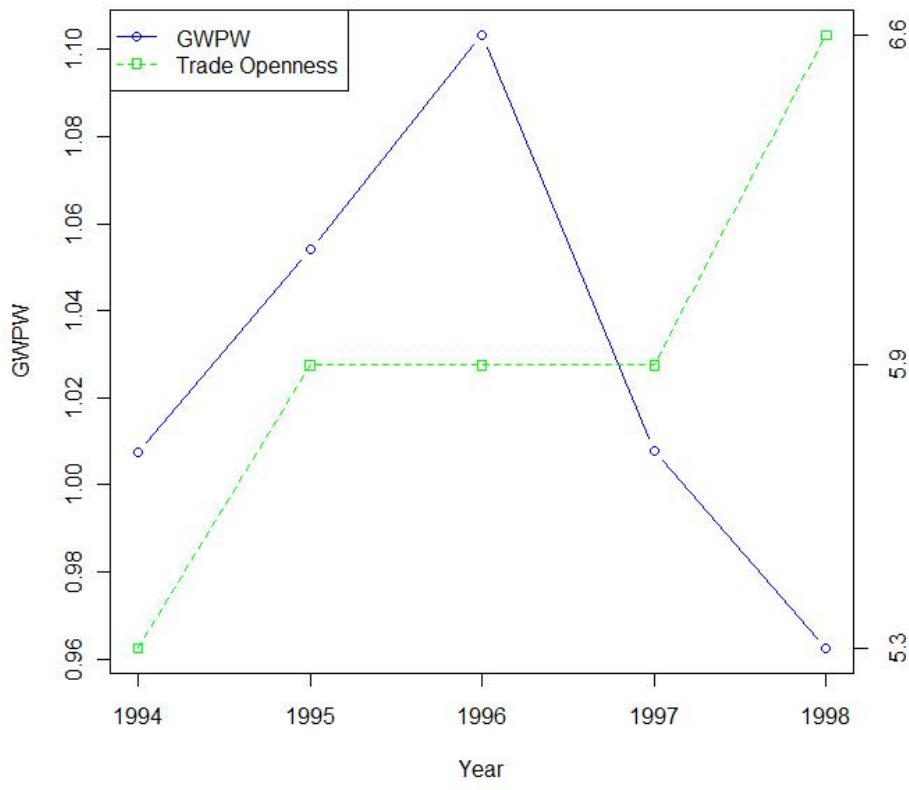

Figure 7.11: El Salvador's Trade Openness versus Weighted Population Welfare

manufacturing for export, reflected in the increase to GWPW. In 1996, the electrical energy distribution, telecommunications and pension systems were privatized, which favored the elites and reduced GWPW. El Salvador still had one of the lowest tax burdens in Latin America (around 11 percent of GDP). The government focused on improving the collection of revenues, primarily indirect taxes. A 10 percent value-added tax (VAT), implemented in September 1992, was raised to 13 percent in July 1995. The VAT has been the biggest source of government revenue,

which represents additional downward pressure on GWPW. In 1997, El Salvador

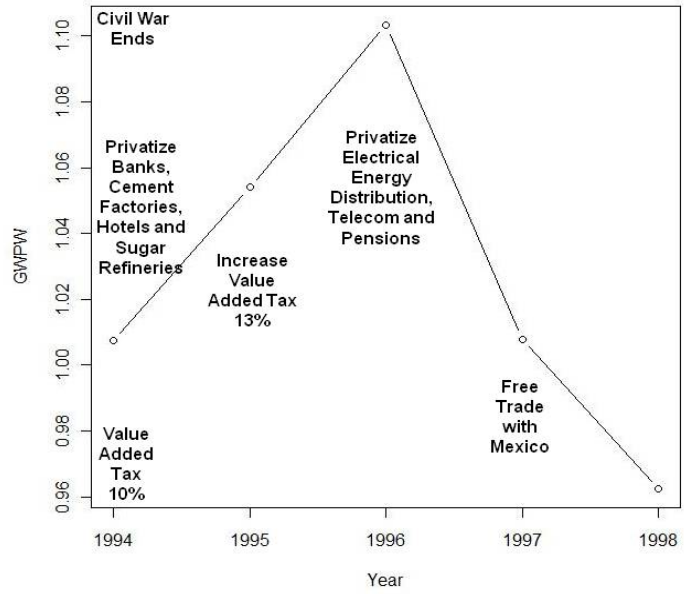

Figure 7.12: El Salvador's Intertemporal Government Weighted Population Welfare

implemented free trade with Mexico, slowing the decrease in GWPW (*El Salvador Economy*, 2012).

GUATEMALA	Years			
	1987	**1988**	**1992**	**1993**
GWPW	1.0027***	1.0134***	1.0004***	1.0001***
	(0.0106)	(0.0054)	(0.0053)	(0.0059)
Output/Imports (z)	-0.0024	-0.0027*	-0.0046**	-0.0001
	(0.0027)	(0.0010)	(0.0016)	(0.0018)
Organization × z	-0.0027	-0.0132*	-0.0004	-0.0001
	(0.0105)	(0.0052)	(0.0053)	(0.0059)
Intercept	-0.0866***	-0.0716***	-0.0759***	-0.0979***
	(0.0106)	(0.0096)	(0.0096)	(0.0011)
RSE	0.0486	0.0399	0.0419	0.0550
Degrees of Freedom	24	24	24	25
R^2	0.2583	0.4982	0.4480	0.0622
F-statistic	4.180	11.910	9.737	0.829
Degrees of Freedom	2,24	2,24	2,24	2,25

	1994	**1995**	**1998**
GWPW	1.0140	1.0410	0.9960
	(0.0056)	(0.0297)	(0.0088)
Output/Imports (z)	-0.0004	0.0301	-0.0025
	(0.0006)	(0.0231)	(0.0026)
Organization × z	0.0138*	-0.0406	0.0041
	(0.0054)	(0.0291)	(0.0089)
Intercept	-0.0872***	-0.0900***	-0.0747***
	(0.0101)	(0.0120)	(0.0142)
RSE	0.0477	0.0528	0.0654
Degrees of Freedom	25	25	25
R^2	0.2938	0.1347	0.0555
F-statistic	5.199	1.947	0.735
Degrees of Freedom	2,25	2,25	2,25

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.8: Guatemala's Government Weighted Population Welfare and Regressions

Figure 7.13 presents counterfactual evidence supporting the effectiveness of the new methodology. The TOI, focused only on trade, does not recognize the impact of the failing economy (1988-89), and financial crises (1998) as reflected in GWPW.

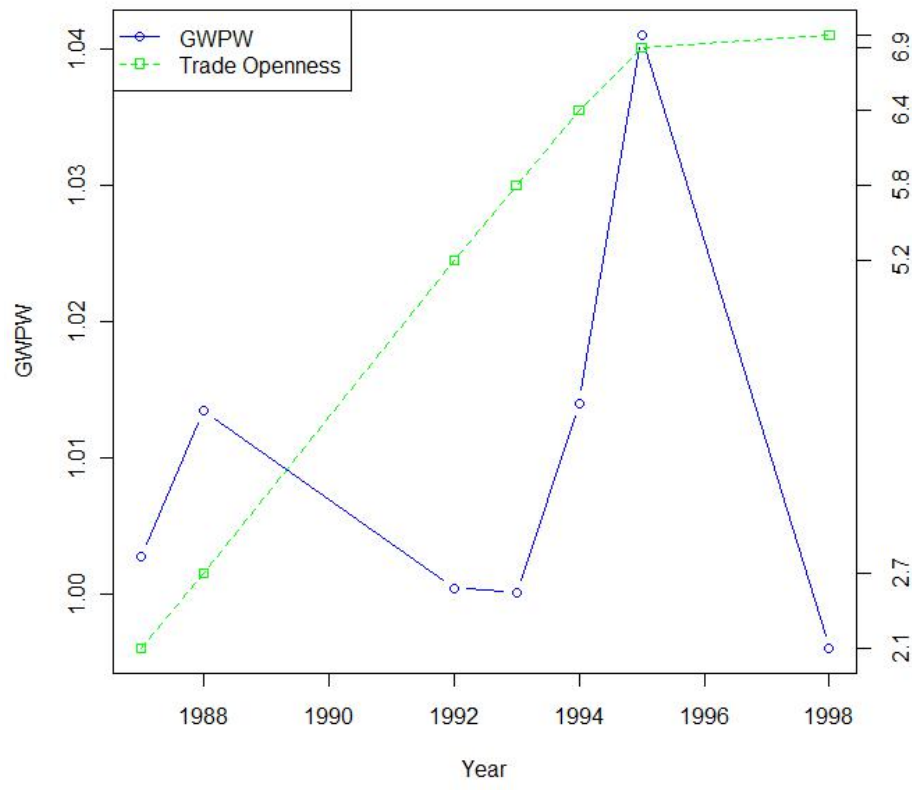

Figure 7.13: Guatemala's Trade Openness versus Weighted Population Welfare

In 1986, Guatemala implemented reforms to end political violence and establish the rule of law. In 1988 and 1989, the economy fell, there were strikes and protest marches, and allegations of widespread corruption. In 1994, the peace process, brokered by the United Nations, resulted in agreements on human rights, resettlement of displaced persons, and indigenous rights. Peace negotiations were concluded, ending the 36-year internal conflict in December, 1996. The human rights situation also improved. During this period, GWPW steeply increased.

Guatemala enjoyed economic growth until the 1998 financial crisis disrupted the

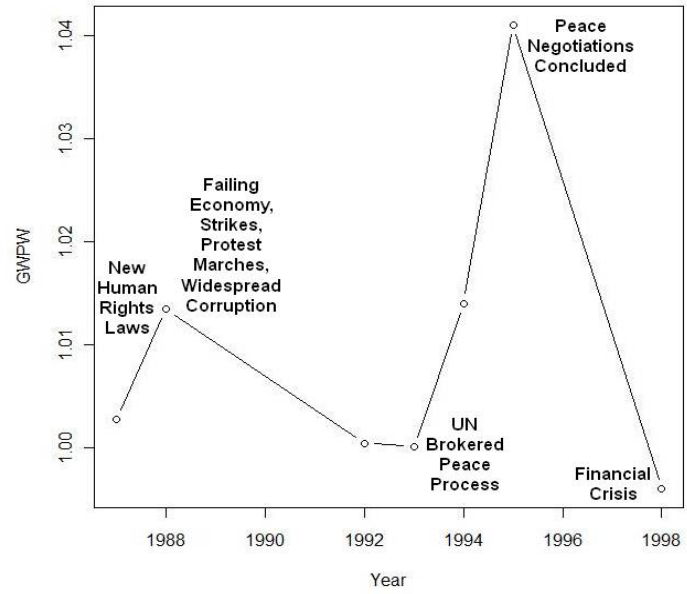

Figure 7.14: Guatemala's Intertemporal Government Weighted Population Welfare

economy, and collapsed coffee prices as reflected in downward pressure on GWPW. (*Guatemala History and Economy*, 2012)

HONDURAS	Years				
	1991	**1992**	**1993**	**1994**	**1995**
GWPW	1.0008***	0.9960***	0.9944***	1.0033***	1.0102***
	(0.0045)	(0.0035)	(0.0077)	(0.0054)	(0.0080)
Output/Imports (z)	-0.0009	-0.0017*	-0.0018	-0.0002	0.0003
	(0.0010)	(0.0008)	(0.0016)	(0.0005)	(0.0004)
Organization × z	-0.0008	0.0040	0.0056	-0.0033	-0.0101
	(0.0045)	(0.0036)	(0.0077)	(0.0053)	(0.0078)
Intercept	-0.0860***	-0.0891**	-0.0946***	-0.0961***	-0.0948***
	(0.0096)	(0.0096)	(0.0102)	(0.0101)	(0.0101)
RSE	0.0411	0.0421	0.0465	0.0471	0.0464
Degrees of Freedom	22	22	23	23	23
$\mathbf{R}^2$	0.3159	0.2827	0.1487	0.1253	0.1517
F-statistic	5.081	4.336	2.009	1.647	1.847
Degrees of Freedom	2,22	2,22	2,23	2,23	2,23

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.9: Honduras' Government Weighted Population Welfare and Regressions

Figure 7.15 presents evidence supporting the effectiveness of the new methodology. GWPW closely tracks the significant changes in the TOI.

In 1991, the maquiladoras in Honduras, dominated by 21 Asian-owned firms, operated in export processing zones and employed approximately 16,000 workers. Another nine firms opened in 1992. The export processing zone textile manufacturing industry decimated small local manufacturers, who could not compete for labor due to the maquiladoras' high wage scale of close to US$4 per day. Small firms also found it increasingly difficult to meet the high cost of (primarily) imported inputs. GWPW decreased as small firms closed and the maquiladoras' importance grew.

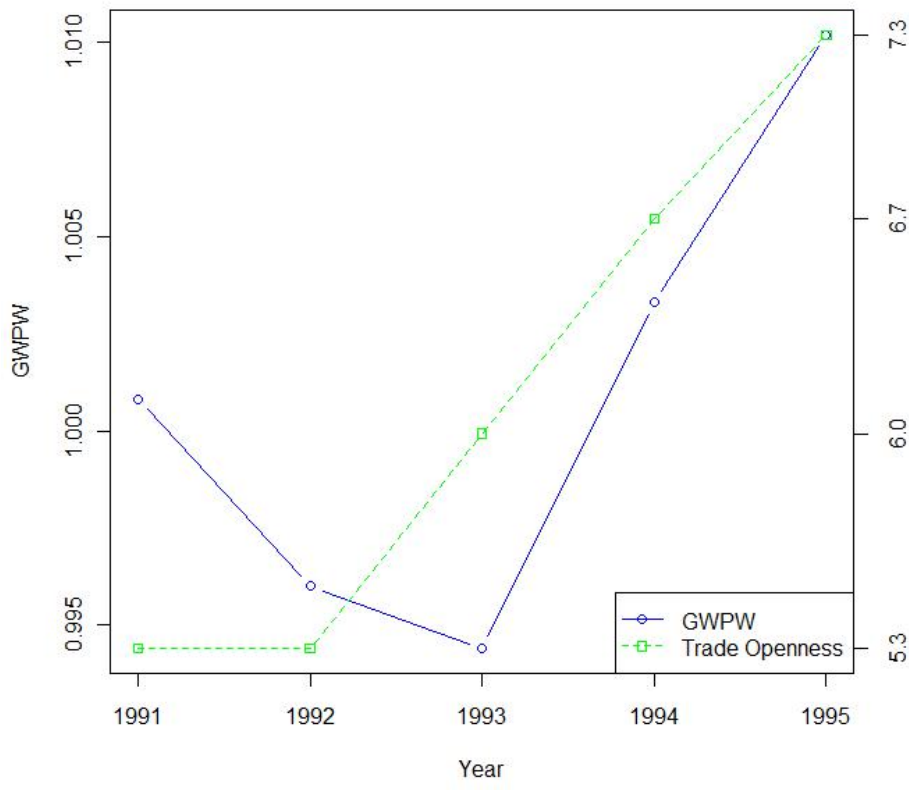

Figure 7.15: Honduras' Trade Openness versus Weighted Population Welfare

The 1993 election, based on improving social programs, addressing employment needs, and appeasing the public sector, was a significant change from the past. Reaching these goals required policies different from those in the Washington Consensus: a balanced budget, lower inflation, a reduced deficit, and external debt to attract investment and stimulate economic growth. In 1996, the Central Bank's net international reserves were substantially increased, inflation was reduced to 12.8 percent a year, and spending held down to achieve a 1.1 percent non-financial

public sector deficit in 1997 (*Honduras: The beginning of the end of impunity?*,

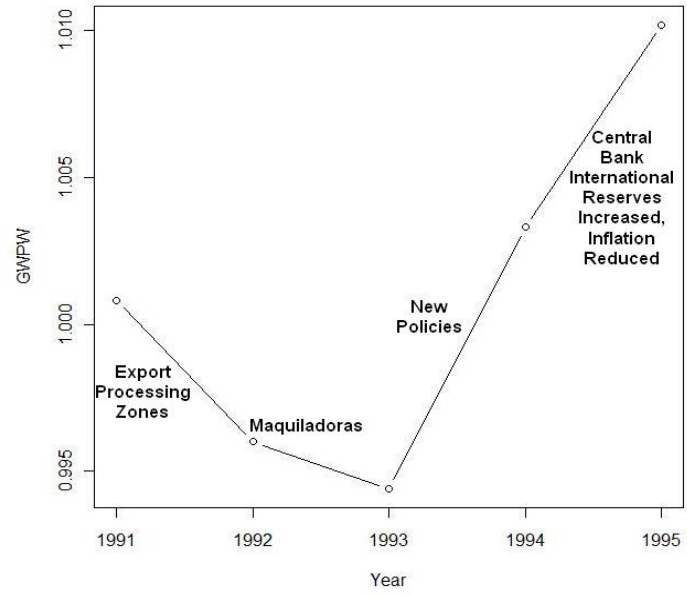

Figure 7.16: Honduras' Intertemporal Government Weighted Population Welfare

1995). These new policies achieved what the Washington Consensus had failed to produce, and GWPW increased.

MEXICO	Years				
	1987	**1988**	**1989**	**1990**	**1991**
GWPW	1.0013***	1.0034***	1.0076***	1.0077***	1.0067***
	(0.0003)	(0.0006)	(0.0014)	(0.0014)	(0.0015)
Output/Imports (z)	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Organization × z	-0.0013***	-0.0034***	-0.0075***	-0.0077***	-0.0067***
	(0.0003)	(0.0005)	(0.0014)	(0.0014)	(0.0015)
Intercept	-0.1187***	-0.1177***	-0.1125***	-0.1143***	-0.1121***
	(0.0080)	(0.0069)	(0.0081)	(0.0077)	(0.0090)
RSE	0.0372	0.0326	0.0356	0.0349	0.0388
Degrees of Freedom	23	23	23	23	23
R^2	0.5150	0.6273	0.5541	0.5729	0.4716
F-statistic	12.210	19.360	14.290	15.430	10.260
Degrees of Freedom	2,23	2,23	2,23	2,23	2,23
	1992	**1993**	**1994**	**1995**	**1996**
GWPW	1.0066***	1.0069***	1.0092***	1.0113***	1.0251***
	(0.0022)	(0.0022)	(0.0024)	(0.0020)	(0.0032)
Output/Imports (z)	-0.0000	-0.0000	-0.0000	-0.0001	-0.0003***
	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)
Organization × z	-0.0065**	-0.0069**	-0.0091***	-0.0112***	-0.0245***
	(0.0021)	(0.0021)	(0.0024)	(0.0020)	(0.0030)
Intercept	-0.1116***	-0.1114***	-0.1092***	-0.1137***	-0.1160***
	(0.0110)	(0.0108)	(0.0098)	(0.0075)	(0.0103)
RSE	0.0459	0.0452	0.0419	0.0351	0.0486
Degrees of Freedom	23	23	24	24	24
R^2	0.2934	0.3136	0.3872	0.5693	0.7699
F-statistic	4.775	5.255	7.582	15.860	40.150
Degrees of Freedom	2,23	2,23	2,24	2,24	2,24
	1997	**1998**	**1999**	**2000**	
GWPW	1.0242***	1.0232***	1.0200***	1.0164***	
	(0.0034)	(0.0031)	(0.0024)	(0.0021)	
Output/Imports (z)	-0.0014***	-0.0010***	-0.0009**	-0.0013**	
	(0.0004)	(0.0002)	(0.0003)	(0.0004)	
Organization × z	-0.0236***	-0.0226***	-0.0195***	-0.0161***	
	(0.0032)	(0.0029)	(0.0023)	(0.0020)	
Intercept	-0.1161***	-0.1177***	-0.1454***	-0.1438***	
	(0.0102)	(0.0101)	(0.0103)	(0.0105)	
RSE	0.0484	0.0480	0.0497	0.0505	
Degrees of Freedom	24	24	24	24	
R^2	0.7724	0.7765	0.8029	0.8044	
F-statistic	40.710	41.690	48.870	49.350	
Degrees of Freedom	2,24	2,24	2,24	2,24	

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.10: Mexico's Government Weighted Population Welfare and Regressions

Figure 7.17 presents evidence supporting the effectiveness of the new methodology. GWPW tracks the significant changes in the TOI and displays the effects of the financial crises of 1992 and the late 1990s.

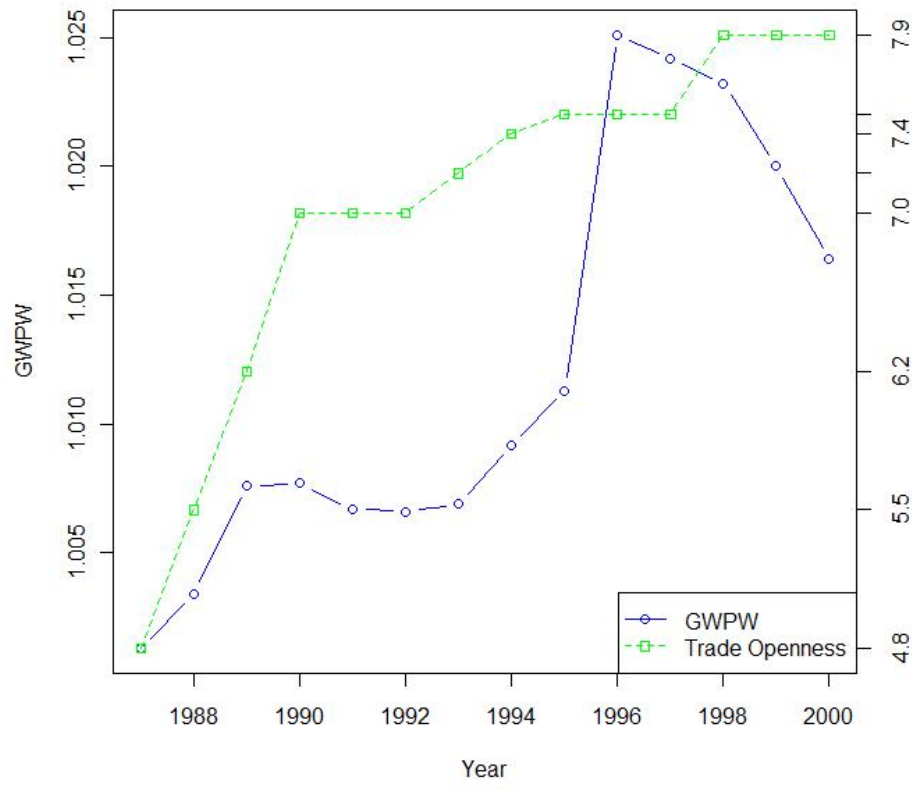

Figure 7.17: Mexico's Trade Openness versus Weighted Population Welfare

In 1985, Mexican trade policy reform began with a reduction in nontariff barriers, accompanied by an increase in tariff levels. In 1986, Mexico joined GATT, and reduced tariffs by half, and in 1987, the maximum tariff was reduced to 30 percent. The Economic Solidarity pact of 1988 further reduced the maximum tariff to 20 percent. These tariff reductions are reflected in the late 1980s increase in GWPW.

In 1990, the Brady Plan reduced interest and principal payments (Wijnbergen et al., 1991). Mexico's focus shifted to market-oriented reforms (the Washington Consensus) with reduced government spending, while focusing on social needs, tax system changes, privatization of state enterprises, and liberalization

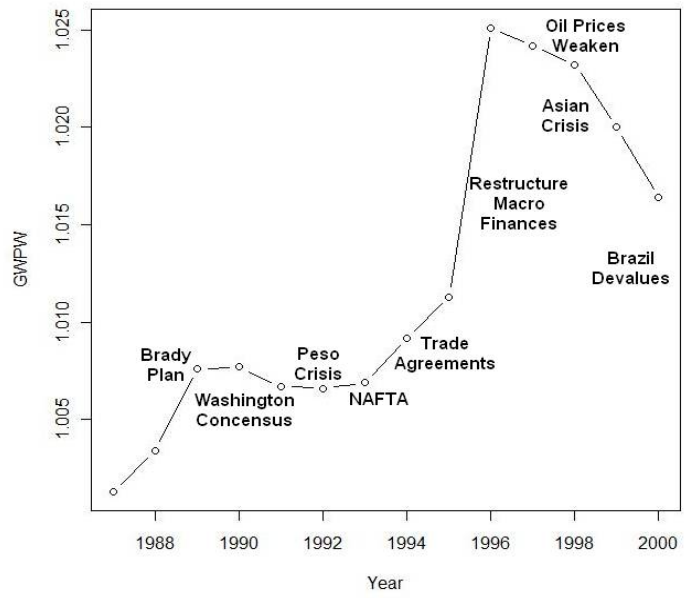

Figure 7.18: Mexico's Intertemporal Government Weighted Population Welfare

of trade; all of these together caused a degradation of GWPW, leading to the peso crisis of 1992. When the North American Free Trade Agreement (NAFTA) went into effect, in 1994, Mexico devalued the peso (Neely, 1996) in order to implement the intended strategy for export-led growth. Mexico's main motivation for NAFTA

was to encourage direct foreign investment in export-oriented manufacturing industries.

After the 1994-95 economic crisis, 50 percent of the population fell into poverty. Rapid growth in exports through NAFTA and other trade agreements, and the restructuring of the macroeconomic finances significantly reduced the poverty rate, enabling GWPW growth through 1997. GWPW fell in 1998, due to the Asian financial crisis, when Mexico saw capital inflows reduced. The price of oil, which represented about a third of total government revenues, dropped sharply, which negatively affected Mexico's public finances. In 1999, Brazil devalued its currency, causing the Mexican peso to weaken again (Vargas, 1999).

PANAMA	Years			
	1987	**1988**	**1989**	**1990**
GWPW	1.0014***	0.9970***	0.9958***	1.0021***
	(0.0022)	(0.0021)	(0.0025)	(0.0027)
Output/Imports (z)	-0.0027*	-0.0048**	-0.0030	-0.0057**
	(0.0010)	(0.0017)	(0.0018)	(0.0016)
Organization × z	-0.0013	0.0030	0.0042	-0.0020
	(0.0022)	(0.0021)	(0.0025)	(0.0027)
Intercept	-0.1227***	-0.1269***	-0.1404***	-0.1168***
	(0.0138)	(0.0135)	(0.0145)	(0.0109)
RSE	0.0510	0.0519	0.0605	0.0420
Degrees of Freedom	19	19	20	20
$\mathbf{R^2}$	0.3600	0.3384	0.1257	0.5445
F-statistic	5.343	4.860	1.438	11.960
Degrees of Freedom	2,19	2,19	2,20	2,20
	1991	**1992**	**1993**	**1994**
GWPW	1.0035***	0.9930***	1.0022***	0.9967***
	(0.0028)	(0.0089)	(0.0042)	(0.0044)
Output/Imports (z)	-0.0049**	-0.0073*	-0.0070***	-0.0132***
	(0.0014)	(0.0032)	(0.0016)	(0.0028)
Organization × z	-0.0035	0.0070	-0.0022	0.0032
	(0.0027)	(0.0090)	(0.0042)	(0.0044)
Intercept	-0.1156***	-0.1199***	-0.1045***	-0.1008***
	(0.0116)	(0.0138)	(0.0124)	(0.0096)
RSE	0.0433	0.0467	0.0402	0.0329
Degrees of Freedom	19	17	17	17
$\mathbf{R^2}$	0.5386	0.4559	0.5972	0.7292
F-statistic	11.090	7.123	12.600	22.890
Degrees of Freedom	2,19	2,17	2,17	2,17
	1997	**1998**	**1999**	**2000**
GWPW	1.0142***	0.9922***	0.9431***	1.0118***
	(0.0055)	(0.0068)	(0.0524)	(0.0260)
Output/Imports (z)	-0.0073**	-0.0155*	-0.0571	0.0010
	(0.0020)	(0.0054)	(0.0453)	(0.0249)
Organization × z	-0.0139*	0.0078	0.0569	-0.0117
	(0.0053)	(0.0067)	(0.0528)	(0.0257)
Intercept	-0.0975***	-0.0693***	-0.0708***	-0.0672***
	(0.0123)	(0.0065)	(0.0095)	(0.0096)
RSE	0.0394	0.0222	0.0305	0.0281
Degrees of Freedom	17	17	16	16
$\mathbf{R^2}$	0.6119	0.5306	0.2973	0.4046
F-statistic	13.400	9.607	3.385	5.437
Degrees of Freedom	2,17	2,17	2,16	2,16

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.11: Panama's Government Weighted Population Welfare and Regressions

Figure 7.19 shows that GWPW closely tracks the significant changes in the TOI, which possibly reflects the imminent change in control of the Panama Canal.

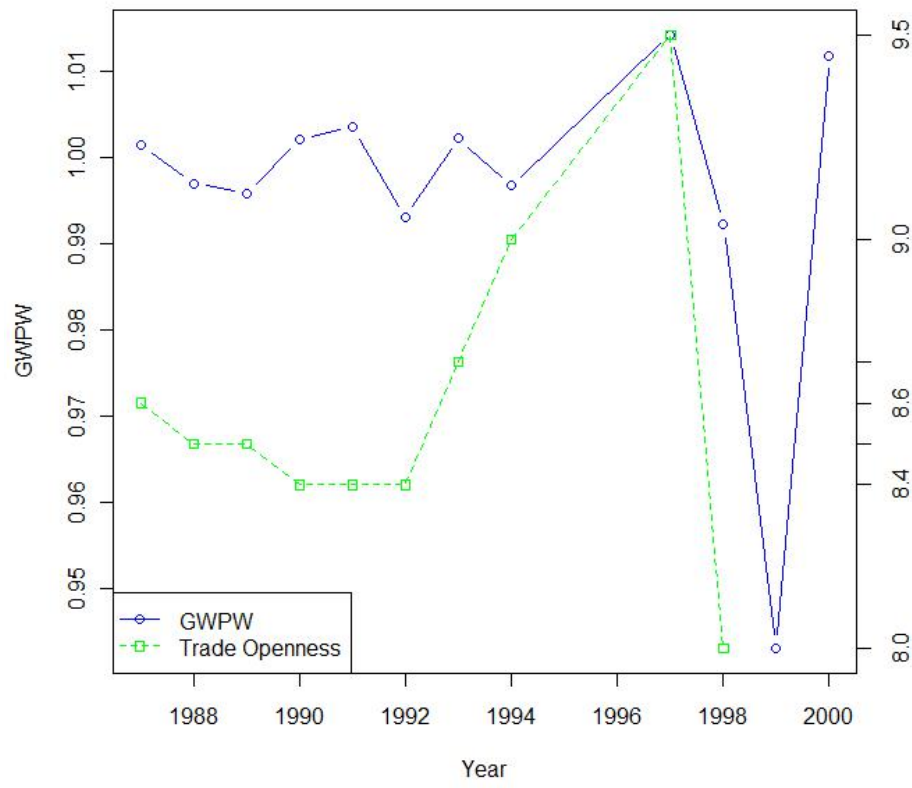

Figure 7.19: Panama's Trade Openness versus Weighted Population Welfare

It is also interesting to observe the impact of the 1999 withdrawal of the United States from the Panama Canal Zone, resulting in the loss of jobs, and $175-350 million that were spent by the U.S. military. Most of the lost jobs were service sector jobs that provided support for the U.S. forces. Preparations for withdrawal are reflected in the drop in GWPW in 1998, and the full withdrawal is reflected in the sharp drop in 1999. The Panamanian government was left with 364,000 acres of land and 5,000 buildings, compounding the steepness of the 1999 drop,

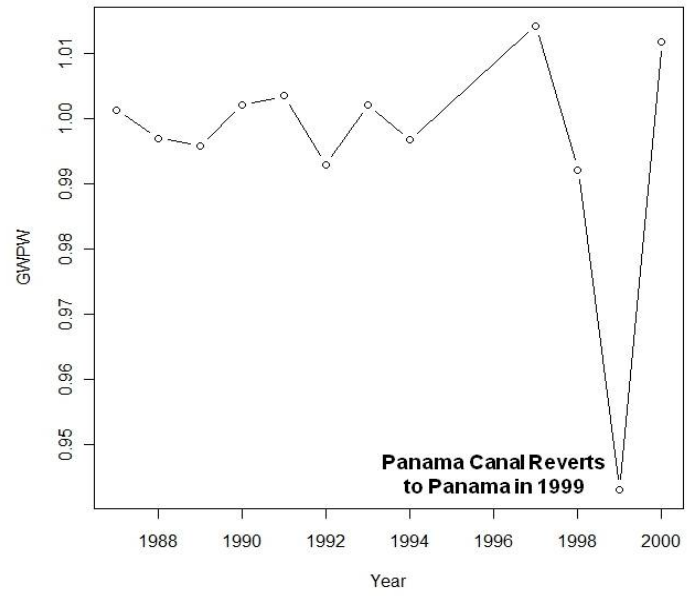

Figure 7.20: Panama's Intertemporal Government Weighted Population Welfare

but in 2000, the canal provided the government with $569 million in tolls. This is reflected in the steep increase in GWPW in 2000 (*Panama Rebuilding Democracy*, 2011).

PERU	Years			
	1983	**1984**	**1985**	**1986**
GWPW	1.0001***	0.9999***	0.9996***	0.9999***
	(0.0008)	(0.0002)	(0.0005)	(0.0001)
Output/Imports (z)	0.0000	-0.0000	-0.0003	-0.0001
	(0.0005)	(0.0001)	(0.0004)	(0.0001)
Organization × z	-0.0001	0.0001	0.0004	0.0001
	(0.0008)	(0.0002)	(0.0005)	(0.0001)
Intercept	-0.1630***	-0.1668***	-0.1708***	-0.1717***
	(0.0163)	(0.0165)	(0.0153)	(0.0142)
RSE	0.0734	0.0734	0.0724	0.0692
Degrees of Freedom	24	24	24	24
$\mathbf{R^2}$	0.0084	0.0095	0.0377	0.1195
F-statistic	0.101	0.115	0.470	1.629
Degrees of Freedom	2,24	2,24	2,24	2,24
	1987	**1988**	**1989**	**1990**
GWPW	1.0000***	1.0000***	0.9992***	0.9969***
	(0.0000)	(0.0000)	(0.0004)	(0.0050)
Output/Imports (z)	-0.0000	-0.0000	-0.0007*	-0.0030
	(0.0000)	(0.0000)	(0.0003)	(0.0048)
Organization × z	0.0000	0.0000	0.0008*	0.0031
	(0.0000)	(0.0000)	(0.0004)	(0.0050)
Intercept	-0.1701***	-0.1680***	-0.1693***	-0.1646***
	(0.0137)	(0.0149)	(0.0141)	(0.0143)
RSE	0.0683	0.0726	0.0686	0.0729
Degrees of Freedom	24	24	23	24
$\mathbf{R^2}$	0.1419	0.0300	0.1634	0.0230
F-statistic	1.984	0.372	2.246	0.282
Degrees of Freedom	2,24	2,24	2,23	2,24
	1991	**1992**	**1995**	**1996**
GWPW	1.0045***	1.0072***	1.0078***	1.0057***
	(0.0033)	(0.0056)	(0.0064)	(0.0048)
Output/Imports (z)	0.0040	0.0060	0.0061	0.0040
	(0.0029)	(0.0047)	(0.0055)	(0.0040)
Organization × z	-0.0045	-0.0072	-0.0078	-0.0057
	(0.0032)	(0.0056)	(0.0064)	(0.0048)
Intercept	-0.1625***	-0.1581***	-0.1356***	-0.1103***
	(0.0140)	(0.0148)	(0.0138)	(0.0119)
RSE	0.0707	0.0708	0.0576	0.0477
Degrees of Freedom	24	24	24	24
$\mathbf{R^2}$	0.0812	0.0784	0.0739	0.0805
F-statistic	1.061	1.021	0.958	1.050
Degrees of Freedom	2,24	2,24	2,24	2,24

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.12: Peru's Government Weighted Population Welfare and Regressions

Figure 7.21 presents evidence supporting the effectiveness of the new methodology. GWPW tracks the significant changes in the TOI and displays the cummulative effects of the late 1980s hyperinflation.

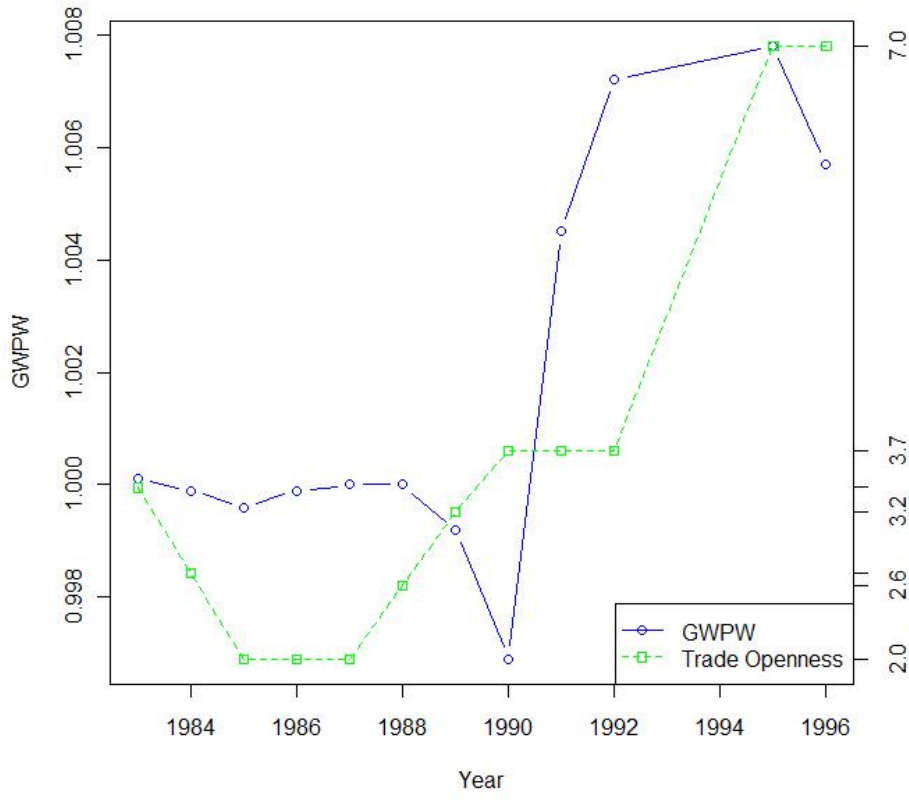

Figure 7.21: Peru's Trade Openness versus Weighted Population Welfare

In Peru, between 1985 and 1990, public expenditures were increased and limitations were placed on external debt payments, isolating the country from international financial markets. Hyperinflation reached 7,649 percent in 1990, with a five-year cumulative effect of over 2,200,200 percent, destabilizing the economy. As a result of this chronic inflation, per capita annual income fell to $720 (below 1960 levels) and GDP dropped by 20 percent. In 1992, the economy was liberal-

ized, ending price controls and discarding protectionism. These reforms enabled sustained economic growth between 1994 - 1997, and inflation was brought under

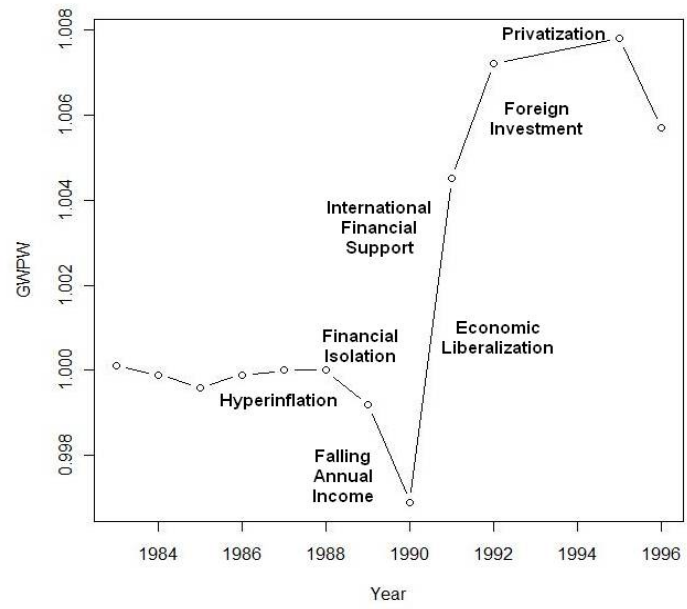

Figure 7.22: Peru's Intertemporal Government Weighted Population Welfare

control (*Peru History*, 2012). These changes, particularly the removal of protectionism, are reflected in the rising value of GWPW. Eliminating restrictions on foreign direct investment allowed most state companies to be privatized, increasing the influence of industry, leading to the decrease of GWPW in the late 1990s.

VENEZUELA	Years				
	1983	**1984**	**1985**	**1986**	**1987**
GWPW	1.0002***	0.9999***	0.9998***	0.9999***	0.9998***
	(0.0002)	(0.0004)	(0.0005)	(0.0002)	(0.0004)
Output/Imports (z)	0.0001	-0.0001	-0.0002	-0.0001	-0.0003
	(0.0002)	(0.0004)	(0.0005)	(0.0002)	(0.0004)
Organization × z	-0.0002	0.0001	0.0002	0.0001	0.0002
	(0.0002)	(0.0004)	(0.0005)	(0.0002)	(0.0004)
Intercept	-0.1578***	-0.1621***	-0.1607***	-0.1597***	-0.1593***
	(0.0164)	(0.0168)	(0.0167)	(0.0163)	(0.0163)
RSE	0.0815	0.0839	0.0836	0.0827	0.0825
Degrees of Freedom	25	25	25	25	25
R^2	0.1147	0.0616	0.0687	0.0895	0.0921
F-statistic	1.620	0.821	0.922	1.228	1.268
Degrees of Freedom	2,25	2,25	2,25	2,25	2,25
	1988	**1989**	**1990**	**1991**	**1992**
GWPW	0.9999***	1.0014***	1.0030***	1.0055***	1.0031***
	(0.0001)	(0.0012)	(0.0029)	(0.0045)	(0.0033)
Output/Imports (z)	-0.0001	0.0009	0.0025	0.0037	0.0020
	(0.0001)	(0.0009)	(0.0025)	(0.0031)	(0.0023)
Organization × z	0.0001	-0.0014	-0.0030	-0.0055	-0.0031
	(0.0001)	(0.0012)	(0.0029)	(0.0044)	(0.0033)
Intercept	-0.1596***	-0.1571***	-0.1613***	-0.1561***	-0.1621***
	(0.0162)	(0.0165)	(0.0164)	(0.0170)	(0.0164)
RSE	0.0825	0.0820	0.0829	0.0826	0.0838
Degrees of Freedom	25	25	25	25	25
R^2	0.0928	0.1041	0.0831	0.0907	0.0643
F-statistic	1.279	1.452	1.133	1.246	0.859
Degrees of Freedom	2,25	2,25	2,25	2,25	2,25
	1993	**1994**	**1995**	**1996**	**1997**
GWPW	1.0022***	1.0029***	1.0019***	0.9985***	1.0024***
	(0.0023)	(0.0032)	(0.0019)	(0.0032)	(0.0028)
Output/Imports (z)	0.0016	0.0021	0.0014	-0.0001	0.0022
	(0.0017)	(0.0023)	(0.0014)	(0.0001)	(0.0028)
Organization × z	-0.0022	-0.0029	-0.0019	0.0015	-0.0024
	(0.0022)	(0.0032)	(0.0019)	(0.0032)	(0.0028)
Intercept	-0.1295***	-0.1275***	-0.1295***	-0.1261***	-0.1227***
	(0.0114)	(0.0116)	(0.0114)	(0.0194)	(0.0124)
RSE	0.0586	0.0586	0.0585	0.0584	0.0579
Degrees of Freedom	25	25	25	25	25
R^2	0.0399	0.0382	0.0439	0.0220	0.0395
F-statistic	0.520	0.496	0.574	0.282	0.514
Degrees of Freedom	2,25	2,25	2,25	2,25	2,25

Significance codes: *** = 0.001, ** = 0.01, * = 0.05

Table 7.13: Venezuela's Government Weighted Population Welfare and Regressions

Figure 7.23 presents evidence supporting the effectiveness of the new methodology. GWPW closely tracks the significant changes in the TOI, which does not reflect the mid-1990s banking crisis.

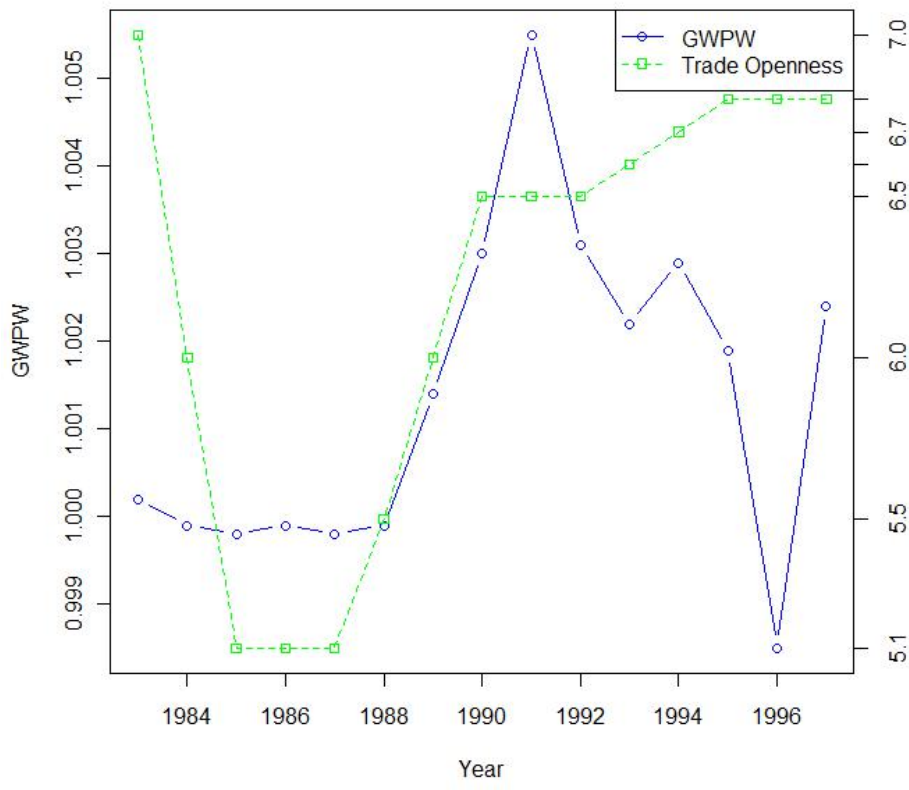

Figure 7.23: Venezuela's Trade Openness versus Weighted Population Welfare

Venezuela's economy moves positively with the price of oil. The government, due to a strong oil sector in the 1960s and 1970s, was able to spend large sums on public programs. Because of the oil wealth, Venezuelan wages were high relative to other Latin American countries. When oil prices collapsed during the 1980s, the situation was reversed (Haggerty, 1990). GWPW appears to have fallen in the mid-1980s.

In 1989, Washington Consensus reforms were implemented with the support of structural adjustment loans from the IMF and the World Bank. These reforms had the goal of reducing the role of government in the economy, moving

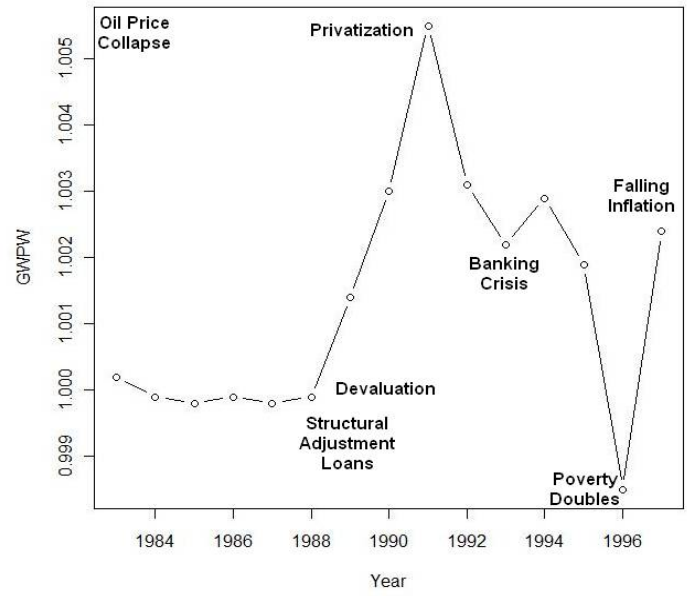

Figure 7.24: Venezuela's Intertemporal Government Weighted Population Welfare

toward the free market, and stimulating foreign investment. The initial response was that GWPW increased, reflecting the reduction in tariffs, but the economy contracted, and the number of people living in poverty rose from 36 percent in 1984 to 66 percent in 1995. Privatization caused a sharp fall in GWPW as the elites gained power. The country suffered a severe banking crisis in 1994. The value of GWPW rose as inflation fell from 103 percent in 1996 to 37.6 percent in

1997 (McCaughan, 2005).

These twelve examples provide evidence that this new methodology, using the heterogeneous sectoral political organization vector, delivers a value of GWPW which reasonably correlates with trade policy and history for a variety of countries.

Chapter 8

Conclusions

Evidence has been presented showing that sectoral political organization is not binary; rather, there are heterogeneous degrees of such organization (i.e., a continuum beween zero and one); and, consistent multi-country sectoral political organization information is extremely difficult to obtain. Hence, I have proposed a standard method designed to address these issues.

The GH94 theory has been extended to include heterogeneous sectoral political organization, replacing the assumption of binary organization. Principal component analysis allows a well accepted selection of sectoral political organization determinants to be reduced to a single sectoral political organization variable whose elements are between zero and one. Principal component analysis has also been applied to the GB dataset of characteristics, where two groups of "influential" outliers were uncovered. As subsets of these outliers were removed from the analysis, the results measurably improved. In addition, when combined with the heterogeneous sectoral political organization vector, the measure of "a" was found to improve by between two and two-and-one-half orders of magnitude. This is significant since GB clearly state that their estimate of "a" is much higher than the existing CGE estimates.

The heterogeneous degree of sectoral political organization vector has been compared with the GB binary vector; the match is about 60 percent. Furthermore, using the GB model, a "placebo" test of 10,000 randomly generated

heterogeneous sectoral political organization vectors was not able to meet or beat the results from the PCA generated heterogeneous sectoral political organization vector, demonstrating that these results are robust.

Finally, applying this new methodology to the World Bank dataset allowed for the tracing of the evolution of GWPW for twelve Latin American countries. The traces are highly correlated with the Trade Openness Index and exogenous political and economic events in those countries, demonstrating that this methodology does represent reality.

Appendix A

Organization Comparison Details

This Appendix compares GM's binary organization vector to GB's binary organization vector and shows that they agree on only 37.5 percent of the sectors they both rated.

ISIC Code	Description	Goldberg Maggi 1981 PAC Data	Gawande Bandyopadhyay 1983 PAC Data
311	Food manufacturing	-	No
312	Food manufacturing	-	No
313	Beverage industries	-	No
314	Tobacco manufactures	No	-
321	Manufacture of textiles	No	Yes
322	Manufacture of wearing apparel, except footwear	No	Yes
323	Manufacture of leather and products of leather, leather substitutes and fur, except footwear and wearing apparel	No	Yes
324	Manufacture of footwear, except vulcanized or molded rubber or plastic footwear	No	No
331	Manufacture of wood and wood and cork products, except furniture	No	Yes
332	Manufacture of furniture and fixtures, except primarily of metal	No	Yes
341	Manufacture of paper and paper products	No	Yes
342	Printing, publishing and allied industries	No	No
351	Manufacture of industrial chemicals	Yes	Yes
352	Manufacture of other chemical products	Yes	Yes
353	Petroleum refineries	-	No
354	Manufacture of miscellaneous products of petroleum and coal	No	No
355	Manufacture of rubber products	No	Yes
356	Manufacture of plastic products not elsewhere classified	No	Yes
361	Manufacture of pottery, china and earthenware	No	Yes
362	Manufacture of glass and glass products	No	Yes
369	Manufacture of other non-metallic mineral products	No	Yes
371	Iron and steel basic industries	No	Yes
372	Non-ferrous metal basic industries	No	Yes
381	Manufacture of fabricated metal products, except machinery and equipment	No	No
382	Manufacture of machinery except electrical	No	Yes
383	Manufacture of electrical machinery apparatus, appliances and supplies	Yes	Yes
384	Manufacture of transport equipment	Yes	No
385	Manufacture of professional and scientific and measuring and controlling equipment not elsewhere classified, and of photographic and optical goods	No	No
390	Other Manufacturing Industries	No	No
	a	70.43	3,175
	α_L	0.883	0.9819

Table A-1: U.S. Political Action Committee driven Organization Comparison

Bibliography

Baldwin, R. E. (1986), *The Political Economy of U.S. Import Policy*, MIT Press, Cambridge, MA.

Baldwin, R. E. (1990), Optimal Tariff Retaliation Rules, *in* R. W. Jones and A. Krueger, eds, 'The Political Economy of International Trade: Essays in Honor of Robert E. Baldwin', Basil Blackwell, Cambridge, MA.

Baldwin, R. E. and Lewis, W. E. (1978), U.S. Tariff Effects on Trade and Employment in Detailed SIC Industries, *in* W. G. Dewald, ed., 'The Impact of International Trade and Investment on Employment', U.S. Dept. of Labor, Washington, D.C.

Becker, G. S. (1983), "A Theory of Competition among Pressure Groups for Political Influence", *The Quarterly Journal of Economics* , Vol. 98, pp. 371–400.

Belloc, M. (2007), Protection for Sale in the EU, Working Papers 100, Sapienza University of Rome, Department of Public Economics.

Bhagwati, J. (1989), *Protectionism*, MIT Press Books, The MIT Press.

Bombardini, M. (2008), "Firm heterogeneity and lobby participation", *Journal of International Economics* , Vol. 75, pp. 329–348.

Brock, W. A. and Magee, S. P. (1978), "The economics of special interest politics: The case of the tariff", *American Economic Review* , Vol. 68, pp. 246–50.

Cadot, O., Grether, J.-M., Olarreaga, M. and Dutoit, L. C. (2007), Endogenous Tariffs in a Common-Agency Model: A New Empirical Approach Applied to India, Technical report.

Caves, R. E. (1976), "Economic Models of Political Choice: Canada's Tariff Structure", *Canadian Journal of Economics* , Vol. 9, pp. 278–300.

Chang, P.-L. and Willmann, G. (2006), Protection for Sale with Heterogeneous Interests within Industries. available at http://www.mysmu.edu/faculty/plchang/papers/iit_hetero-Apr06.pdf.

Cline, W. R., Kawanabe, N., Kronsjo, T. O. M., and Williams, T. (1978), *Trade Negotiations in the Tokyo Round: A Quantitative Assessment*, Brookings Inst., Washington, D.C.

Costa Rica Economic History (2012).
URL: *http://costarica-information.com/about-costa-rica/economy/economic-history*

Crabtree, J., Duffy, G. and Pearce, J. (1987), *The Great Tin Crash: Bolivia and the World Tin Market*, Latin America Bureau, London and New York.

Deardorff, A. V. and Stern, R. M. (1986), *The Michigan Model of World Production and Trade: Theory and Applications*, MIT Press, Cambridge, Mass.

Durand, F. and Silva, Eduardo, E. (1998), *Organized Business, Economic Change, and Democracy in Latin America*, North-South Center Press, Coral Gables, Florida.

Eicher, T. and Osang, T. (2002), "Protection for Sale: An Empirical Investigation: Comment", *The American Economic Review* , Vol. 92, American Economic Association, pp. 1702–1710.

El Salvador Economy (2012).
URL: *http://www.state.gov/r/pa/ei/bgn/2033.htm#econ*

Facchini, G., Olarreaga, M., Silva, P. and Willmann, G. (2007), Substitutability and protectionism: Latin America's trade policy and imports from China and India, Economics working papers 2007,08, Christian-Albrechts-University of Kiel, Department of Economics.

Facchini, G., Van Biesebroeck, J. and Willmann, G. (2006), "Protection for Sale with Imperfect Rent Capturing", *Canadian Journal of Economics* , Vol. 39, pp. 845–873.

Findlay, R. and Wellisz, S. (1982), Endogenous Tariffs, the Political Economy of Trade Restrictions, and Welfare, *in* J. N. Bhagwati, ed., 'Import Competition and Response', University of Chicago Press, Chicago, p. 223243.

Gawande, K. (1998), "Comparing Theories of Endogenous Protection: Bayesian Comparison of Tobit Models Using Gibbs Sampling Output", *The Review of Economics and Statistics* , Vol. 80, pp. 128–140.

Gawande, K. and Bandhopadhyay, U. (2000), "Is Protection for Sale? A Test of the Grossman-Helpman Theory of Endogenous Protection", *Journal of Political Economy* , Vol. 82, pp. 139–52.

Gawande, K., Krishna, P. and Olarreaga, M. (2009), "What Governments Maximize and Why: The View from Trade", *International Organization* , Vol. 63, pp. 491–532.

Gawande, K., Sanguinetti, P. and Bohara, A. K. (2005), Exclusions For Sale: Evidence on the Grossman-Helpman Model of Free Trade Agreements, Technical report.

Glezer, L. (1982), *Tariff Politics: Australian Policy Making 1960 - 1980*, Melbourne University Press, Melbourne.

Goldberg, P. K. and Maggi, G. (1999), "Protection for Sale: An Empirical Investigation", *American Economic Review* , Vol. 89, pp. 1135–1155.

Grossman, G. M. and Helpman, E. (1994), "Protection for Sale", *American Economic Review* , Vol. 84, pp. 833–50.

Grossman, G. M. and Helpman, E. (1995*a*), "The Politics of Free-Trade Agreements", *American Economic Review* , Vol. 85, pp. 667–90.

Grossman, G. M. and Helpman, E. (1995*b*), "Trade Wars and Trade Talks", *Journal of Political Economy* , Vol. 103, pp. 675–708.

Grossman, G. M. and Helpman, E. (1996), "Electoral Competition and Special Interest Politics", *Review of Economic Studies* , Vol. 63, pp. 265–86.

Guatemala History and Economy (2012).
URL: *http://www.state.gov/r/pa/ei/bgn/2045.htm*

Gwartney, J. and Lawson, R. (2001), *Economic Freedom of the World: 2001 Annual Report*, The Fraser Institute, Vancouver, BC.

Haggerty, R. A. (1990), Venezuela: A Country Study, Technical report, GPO for the Library of Congress.

Hillman, A. L. (1982), "Declining Industries and Political-Support Protectionist Motives", *American Economic Review* , Vol. 72, pp. 1180–87.

Hillman, A. L. (1989), *The Political Economy of Protection*, Harwood Academic Publishers, Chur, London and New York.

Honduras: The beginning of the end of impunity? (1995).
URL: *http://www.unhcr.org/refworld/docid/3ae6a98718.html*

Hudson, R. A. (1994), Chile: A Country Study, *in* 'Development and Breakdown of Democracy, 1830-1973', Library of Congress.

Imai, S., Katayama, H. and Krishna, K. (2008), Protection for Sale or Surge Protection?, Working Papers 1114, Queen's University, Department of Economics.

Jolliffe, I. (2002), *Principal Component Analysis*, Springer, New York.

Jones, C., Morrissey, O. and Nelson, D. (2008), African Trade Policy in the 1990s: Political Economy or Technocratic Reforms?, Discussion Papers 08/01, University of Nottingham, CREDIT.

Kee, H. L., Nicita, A. and Olarreaga, M. (2008), "Import Demand Elasticities and Trade Distortions", *The Review of Economics and Statistics* , Vol. 90, pp. 666–682.

Kelejian, H. H. (1971), "Two-Stage Least Squares and Econometric Systems Linear in Parameters but Nonlinear in the Endogenous Variables", *Journal of the American Statistical Association* , Vol. 66, American Statistical Association, pp. 373–374.

Leamer, E. E. (1988), Cross-Section Estimation of the Effects of Trade Barriers, *in* R. C. Feenstra, ed., 'Empirical Methods for International Trade', MIT Press, Cambridge, Mass.

Long, N. V. and Soubeyran, A. (1996), "Lobbying for protection by heterogeneous firms", *European Journal of Political Economy* , Vol. 12, pp. 19–32.

Ludema, R. D., Mayda, A. M. and Mishra, P. (2011), Protection for Free? The Political Economy of U.S. Tariff Suspensions, CEPR Discussion Papers 7926, C.E.P.R. Discussion Papers.

McCalman, P. (2004), "Protection for Sale and Trade Liberalization: an Empirical

Investigation", *Review of International Economics* , Vol. 12, pp. 81–94.

McCaughan, M. (2005), *The Battle of Venezuela*, Seven Stories Press, New York.

Melitz, M. J. (2003), "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity", *Econometrica* , Vol. 71, pp. 1695–1725.

Mitra, D., Thomakos, D. D. and Ulubasoglu, M. A. (2002), "Protection for Sale in a Developing Country: Democracy vs. Dictatorship", *The Review of Economics and Statistics* , Vol. 84, pp. 497–508.

Mitra, D., Thomakos, D. and Ulubasoglu, M. (2006), "Can we obtain realistic parameter estimates for the "Protection for Sale" model?", *Canadian Journal of Economics* , Vol. 39, pp. 187–210.

Neely, C. J. (1996), "The giant sucking sound: did NAFTA devour the Mexican peso?", *Review - Federal Reserve Bank of St. Louis* , pp. 33–48.

Nicita, A. and Olarreaga, M. (2006), "Trade, Production and Protection 1976-2004", *World Bank Economic Review* , Vol. 21.

Olsen, W. (2008), Notes For the Workshop on Quantile Regression, Technical report, Cathie Marsh Centre, University of Manchester.

Panama Rebuilding Democracy (2011).
URL: *http://www.state.gov/r/pa/ei/bgn/2030.htm*

Peltzman, S. (1976), Toward a More General Theory of Regulation, NBER Working Papers 0133, National Bureau of Economic Research, Inc.

Peru History (2012).
URL: *http://www.state.gov/r/pa/ei/bgn/35762.htm*

Ray, E. J. (1981), "The Determinants of Tariff and Nontariff Trade Restrictions in the United States", *Journal of Political Economy* , Vol. 89, pp. 105–21.

Shiells, C., Stern, R. and Deardorff, A. (1986), "Estimates of the Elasticities of Substitution between Imports and Home Goods for the United States", *Review of World Economics* , Vol. 122, Springer Berlin / Heidelberg, pp. 497–519.

Stigler, G. J. (1971), "The Theory of Economic Regulation", *Bell Journal of Economics* , Vol. 2, pp. 3–21.

Stokes, D. (2005), *America's Other War: Terrorizing Colombia*, Zed Books, Ltd., London and New York.

Trefler, D. (1993), "Trade Liberalization and the Theory of Endogenous Protection: An Econometric Study of U.S. Import Policy", *Journal of Political Economy* , Vol. 101, University of Chicago Press, pp. 138–60.

Vargas, L. (1999), "Mexico's Economy in 1998 and 1999", *Business Frontier* , Federal Reserve Bank of Dallas, El Paso Branch.

Whalley, J. (1985), *Trade Liberalization among Major World Trading Areas*, MIT Press, Cambridge, Mass.

Wijnbergen, S. v., King, M. and Portes, R. (1991), "Mexico and the Brady Plan", *Economic Policy* , Vol. 6, Blackwell Publishing on behalf of the Centre for Economic Policy Research, Center for Economic Studies, and the Maison des Sciences de l'Homme, pp. pp. 13–56.

Wijnholds, J. O. d. B. (2003), The Argentine Drama: A View from the IMF Board, *in* J. J. Teunissen and A. Akkerman, eds, 'The Crisis That Was Not Prevented: Argentina, the IMF, and Globalisation', Forum on Debt and Development (FONDAD), chapter 7, pp. 101–119.