Impact of U.S. Tariffs on Democratic Vote Share

Miaojie Yu [†‡]

Department of Economics

University of California, Davis

[Abstract]

This paper provides evidence on an amended Mayer-Heckscher-Ohlin model with parties by studying the effects of U.S. tariffs on the Democratic vote share. The effects are estimated with fixed effects and Two-Stage Least Squares based on data from the House of Representatives from the years 1982 to 2000. Weighted trade policy proxy for each congressional district are constructed and shown to be significant. Overall, a 10% decrease of weighted tariffs leads to a 12% decrease in the Democratic vote share in the election to the House, *ceteris paribus*. Also, the predictions of the model for electoral outcome are consistent with today's U.S. politics.

JEL classifications: F13, F14, P16

Key words: tariffs, democratic vote share, electoral competition, campaign contributions, House election

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[†] I would like to thank Robert Feenstra, Peter Lindert, Joaquim Silvestre and Deborah Swenson for their very helpful suggestions. I thank seminar participants at the AEA/ODE session in the 2005 Annual ASSA meetings, Department of Agricultural and Resource Economics at Oregon State University, Department of Economics at UC-Davis and School of Economics and Finance at University of Hong Kong for useful comments. Financial support from the University of California-Davis Humanities Research Fellowship is gratefully acknowledged. All errors are mine.

[‡] Corresponding address: 908 K.K. Leung Building, School of Economics and Finance, University of Hong Kong, Pokfulam Road, Hong Kong. Email: mjyu@econ.hku.hk .Tel: (+852) 2857-8501, Fax: (+852)2548-1152.

I. Introduction

After many rounds of trade negotiations raised by the GATT-WTO agreement, numerous countries have successfully reduced their tariff barriers. Tariffs have fallen over the last 20 years in the U.S. Figure 1 shows the decrease in the U.S. average tariff rates from 4.33% in 1982 to around 1.36% in 2000. Coincidentally, the Democratic Party's average vote share in the election to the House of Representatives has also dropped during these years. For example, the average vote share of the Democratic Party in year 1982 was 57.8%; it diminished to 54.7% in year 2000. This raises an interesting question: can trade policy affect the electoral outcome?[1] More specifically, can the declining level of tariffs translate into a falling vote share for the Democratic Party?

[Insert Figure 1 Here]

The related theoretical models on the political economy of trade policy have two different kinds of setup. The first one is "the median voter" approach, theorized by Mayer (1984) and by Magee, Brock and Young (1989). According to Mayer, trade policy is determined by majority voting while political parties maximize their probability of winning the election by choosing trade policy platform. Similarly, Magee, Brock and Young (1989)

[1]Notice that the U.S. trade policy is determined by the House of Representatives and Senates, as stated in article 1, section 8 of the US Constitution "the Congress shall have the power ... to regulate commerce with foreign nations ..."

considered a political model of endogenous policy formation. Under their framework, two parties set their trade platforms and then interest groups contribute funds in order to increase the probability that their preferred party would be elected.

The second approach is called "political support". This approach theorizes that tariffs are granted in response to demands by special-interest groups, such as industries and unions. Government weighs the increased political support it captures from pursuing policies beneficial to a particular industry against the support it loses from firms and consumers (Hillman, 1989). Grossman and Helpman (1994) developed this idea and found the optimal tariff formation for the government. Models with political support approach explicitly present the relationship between campaign contribution and optimal tariff; yet they do so at the expense of ignoring political competition between parties in their models.

The existing works provide no clear evidence to the question of whether or not trade policy affects vote pattern. Instead, many empirical papers merely analyze what determines congressional roll-call vote patterns on American trade policy. These works include those of Baldwin (1985), Irwin (1996) and Beaulieu (2002). The Stolper-Samuelson theorem (1941) implied that trade policy is independent of industry and depends only on the type of factor ownership. Based on this prediction, Baldwin (1985) published the pioneering work that examined the determinants of congressional vote patterns on trade

legislation for the Tokyo Round of GATT. Shortly thereafter, Irwin (1996) investigated this issue using election data from early twentieth century English countries where trade policy was the primary election issue. Both papers suggested that greater labor union is likely to result in higher protection level.

From the political science perspective, two findings are important to understand the vote pattern. First, labor union is a strong electoral base for the Democratic Party. Besides which, Democrats also maintain a strong influence on many groups such as black voters and metropolitan residents. Second, campaign contributions play an important role in the pattern of voters. For example, Snyder (1990) found evidence of a positive causality between a political candidate's probability of winning and the amount of money he collects from campaign contributors. Levitt (1994), on the other hand, found that challenger spending is marginally more productive than incumbent spending. Baldwin and Magee (2002) found evidence that voting behavior on recent trade bills can be explained by campaign contributions from special-interest groups. Particularly, financial contribution from labor groups was associated with votes against free trade, while contributions from business groups were associated with votes against freer trade.

However, whether or not American trade policy has any effect on congressional vote pattern still remains an empirical question. In reality, trade policy is an important issue for politicians. One good example is what

transpired during the 2004 Presidential Election. The debate of "freer trade" vs. "free trade" was one of the most important contents of the two parties' platforms.

In this paper, I have explored the impact of trade policy on vote outcome.[2] The empirical work of this paper was based on an amended Mayer-Heckscher-Ohlin model with parties: Democrats and Republicans. The Democratic Party is assumed to be a protectionist party and has traditionally shown preference on higher tariffs. Campaign contributions are collected from informed voters. Such funding influences the vote of a group of uninformed voters. The Democratic Party maximizes its vote share in the election by choosing the trade policy platform. Accordingly, in the U.S., a more protectionist trade policy platform of Democrats implies more contributions to the Democratic candidates and, therefore, could lead to a larger vote share.

The methodology I used in this paper was the fixed effects estimation given the data set consisting of a panel of each congressional district from the years 1982 to 2000. The estimation findings suggested that a 10% decrease of tariffs led to a 12.0% decrease in the Democratic vote share in the election to the House.

[2] I adopted the "median-voter" approach here because the "political support" model does not consider political competition between parties.

The rest of the paper is organized as follows: Section 2 is a discussion of the theoretical model; Section 3 is a presentation of the empirical specifications and estimation results; Section 4 shows the sensitivity analysis; and Section 5 presents the conclusion.

II. Theoretical Model

In this section, I developed a model of political competition between Democrats and Republicans based on the Mayer-Heckscher-Ohlin setting. Such a model allowed me to develop an empirical estimation for the effects of trade policy on vote pattern.

Consider a two-by-two (2 goods and 2 factors) Mayer-Heckscher-Ohlin model. A capital-abundant country produces a capital- intensive commodity (y_1) and a labor- intensive commodity (y_2), using capital and labor.

Two political parties, i.e., Democratic Party and Republican Party, compete for office via trade policy. The Democratic Party, a protectionist party, prefers freer trade. On the other hand, the Republican Party, a pro-trade party, prefers free trade. Based on these assumptions, I came up with the expression: $p^D > p^R$.

There also exist two types of voters: the informed and the uninformed. Informed voters prefer a particular party while uninformed voters do not. One example is that some voters may spend so much money on imported goods and therefore care much about the import tariff. Because of this, they

have the inclination to make campaign contributions to their preferred party, and get benefits from their preferred trade policy if their preferred party wins the election.[3]

Informed voters share the same additively separable quasi-linear preferences and maximize their utilities, $U^j = y_1^j + u\left(y_2^j\right)$, subject to their budget constraints $y_1^j + py_2^j = E^j$. With the Metzler paradox ruled out, the import tariff (τ) is assumed to be a specific one, $p = t + p^w$, where p^w denotes the world price; and the import tariff income (T) is redistributed with a lump sum subsidy. Assuming that each voter has the same labor endowment (L) but different capital endowments (K^j), voter j's indirect utility function can be expressed as:

$$v^j(p) = CS(p) + w(p) + r(p) \cdot K^j + T(p)/\overline{L},$$

where $CS(p)$ is the consumer surplus and $\overline{L}$ is the aggregate labor endowment for the whole labor force.

A voter would support the Democratic Party if and only if his/her indirect utility under a Democratic tariff platform is higher than that under a republican tariff platform, hence, $v^j(p^D) - v^j(p^R) > 0$. Otherwise, he/she

[3]Here one voter is assumed to make a contribution to a single party only according to the campaign-contribution-specialization theorem introduced by Magee, Brock, and Young (1989), Furthermore, by applying the theories of Grossman and Helpman (1996, 2001), in this paper, the primary objective of making contribution is to affect the election outcome while the secondary objective is to buy the policy.

would vote for the Republican Party. This implies the set of voters for the Democratic Party, Ω_D, is:

$$\Omega_D = \{K^j \Big| [CS(p^D) - CS(p^R)] + [w(p^D) - w(p^R)]$$

$$+ K^j[r(p^D) - r(p^R)] + \frac{[T(p^D) - T(p^R)]}{\overline{L}} > 0\}$$

The supporting set of the Democratic Party can be written as $\Omega_D = \{j | K^j < \widetilde{K}(p^D, p^R)\}$, where the cutoff capital level $\widetilde{K}$ is defined as:

$$\widetilde{K}(p^D, p^R) \equiv \frac{[CS(p^D) - CS(p^R)] + [w(p^D) - w(p^R)] + [T(p^D) - T(p^R)]/\overline{L}}{r(p^R) - r(p^D)}.$$

Intuitively, informed voters are separated into two groups. The blue-collar workers vote for the Democratic Party while the white-collar workers vote for the Republican Party.

Informed voters make campaign contributions in order to affect the electoral outcome. Conversely, uninformed voters do not, yet they cast their ballots after being exposed to the different advertisements of each party.[4] The advertisement expenditure comes from the financial contributions of the informed voters.

[4] Although the uninformed voters understood the advertisement is just a "dress," they still like to be swayed due to the enthusiasm of "social participation."

The fraction of informed voters and uninformed voters is presumed as ρ and $1-\rho$, where $\rho \in (0,1)$.[5] Each party's vote share includes both the informed and the uninformed supporters. Out of the total informed group, the portion of informed voters who support the Democratic Party can be expressed as $\int_0^{\tilde{K}(p^D,p^R)} f(K^j)dK^j$, where $f(K^j)$ is the corresponding probability density function for voter j. However, the behavior of the uninformed supporters is still a black-box because their utility functions are unknown. Following the opinions of Jacobson *et. al*, (1987), the vote share from the uninformed group is directly proportional to the advertisement expenditure share of both parties. Specifically, a functional form $C^D/(C^D+C^R)$ is used to characterize the behavior of uninformed voters, where C^D, C^R denote the aggregate campaign contributions that the Democratic Party and the Republican Party could collect, respectively.

The timing of this three-stage non-cooperative game is as follows: (1) informed voters have their own contributions schedules; (2) both parties announce their trade platforms; and (3) all voters vote.[6]

[5] Here, I assumed this fraction is exogenous given, and then provide an estimated number in the empirical section.

[6] This framework is consistent with previous researches, such as those done by Grossman and Helpman (1994) and by Baron (1994).

The backward induction implied that the contribution schedule was a function of the trade platform for each party. In the sub-game perfect Nash Equilibrium, each party chooses its optimal platform that is feasible to be able to maximize its vote share. Assuming the vote share of the Democratic Party, π^D, is a concave function, it has the following form:

$$\pi^D = \rho \cdot \int_0^{\tilde{K}(p^D, p^R)} f(K^j) dK^j + (1-\rho) \cdot \frac{C^D(p^D, p^R)}{C^D(p^D, p^R) + C^R(p^D, p^R)} \qquad (1).$$

It should be noted that the informed voters for the Democratic Party are relatively skewed towards the labor groups. According to the Stolper-Samuelson theorem (1941), a rise in the import tariff would increase the relative wage for workers. Hence, the contribution schedule of the Democratic Party is an increasing function of tariff. That is, the marginal contribution schedule of the Democratic Party of its trade platform is positive: $\partial C^D / \partial p^D > 0$.

To consider the effect of the Democratic trade platform on its vote share, I took the partial derivative of the Democratic vote share with respect to its trade platform and obtained:

$$\frac{\partial \pi^D}{\partial p^D} = \underbrace{\rho}_{(+)} \cdot \underbrace{f(\tilde{K})}_{(+)} \underbrace{\frac{\partial \tilde{K}(p^D, p^R)}{\partial p^D}}_{(?)} + \underbrace{\frac{(1-\rho)}{(C^D + C^R)^2}}_{(+)} \underbrace{\frac{\partial C^D}{\partial p^D}}_{(+)} \underbrace{C^R}_{(+)}.$$

The signs of each term are certain except for the partial effect of tariff on the cut-off point: $\frac{\partial \tilde{K}(p^D, p^R)}{\partial p^D}$. As shown in Appendix A, the sign of this term

is ambiguous. Accordingly, the effect of trade platform on the Democratic vote share is also uncertain. Specifically, when $\frac{\partial \widetilde{K}(p^D, p^R)}{\partial p^D} > 0$, the effect is positive, $\frac{\partial \pi^D}{\partial p^D} > 0$; however, when $\frac{\partial \widetilde{K}(p^D, p^R)}{\partial p^D} < 0$, it could be negative.

This makes sense intuitively. A rise in tariff brings more votes in favor of the protectionist party if the platform is less than its optimal level. However, when the party announces a very high tariff platform, it collects more money from the informed group and hence gets more votes from the uninformed group, yet at the expense of losing some informed voters because the former (i.e., those at the borderline) would be inclined to vote for another party.

In a nutshell, the theoretical model clearly suggests that the Democratic vote share depends on tariffs and campaign contribution share. However, the effect of the Democratic trade platform on its vote share is still ambiguous, and hence, remains an empirical question.

III. Estimates

In reality, it is impossible to estimate the effect of a Democratic trade platform on the congressional voting pattern since the trade platform is unobservable. Instead, what we can observe is the congressional trade policy. Hence, in this paper, the focus is on the effect of congressional trade policy on the Democratic vote share.

The endogenous protection model presented above is not being tested here for two reasons. First, my theoretical model is based on the Mayer-Heckscher-Ohlin model, which is known to be a simplification if to be taken as literally correct and hence no alternative hypothesis is offered. Second, the theory above implies an ambiguous sign of the effect of trade platform given that the objective function, the Democratic vote share, is concave. Hence, the strategy I used here is to "estimate, but not test it" introduced by Learner-Levinsohn (1995). In other words, the theoretical model is being used to motivate the endogenous relationship between the Democratic vote share and tariffs.

A. Industrial Weighted Tariffs

There is no doubt that each congressional district faces an identical national-line tariff for a commodity given a specific year. However, different states in the U.S. have different industrial structures. For example, Alaska has a higher weight in the agricultural sector while Massachusetts has a higher weight in the manufacturing sector. Even in the same state, different congressional districts may have quite different industrial structures. For example, the California bay area (congressional district 8) has a very large weight on electronic machinery while Imperial County (congressional district 51) has a very large weight on forestry products instead. Hence, the effects of an identical national-line tariff on different congressional districts are quite different. In order to explore the effect of tariffs on vote pattern, I constructed

and calculated weighted tariffs at the congressional district level, using data on its industrial structure.

The industrial weighted tariff at district i is defined as $\sum_n w_n^i \tau_n$, where w_n^i is the industrial share of SIC 2-digit sector n relative to its gross district product for all tradable sectors at the congressional district i, and τ_n is the SIC 2-digit tariff rate in industry n. The SIC 2-digit tariffs are aggregated from the SIC 4-digit tariffs across countries and industries, which, in turn, are calculated using the duties value divided by the customs value. A more detailed description of tariffs manipulation can be found in Appendix B. Figure 2 presents the different industrial weighted tariffs in the congressional district 1 of Alaska, district 1 of Massachusetts, and districts 8 and 51 of California. All of these cases demonstrate tariffs decrease over time.

[Insert Figure 2 Here]

B. Empirical Methodology

To fully capture the effect of tariffs on Democratic vote share, it is appropriate to use a variable of measuring the difference in tariffs between two election years since the weighted tariffs are based on the industrial structure of each district. Consider a motivated example. Weighted state-level tariffs in year 2000 are lower than those in year 1982 for all 50 states. How does this change affect the Democratic vote share? A simple OLS

regression clearly suggests that the elasticity of the Democratic vote share with respect to weighted tariffs is significantly positive:

$$(\pi^{D}_{s,2000} - \pi^{D}_{s,1982}) = \underset{(.09)}{-.003} + \underset{(1.75)}{1.368} \cdot (\tau_{s,2000} - \tau_{s,1982}),$$

where $\pi^{D}_{s,2000}$ and $\tau_{s,2000}$ denote the Democratic vote share and weighted tariffs in state s at year 2000. Figure 3 plots these period-change weighted tariffs and the Democratic vote shares for 50 states.

[Insert Figure 3 Here]

My theoretical setup also suggests that campaign contribution is an important factor to the Democratic vote share. Hence, the empirical specification is:

$$\Delta\pi^{D}_{it} = \beta_0 + \beta_1 \cdot \Delta x^{D}_{it} + \beta_2 \cdot \Delta\tau_{it} + \theta \cdot Z_{it} + \alpha_i + \varphi_t + \varepsilon_{it} \qquad (2).$$

In this specification, the regressand is the change of the Democratic vote share ($\Delta\pi^{D}$) in each congressional district i between two periods t and $t+1$. The regressors include the change of Democratic campaign contribution share (Δx^{D}), the change of weighted tariffs ($\Delta\tau$), and also other control variables (Z). For example, $\Delta\pi^{D}_{i,1982}$ measures the change of the Democratic vote share at congressional district i between year 1982 and year 1984. Treating the factors unconsidered as random variable, the error term is decomposed into three components: (1) congressional district fixed effects α_i; (2) time fixed

effects φ_t; and (3) a random component ε_{it} with constant variance: $\varepsilon_{it} \sim N(0, \sigma_i^2)$.

Besides the trade policy, many other social factors could affect the Democratic vote share, such as sub-urbanization and immigration. The Democratic Party has a strong electoral base from the metropolitan residents, African-American, and immigrants who came from some specific countries. One good example is those who migrated from Ireland. Over the past 200 years, almost all the Irish immigrants would vote in favor of the Democrats to reward the generosity that their first-American-generation ancestors received from the Democrats.

Equally important is the analysis of how other public policies could affect the vote outcome. Traditionally, the Republican Party (e.g. Reagan Administration) favors anti-labor macroeconomic policies, such as high unemployment and low inflation. Conversely, the Democratic Party (e.g., Franklin Roosevelt, Kennedy, Johnson, Carter and Clinton Administrations) generates labor-friendly policies, such as low unemployment and high inflation. Furthermore, the strong organizational ability of the Republican Party could also explain the diminishing Democratic vote share over these years.

To control these factors, the socio-economic variables (Z) are included. Particularly, the rural ratio, the black race ratio, and the foreign born ratio in each district were used in my estimations. In addition, the inflation rate at

national level was also included. However, it is extremely difficult, if not impossible, to measure the organizational ability of the Democratic Party and hence it was omitted in my estimations. In other words, the omitted variables issue could lead to the endogeneity problem for my empirical specification.

This endogeneity problem may also come from the issue of measurement error. After the 1994 Uruguay round, the U.S. tariffs were cut to 1/3 due to international trade agreements. This forced the U.S. to protect its products implicitly, using various non-tariff-barriers (henceforth referred to as NTB). Hence, the estimations could have a measurement error if using tariffs only to represent trade policy. To avoid this potential deficiency, two remedies were used here. First, I performed the Two-Stage Least Squares (henceforth referred to as 2SLS) to mitigate the endogeneity problem. Second, I used data on NTB to replace tariffs, serving as robustness check.

C. Endogeneity and Instruments

In order to mitigate the endogeneity issue in my model, good instruments of trade policy in the 2SLS estimate need to be addressed.

Trade protection will be progressive in aiding the disadvantaged special-interest-groups, especially when unemployment is high in the economy (Magee, Brock and Young, 1989; Trefler, 1993). Dutt and Mitra (2002) also found evidence that an increase in equality raises trade barriers in capital abundant economies. These studies thus suggested that tariffs are affected by unemployment rate and income GINI coefficient, which, in turn, could serve

as instruments in the 2SLS estimation. The source of these data is found on Appendix B.

An instrument is "weak" if it has a low correlation with the included endogenous regressors. In my estimations, the t-values and the F-value in the first-stage regression of TSLS are significant at the conventional statistical level. Also, the correlations between the instruments (unemployment rate and income GINI coefficient) and the endogenous variable (weighted tariffs) are sufficiently large.[7] These suggest that the instruments are not "weak" and the estimators are consistent (Anderson and Sawa, 1979; Staiger and Stock, 1997).

The over-identification test also suggests that unemployment rate and income GINI coefficient are good instruments indeed. The p-value for the over-identification test is 0.16, which is higher than the cutoff number, 0.1, that was suggested by Wooldridge (2002). In other words, the null hypothesis that the instruments are valid cannot be rejected.

D. Data Descriptions

Data from the House of Representatives during the years 1982-1990 were used to perform my estimations for two reasons. First, the number of House of Representatives is larger than that of the Senate (i.e., 435 House Representatives versus 100 Senators in the 108th Congress). Hence, the obvious advantage of using a large sample data from the House of

[7] Both instruments have small correlation with the regressand (the Democratic vote share) too.

Representatives is to reduce the possible multicollinearity among the regressors. Second, some of the vote share data before 1982 are missing, and thus I restricted my scope between the years 1982 and 2000. Table 1 reports the apportionment of the House of Representatives for the 108th Congress in each region. Such regions are classified using the standard of the Bureau of Economic Analysis (henceforth referred to as BEA).

[Insert Table 1 Here]

The contributions share is measured as the share of money that the Democrats collect relative to the sum collected by both the Democrats and the Republicans. Following the analysis of Snyder (1990), candidates defeated in the primaries and the minor candidates in the general election were excluded in my estimations. Also, I discarded the races in which a third-party candidate received more than 10 percent of the vote. In other words, the scope was restricted to Democratic and Republican candidates who ran in the general election. Based on this consideration, the number of observations was reduced to 3666.

Since the main objective of this paper is to consider the effect of trade policy, two different data sets of campaign contributions were used: aggregate contributions and Trade-Membership-Health contributions (henceforth referred to as TMH). The former measures money from all fields; while the latter specifies funding from trade organizations and health industrial groups, which is a sub-set of contributions of Political Action Committees(PACs).

As argued before, the effects of NTB on the Democratic vote share need to be addressed since the NTB is also an important trade policy proxy. Following the proposition of Goldberg and Maggi (2000), the coverage ratio is used to measure the NTB. To be more precise, the coverage ratio for industry l is defined as $\sum_n w_n^l I_n^l$, where w_n^l is the import share of product n relative to total imports in the industry l, and I_n^l is the indicator variable that equals one when the product n is covered by some NTB measures.

Table 2 summarizes the basic statistics applied on my data set. These include the mean and standard error of change of the Democrat vote share, change of the contribution share and also change of the weighted tariffs at district level for each region over a period of two election years. The sources of all data used in this paper are reported in Appendix B.

[Insert Table 2 Here]

IV. Estimation Results

A. Effects of Tariffs on Vote Share

Equation (2) is estimated using fixed effects estimation and also 2SLS estimates, and the results are reported in Row 1 in Table 3. A parameter of tariffs of 1.20 implies that a 10% decrease of tariffs will lead to a fall of the Democratic vote share by 12.0 percentage points, *ceteris paribus*. Many control variables, congressional district and time fixed effects were included but not reported here to save space. The positive effect of tariffs on the

Democratic vote share makes sense intuitively, i.e., a fall of protection level harms the interests of the labor unions in the U.S., which, in turn, contributes less to the Democratic Party. Accordingly, the Democratic Party is unable to spend more money on the campaigns to sway the public.

[Insert Table 3 Here]

Regional estimates are also reported in Table 3. As discussed above, a national-line tariff could have different impacts on different regions. To consider the regional difference, 50 states were separated into eight districts according to the classification of BEA: i.e., Far West, Rocky Mountain, Plains, Great Lakes, Southwest, Southeast, Mid-east and also New England.

Most of the coefficients of tariffs are positive and statistically significant at conventional levels. However, there exist some exceptions. For example, coefficients of tariffs in the Mid-east region are negative for both the fixed effects and the 2SLS estimates, though they are insignificant. After controlling for the endogeneity problem, the coefficient of weighted tariffs in New England and Southeast regions are insignificant too. Simultaneously, the effects of campaign contributions on the Democratic vote share in these two regions are relatively large: 0.28 for New England and 0.34 for Southeast, respectively. These suggest that the voters in these regions are very insensitive to the trade policy. Instead, the campaign plays a major role for the election outcome.

Compared to the tariff coefficient for the whole country, the magnitudes of tariffs in some regions (i.e., Far West, Plains, Southwest and Rocky Mountain) are relatively large. These suggest that trade policy is relatively important to the Democratic vote share in these regions. Thus, a fall of tariffs might cause many blue-collar workers to lose their jobs, which, in turn would result to less campaign funding to the Democratic Party. As a consequence, the Democratic Party has a disadvantaged position in the election.

In all the estimates presented in Table 3, the effect of campaign contribution to the election outcome is significantly positive. The impact of the Democratic campaign spending on its vote share is around 0.22. This effect varies from 0.14 in Far West region to 0.34 in Southwest region.

B. Various Robustness Checks

In this section, I used different data sets of campaign contributions and trade policy proxy to perform four kinds of robustness checks. Table 4 contains the main results.

First, trade policy could have different impacts on election outcomes in terms of incumbency status. In some districts, the electoral competition in the House of Representatives is between two challengers (i.e., open-seat competition). However, in some districts, competition happens between an incumbent and a challenger. Tariffs changes might matter much in elections that are contested. Estimate (2) in Table 4 shows the estimated results for open-seat districts, dropping observations with incumbent candidates.

Compared to Estimate (1) in Table 4, which includes both cases—open-seat and incumbent, the effects of trade policy on electoral outcome for open-seat candidates are stronger than for those with an incumbent candidate. To be more precise, the coefficient of tariffs is 2.11 for open-seat districts. This estimated coefficient is around 2 times larger than that including all districts.

Second, Estimate (4) in Table 4 shows that the coefficient of NTB is 1.01.This number is close to the coefficient of Tariffs, 1.20, in Estimate (1) in Table 3. This suggests that the effect of trade policy on electoral outcome is relatively stable regardless of its proxy.

[Insert Table 4 Here]

Finally, given that my interest is to see the effect of trade policy, the campaign funding, which comes directly from trade industry, might have a stronger link to the electoral outcome. Estimate (3) and (5) use funding from trade industry and health industry to replace the total funding. The coefficients of campaign contributions turned out to be smaller while those of trade policy are larger. Particularly, when the tariffs are used as a trade policy proxy, the effect of TMH contribution is smaller than the effect of total contributions: $0.07<0.21$. Similarly, I obtained the same result even when using NTB as trade proxy: $0.07< 0.11$.

Table 5 contains the 2SLS estimates results for these four kinds of robustness checks. Estimate (4) in Table 5 reports the coefficients of total contributions share and NTB, using the income GINI ratio and the

unemployment rate as instruments. The effect of NTB on electoral outcome is relatively large (4.25) compared to the corresponding fixed effects estimate (1.01) in Estimate (4) in Table 5. A very similar result can be found in Estimate (5) in Table 5, using TMH funding to replace total funding.

[Insert Table 5 Here]

In a nutshell, in this section, various robustness checks confirmed my previous finding: the effect of trade policy on Democratic vote share is significantly positive. The coefficient of Democratic vote share with respect to trade policy proxy is around one unit, and it is amplified when the endogeneity problem is mitigated.

V. Prediction of Electoral Outcome

My theoretical model can also be used to predict the electoral model, ignoring the information of trade policy. Consider a simplified version of theoretical specification (1) without tariff:

$$\pi^D = \rho \cdot \int_0^{\tilde{K}} f(K^j) dK^j + (1-\rho) \cdot \frac{C^D}{C^D + C^R} \qquad (3).$$

Treating tariff as a random variable, and only using data on Democratic vote share and its campaign contributions, its corresponding empirical specification is:

$$\pi_{it}^D = \beta_0 + \beta_1 \cdot x_{it}^D + \alpha_i + \varphi_t + \varepsilon_{it} \qquad (4).$$

Note that the estimated marginal effect of contributions on the Democratic vote share, $\hat{\beta}_1$, can also be explained as the fraction of uninformed group $1-\rho$, which, in turn, implies that the fraction of informed group is $\rho = 1-\hat{\beta}_1$. Accordingly, the portion for Democrats within the informed group, $\int_0^{\tilde{K}} f(K^j)dK^j$, can be measured by $\hat{\beta}_0/(1-\hat{\beta}_1)$. In a nutshell, there are two advantages to use this simple specification: first, the informed share can be identified; and second, the portion for Democrats within the informed groups can be measured as well, which are used to compare with the U.S. politics today.

Row (1) in Table 6 reports the fixed effects estimation results. The coefficient, $\hat{\beta}_1 = 0.34$, measures the marginal effect of campaign contribution share. If the Democratic contributions share increases by 1%, then its vote share will increase by 0.34%, *ceteris paribus*. This coefficient can also be explained as the uninformed voters' fraction in the U.S., using my theoretical framework. In other words, the fraction of the uninformed voters is 34%; and then the fraction of the informed voter is 66%. Roughly speaking, by my estimate, one-third of the voters are uninformed. Given the intercept coefficient, $\hat{\beta}_0 = 0.36$, which measures the vote share from the informed group, the percentages of voters for the Democrat Party within the informed group vote can be measured: $\hat{\beta}_0/(1-\hat{\beta}_1) = 0.36/(1-0.34) = 54.1\%$. Namely, more than

one half of informed voters vote for the Democratic Party in the country as a whole.

Table 6 also contains regional estimation results. The marginal effect of contributions, β_1, for each region varies from 0.26 to 0.44. Applying the same method above, I obtained the percentage of the Democratic supporters within the informed group for each state. Such percentages varied from 44% to 56%. Particularly, such fractions are lower than 50% for the Great Lakes, Plains and Rocky Mountain regions. These suggest that more informed voters in these three regions prefer the Republican Party. Conversely, more informed voters in other five regions (i.e., New England, Mid-east, Southeast, Southwest and Far West) are in favor of the Democratic Party. Moreover, 56.3% of the informed voters favor the Democratic Party in the New England region. This confirms that the New England region is a stronghold of the Democratic Party.

[Insert Table 6 Here]

I also went further to examine each state's election outcome. Figure 4A describes the states wherein more informed voters prefer the Republican Party. Clearly, Ohio favors the Republicans while Pennsylvania favors the Democrats, which is exactly the same as the outcome of the 2004's Presidential Election in Figure 4B. One might worry that some states in the Southeast region, known to be traditional strongholds of the Republican Party, were shown to be for the Democrats instead. Remember that my

estimations merely considered the behaviors within the informed groups. In other words, although many informed voters would vote a Democrat in such states, the uninformed voters would vote a Republican instead. This makes sense by taking into account the strong organizational ability of the Republicans (Recall the Poll of Democrats strictly decreased after the Convention of the Republic Party in the 2004 Presidential Election).

[Insert Figure 4 Here]

VI. Conclusions

The aim of this paper is to investigate how trade policy affects vote pattern in the U.S. Earlier literature has recognized that campaign contributions and lobbies affects trade policy (Grossman and Helpman, 1994). Whether or not trade policy affects the electoral outcome still remains an empirical question. This is the contribution of the paper. Applying an amended median voter model in a Mayer-Heckscher-Ohlin framework, the declining level of protection can translate into a falling vote share for the protectionist party. All estimations suggest a positive effect, using a different trade policy proxy. Also, the simple political model presented in this paper can be used to predict the election outcome.

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Appendix

Appendix A: Effect of Tariffs on the Democratic Vote Share

Considering the effect of tariffs on people who support Democratic Party within the informed group:

$$\frac{\partial}{\partial p^D}\left[\int_0^{\widetilde{K}(p^D,p^R)} f(K^i)dK^i\right] = f(\widetilde{K}^j)\frac{\partial \widetilde{K}(p^D,p^R)}{\partial p^D} \tag{A1}$$

where $\widetilde{K}(p^D,p^R) \equiv \dfrac{[CS(p^D)-CS(p^R)]+[w(p^D)-w(p^R)]+[T(p^D)-T(p^R)]/\overline{L}}{r(p^R)-r(p^D)}$.

Note that the F.O.C of utility's maximization implies $CS'(p^D) = -d(p^D)$, where $CS'(p)$ is the derivative of consumer surplus and $d(p)$ is the import good's consumption. Given the tariff revenue,

$$T(p^D) = t^D \cdot m(p^D) = (p^D - p^W)m(p^D)$$

we get $T'(p^D) = m(p^D) + t^D \cdot m'(p^D)$. Furthermore, notice that $d(p^D)$ is the individual level of consumption of the import good, we know $m(p^D) = d(p^D)\overline{L} - y_2$. Hence,

$$\frac{\partial \widetilde{K}(p^D,p^R)}{\partial p^D} = \frac{w'(p^D) - y_2/\overline{L} + t\cdot m'(p^D)/\overline{L} + \widetilde{K}\cdot r'(p^D)}{r(p^R)-r(p^D)} \quad . \tag{A2}$$

One can use the GDP function, $GDP = y_1 + p^D y_2 = w\overline{L} + r\overline{K}$, to simplify (A2). It turns out $\dfrac{y_2}{\overline{L}} = w'(p^D) + \dfrac{\overline{K}}{\overline{L}}r'(p^D)$, taking the partial derivative with respect to p^D, and using the Envelope theorem. Now plug it into (A2):

$$\frac{\partial \widetilde{K}(p^D,p^R)}{\partial p^D} = \frac{[\overbrace{\widetilde{K}-\overline{K}/\overline{L}}^{(?)}]\overbrace{r'(p^D)}^{(-)} + t^D\cdot\overbrace{m'(p^D)}^{(-)}/\overline{L}}{\underbrace{r(p^R)-r(p^D)}_{(+)}} \quad . \tag{A3}$$

Since $r(p^R) > r(p^D)$ given that $p^R < p^D$, the denominator is positive. However, without more information, we can not determine the sign of the nominator. If $\widetilde{K} - \overline{K}/\overline{L} > 0$, then $\dfrac{\partial \widetilde{K}(p^D,p^R)}{\partial p^D} < 0$. However, we can have $\dfrac{\partial \widetilde{K}(p^D,p^R)}{\partial p^D} > 0$ if $\widetilde{K} - \overline{K}/\overline{L} < 0$ instead.

(Q. E. D.)

Appendix B: Data Sources

Variables	Data Sources and Descriptions
Democratic Vote Share	Data are directly from Federal Elections Committee via ftp://ftp.fec.gov/FEC/ .
Campaign Contributions	Data are directly from Federal Elections Committee via ftp://ftp.fec.gov/FEC/ .
T/M/H Contributions	Campaign funding from trade industries and health industries. It is part of funding from Political Action Committees.
Foreign Born Ratio	Ratio of persons identifying as foreign born relative to labor force in its district. Data from E. Scott Adler via http://sosci.colorado.edu/~esadler/districtdatawebsite .
Race Percentage	Ratio of number of Black relative to number of population. Data source is the same as above.
Urban Ratio	Ratio of population living in urban areas relative to the labor force in district. Data from various years Census.
Unemployed Ratio	Ratio of persons identified as unemployed relative to the labor force in district, Data from various years Census.
Income GINI coefficient	The state-level income GINI distribution data comes directly from Western-Guetzkow-Rosenfeld (2002). The data is calculated according to individual annual income level. Data can be obtained from http://www.princeton.edu/~joshg/inequality.htm
Weighted Tariffs	Data are from Intentional Data Center at University of California Davis directed by Robert C. Feenstra: http://cid.econ.ucdavis.edu/ .The weighted tariffs are constructed via 4 steps: (1) obtain SIC 4-digit tariffs using the duties value divided by the customs value; (2) Aggregate SIC4-digit tariffs across countries and industries to obtain SIC 2-digit tariffs. (3) Calculate the weighted county-level tariffs, using the industrial structure provided by Bureau of Economic Analysis. (4) Harmonize the county level tariffs data and congressional district level data.
Non-Tariff-Barriers	Data are from TRAINS by UNCTAD (various years)

Table 1: Congressional Apportionment in Each Region

Region	States Abbreviations included
Far West	AK(1), CA(53), HI(2),NV(3),OR(5),WA(9)
Mid-east	DE(1),MD(8),NJ(13),NY(29),PA(19)
New England	CT(5),ME(2),MA(10),NH(2),RI(2),VT(1)
Great Lakes	IL(19),IN(9),MI(15),OH(18),WI(8)
Plains	IA(5), KS(4),MN(8),MO(9),NE(3),ND(1),SD(1)
Rocky Mountain	CO(7),ID(2),MT(1),UT(3),WY(1)
Southeast	AL(7),AR(4),FL(25),GA(13),KY(6),LA(7),MS(4),NC(13), SC(6),TN(9),VA(11),WV(3)
Southwest	AZ(8),NM(3),OK(5),TX(32)

Sources: BEA website from http://www.bea.gov/. Numbers in parentheses are apportionment of the House Representatives for the 108th Congress.

Table 2: Summary Statistics, 1982-2000

Democrats / Region	Change of Vote share ($\Delta\pi^D$)		Change of Contribution Share (Δx^D)		Change of Weighted Tariffs ($\Delta\tau$)	
	Mean	Stan. Err.	Mean	Stan. Err.	Mean	Stan. Err.
Whole Country	-.002	*.15*	.005	*.30*	-.003	*.01*
Southwest	-.013	*.17*	-.017	*.31*	-.003	*.01*
Southeast	-.007	*.20*	.001	*.32*	-.003	*.02*
Plains	-.004	*.11*	.002	*.25*	-.003	*.01*
Great Lake	-.003	*.11*	.007	*.27*	-.002	*.10*
Rocky Mountain	-.001	*.25*	.007	*.25*	-.002	*.008*
Mid-east	-.001	*.15*	.004	*.34*	-.004	*.01*
Far-west	.007	*.10*	.019	*.27*	-.003	*.006*
New England	.009	*.17*	.015	*.25*	-.003	*.01*

Sources: various datasets are introduced in the paper. Data are sorted by the mean of change of weighted vote share for each region.

Table 3: National and Regional Estimates

Regressors / Region	Fixed Effects		2SLS		
	Contribution Share Change (Δx_{irt}^{D})	Tariffs Change ($\Delta \tau_{irt}$)	Contribution Share Change (Δx_{irt}^{D})	Tariffs Change ($\Delta \tau_{irt}$)	# of Obs.
Whole Country	.22**	1.20**	.22**	2.78**	3666
	(27.13)	(4.83)	(24.31)	(1.98)	
Far West	.15**	1.42*	.14**	8.99**	576
	(9.36)	(1.88)	(8.19)	(2.34)	
Plains	.20**	.48	.19**	8.01*	274
	(7.88)	(.86)	(5.61)	(1.84)	
Southwest	.23**	1.82*	.22**	7.09*	346
	(7.84)	(1.87)	(7.16)	(1.75)	
Rocky Mountain	.21**	.53	.21**	5.76	114
	(6.68)	(.52)	(5.77)	(1.58)	
Great Lakes	.20**	.75**	.20**	2.45**	672
	(13.54)	(2.07)	(13.32)	(1.93)	
New England	.28**	-2.21	.28**	.80	207
	(5.94)	(1.69)	(5.76)	(.10)	
Southeast	.32**	1.92**	.34**	-.15	806
	(15.77)	(4.05)	(11.06)	(.05)	
Mid-east	.15**	-.10	.15**	-2.61	671
	(8.29)	(.17)	(8.17)	(.078)	

Notes: The regressand is the Democratic vote share. Numbers in parentheses are t values. Coefficients with double stars (**) and single star (*) denote significance at 1% level and 5% level, respectively. Income GINI coefficient and unemployment rate were used as instruments for 2SLS estimates. The district level and year specific fixed effects were included. Control variables such as race, blue-collar ratio and foreign-born ratio were also included.

Table 4: Various Fixed Effects Estimates

Regressand: Democrat Vote Share	Estimate (1)	Estimate (2)	Estimate (3)	Estimate (4)	Estimate (5)
Contribution Share	.22**	.21**		.11**	
	(27.13)	(5.60)		(10.28)	
T/M/H Contribution Share			.07**		.07**
			(12.76)		(7.72)
Weighted Tariffs	1.20**	2.11**	1.28**		
	(4.83)	(3.05)	(4.76)		
Non-Tariff-Barrier				1.01**	1.08**
				(4.81)	(5.05)
District Fixed Effect	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	No	Yes	No	No
Type of Candidates	O; I	O	O; I	O; I	O; I
Other Control Variables	Yes	Yes	Yes	Yes	Yes
# of Obs.	3666	426	3666	1196	1196

Notes: numbers in parentheses are t-values. Coefficients with double stars (**) denote significance at 1% level. Coefficients of intercept, controllable variables and year-specific effects were ignored to save space. O= Open seats; I= Incumbents.

Table 5: Various 2SLS Estimates

Regressand: Democrat Vote Share	Estimate (1)	Estimate (2)	Estimate (3)	Estimate (4)	Estimate (5)
Contribution Share	.22**	.20**		.10***	
	(24.31)	(4.84)		(8.23)	
TMH Contribution Share			.06**		.06***
			(11.22)		(6.28)
Weighted Tariffs	2.78**	4.62**	4.15**		
	(1.98)	(2.92)	(2.29)		
Non-Tariff-Barrier				4.25***	4.45***
				(5.73)	(5.90)
District Fixed Effect	Yes	Yes	Yes	Yes	Yes
Time Trend	Yes	Yes	Yes	Yes	Yes
Type of Candidates	O; I	O	O; I	O; I	O; I
Other Control Variables	Yes	Yes	Yes	Yes	Yes
# of Obs.	3666	426	3666	1196	1196

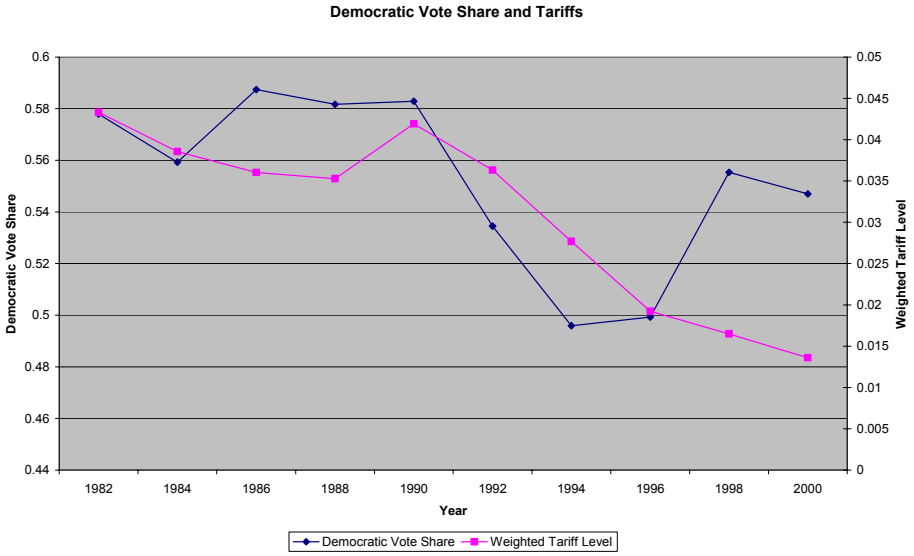
Notes: numbers in parentheses are t-values. Coefficients with double stars (**) denote significance at 1% level. The GINI coefficient and unemployment rate were used as instruments. Coefficients of intercept, controllable variables, and year-specific effects were ignored to save space. O= Open seats; I= Incumbents.

Table 6: Prediction of Election Outcomes

Regressand: Democratic Vote Share / Region	Regressors		Support Ratio within Informed Group	# of Obs.
	Intercept (β_{0r})	Contribution Share (x_{irt}^{D})	($\frac{\beta_{0r}}{1-\beta_{1r}}$)	
Whole Country	.36**	.34**	54%	4099
	(71.40)	(48.57)		
Rocky Mountain	.30**	.32**	44%	127
	(21.64)	(10.86)		
Great Lakes	.32**	.32**	47%	738
	(29.93)	(22.93)		
Plains	.36**	.28**	49%	305
	(27.38)	(12.09)		
Far West	.37**	.30**	52%	654
	(40.67)	(19.94)		
Southwest	.35**	.37**	55%	400
	(20.41)	(13.74)		
Mid-east	.41**	.26**	55%	756
	(34.00)	(15.56)		
Southeast	.32**	.44**	56%	891
	(26.25)	(25.82)		
New England	.34**	.40**	56%	228
	(13.04)	(10.47)		

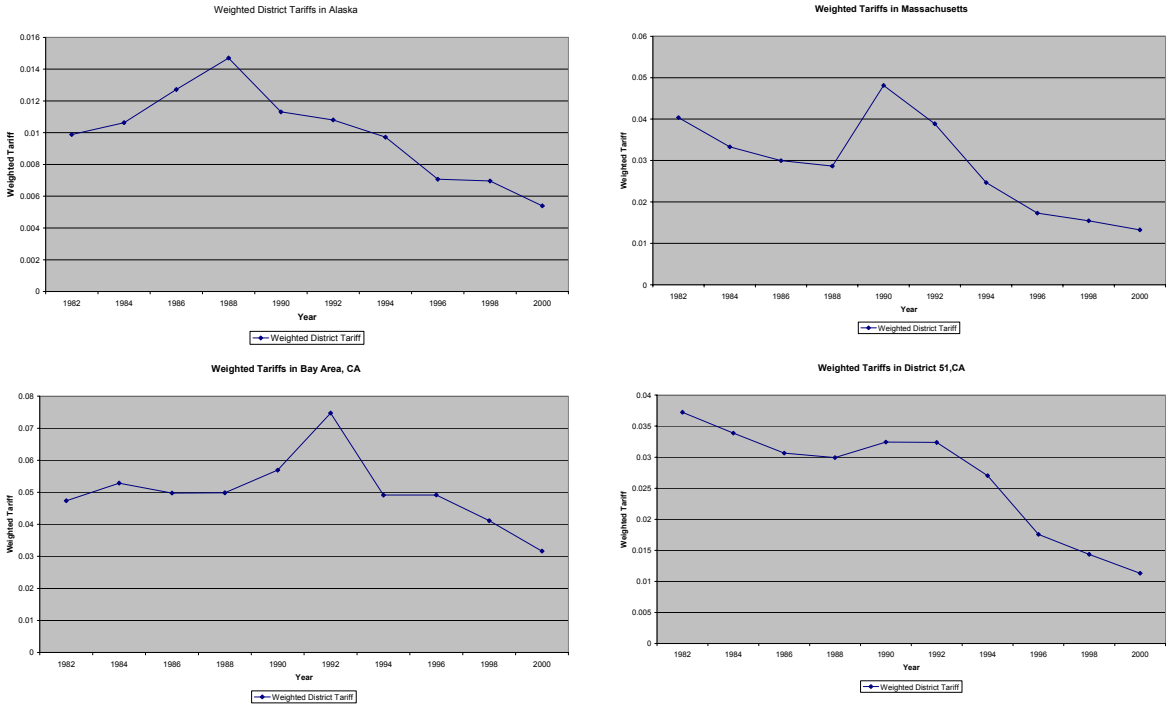
Notes: numbers in parentheses are t-values. Coefficients with double stars (**) denote significance at 1% level.

Figure 1: Data Pattern for the Whole Country



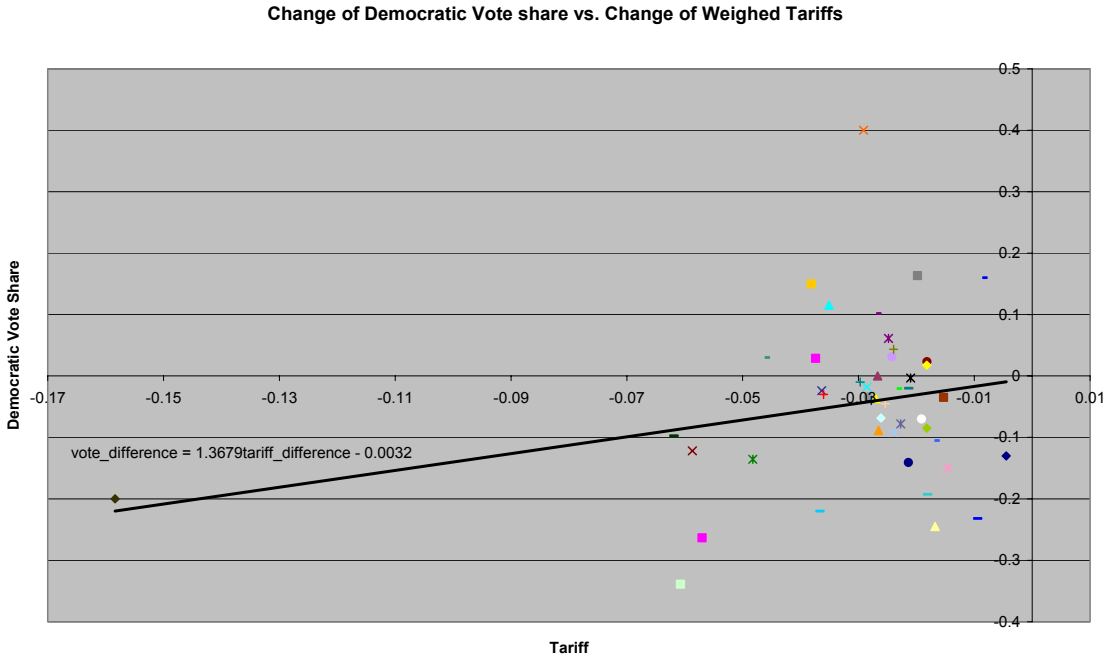
Note: Data of the Democratic vote share are from Federal Elections Committee. Data of tariffs are from Feenstra (2002).

Figure 2: Different Weighted District Tariffs



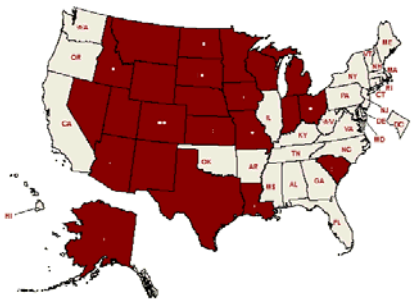
Notes: top-left and top-right panels are weighted district tariffs in Alaska and Massachusetts, respectively. Bottom-left and bottom-right panels are weighted district tariffs in district 8 (Bay area) and district 51 (Imperial county) in California, respectively.

Figure 3: Change of Democratic Vote Share and Weighted Tariffs



Notes: the simple OLS regression suggests that 10% change of tariffs increased to 13.7% change of the Democratic vote share. The tariffs coefficient is significant at 5% level. Observation is at state level.

Figure 4: Comparison between Estimation and Political Reality



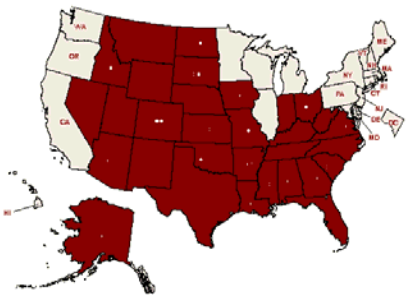


Figure 4A: Estimate Results

Figure 4B: Presidential Elections (2004)

Note: States in dark color in Figure 4A denote that the Republican Party has a majority supporter within the informed group. Similarly, States in dark color in Figure 4B denote those states were pro-Republican Party in the 2004 Presidential Election. The data in Figure 4B were taken from the webpage of the Federal Election Committee.