

Web Appendix to Political Cleavages within Industry: Firm level lobbying for Trade Liberalization

In Song Kim*

October 23, 2016

Abstract

This appendix contains supplemental results. First, Section 1 shows that we observe high within-industry variance even when different levels of aggregations are used for defining the industry categories. Sections 2, 3 and 4 contain technical details of the formal model. Section 5 and 6 include a set of robustness check results in which we examine the effects of product differentiation and firm-level productivity on lobbying. Section 7 include supporting materials for bill-level analysis including the results from LDA (Latent Dirichlet allocation) topic models. I then discuss some details for the LASSO analysis used for the results in the main text.

*Assistant Professor, Department of Political Science, Massachusetts Institute of Technology, Cambridge, MA, 02139. Phone: 617-253-3138, Email: insong@mit.edu, URL: <http://web.mit.edu/insong/www/>

1 Between- and Within-industry Variation in Tariffs

Table 1 decomposes the total variance in applied tariffs of the U.S. into within and between industry components such that $T_t = W_t + B_t$. I calculate each component by $T_t = \frac{1}{N_t} \sum_j \sum_{i \in j} (\tau_{it} - \bar{\tau}_t)^2$, $W_t = \frac{1}{N_t} \sum_j \sum_{i \in j} (\tau_{it} - \bar{\tau}_{j,t})^2$, and $B_t = \frac{1}{N_t} \sum_j N_{j,t} (\bar{\tau}_{j,t} - \bar{\tau}_t)^2$ where Harmonized System 8 digits level products (HS8) are indexed by i and time by t ; $j \in \{\text{HS2, HS4, HS6}\}$ denotes the industry category used for the analysis; N_t and $N_{j,t}$ denote the overall number of products and the products within each industry j ; τ_{it} , $\bar{\tau}_{j,t}$ and $\bar{\tau}_t$ are the applied tariff rates, the average tariff rates within each industry, and the overall average of tariff rates across all products, respectively.

Year	HS2		HS4		HS6		Total Variance
	Between	Within	Between	Within	Between	Within	
1989	17.77	30.11	27.00	20.89	33.23	14.66	47.88
1990	17.52	29.49	26.58	20.43	32.69	14.32	47.01
1991	17.32	30.35	26.24	21.43	32.53	15.14	47.67
1992	17.18	30.32	26.03	21.46	32.35	15.14	47.49
1993	17.29	30.40	26.03	21.65	32.41	15.27	47.69
1995	24.07	70.82	37.30	57.59	46.19	48.70	94.89
1996	44.41	174.50	58.74	160.17	66.90	152.01	218.91
1997	42.05	164.05	59.03	147.08	67.53	138.57	206.10
1998	39.65	134.14	50.09	123.70	56.65	117.14	173.79
1999	39.28	131.72	52.19	118.81	60.78	110.22	171.00
2000	37.86	136.59	51.17	123.28	59.92	114.53	174.45
2001	34.76	129.76	47.75	116.77	55.49	109.03	164.52
2002	33.89	120.96	45.74	109.10	52.06	102.78	154.85
2003	35.35	130.83	46.97	119.20	53.73	112.44	166.17
2004	34.97	128.64	46.77	116.84	53.69	109.91	163.61
2005	36.68	130.31	48.59	118.40	55.54	111.44	166.98
2006	36.32	127.91	48.07	116.15	55.21	109.02	164.23
2007	37.96	124.51	57.67	104.80	65.78	96.70	162.47
2008	34.91	135.15	56.67	113.40	65.35	104.72	170.06

Table 1: **Variance Decomposition of the Applied MFN Tariff Rates of the U.S.**

Note that the product-by-product negotiation approach at the Uruguay Round resulted in a sharp increase in the variation in tariffs across products within industries. This is due to the increase in the number of tariff lines and the inclusion of all agricultural and textile products in this round’s negotiation.¹

Table 2 compares this pattern with the changes in India’s applied tariff rates between 1992 and 2008. It shows that both the mean tariff rate and the total variation in applied tariffs have decreased over time in India. I also shows that between-industry variation is larger unlike the pattern that we observe in the U.S. The difference can be explained by examining how firms’ interests were reflected in the process of trade liberalization. Unlike the U.S., whereby firms’ heterogeneous interests are key to understand within industry variation, India went through trade liberalization that is imposed by the IMF. Specifically, as Topalova and Khandelwal (2011) show “the reform was rapid, comprehensive, and externally imposed, it is reasonable to assume that the

¹Although the product-by-product approach has always been important, negotiations in the previous round, such as the Kennedy Round (1962–1967) and Tokyo Round (1973–1979), also relied on a formula-based approach in which countries agreed to reduce tariff rates more or less uniformly across products.

changes in the level of protectionism were unrelated to firm- and industry-level productivity.” This illustrates the importance of firm’s heterogeneous interests in understanding trade policy-making.

	1992	2008
Mean Applied Tariffs	37.72	12.86
Number of Tariff Lines	2,318	11,831
Between Industry Variance	546.46	228.83
Within Industry Variance	34.05	35.40
Total Variance	580.51	264.23

Table 2: **Descriptive Statistics Summarizing India’s Tariffs**

2 Demand and Price under Oligopoly

A representative consumer maximizes equation (1) in the paper subject to the standard budget constraint E . The utility function captures the degree of product differentiation (i.e., consumer’s “love of variety”) with the parameter σ . For example, supposed that there are two products. Product differentiation (i.e., low σ) implies that a representative consumer gets higher utility by consuming one unit of each product than by consuming two units of one product with no consumption of the second product. The difference in the utility even when the same total units are consumed captures the degree of product differentiation. To ensure a positive demand, I make a technical assumption that α_D and α_F are sufficiently high. In particular, I assume the following.

ASSUMPTION 1 (POSITIVE DEMAND)

$$\alpha_D + \alpha_F > c_1 + c_3 + 2\tau \quad \text{and} \quad \alpha_D + \alpha_F > c_2 + c_4 - 2\tau.$$

We obtain the following inverse demand function for product i .

$$p_i(q_i, q_j) = \alpha_s - q_i - \sigma \left(\sum_{j \neq i} q_j \right). \quad (1)$$

Note that firm 1 and firm 3 face the same tariff τ in their respective exporting markets in this model (see equation (2)). This reflects the importance of the norm of reciprocity in trade negotiation (Bagwell and Staiger, 1999). It is also consistent with the “principal supplier rule” that underlies the Uruguay Round negotiation in which advanced economies simultaneously lower trade barriers reciprocally when they exchange differentiated products with each other within an industry (Gowa and Kim, 2005). The assumption of reciprocity itself does not necessarily imply trade liberalization, however. The intensity of the import-competing firm’s interest is also captured by a higher import tariff, while the productive domestic firm will lose a significant portion of its domestic revenue if products are substitutable. That is, productive firms still need to evaluate the trade-off between the decrease in domestic revenue and the increase in foreign market revenue when deciding whether to lobby for liberalization, and this tradeoff will vary with the level of product

differentiation. In fact, the result in the paper shows that even with the norm of reciprocity, high tariffs are optimal with sufficiently high levels of substitutability .

- Taking first order conditions of firms' problem in equation (2) in the paper gives

$$\begin{aligned}
q_1 &= \frac{1}{2}(\alpha_D - \sigma q_2 - \sigma q_3 - c_1) & q_1^* &= \frac{1}{2}(\alpha_F - \sigma q_3^* - \sigma q_4^* - c_1 - \tau) \\
q_2 &= \frac{1}{2}(\alpha_D - \sigma q_1 - \sigma q_3 - c_2) & q_3^* &= \frac{1}{2}(\alpha_F - \sigma q_1^* - \sigma q_4^* - c_3) \\
q_3 &= \frac{1}{2}(\alpha_D - \sigma q_1 - \sigma q_2 - c_3 - \tau) & q_4^* &= \frac{1}{2}(\alpha_F - \sigma q_1^* - \sigma q_3^* - c_4)
\end{aligned} \tag{2}$$

- Solving the above systems of equations gives optimal quantity of each product in respective market.

$$\begin{aligned}
q_1 &= \frac{\alpha_D(2 - \sigma) + \sigma(\tau + c_2 + c_3 - c_1) - 2c_1}{2(2 - \sigma)(1 + \sigma)} \\
q_2 &= \frac{\alpha_D(2 - \sigma) + \sigma(\tau + c_1 + c_3 - c_2) - 2c_2}{2(2 - \sigma)(1 + \sigma)} \\
q_3 &= \frac{\alpha_D(2 - \sigma) + \sigma(c_1 + c_2 - c_3 - \tau) - 2(c_3 + \tau)}{2(2 - \sigma)(1 + \sigma)} \\
q_1^* &= \frac{\alpha_F(2 - \sigma) + \sigma(c_3 + c_4 - c_1 - \tau) - 2(c_1 + \tau)}{2(2 - \sigma)(1 + \sigma)} \\
q_3^* &= \frac{\alpha_F(2 - \sigma) + \sigma(\tau + c_4 + c_1 - c_3) - 2c_3}{2(2 - \sigma)(1 + \sigma)} \\
q_4^* &= \frac{\alpha_F(2 - \sigma) + \sigma(\tau + c_1 + c_3 - c_4) - 2c_4}{2(2 - \sigma)(1 + \sigma)}
\end{aligned} \tag{3}$$

- Finally, combining equations (1) and (3), we have

$$\begin{aligned}
p_1 &= \frac{\alpha_D(\sigma - 2) + c_1(2\sigma^2 - \sigma - 2) - \sigma(c_2 + c_3 + \tau)}{2(2 - \sigma)(1 + \sigma)} \\
p_2 &= \frac{\alpha_D(\sigma - 2) + c_2(2\sigma^2 - \sigma - 2) - \sigma(c_1 + c_3 + \tau)}{2(2 - \sigma)(1 + \sigma)} \\
p_3 &= \frac{\alpha_D(2 - \sigma) + c_3(2 + \sigma - 2\sigma^2) + \sigma(c_1 + c_2 + \tau - 2\sigma\tau) + 2\tau}{2(2 - \sigma)(1 + \sigma)} \\
p_1^* &= \frac{\alpha_F(2 - \sigma) + c_1(2 + \sigma - 2\sigma^2) + \sigma(c_3 + c_4 + \tau - 2\sigma\tau) + 2\tau}{2(2 - \sigma)(1 + \sigma)} \\
p_3^* &= \frac{\alpha_F(\sigma - 2) + c_3(2\sigma^2 - \sigma - 2) - \sigma(c_1 + c_4 + \tau)}{2(2 - \sigma)(1 + \sigma)} \\
p_4^* &= \frac{\alpha_F(\sigma - 2) + c_4(2\sigma^2 - \sigma - 2) - \sigma(c_1 + c_3 + \tau)}{2(2 - \sigma)(1 + \sigma)}
\end{aligned} \tag{4}$$

3 Characterization of Truthful Contribution

To characterize the contribution schedule, I follow the literature to assume that contribution schedules are truthful *everywhere* (Grossman and Helpman, 1994; Bombardini, 2008). See equation (10) in Grossman and Helpman (1994) (pg., 840). This is stated as Assumption 1 in the main text. Formally, $L_i(\tau, V_i) = \max[0, \Pi_i(\tau) - V_i]$, where V_i is an arbitrary benchmark level of welfare for firm i .

Note that Assumption 1 is stronger than the local differentiability at the equilibrium point (Bernheim and Whinston, 1986). I focus on the profit evaluated at the optimal tariff rate: $\Pi_i(\tau_o)$. Note that this quantity is positively correlated with the truthful contribution given a fixed level of B_i , which does not depend on τ_o . Given this the truthful contribution schedules I derive the contribution schedules for productive and unproductive domestic firms in equilibrium. By symmetry the optimal contribution scheduled by foreign productive firms will be same as that by productive domestic firm although the role of α_D and α_F will change.

3.1 Productive Domestic Firm

$$\frac{1}{(4(-2 + \sigma)^2(1 + \sigma)^2)} \left[\left(A_0 + \frac{(2 + \sigma)(A_1 + 4A_2\sigma - A_3\sigma^2 + 4aA_4\sigma^3)}{(2(8 + \sigma(8 + 5\sigma)) + a(-20 + \sigma(-20 + \sigma(21 + 10\sigma))))} \right)^2 + \left(B_0 - \sigma \left\{ c_2 + c_3 + \frac{B_1 + 4B_2\sigma - B_3\sigma^2 + B_4\sigma^3}{2(8 + \sigma(8 + 5\sigma)) + a(-20 + \sigma(-20 + \sigma(21 + 10\sigma)))} \right\} \right)^2 \right]$$

$$A_0 = \alpha_F(-2 + \sigma) - (c_3 + c_4)\sigma + c_1(2 + \sigma)$$

$$A_1 = -8(1 + a)c_1 + 4(-2 + 5a)c_3 - 4(-2 + a)\alpha_D + 8(1 + a)\alpha_F$$

$$A_2 = 2c_2 + c_4 + a(-2c_1 + 6c_3 + c_4 - 3\alpha_D) - 2\alpha_D - \alpha_F$$

$$A_3 = (2 + 7a)c_1 - 2(c_2 - c_3 + \alpha_D) + a(c_2 + 15c_3 - 2c_4 - 15\alpha_D + 2\alpha_F)$$

$$A_4 = c_1 + 2c_2 - 2c_3 - \alpha_D$$

$$B_0 = \alpha_D(-2 + \sigma) + c_1(2 + \sigma)$$

$$B_1 = -8(1 + a)c_1 + 4(-2 + 5a)c_3 - 4(-2 + a)\alpha_D + 8(1 + a)\alpha_F$$

$$B_2 = 2c_2 + c_4 + a(-2c_1 + 6c_3 + c_4 - 3\alpha_D) - 2\alpha_D - \alpha_F$$

$$B_3 = (2 + 7a)c_1 - 2(c_2 - c_3 + \alpha_D) + a(c_2 + 15c_3 - 2c_4 - 15\alpha_D + 2\alpha_F)$$

$$B_4 = 4a(c_1 + 2c_2 - 2c_3 - \alpha_D)$$

3.2 Unproductive Domestic Firm

$$\left(C_0 + \frac{(\sigma(-8(c_3 + \alpha_D + \alpha_F) - 2\sigma C_1 - C_2 + aC_3))}{(2(8 + \sigma(8 + 5\sigma)) + a(-20 + \sigma(-20 + \sigma(21 + 10\sigma))))} \right)^2 / (4(-2 + \sigma)^2(1 + \sigma)^2)$$

$$\begin{aligned}
C_0 &= \alpha_D(-2 + \sigma) + c_2(2 + \sigma) \\
C_1 &= (2c_4 - 2\alpha_F + \alpha_D(-4 + \sigma) + 4c_3(2 + \sigma) + c_2(4 + \sigma)) \\
C_2 &= 2c_1(1 + \sigma)(4(1 + \sigma) + 7a(-2 + \sigma^2)) \\
C_3 &= (-8\alpha_F - 4(c_3 + c_4)\sigma + \alpha_D(-2 + \sigma)^2(1 + 4\sigma) + \sigma^2(c_2 - 8c_2\sigma - 2(c_4 - \alpha_F + c_3(3 + \sigma))))
\end{aligned}$$

4 Intra-industry Trade with Differentiation

I show that increased product differentiation implies a high degree of intra-industry trade given the fixed level of τ . This will lay an theoretical foundation for understanding the source of gains from trade independent of comparative advantage or technological difference, which are the conceptual base for existing political economy models. Specifically, high intra-industry trade with product differentiation will shed light on who the potential winners and losers from trade are. Intra-industry trade is defined in terms of the quantity of goods that productive firms export to each market, i.e., a foreign firm's export to the domestic market (q_3) + domestic firm's export to the foreign market (q_1^*).

Proposition 1 shows that consumers' love of variety results in a high degree of intra-industry trade.² It also highlights the fact that productive exporting firms will gain greatly from trade liberalization, particularly when products in an industry are not substitutable with each other. In this respect, I argue that the incentives of exporting firms to lobby will be stronger than those of their import-competing counterparts when products are sufficiently differentiated. Although any firm will benefit by having protection at home and open markets abroad, highly productive exporting firms find the latter more attractive than the former due to increasing returns-to-scale. In the following section, I examine the political interaction between firms and government.

DEFINITION 1 (INTRA-INDUSTRY TRADE)

$$IIT(\cdot) := q_3 + q_1^* \quad (5)$$

PROPOSITION 1 (INTRA-INDUSTRY TRADE) *Suppose products are sufficiently differentiated such that $0 \leq \sigma < \frac{1}{2}$. Then, intra-industry trade increases as the degree of product differentiation increases.*

$$\left. \frac{\partial IIT}{\partial \sigma} \right|_{\sigma < \frac{1}{2}} < 0 \quad (6)$$

Proof Intra-industry trade in physical quantity is

$$\begin{aligned}
IIT(\cdot) &= q_3 + q_1^* \\
&= \frac{2(c_1 + c_3 + 2\tau) + (\sigma - 2)(\alpha_D + \alpha_F) - \sigma(c_2 + c_4 - 2\tau)}{2(\sigma - 2)(\sigma + 1)}
\end{aligned}$$

²Note that the new trade theory and new-new trade theory emphasize this mechanism through the Dixit-Stiglitz CES utility function (Krugman, 1980).

Suppose $0 \leq \sigma_1 < \sigma_2 < \frac{1}{2}$, and let $\chi_1 = (\sigma_1 - 2)(\sigma_1 + 1)$ and $\chi_2 = (\sigma_2 - 2)(\sigma_2 + 1)$. First, we show that $\chi_2 - \chi_1 < 0$.

$$\begin{aligned}
\chi_2 - \chi_1 &= (\sigma_2 - 2)(\sigma_2 + 1) - (\sigma_1 - 2)(\sigma_1 + 1) \\
&= (\sigma_2 - \sigma_1)(\sigma_2 + \sigma_1) - (\sigma_2 - \sigma_1) \\
&= \underbrace{(\sigma_2 - \sigma_1)}_{>0} \underbrace{(\sigma_1 + \sigma_2 - 1)}_{<0} < 0
\end{aligned} \tag{7}$$

Second, we show $\sigma_1\chi_2 - \sigma_2\chi_1 > 0$.

$$\begin{aligned}
\sigma_1\chi_2 - \sigma_2\chi_1 &= \sigma_1(\sigma_2^2 - \sigma_2 - 2) - \sigma_2(\sigma_1^2 - \sigma_1 - 2) \\
&= \sigma_1\sigma_2(\sigma_2 - \sigma_1) + 2(\sigma_2 - \sigma_1) > 0
\end{aligned} \tag{8}$$

Finally, it is sufficient to show that $IIT(\cdot)$ is monotonically decreasing for any σ_1 and σ_2 such that $0 \leq \sigma_1 < \sigma_2 < \frac{1}{2}$.

$$\begin{aligned}
&IIT(\sigma_1) - IIT(\sigma_2) \\
= &\frac{2(c_1 + c_3 + 2\tau) + (\sigma_1 - 2)(\alpha_D + \alpha_F) - \sigma_1(c_2 + c_4 - 2\tau)}{2(\sigma_1 - 2)(\sigma_1 + 1)} - \frac{2(c_1 + c_3 + 2\tau) + (\sigma_2 - 2)(\alpha_D + \alpha_F) - \sigma_2(c_2 + c_4 - 2\tau)}{2(\sigma_2 - 2)(\sigma_2 + 1)} \\
= &\frac{(\chi_2 - \chi_1)(c_1 + c_3 + 2\tau - \alpha_D - \alpha_F)}{\chi_1\chi_2} + \frac{(\sigma_1\chi_2 - \sigma_2\chi_1)(\alpha_D + \alpha_F - c_2 - c_4 + 2\tau)}{2\chi_1\chi_2} \\
> &0
\end{aligned} \tag{9}$$

, where the last inequality follows from equations (7), (8), and Assumption 1. This proves the result. \square

Note that a more general result can be achieved with a stronger assumption. It can be shown that $\frac{\partial IIT}{\partial \sigma} < 0$ for all $0 < \sigma < 1$ if $\{3(\alpha_c + \alpha_F) - (2c_1 + c_2 + 2c_3 + c_4)\}/2 < \tau < (c_2 - c_1 + c_4 - c_3)/4$ and $\alpha_D + \alpha_F > c_2 + c_4 - 2\tau$.

5 Robustness Checks on Firm-level Lobbying Analysis

Removing Outliers

	Removing Outliers							
	Top/Bottom 1% Productivity		Top/Bottom 5% Productivity		Top/Bottom 1% Productivity		Top/Bottom 1% Differentiated	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Differentiated x Productivity	0.343*** (0.071)	0.334*** (0.074)	0.335*** (0.071)	0.307*** (0.069)	0.282*** (0.089)	0.278*** (0.090)	0.484*** (0.106)	0.432*** (0.108)
Productivity	0.990*** (0.181)	0.571*** (0.099)	0.939*** (0.179)	1.023*** (0.175)	0.755** (0.296)	0.415*** (0.120)	1.236*** (0.214)	0.681*** (0.133)
Productivity squared	0.082*** (0.030)	0.079*** (0.030)	0.079*** (0.030)	0.115*** (0.029)	0.066 (0.053)		0.099*** (0.030)	
Differentiated	0.972*** (0.211)	0.942*** (0.215)	0.945*** (0.210)	0.828*** (0.205)	0.810*** (0.256)	0.796*** (0.258)	1.470*** (0.270)	1.337*** (0.272)
Capital expenditure	0.364*** (0.058)	0.380*** (0.058)	0.339*** (0.056)	0.368*** (0.053)	0.433*** (0.063)	0.439*** (0.063)	0.354*** (0.059)	0.374*** (0.059)
Property, plant	0.733*** (0.056)	0.719*** (0.056)	0.750*** (0.055)	0.706*** (0.051)	0.703*** (0.061)	0.699*** (0.061)	0.744*** (0.057)	0.725*** (0.057)
Constant	-4.632*** (0.399)	-4.982*** (0.383)	-4.740*** (0.380)	-6.043*** (0.323)	-5.166*** (0.536)	-5.532*** (0.453)	-4.025*** (0.447)	-4.553*** (0.423)
Year Fixed Effects	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Observations	28,208	28,208	28,208	28,208	26,059	26,059	27,538	27,538
Log Likelihood	-4,057.431	-4,061.100	-4,069.583	-4,111.783	-3,670.694	-3,671.477	-3,935.377	-3,940.550
Akaike Inf. Crit.	8,164.863	8,170.201	8,159.167	8,237.566	7,391.388	7,390.953	7,920.754	7,929.100

Note:

*p<0.1; **p<0.05; ***p<0.01

Table 3: **Robustness Checks:** This table represents a set of robustness check results for Table 3 in the main text. It is well known that the measures for product differentiation and firm productivity are highly skewed. Thus, we examine the robustness of the results by removing outliers on both dimensions. The first 4 columns present results with firms productivity below 1% and above 99% are removed. The following two columns focus on firms productivity level is between 5% and 95% of the distribution. The last two columns display results based on firms for which product differentiation is below and above 1% and 99%. Removing the outliers do not change the result both substantively and statistically. The table also shows that removing the non-linear term for productivity does not change the results as shown from models (2),(6) and (8). Finally, models (3) and (4) show that removing year and industry fixed effects respectively does not change the results.

6 Heckman Selection Model

	<i>Dependent variable:</i>	
	Lobbied	Amount of Lobbying (in Million \$)
Differentiated x Productivity	0.160*** (0.040)	0.740*** (0.235)
Productivity	0.580*** (0.085)	2.830*** (0.560)
Productivity squared	0.055*** (0.011)	0.289*** (0.067)
Differentiated	0.401*** (0.116)	1.128* (0.676)
Mutinalational	0.206*** (0.061)	1.270*** (0.325)
Capital expenditure	0.036 (0.035)	-0.013 (0.188)
Property, plant	0.194*** (0.035)	1.474*** (0.223)
Cost of goods sold	0.277*** (0.024)	1.442*** (0.196)
Market value	0.089*** (0.018)	0.765*** (0.105)
Constant	-3.117*** (0.251)	-27.492*** (2.621)
Observations	22,376	
Adjusted R ²	0.457	
ρ	1.184	
Inverse Mills Ratio	7.180*** (0.716)	
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

Table 4: **Results from Heckman Selection (Type-II Tobit) Model:** This table presents a two-stage Type-II Tobit model. In the first stage (first column), a probit regression of an indicator of lobbying activity on the firm level covariates are run. In the second stage, a regression of lobbying amount (in million \$) is run on the firm level covariates. The following inverse-mills ratio from the first stage is included to account for the bias due to selection: $\phi \left(X'_{ijtk} \hat{\beta}_k \right) / \left(1 - \Phi \left(X'_{ijtk} \hat{\beta}_k \right) \right)$. In both first and second stages, the estimates on the interaction between productivity and product differentiation (first row) is found to be positive and statistically significant. Note that **Mutinalational** indicates the presence of foreign sales. Each firm trading in the U.S. stock market files FORM 10-K pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934. In this form, firms report their geographic sales data. I calculated the U.S. sales share based on the most recent data stored in Wharton Research Data Services (WRDS) UNIX secure server. The segment history database is separated into multiple sub-datasets. In order to identify actual geographic sales share, one needs to carefully merge SEG-ANFUND and SEG-GEO datasets in Compustat.

7 Supporting Materials for Bill-level Analysis

7.1 List of Trade Bills

Congress	Bill Number	Lobbied	Sponsor	Sponsor Party	Sponsor State
106	S2226	0	Max Baucus	Democrat	MT
106	HCONRES262	0	Jennifer Dunn	Republican	WA
106	S743	1	Ernest Hollings	Democrat	SC
106	S1389	1	William Roth	Republican	DE
106	HR2406	0	Charles Rangel	Democrat	NY
106	HR5469	0	Charles Norwood	Republican	GA
106	S2445	0	Charles Robb	Democrat	VA
106	SRES333	0	Susan Collins	Republican	ME
106	SRES350	0	Craig Thomas	Republican	WY
106	HR1834	1	John Lewis	Democrat	GA
106	HR650	0	Lynn Rivers	Democrat	MI
106	HR577	0	Douglas Bereuter	Republican	NE
106	S2115	0	Max Baucus	Democrat	MT
106	HR2652	0	John Tierney	Democrat	MA
106	HR1166	0	Martin Meehan	Democrat	MA
106	HR4764	0	Thomas Ewing	Republican	IL
106	S2395	0	Daniel Moynihan	Democrat	NY
106	SRES226	0	Max Baucus	Democrat	MT
106	S1386	0	William Roth	Republican	DE
106	HRES602	0	Sherrod Brown	Democrat	OH
106	SCONRES58	0	Ron Wyden	Democrat	OR
106	HRES224	0	Thomas Ewing	Republican	IL
106	SRES101	0	Peter Fitzgerald	Republican	IL
106	HR3393	0	Sander Levin	Democrat	MI
106	S1373	0	Russell Feingold	Democrat	WI
106	HR1993	0	Donald Manzullo	Republican	IL
106	HR884	1	Richard Gephardt	Democrat	MO
106	S3216	0	Larry Craig	Republican	ID
106	S185	0	John Ashcroft	Republican	MO
106	S112	1	Phil Gramm	Republican	TX
106	S1254	0	William Roth	Republican	DE
106	S1008	0	Max Baucus	Democrat	MT
106	S120	0	Olympia Snowe	Republican	ME
106	S262	0	William Roth	Republican	DE
106	HR450	0	David Camp	Republican	MI
106	HR326	0	Bill Archer	Republican	TX
106	S1870	0	Max Baucus	Democrat	MT
106	HR817	1	Thomas Ewing	Republican	IL
106	S2896	0	Max Baucus	Democrat	MT
106	HR2612	0	James Traficant	Democrat	OH
106	HR5586	0	Joseph Knollenberg	Republican	MI
106	HR1201	0	Ralph Regula	Republican	OH
106	HR1728	0	Philip English	Republican	PA
106	HR5416	0	Amory Houghton	Republican	NY
106	S1741	0	Richard Durbin	Democrat	IL
106	S1388	0	William Roth	Republican	DE
106	HR1505	1	Philip English	Republican	PA
106	S1869	0	Max Baucus	Democrat	MT
106	S111	1	Phil Gramm	Republican	TX
106	HR3066	0	Benjamin Cardin	Democrat	MD
106	S1073	0	John Ashcroft	Republican	MO
106	HR1120	1	Sander Levin	Democrat	MI
106	HR5381	0	Ernest Fletcher	Republican	KY
106	HRES384	0	Gerald Weller	Republican	IL
106	HCONRES70	0	Henry Bonilla	Republican	TX
106	HR1361	0	Maxine Waters	Democrat	CA
106	HCONRES276	0	Peter DeFazio	Democrat	OR
106	S742	1	Charles Grassley	Republican	IA
106	S261	0	Arlen Specter	Republican	PA
106	HR1942	0	Philip Crane	Republican	IL

Congress	Bill Number	Lobbied	Sponsor	Sponsor Party	Sponsor State
106	HR4662	0	Samuel Johnson	Republican	TX
106	S2466	1	T. Gorton	Republican	WA
106	S658	0	Phil Gramm	Republican	TX
106	S1746	0	Daniel Moynihan	Democrat	NY
106	HR1491	0	Robert Matsui	Democrat	CA
106	S1871	0	Max Baucus	Democrat	MT
106	S1387	1	William Roth	Republican	DE
106	HR984	1	Philip Crane	Republican	IL
106	S371	1	Bob Graham	Democrat	FL
106	S2277	1	William Roth	Republican	DE
106	S1662	0	Max Baucus	Democrat	MT
106	S528	0	Arlen Specter	Republican	PA
106	S689	0	Charles Grassley	Republican	IA
106	HR2106	0	Robert Menendez	Democrat	NJ
106	HJRES90	1	Ronald Paul	Republican	TX
106	HR4856	0	Charles Rangel	Democrat	NY
106	S101	0	Richard Lugar	Republican	IN
106	HR2353	0	Bill McCollum	Republican	FL
106	HR4509	0	Clifford Stearns	Republican	FL
106	S1222	0	Kent Conrad	Democrat	ND
106	S1585	0	Max Baucus	Democrat	MT
106	HR3173	0	Kenny Hulshof	Republican	MO
106	SCONRES4	0	John Ashcroft	Republican	MO
106	S1065	0	Christopher Dodd	Democrat	CT
106	HR412	0	Ralph Regula	Republican	OH
106	SRES120	0	John Ashcroft	Republican	MO
106	HCONRES330	0	Clifford Stearns	Republican	FL
106	S1619	0	Michael DeWine	Republican	OH
106	HRES442	0	James Traficant	Democrat	OH
106	HCONRES190	1	C. Cox	Republican	CA
106	HR4706	0	Benjamin Cardin	Democrat	MD
106	S2694	0	Frank Murkowski	Republican	AK
106	S119	0	Olympia Snowe	Republican	ME
106	S3247	0	Thomas Harkin	Democrat	IA
106	HR4444	1	Bill Archer	Republican	TX
106	HR2991	0	Larry Combest	Republican	TX
106	HR435	0	Bill Archer	Republican	TX
106	HR4465	0	Robin Hayes	Republican	NC
106	S2548	0	John Ashcroft	Republican	MO
106	S1724	0	Max Baucus	Democrat	MT
106	SRES285	0	Susan Collins	Republican	ME
106	SCONRES55	0	Max Baucus	Democrat	MT
106	HJRES89	0	Ronald Paul	Republican	TX
107	S137	0	Phil Gramm	Republican	TX
107	HCONRES454	1	James Kolbe	Republican	AZ
107	S1671	0	Max Baucus	Democrat	MT
107	SCONRES135	1	Don Nickles	Republican	OK
107	HR3019	1	Charles Rangel	Democrat	NY
107	HR5622	0	Sander Levin	Democrat	MI
107	HR2871	1	Douglas Bereuter	Republican	NE
107	S274	1	Max Baucus	Democrat	MT
107	HCONRES144	0	Dale Kildee	Democrat	MI
107	S979	1	Richard Durbin	Democrat	IL
107	S138	0	Phil Gramm	Republican	TX
107	HR1782	0	Donald Manzullo	Republican	IL
107	S3151	0	Phil Gramm	Republican	TX
107	HR3422	0	Peter DeFazio	Democrat	OR
107	HR1988	1	Philip English	Republican	PA
107	S1869	0	Blanche Lincoln	Democrat	AR
107	HR3009	1	Philip Crane	Republican	IL

Congress	Bill Number	Lobbied	Sponsor	Sponsor Party	Sponsor State
107	HR796	0	Charles Rangel	Democrat	NY
107	HCONRES507	0	Joseph Knollenberg	Republican	MI
107	HRES27	0	Peter DeFazio	Democrat	OR
107	S1372	1	Paul Sarbanes	Democrat	MD
107	S401	0	Max Baucus	Democrat	MT
107	S1584	0	Larry Craig	Republican	ID
107	HR3557	0	William Thomas	Republican	CA
107	S714	0	Olympia Snowe	Republican	ME
107	SCONRES43	0	Carl Levin	Democrat	MI
107	HR2810	0	Silvestre Reyes	Democrat	TX
107	HCONRES262	0	Philip English	Republican	PA
107	HR518	0	Ralph Regula	Republican	OH
107	S2796	0	Richard Lugar	Republican	IN
107	HR1484	0	Sander Levin	Democrat	MI
107	S1813	0	Olympia Snowe	Republican	ME
107	S944	0	Max Baucus	Democrat	MT
107	HR3129	0	Philip Crane	Republican	IL
107	S2088	0	Evan Bayh	Democrat	IN
107	S140	0	Phil Gramm	Republican	TX
107	S1104	1	Bob Graham	Democrat	FL
107	S422	0	Paul Wellstone	Democrat	MN
107	HR3010	1	Philip Crane	Republican	IL
107	S2062	1	Richard Durbin	Democrat	IL
107	HCONRES126	0	John Duncan	Republican	TN
107	S2105	0	James Inhofe	Republican	OK
107	HCONRES400	0	Ronnie Shows	Democrat	MS
107	HR1973	0	Charles Norwood	Republican	GA
107	S3123	0	Michael DeWine	Republican	OH
107	HCONRES54	1	Saxby Chambliss	Republican	GA
107	S3089	0	Carl Levin	Democrat	MI
107	S2235	1	John Breaux	Democrat	LA
107	HR3571	0	Robert Berry	Democrat	AR
107	S586	0	Christopher Dodd	Democrat	CT
107	S1347	0	Max Baucus	Democrat	MT
107	HJRES105	0	Howard Coble	Republican	NC
107	S2005	0	Richard Lugar	Republican	IN
107	S943	0	Max Baucus	Democrat	MT
107	S643	1	Max Baucus	Democrat	MT
107	HR4779	0	Philip Crane	Republican	IL
107	S1209	1	Jeff Bingaman	Democrat	NM
107	HR85	0	Philip English	Republican	PA
107	HR2149	1	Philip Crane	Republican	IL
107	HR837	0	James Oberstar	Democrat	MN
107	S1100	0	Kent Conrad	Democrat	ND
107	HR1757	0	Samuel Johnson	Republican	TX
107	HR3005	1	William Thomas	Republican	CA
107	HR4723	0	Sander Levin	Democrat	MI
107	S1636	0	Max Baucus	Democrat	MT
107	HR1690	0	Maxine Waters	Democrat	CA
107	HR4128	0	Kevin Brady	Republican	TX
107	SCONRES37	0	Joseph Lieberman	Democrat	CT
107	HCONRES132	0	Ellen Tauscher	Democrat	CA
107	HR3008	1	Nancy Johnson	Republican	CT
107	HCONRES256	0	Philip English	Republican	PA
107	S935	0	Max Baucus	Democrat	MT
107	HR2603	0	William Thomas	Republican	CA
107	S525	1	Bob Graham	Democrat	FL
107	HRES16	0	James Traficant	Democrat	OH
107	HR5385	1	Philip Crane	Republican	IL
107	HR473	0	Lynn Rivers	Democrat	MI

Congress	Bill Number	Lobbied	Sponsor	Sponsor Party	Sponsor State
107	S3150	0	Phil Gramm	Republican	TX
107	HR1446	1	Philip English	Republican	PA
107	HR5650	0	Benjamin Gilman	Republican	NY
108	S2927	0	Charles Schumer	Democrat	NY
108	SCONRES140	0	Samuel Brownback	Republican	KS
108	S1258	0	Evan Bayh	Democrat	IN
108	S2677	1	Charles Grassley	Republican	IA
108	S2235	0	Ernest Hollings	Democrat	SC
108	HR4986	0	Michael Rogers	Republican	MI
108	SRES217	1	Kent Conrad	Democrat	ND
108	HR3889	0	Frank Wolf	Republican	VA
108	HCONRES98	0	James Ramstad	Republican	MN
108	S3000	0	Norm Coleman	Republican	MN
108	HRES441	1	Philip English	Republican	PA
108	HR2579	1	David Camp	Republican	MI
108	HR3688	0	Charles Pickering	Republican	MS
108	S624	0	Max Baucus	Democrat	MT
108	HR1047	1	Philip Crane	Republican	IL
108	HR3949	0	Samuel Graves	Republican	MO
108	HR2629	0	Joseph Crowley	Democrat	NY
108	SCONRES11	0	Michael Crapo	Republican	ID
108	HCONRES290	0	Peter DeFazio	Democrat	OR
108	HCONRES23	1	Joseph Knollenberg	Republican	MI
108	HR4842	1	Thomas DeLay	Republican	TX
108	S1417	1	Charles Grassley	Republican	IA
108	S1416	1	Charles Grassley	Republican	IA
108	S489	1	Michael DeWine	Republican	OH
108	HR851	0	Louise Slaughter	Democrat	NY
108	HR4103	1	William Thomas	Republican	CA
108	HR2739	1	Thomas DeLay	Republican	TX
108	HRES328	0	Philip English	Republican	PA
108	S1592	1	Joseph Lieberman	Democrat	CT
108	HCONRES225	0	Gregory Meeks	Democrat	NY
108	HR5117	0	Adam Schiff	Democrat	CA
108	SCONRES27	1	Christopher Bond	Republican	MO
108	SRES293	0	Russell Feingold	Democrat	WI
108	HR4418	0	Philip Crane	Republican	IL
108	S2610	1	Charles Grassley	Republican	IA
108	S1120	0	Max Baucus	Democrat	MT
108	S2786	0	Evan Bayh	Democrat	IN
108	S2624	0	Frank Lautenberg	Democrat	NJ
108	HR3624	0	James Oberstar	Democrat	MN
108	HCONRES331	0	Mark Souder	Republican	IN
108	HR1224	0	Charles Rangel	Democrat	NY
108	S1900	0	Richard Lugar	Republican	IN
108	HR2092	1	Robert Berry	Democrat	AR
108	HRES445	1	Benjamin Cardin	Democrat	MD
108	HRES705	0	Philip English	Republican	PA
108	HCONRES243	0	Sander Levin	Democrat	MI
108	S1893	0	Max Baucus	Democrat	MT
108	S2992	0	Max Baucus	Democrat	MT
108	HRES346	0	Michael Michaud	Democrat	ME
108	S1911	0	Orrin Hatch	Republican	UT
108	S1952	0	Charles Grassley	Republican	IA
108	HCONRES509	0	George Nethercutt	Republican	WA
108	S1541	0	John Edwards	Democrat	NC
108	HCONRES197	1	James Kolbe	Republican	AZ
108	HR2738	1	Thomas DeLay	Republican	TX
108	S671	1	Charles Grassley	Republican	IA
108	HR4780	0	Peter DeFazio	Democrat	OR

Congress	Bill Number	Lobbied	Sponsor	Sponsor Party	Sponsor State
108	HCONRES224	0	Virgil Goode	Democrat/Independent	VA
108	HRES510	0	Dale Kildee	Democrat	MI
108	HR2056	0	Scott McInnis	Republican	CO
108	SRES119	0	Susan Collins	Republican	ME
108	HR4759	1	Thomas DeLay	Republican	TX
108	HR3564	0	Ted Strickland	Democrat	OH
108	HR5026	0	Sander Levin	Democrat	MI
108	S2205	0	Carl Levin	Democrat	MI
108	S676	0	Max Baucus	Democrat	MT
108	S1324	1	Charles Grassley	Republican	IA
108	HR2737	0	Sander Levin	Democrat	MI
108	HR1031	0	E. Shaw	Republican	FL
108	S136	1	Blanche Lincoln	Democrat	AR
108	SRES289	0	Byron Dorgan	Democrat	ND
108	S2765	0	Olympia Snowe	Republican	ME
108	HRES718	0	Christopher John	Democrat	LA
108	S2529	1	Charles Grassley	Republican	IA
108	S1989	0	Mark Dayton	Democrat	MN
108	SCONRES22	1	Don Nickles	Republican	OK
108	HR4559	0	Henry Hyde	Republican	IL
108	HR3958	1	Sander Levin	Democrat	MI
108	HR2365	1	Philip English	Republican	PA
109	S4077	1	Norm Coleman	Republican	MN
109	S4066	0	Lindsey Graham	Republican	SC
109	HR6142	1	William Thomas	Republican	CA
109	S1307	1	Charles Grassley	Republican	IA
109	HR5684	1	John Boehner	Republican	OH
109	HR466	0	Samuel Graves	Republican	MO
109	S3933	1	James Inhofe	Republican	OK
109	HR1170	1	Sander Levin	Democrat	MI
109	HCONRES230	1	Darrell Issa	Republican	CA
109	HR3480	1	Michael Michaud	Democrat	ME
109	S1050	1	Blanche Lincoln	Democrat	AR
109	HR3283	1	Philip English	Republican	PA
109	HCONRES342	1	Robert Andrews	Democrat	NJ
109	SCONRES25	0	William Frist	Republican	TN
109	HR6076	1	Charles Rangel	Democrat	NY
109	HJRES27	1	Bernard Sanders	Independent	VT
109	S1444	1	Max Baucus	Democrat	MT
109	HR6032	1	Robin Hayes	Republican	NC
109	S3903	1	Elizabeth Dole	Republican	NC
109	HR5068	1	Deborah Pryce	Republican	OH
109	S3938	1	Michael Crapo	Republican	ID
109	S3640	0	Charles Schumer	Democrat	NY
109	HR5529	1	Philip English	Republican	PA
109	HR6406	1	William Thomas	Republican	CA
109	S3967	1	Hillary Clinton	Democrat	NY
109	HR4680	1	Gerald Weller	Republican	IL
109	HR1498	1	Timothy Ryan	Democrat	OH
109	HR3306	1	Charles Rangel	Democrat	NY
109	HR3045	1	Thomas DeLay	Republican	TX
109	HR4340	1	Roy Blunt	Republican	MO
109	S3904	1	Max Baucus	Democrat	MT
109	HR4217	1	Joseph Knollenberg	Republican	MI
109	HR2208	1	Donald Manzullo	Republican	IL
109	SCONRES111	0	Charles Hagel	Republican	NE
109	HR4812	1	Sherrod Brown	Democrat	OH
109	S1308	1	Max Baucus	Democrat	MT
109	HR5043	1	Benjamin Cardin	Democrat	MD
109	SRES142	1	Byron Dorgan	Democrat	ND

Congress	Bill Number	Lobbied	Sponsor	Sponsor Party	Sponsor State
109	S355	1	Byron Dorgan	Democrat	ND
109	HR4186	1	David Camp	Republican	MI
109	HR6346	1	William Thomas	Republican	CA
109	HRES84	1	Joseph Knollenberg	Republican	MI
109	HCONRES244	0	David Dreier	Republican	CA
109	S3364	0	Ben Nelson	Democrat	NE
109	S752	0	Frank Lautenberg	Democrat	NJ
109	HR5696	0	Jim Costa	Democrat	CA
109	S46	1	Carl Levin	Democrat	MI
109	HR5196	0	Donald Manzullo	Republican	IL
109	HRES98	1	Dale Kildee	Democrat	MI
109	HR4392	1	Thomas Allen	Democrat	ME
109	SCONRES84	0	Jon Kyl	Republican	AZ
109	S2317	1	Max Baucus	Democrat	MT
109	S3658	1	Charles Grassley	Republican	IA
109	HR1575	1	Sue Myrick	Republican	NC
109	S2267	1	Byron Dorgan	Democrat	ND
109	HR3271	1	Michael Rogers	Republican	MI
109	S2	1	Olympia Snowe	Republican	ME
109	HRES433	0	Michael Michaud	Democrat	ME
109	HR3583	0	Anne Northup	Republican	KY
109	S1542	1	Debbie Ann Stabenow	Democrat	MI
109	S1048	1	Charles Schumer	Democrat	NY
109	S3569	1	Charles Grassley	Republican	IA
109	HR5718	1	Robin Hayes	Republican	NC
109	HR886	1	James Kolbe	Republican	AZ
109	S3899	1	Byron Dorgan	Democrat	ND
109	HCONRES346	1	James Ramstad	Republican	MN
109	S377	1	Joseph Lieberman	Democrat	CT
109	S1551	1	David Vitter	Republican	LA
109	HR3363	1	Kevin Brady	Republican	TX
109	HCONRES217	1	Mark Souder	Republican	IN
109	SCONRES28	1	Richard Lugar	Republican	IN
109	S2467	1	Charles Grassley	Republican	IA
109	HCONRES186	1	Virgil Goode	Democrat/Independent	VA
109	HR4250	0	John Mica	Republican	FL
109	SCONRES55	1	Larry Craig	Republican	ID
109	S1963	1	Max Baucus	Democrat	MT
109	HR6208	1	Philip English	Republican	PA
109	SRES459	0	Evan Bayh	Democrat	IN
109	HR2414	1	Michael Rogers	Republican	MI
109	S817	1	Debbie Ann Stabenow	Democrat	MI
109	HR3141	0	Mark Kirk	Republican	IL
109	HCONRES303	1	Peter DeFazio	Democrat	OR
109	HRES577	1	Philip English	Republican	PA
109	HCONRES131	1	David Dreier	Republican	CA
109	HR4733	1	Charles Rangel	Democrat	NY
109	S191	1	Gordon Smith	Republican	OR
109	S1421	1	Susan Collins	Republican	ME
109	HR746	1	Benjamin Cardin	Democrat	MD
109	HCONRES203	1	Charles Rangel	Democrat	NY
109	HR5070	1	Charles Rangel	Democrat	NY
109	S2027	1	Charles Grassley	Republican	IA
109	S984	1	Olympia Snowe	Republican	ME
109	S3556	1	Jim DeMint	Republican	SC
110	SRES241	0	Sherrod Brown	Democrat	OH
110	HR6530	1	Charles Rangel	Democrat	NY
110	HR1958	1	Marcy Kaptur	Democrat	OH
110	HR2714	1	James Barrett	Republican	SC
110	S2113	1	Max Baucus	Democrat	MT

Congress	Bill Number	Lobbied	Sponsor	Sponsor Party	Sponsor State
110	S2372	1	Gordon Smith	Republican	OR
110	SRES417	0	Charles Hagel	Republican	NE
110	HRES525	1	Thomas Allen	Democrat	ME
110	HRES1087	0	Marcy Kaptur	Democrat	OH
110	HR1002	1	John Spratt	Democrat	SC
110	HRES928	1	David Dreier	Republican	CA
110	HR6452	1	Earl Blumenauer	Democrat	OR
110	S2222	1	Hillary Clinton	Democrat	NY
110	S3464	1	Max Baucus	Democrat	MT
110	SCONRES60	0	Max Baucus	Democrat	MT
110	S1250	0	Olympia Snowe	Republican	ME
110	HR6148	1	Peter DeFazio	Democrat	OR
110	HR2600	1	William Pascrell	Democrat	NJ
110	S217	1	Norm Coleman	Republican	MN
110	HR3214	0	Patrick Murphy	Democrat	PA
110	HR2942	1	Timothy Ryan	Democrat	OH
110	S974	1	Susan Collins	Republican	ME
110	S2611	1	Byron Dorgan	Democrat	ND
110	S491	1	Charles Schumer	Democrat	NY
110	HR3684	1	Mike McIntyre	Democrat	NC
110	HR857	1	Michael McNulty	Democrat	NY
110	S364	1	John Rockefeller	Democrat	WV
110	HR5960	1	Jason Altmire	Democrat	PA
110	HCONRES137	1	Shelley Berkley	Democrat	NV
110	HR6415	1	William Pascrell	Democrat	NJ
110	HR3273	1	Rick Larsen	Democrat	WA
110	HR6180	1	Michael Michaud	Democrat	ME
110	HRES552	1	James Marshall	Democrat	GA
110	HR4329	1	Marcy Kaptur	Democrat	OH
110	HR3427	1	James McDermott	Democrat	WA
110	HR708	1	Philip English	Republican	PA
110	S2776	1	Maria Cantwell	Democrat	WA
110	S2906	1	Robert Casey	Democrat	PA
110	SRES33	0	Richard Lugar	Republican	IN
110	S3083	1	Sherrod Brown	Democrat	OH
110	HR782	1	Timothy Ryan	Democrat	OH
110	S652	1	Gordon Smith	Republican	OR
110	HR1729	1	Robin Hayes	Republican	NC
110	HR6924	0	Walter Herger	Republican	CA
110	S796	1	Jim Bunning	Republican	KY
110	HR6560	1	Charles Rangel	Democrat	NY
110	S318	1	Elizabeth Dole	Republican	NC
110	HR504	1	Robin Hayes	Republican	NC
110	S460	1	Olympia Snowe	Republican	ME
110	S1919	1	Max Baucus	Democrat	MT
110	S445	1	Debbie Ann Stabenow	Democrat	MI
110	S1280	1	Sherrod Brown	Democrat	OH
110	S2964	0	Frank Lautenberg	Democrat	NJ
110	HR7222	1	Charles Rangel	Democrat	NY
110	S1021	1	Debbie Ann Stabenow	Democrat	MI
110	HR3688	1	Steny Hoyer	Democrat	MD
110	SJRES38	0	Charles Grassley	Republican	IA
110	S2830	1	Harry Reid	Democrat	NV
110	HR7014	0	Philip English	Republican	PA
110	HR3905	1	James McDermott	Democrat	WA
110	S1652	1	Elizabeth Dole	Republican	NC
110	HR910	1	Philip English	Republican	PA
110	HCONRES22	0	Virgil Goode	Democrat/Independent	VA
110	HR3934	1	Joseph Crowley	Democrat	NY
110	HR5724	1	Steny Hoyer	Democrat	MD

Congress	Bill Number	Lobbied	Sponsor	Sponsor Party	Sponsor State
110	HR1127	1	Joseph Knollenberg	Republican	MI
110	S571	1	Byron Dorgan	Democrat	ND
110	HR1229	1	Artur Davis	Democrat	AL
110	HR6795	0	Peter DeFazio	Democrat	OR
110	HR3920	1	Charles Rangel	Democrat	NY
110	HCONRES178	0	David Dreier	Republican	CA
110	HR2886	1	Joseph Knollenberg	Republican	MI
110	S2976	1	Frank Lautenberg	Democrat	NJ
110	HR1278	1	David Camp	Republican	MI
111	HR4759	1	Gene Taylor	Democrat	MS
111	HR5694	1	Zoe Lofgren	Democrat	CA
111	HR5797	0	Rick Larsen	Democrat	WA
111	S4003	1	Jim DeMint	Republican	SC
111	HR4046	0	Shelley Berkley	Democrat	NV
111	HR2293	1	Christopher Van Hollen	Democrat	MD
111	HRES1562	0	Walter Minnick	Democrat	ID
111	HRES934	0	John Dingell	Democrat	MI
111	HRES987	0	Rodney Frelinghuysen	Republican	NJ
111	HR3012	1	Michael Michaud	Democrat	ME
111	S1982	1	Sherrod Brown	Democrat	OH
111	S1644	1	Debbie Ann Stabenow	Democrat	MI
111	S1671	0	Lindsey Graham	Republican	SC
111	HR4101	1	James McDermott	Democrat	WA
111	HRES997	1	Betty Sutton	Democrat	OH
111	HR496	1	Charles Rangel	Democrat	NY
111	S1466	1	Debbie Ann Stabenow	Democrat	MI
111	S3823	1	Jefferson Sessions	Republican	AL
111	S705	1	John Kerry	Democrat	MA
111	S2821	1	Sherrod Brown	Democrat	OH
111	S363	1	Olympia Snowe	Republican	ME
111	S730	1	John Ensign	Republican	NV
111	S1141	1	Dianne Feinstein	Democrat	CA
111	S1043	1	Lindsey Graham	Republican	SC
111	S594	0	Robert Casey	Democrat	PA
111	HRES933	1	John Dingell	Democrat	MI
111	SRES311	1	Richard Lugar	Republican	IN
111	HR5975	0	Brad Sherman	Democrat	CA
111	HR6007	0	Mark Critz	Democrat	PA
111	HR4284	1	Charles Rangel	Democrat	NY
111	HR3674	1	Peter Welch	Democrat	VT
111	HR1971	1	John Spratt	Democrat	SC
111	HRES887	1	Robert Andrews	Democrat	NJ
111	HR5156	1	Doris Matsui	Democrat	CA
111	S2861	1	Olympia Snowe	Republican	ME
111	HRES414	0	David Dreier	Republican	CA
111	SRES136	0	John Kerry	Democrat	MA
111	SRES76	0	Maria Cantwell	Democrat	WA
111	HR2310	1	Rick Larsen	Democrat	WA
111	S496	1	Maria Cantwell	Democrat	WA
111	S1766	1	Sherrod Brown	Democrat	OH
111	S3741	1	Kay Hagan	Democrat	NC
111	HR3039	1	James McDermott	Democrat	WA
111	HR5393	1	Larry Kissell	Democrat	NC
111	HR3252	0	Rubn Hinojosa	Democrat	TX
111	HCONRES276	0	Robert Andrews	Democrat	NJ
111	HR6259	0	Zachary Space	Democrat	OH
111	HRES1748	0	F. Sensenbrenner	Republican	WI
111	S1631	1	Max Baucus	Democrat	MT
111	HR3786	1	Louise Slaughter	Democrat	NY
111	HRES1699	0	Steve Kagen	Democrat	WI

Congress	Bill Number	Lobbied	Sponsor	Sponsor Party	Sponsor State
111	HRES1435	0	Charles Djou	Republican	HI
111	SRES388	0	Debbie Ann Stabenow	Democrat	MI
111	S1616	1	Maria Cantwell	Democrat	WA
111	HR6311	0	Earl Blumenauer	Democrat	OR
111	HR5940	1	Robert Aderholt	Republican	AL
111	HR471	1	Jason Altmire	Democrat	PA
111	HR2927	1	William Pascrell	Democrat	NJ
112	HR5986	1	David Camp	Republican	MI
112	S3327	1	Sherrod Brown	Democrat	OH
112	HR3079	1	Eric Cantor	Republican	VA
112	HR6537	1	Devin Nunes	Republican	CA
112	S2215	1	Richard Durbin	Democrat	IL
112	HRES472	0	David Dreier	Republican	CA
112	S1443	1	Dianne Feinstein	Democrat	CA
112	HR2832	1	David Camp	Republican	MI
112	S3406	1	Max Baucus	Democrat	MT
112	S1641	1	Max Baucus	Democrat	MT
112	S3225	0	Ron Wyden	Democrat	OR
112	HR4105	1	David Camp	Republican	MI
112	S1827	0	Debbie Ann Stabenow	Democrat	MI
112	HR6642	1	Kevin Brady	Republican	TX
112	HR1518	1	Mark Critz	Democrat	PA
112	HRES374	0	William Shuster	Republican	PA
112	HR2707	1	Devin Nunes	Republican	CA
112	S1130	1	John Rockefeller	Democrat	WV
112	S1683	1	Kay Hagan	Democrat	NC
112	HR6156	1	David Camp	Republican	MI
112	SRES20	1	Mike Johanns	Republican	NE
112	HR2666	0	William Pascrell	Democrat	NJ
112	S1779	1	Jeff Merkley	Democrat	OR
112	HR6656	1	James McDermott	Democrat	WA
112	S2153	1	Max Baucus	Democrat	MT
112	S1643	1	Max Baucus	Democrat	MT
112	S1267	1	John Rockefeller	Democrat	WV
112	S3292	1	Claire McCaskill	Democrat	MO
112	S3218	1	Jeanne Shaheen	Democrat	NH
112	S1162	1	Jim DeMint	Republican	SC
112	HR1603	1	Peter DeFazio	Democrat	OR
112	HR913	1	Robert Aderholt	Republican	AL
112	S3326	1	Max Baucus	Democrat	MT
112	HRES719	0	David Dreier	Republican	CA
112	HR4071	1	Tammy Baldwin	Democrat	WI
112	HRES103	1	F. Sensenbrenner	Republican	WI
112	HR6538	1	Devin Nunes	Republican	CA
112	HRES266	1	Mike Kelly	Republican	PA
112	HR2287	1	Marcy Kaptur	Democrat	OH
112	S3347	1	Sherrod Brown	Democrat	OH
112	HR4221	1	Christopher Smith	Republican	NJ
112	HR29	1	Mike McIntyre	Democrat	NC
112	HR3112	1	Michael Turner	Republican	OH
112	S1642	1	Max Baucus	Democrat	MT
112	HR5157	0	Zoe Lofgren	Democrat	CA
112	HR6530	1	Zoe Lofgren	Democrat	CA
112	HR3078	1	Eric Cantor	Republican	VA
112	S98	1	Robert Portman	Republican	OH
112	HR6699	1	Michael Turner	Republican	OH
112	HR3782	1	Darrell Issa	Republican	CA
112	S308	1	Robert Casey	Democrat	PA
112	HR2813	1	Peter Welch	Democrat	VT
112	S2029	1	Ron Wyden	Democrat	OR

Congress	Bill Number	Lobbied	Sponsor	Sponsor Party	Sponsor State
112	SRES218	0	Richard Lugar	Republican	IN
112	HR6149	1	Michael Michaud	Democrat	ME
112	HR1749	1	Louise Slaughter	Democrat	NY
112	HRES86	1	Rodney Frelinghuysen	Republican	NJ
112	HR2754	1	Larry Kissell	Democrat	NC
112	HR5708	1	Charles Boustany	Republican	LA
112	S3568	1	Max Baucus	Democrat	MT
112	S708	1	Sherrod Brown	Democrat	OH
112	HR3080	1	Eric Cantor	Republican	VA
112	S1711	1	Sherrod Brown	Democrat	OH
112	HR6307	1	Ander Crenshaw	Independent	FL
112	HR2216	1	Rubn Hinojosa	Democrat	TX
112	S108	1	John Ensign	Republican	NV
112	HR2988	0	Howard Berman	Democrat	CA
112	HR502	1	Doris Matsui	Democrat	CA
112	S1238	1	Olympia Snowe	Republican	ME
112	S433	1	Jefferson Sessions	Republican	AL
112	HR3375	1	Steve King	Republican	IA
112	S3671	1	Richard Lugar	Republican	IN
113	HR3830	1	David Camp	Republican	MI
113	S660	1	Orrin Hatch	Republican	UT
113	HR1020	1	Aaron Schock	Republican	IL
113	S1331	1	Max Baucus	Democrat	MT
113	HR889	1	Zoe Lofgren	Democrat	CA
113	HR2139	1	Ander Crenshaw	Independent	FL
113	S662	1	Max Baucus	Democrat	MT
113	S790	1	Claire McCaskill	Democrat	MO
113	S489	1	John Thune	Republican	SD
113	HR4763	1	Tony Crdenas	Democrat	CA
113	S718	1	Richard Durbin	Democrat	IL
113	S431	1	Dianne Feinstein	Democrat	CA
113	HR400	1	Doris Matsui	Democrat	CA
113	HR2709	1	David Camp	Republican	MI
113	S1788	1	John Thune	Republican	SD
113	S432	1	Dianne Feinstein	Democrat	CA
113	HR1682	1	Zoe Lofgren	Democrat	CA
113	HR580	1	Michael Turner	Republican	OH
113	HR156	0	Mike McIntyre	Democrat	NC
113	HR166	1	Charles Boustany	Republican	LA
113	S1900	1	Max Baucus	Democrat	MT
113	HR191	1	Marcy Kaptur	Democrat	OH
113	HRES712	1	Bobby Rush	Democrat	IL
113	S1748	1	Brian Schatz	Democrat	HI
113	S1179	1	Jeanne Shaheen	Democrat	NH
113	HCONRES39	1	Ted Yoho	Republican	FL
113	HR3558	1	Tom Graves	Republican	GA
113	HR1777	1	Christopher Smith	Republican	NJ
113	S192	1	John Barrasso	Republican	WY
113	HR3167	1	Lee Terry	Republican	NE
113	HR3733	1	Earl Blumenauer	Democrat	OR
113	HR1420	0	Pete Gallego	Democrat	TX
113	S1412	1	Kay Hagan	Democrat	NC
113	S1839	1	Mark Begich	Democrat	AK
113	HR3467	0	Louise Slaughter	Democrat	NY
113	HR3004	1	Ami Bera	Democrat	CA
113	S355	1	Jeff Merkley	Democrat	OR

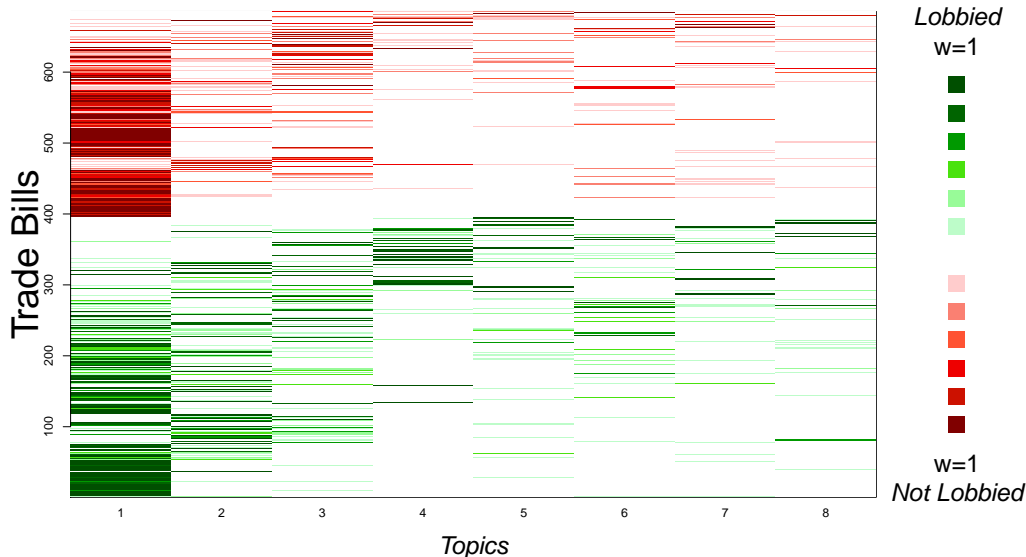


Figure 1: **Distribution over Topics and Lobbying:** This figure summarizes the distribution over 8 trade-related topics for each bill. Lines with darker shade in each column implies that a given bill is highly associated with the given topic. It shows that Topic 2 and Topic 4 are useful in distinguishing lobbied (green) and non-lobbied bills (red).

7.2 LDA Topic Models Applied to Trade Bills

I assume that a given bill has a probability distribution over “topics”, where each topic can be characterized as a distribution over words. For example, suppose that there are five topics that generally describe the universe of trade bills: 1) free trade agreement, 2) miscellaneous tariff bill, 3) fast-track authority for president, 4) appropriations bill, and 5) protection bill. To the extent that a single bill contains one or more than one of these topics, a bill can be characterized as a probability distribution over these topics, e.g., 70% free trade agreement with 30% protection where the latter reflects the concerns of import-competing industries in the face of free trade agreement. Secondly, a topic is a probability distribution over words because free trade agreement topic might have more frequent use of words such as agreement, tariff, president, import and export, etc than appropriations topic.³ This will help us characterize each bill in terms of the distribution over topics, which will be subsequently used to link to the occurrence of lobbying.

I fit topic models with 5 to 20 topics. Using the one topic model as a baseline, I chose a model with highest Bayes factor to determine the number of topics.⁴ This gives the 8 topic model. Figure 1 graphically summarizes the distribution over the 8 topics for each bill categorizing non-lobbied (red & above 400) and lobbied bills (green & below 400) separately. I check whether there exists differences between lobbied and non-lobbied bills. It shows that both kinds of bills are heavily loaded with Topic 1. This is not surprising in that each bill is trade-related and the

³See Blei, Ng, and Jordan (2003) for a more formal description of Latent dirichlet allocation topic models used in this section.

⁴ For N topic model M_N , Bayes factor is calculated based by computing the following quantity $\frac{\Pr(D|M_N)}{\Pr(D|M_1)} = \frac{\int \Pr(\theta_N|M_N) \Pr(D|\theta_N, M_N) d\theta_N}{\int \Pr(\theta_1|M_1) \Pr(D|\theta_1, M_1) d\theta_1}$, where D is observed data, θ is model parameters.

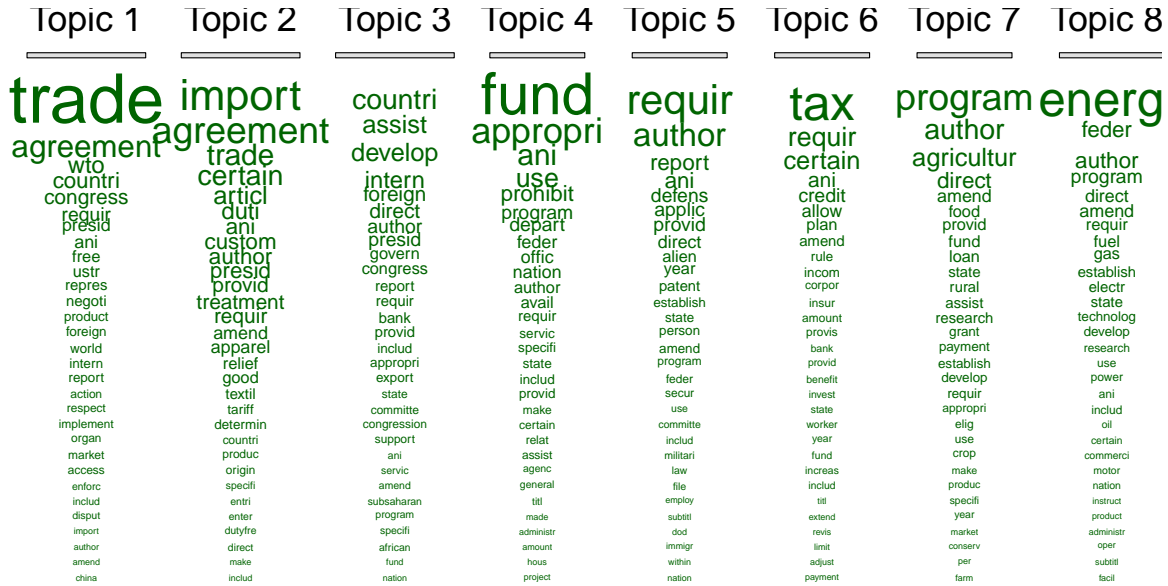


Figure 2: **Distribution over Words in 8 Topics:** This figure presents top 30 words associated with each of the 8 topics. The size is proportional to the loading sizes of each word.

first topic concerns general “trade” as a topic. Compared to Topic 1, Topic 2 and Topic 4 jointly separate the occurrence of lobbying better. In other words, bills with more weights on the two topics tend to get lobbied more.

Figure 2 displays top 30 words associated with each topic. A close examination of Topic 2 and the bills that have the highest loading on the topic suggests that this topic is related to either the fast-track authority bills that grant president an authority to negotiate trade agreements or various bilateral trade agreements themselves, e.g., “United States-Korea Free Trade Agreement Implementation Act” (HR3080). Note that countries negotiate over tariff and non-tariff barriers on highly differentiated products during the course of trade agreements. Topic 4 is related to appropriation bill that authorizes the government to spend money. Most frequent examples include appropriation bills to fund Export-Import Bank of the U.S. and their export financing program to promote U.S. exports abroad, e.g., “Export-Import Bank Reauthorization Act of 2006” (S3938).

To be sure, this is not to argue that all lobbying activities associated with the bills can be considered as pro-trade lobbying. Admittedly, lobbying on liberal trade bills may occur as much to oppose as to support it to be passed. However, the evidence provided in this section strongly suggests that 1) firms are important political actors, 2) they often lobby on specific products, and 3) there exists a pattern that distinguishes between lobbied and non-lobbied trade bills.

7.3 LASSO regression on CRS summary of Trade Bills

LASSO puts a constraint on the sum of coefficients β_j associated with each word.

$$\min_{\beta_0, \beta \in \mathbb{R}^{p+1}} \left[(y_i - \beta_0 - w_i^T \beta)^2 + \lambda \sum_{j=1}^p |\beta_j| \right] \quad (10)$$

I use cross-validation to choose λ that minimizes out-of-sample prediction error. Specifically, I do 20-fold cross-validation whereby λ is chosen to minimize the mean-squared error (MSE) in predicting the occurrence of lobbying. The model is then applied to a randomly chosen 5% of the bills to predict how likely it is that each bill will be lobbied.⁵ This process is repeated 1,000 times to examine whether there exist words in the CRS summaries that help to predict the occurrence of lobbying. On average, bills that are not lobbied are predicted to be lobbied 35% of the time, whereas bills that are actually lobbied are predicted to be so almost 80% of the time. I also did non-parametric statistical test to assess the mean difference of predicted probabilities between lobbied and non-lobbied bills. Wilcoxon signed-rank test is used because the truncation of probabilities (between zero and one) makes it hard to make the normality assumption necessary for t-test. The result validates that there is a significant mean difference in cross-validation sample prediction (p-value $< 2.2e^{-16}$).

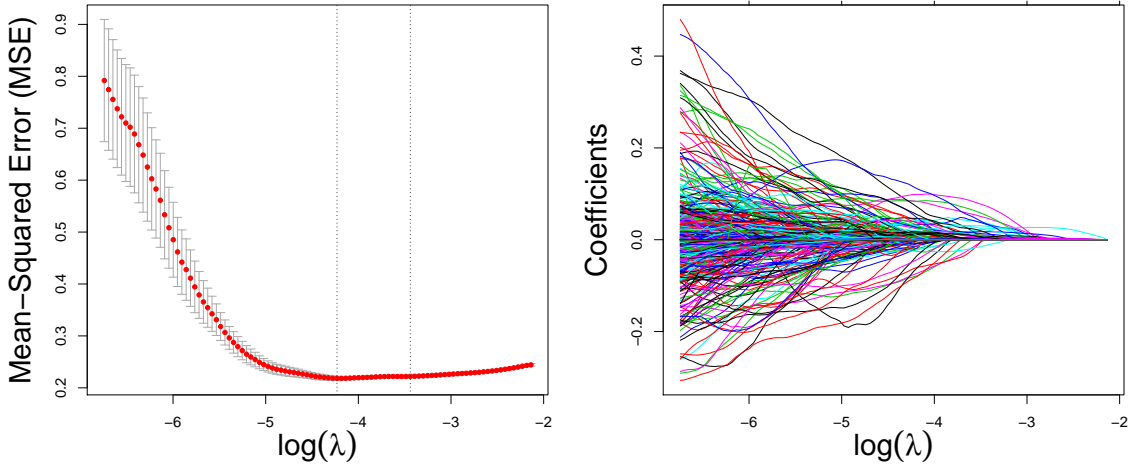
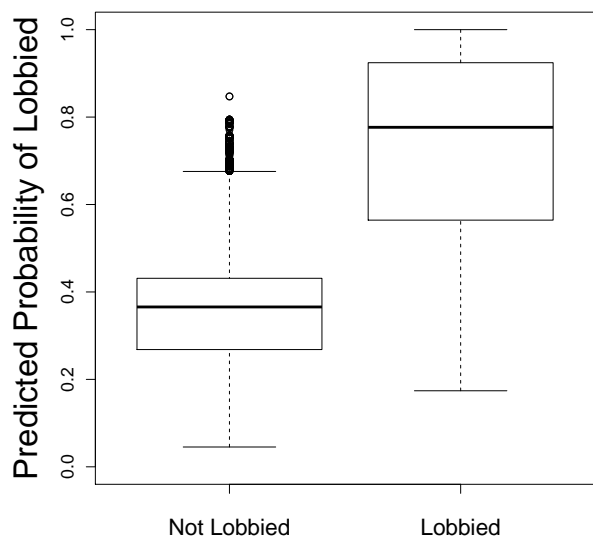
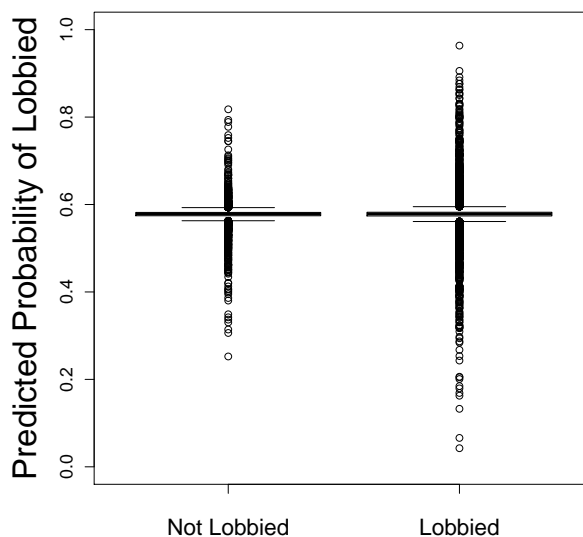


Figure 3: **Cross validation:** The left panel shows that $\log(\lambda) \approx -4$ is found to minimize the MSE. As shown in the right panel, most coefficients are constrained to be zero around the value of the chosen λ .

⁵I used cross-validated estimates instead of out-of-sample-validated estimates given that my purpose is to identify the words associated with lobbying in the sample. I used the latter to check whether there is over-fitting sample-specific attributes of the observed data. Doing so also gives statistically significant separation.



(a) Cross-validation Sample Prediction



(b) Placebo Test

Figure 4: **Predicting the likelihood of Trade Bills Lobbied:** Panel (a) presents the result from the LASSO (Least Absolute Shrinkage and Selection Operator) method. It shows that there exists distinct patterns in the frequency of words appearing in the CRS summaries that distinguish bills that are not-lobbied and lobbied. Panel (b) shows the result from a placebo test whereby such distinction disappears by reordering the bill-to-term matrix such that terms that are originally from bill m becomes *as if* from bill $n \neq m$.

8 An Example of Lobbying Report

Clerk of the House of Representatives Legislative Resource Center B-106 Cannon Building Washington, DC 20515 http://lobbyingdisclosure.house.gov	Secretary of the Senate Office of Public Records 232 Hart Building Washington, DC 20510 http://www.senate.gov/lobby
--	---

LOBBYING REPORT

Lobbying Disclosure Act of 1995 (Section 5) - All Filers Are Required to Complete This Page

1. Registrant Name <input checked="" type="checkbox"/> Organization/Lobbying Firm <input type="checkbox"/> Self Employed Individual <u>Chrysler Group, LLC</u>	
2. Address <input type="checkbox"/> Check if different than previously reported Address1 <u>1401 H Street NW, Suite 700</u> Address2 _____ City <u>Washington</u> State <u>DC</u> Zip Code <u>20005</u> - _____ Country <u>USA</u>	
3. Principal place of business (if different than line 2) City _____ State _____ Zip Code _____ - _____ Country _____	
4a. Contact Name <u>NANCY BELL</u>	b. Telephone Number <input type="checkbox"/> International Number (202) 414-6798
c. E-mail <u>neb14@chrysler.com</u>	5. Senate ID# <u>400460283-12</u>
7. Client Name <input checked="" type="checkbox"/> Self <input type="checkbox"/> Check if client is a state or local government or instrumentality <u>Chrysler Group, LLC</u>	6. House ID# <u>408810000</u>

TYPE OF REPORT 8. Year 2011 Q1 (1/1 - 3/31) Q2 (4/1 - 6/30) Q3 (7/1-9/30) Q4 (10/1 - 12/31)

9. Check if this filing amends a previously filed version of this report

10. Check if this is a Termination Report Termination Date _____ 11. No Lobbying Issue Activity

INCOME OR EXPENSES - YOU MUST complete either Line 12 or Line 13	
<p align="center">12. Lobbying</p> <p>INCOME relating to lobbying activities for this reporting period was:</p> <p>Less than \$5,000 <input type="checkbox"/></p> <p>\$5,000 or more <input type="checkbox"/> \$ _____</p> <p>Provide a good faith estimate, rounded to the nearest \$10,000, of all lobbying related income from the client (including all payments to the registrant by any other entity for lobbying activities on behalf of the client).</p>	<p align="center">13. Organizations</p> <p>EXPENSE relating to lobbying activities for this reporting period were:</p> <p>Less than \$5,000 <input type="checkbox"/></p> <p>\$5,000 or more <input checked="" type="checkbox"/> \$ <u>\$1,131,245.00</u></p> <p>14. REPORTING Check box to indicate expense accounting method. See instructions for description of options.</p> <p><input type="checkbox"/> Method A. Reporting amounts using LDA definitions only</p> <p><input type="checkbox"/> Method B. Reporting amounts under section 6033(b)(8) of the Internal Revenue Code</p> <p><input checked="" type="checkbox"/> Method C. Reporting amounts under section 162(e) of the Internal Revenue Code</p>

Signature Filed Electronically **Date** 01/20/2012

Printed Name and Title Nancy Bell, Senior Manager

LOBBYING ACTIVITY. Select as many codes as necessary to reflect the general issue areas in which the registrant engaged in lobbying on behalf of the client during the reporting period. Using a separate page for each code, provide information as requested. Add additional page(s) as needed.

15. General issue area code (one per page)

16. Specific lobbying issues

Free Trade Agreements with South Korea, Panama and Colombia. Trade agreement negotiations on the Trans Pacific Partnership FTA. Possible future FTA with Egypt.

17. House(s) of Congress and Federal agencies Check if None

U.S. SENATE, U.S. HOUSE OF REPRESENTATIVES, U.S. Trade Representative (USTR)

18. Name of each individual who acted as a lobbyist in this issue area

First Name	Last Name	Suffix	Covered Official Position (if applicable)	New
Jody	Trapasso			<input type="checkbox"/>
Jordan	Moon		Deputy Chief of Staff and LD, Rep. Sue Myrick	<input checked="" type="checkbox"/>
Kristina	Pisanelli			<input type="checkbox"/>
Jennifer	Fox			<input type="checkbox"/>
				<input type="checkbox"/>
				<input type="checkbox"/>
				<input type="checkbox"/>
				<input type="checkbox"/>
				<input type="checkbox"/>

19. Interest of each foreign entity in the specific issues listed on line 16 above Check if None

Fiat S.p.A.
Fiat Automobiles S.p.A.
Fiat North America LLC

Printed Name and Title Nancy Bell, Senior Manager

Figure 5: 4th Quarter Lobbying Report by Chrysler in 2011

References

- Bagwell, Kyle, and Robert W. Staiger. 1999. "An Economic Theory of GATT." *The American Economic Review* 89 (1): 215–248.
- Bernheim, B. Douglas, and Michael D. Whinston. 1986. "Menu Auctions, Resource Allocation, and Economic Influence." *The Quarterly Journal of Economics* 101 (1): 1–31.
- Blei, David M., Andrew Y. Ng, and Michael I. Jordan. 2003. "Latent dirichlet allocation." *J. Mach. Learn. Res.* 3 (March): 993–1022.
- Bombardini, Matilde. 2008. "Firm Heterogeneity and Lobby Participation." *Journal of International Economics* 75 (2): 329 - 348.
- Gowa, Joanne, and Soo Yeon Kim. 2005. "An Exclusive Country Club: The Effects of the GATT on Trade, 1950-94." *World Politics* 57 (4): pp. 453-478.
- Grossman, Gene M., and Elhanan Helpman. 1994. "Protection for Sale." *The American Economic Review* 84 (4): 833–850.
- Krugman, Paul. 1980. "Scale Economies, Product Differentiation, and the Pattern of Trade." *The American Economic Review* 70 (5): pp. 950-959.
- Topalova, Petia, and Amit Khandelwal. 2011. "Trade Liberalization and Firm Productivity: The Case of India." *Review of economics and statistics* 93 (3): 995–1009.