Estimating Trade Preferences Using GloVe:
Discrepancy Between Roll Calls and Press Releases on Trade in the 114th US Congress

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Abstract

- Do legislators speak as they vote?
- The goals of this paper are 1) examining the discrepancy between trade-vote and trade-press releases; and 2) why some legislators show the discrepancy.
- I argue that the constrained voting on trade leads to insufficient reflection of legislators' underlying preferences on trade. Therefore, legislators have incentives to use press releases strategically to signal their preferences to their political audience, particularly their constituents.

Motivation

- Legislators' votes on trade-related bills are highly *constrained choices*: a few binary decisions on multifaceted issues; susceptible to strong party discipline.
- Some legislators' votes and press releases present the discrepancy of their revealed preferences on trade.
- Why is there such the discrepancy?

Hypothesis

- **H1** *Legislators' trade-related press releases are more likely to reflect constituent interests than their votes on trade.*
- **H2** *Leigslators who feel insecure about their re-election are more likely to issue press releases that correspond to their constituent interests.*

Data

- Press release data for the House of Representatives in the 114th Congress (2015-2016): 744 trade-related press releases
- Roll call votes on the 4 trade-related bills in the 114th Congress
- Congressional floor speeches on trade-related bills in the 114th Congress: 250 trade-related congressional records

Method 1: Selecting Reference Text (Pro-/Anti-Trade Phrases)

- Used congressional floor speeches of "rigid members" (the members who voted for all the four trade-related bills or voted against all the bills) as reference text.
- To select useful phrases that efficiently identify legislator's trade preferences and drop "noisy" phrases, I implement the Least Absolute Shrinkage and Selection Operator (LASSO) method for logistic regression (y: 1/0; X: all bigrams in each "rigid" member's floor speeches).
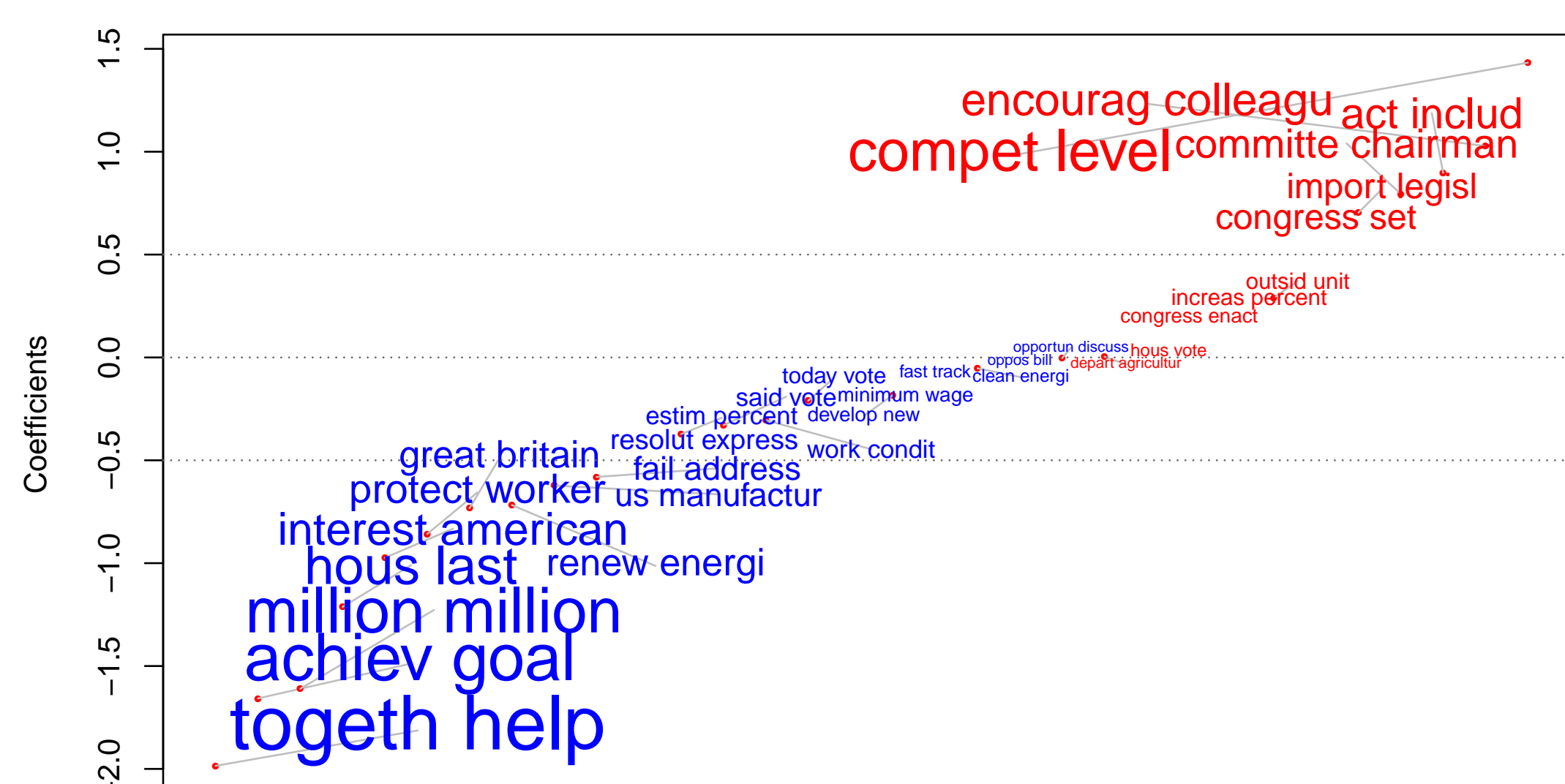

Figure 1: Selected Pro- and Anti-Trade Phrases by LASSO

Method 2: Estimating Trade Preferences Using GloVe (Global Vectors for Word Representation)

Model Overview

- An unsupervised learning algorithm to obtain vector representation for words (Pennington, Socher and Manning 2014).
- Collect word co-occurence statistics in a form of word co-occurrence matrix X.

e.g. Window Size: 2
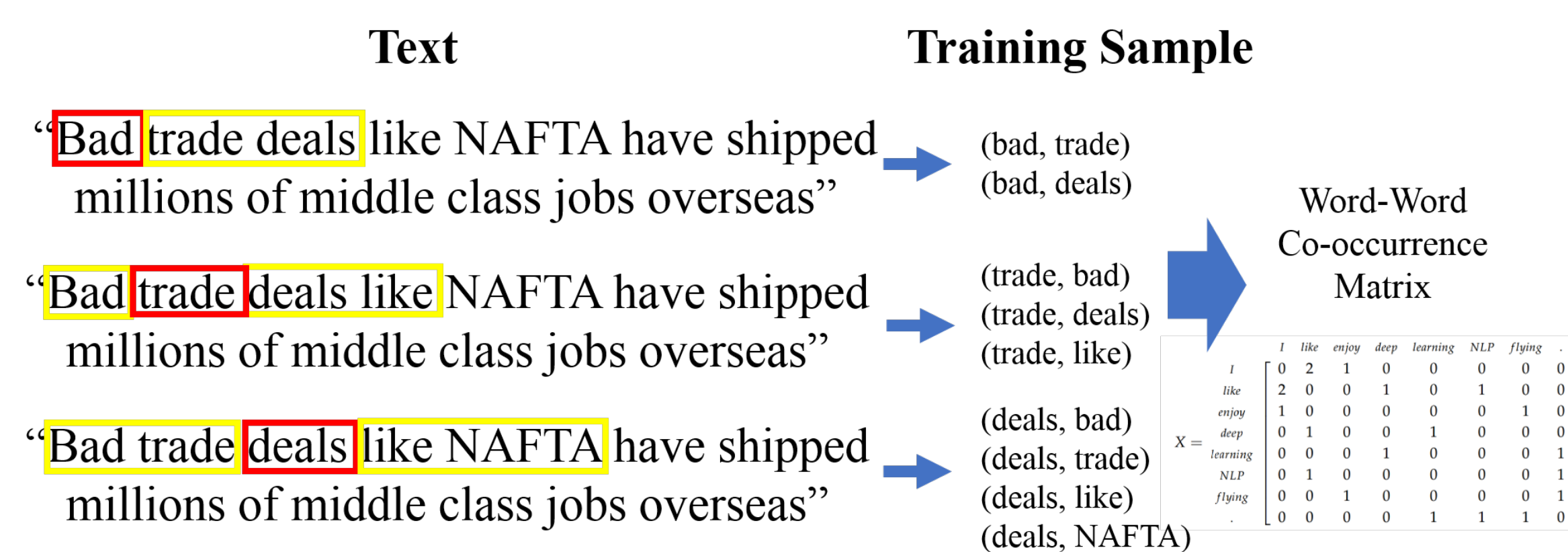
- Intuition: Vectorize words by using the *ratios* of word-word co-occurrence probabilities rather than using the probabilities themselves. -> difference from word2vec

Probability and Ratio	$k = solid$	$k = gas$	$k = water$	$k = fashion$
$P(k|ice)$	1.9×10^{-4}	6.6×10^{-5}	3.0×10^{-3}	1.7×10^{-5}
$P(k|steam)$	2.2×10^{-5}	7.8×10^{-4}	2.2×10^{-3}	1.8×10^{-5}
$P(k|ice)/P(k|steam)$	8.9	8.5×10^{-2}	1.36	0.96

Figure 2: Sample of Co-occurrence Probabilities for Target Words 'ice' and 'steam' with Selected Context Words from a Corpus (Pennington, Socher and Manning 2014)

$$F(w_{ice}, w_{steam}, w_{solid}) = \frac{P_{ice,solid}}{P_{steam,solid}} = \frac{P(solid|ice)}{P(solid|steam)} = \frac{1.9 \times 10^{-4}}{2.2 \times 10^{-5}} = 8.9$$

- Objective Function:

$$J = \sum_{i,j=1}^{V} f(X_{ij})(w_i^T \tilde{w}_j + b_i + \tilde{b}_j - \log X_{ij})^2$$
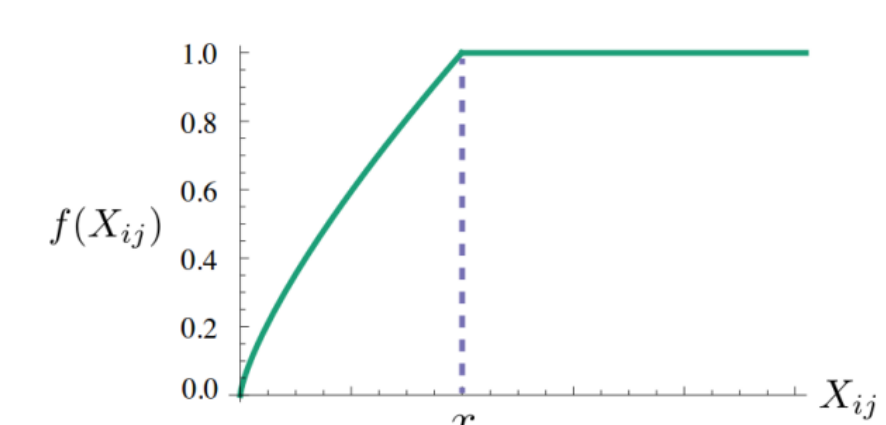
- w_i, w_j: vectors for word i and j, respectively.
- b_i, b_j: scalar biases.
- f is a weighting function which prevents learning only from extremely common word pairs.

Weighting function f

Application to Press Release Data

- Vectorized all bigrams on 50-dimensional space.

- Even if the phrase "success[ful] tpa" is the only phrase selected by the regularization method as a pro-trade phrase, the word embedding method can treat other bigrams such as "grant tpa" and "posit benefit" as pro-trade phrases as well.

- By calculating the sum of cosine similarities between bigrams in each press release and pro-/anti-trade LASSO terms, I classify each press release as pro-/anti-trade.
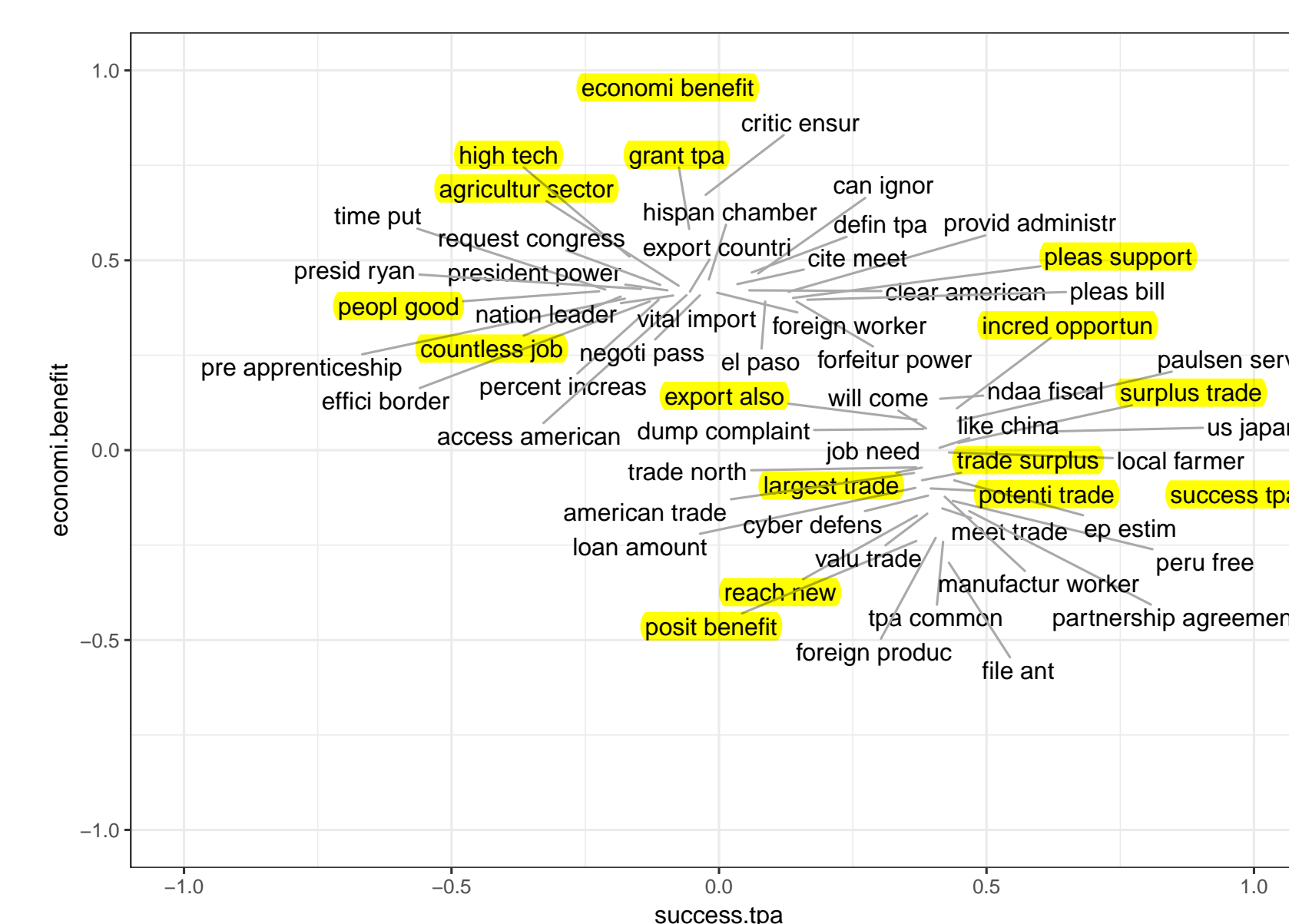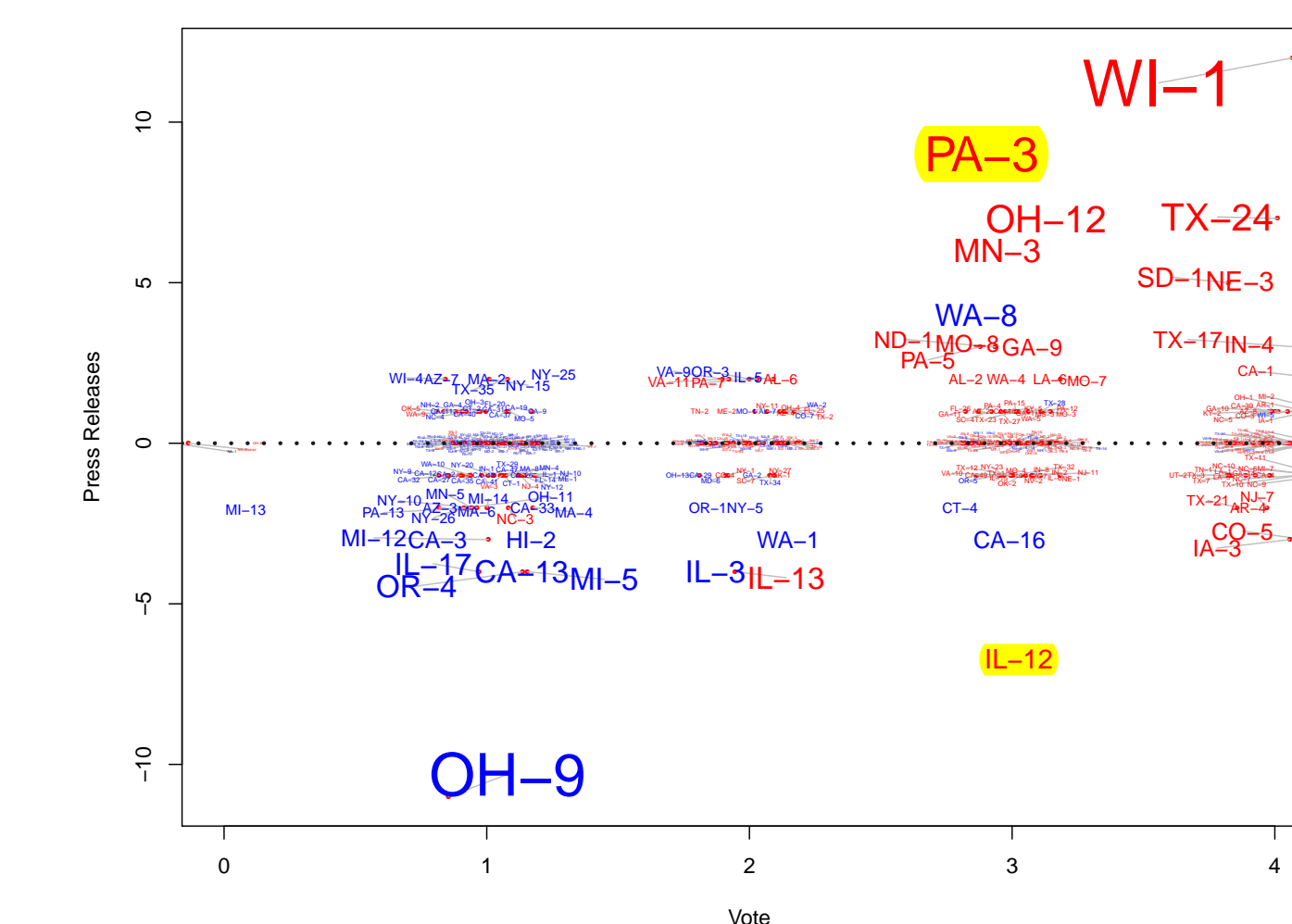
Figure 3: Top 60 Bigrams that have the Highest Cosine Similarities with the Two Pro-Trade Phrases, 'Economi[c] Benefit' and 'Success[ful] TPA'.

Result 1: Discrepancy between Votes and Press Releases

(a) Congressional Districts of Legislators by the Number of Pro-Trade Votes and by the number of Pro-/Anti-Trade Press Releases

(b) Titles of Press Releases Issued by Rep. Mike Bost and Rep. Mike Kelly

Mike Bost (R, IL-12) 8 out of 9: Anti-Trade PR	Mike Kelly (R, PA-3) 10 out of 11: Pro-Trade PR
2016-08-11 "Bost Applauds Tariffs on Unfairly Traded Foreign Steel"	*2015-09-30* "Rep. Kelly Calls for Opening of US Sugar Market in Trade Negotiations"
2015-06-25 "House Approves Bost-Davis Measure to Fight Illegal Foreign Trade"	*2015-06-18* "Rep. Kelly Praises House Passage of Trade Promotion Authority"
2015-05-21 "Rep. Bost Introduces Bipartisan Bill to Address Illegal Foreign Trade Practices" ...	*2015-04-24* "Rep. Kelly Applauds Ways & Means Committee Approval of Trade Promotion Authority" ...

Figure 4: Discrepancy between Trade-Vote and Trade-Talk. Legislators who have the same vote profile issue significantly different number of pro-/anti-trade press releases.

Result 2: Why the Discrepancy?

Table 1: The Effects of Constituency Interests on Pro- and Anti-Trade Press Releases and Pro-Trade Votes

	Dependent variable:				
	Num of Anti-Trade PR		Num of Pro-Trade PR		Num of Pro-Trade Votes
	zero-inflated poisson		zero-inflated poisson		Poisson
	(1)	(2)	(3)	(4)	(5)
unemployedpcnt	-0.08 (-0.20,0.03)	-0.09 (-0.20,0.01)	-0.15** (-0.27,-0.04)	-0.21*** (-0.33,-0.09)	-0.04 (-0.09,0.01)
highskillpcnt	-2.62 (-5.52,0.29)	-2.89* (-5.71,-0.08)	-0.49 (-3.29,2.31)	-1.70 (-4.49,1.08)	-0.67 (-2.12,0.78)
lnManuf	0.62** (0.18,1.05)	0.58** (0.17,0.99)	0.30 (-0.02,0.62)	0.27 (-0.06,0.59)	0.01 (-0.13,0.15)
TradeVote	-0.24*** (-0.39,-0.10)		-0.03 (-0.16,0.11)		
Party(R)		-0.59*** (-0.92,-0.27)		-0.38* (-0.70,-0.05)	0.75*** (0.60,0.91)
Observations	436	436	434	434	434
Log Likelihood	-506.94	-505.24	-520.54	-518.59	-622.95
Akaike Inf. Crit.					1,255.90

Table 2: The Effects of Constituency Interests on Pro- and Anti-Trade Press Releases and Trade-related Votes in Swing States

	Dependent variable:					
	Num of Anti-Trade PR		Num of Pro-Trade PR		Num of Pro-Trade Votes	
	zero-inflated poisson		zero-inflated poisson		Poisson	
	(Swing)	(All)	(Swing)	(All)	(Swing)	(All)
unemployedpcnt	0.24*** (0.08,0.40)	-0.08 (-0.20,0.03)	0.11 (-0.15,0.36)	-0.15** (-0.27,-0.04)	-0.19 (-0.19,0.03)	-0.04 (-0.09,0.01)
highskillpcnt	6.84 (-0.86,14.55)	-2.62 (-5.52,0.29)	2.31 (-5.10,9.73)	-0.49 (-3.29,2.31)	-0.45 (-3.46,2.56)	-0.67 (-2.12,0.78)
lnManuf	2.50*** (1.78,3.22)	0.62** (0.18,1.05)	1.37*** (0.60,2.13)	0.30 (-0.02,0.62)	-0.08 (-0.31,0.16)	-0.13 (-0.13,0.15)
TradeVote	-0.34* (-0.61,-0.07)	-0.24*** (-0.39,-0.10)	0.08 (-0.16,0.32)	-0.03 (-0.16,0.11)		
Party(R)					0.57*** (0.25,0.88)	0.75*** (0.60,0.91)
Observations	110	436	110	436	110	434
Log Likelihood	-111.60	-506.94	-125.03	-520.54	-166.58	-622.95
Akaike Inf. Crit.					343.16	1,255.90

- Table 1: The number of anti-trade press releases has a positive relationship with *lnManuf*, and the number of pro-trade press releases has a negative relationship with *unemployment*, while trade-related votes only have a significant relationship with party affiliation.
- Table 2: The number of anti-trade press releases of legislators in Swing states has a positive relationship with *unemployment* and *lnManuf* (the sizes of the effects for legislators in Swing states are bigger than those for all legislators), while legislators' trade-related votes do not have a significant relationship with both variables even in Swing states.

Conclusion

- Legislators' revealed preferences on trade in votes and press releases show signiciant discrepancies: The discrepancy depends on constituency interests and electoral security.
- The discrepancy between trade-votes and trade-press releases presents systematic patterns: 1) Trade-press releases better reflect constituent interests than trade-votes; 2) Legislators who feel insecure about their re-election issue more anti-trade press releases as their districts are more vulnerable to free trade.