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Do Politically and Economically Similar States in the U.S.A. Trade More with Each Other? *

By

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Abstract

Estimating a Gravity model for trade between the U.S. states, we find that politically and economically similar states trade more among themselves. We use three different definitions of political similarity based on election outcomes, and they all give similar results. For economic similarities, we follow the literature on Linder's hypothesis.

Keywords: Inter-state trade, U.S.A, Gravity model, Politics, Linder's hypothesis
JEL Classifications: F14, R12.

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1 Introduction

Do politically and economically similar states trade more with each other in the United States? This is the main question that this paper addresses. An answer to this question has significant implications for policy makers as more trade between the states is likely to foster growth in the U.S., and attempts should be made to take down barriers to domestic trade in the form of, for example, political similarities.

For trade between countries, several studies have examined the effect of politics on trade flows. Pollins (1989a, 1989b) show that bilateral trade flows are significantly influenced by political relationship between nations, and relative cooperativeness or hostility in bilateral political ties. Marrow et al. (1998) find that trade flows are greater between nations with similar political interests than those dissimilar interest. According to Simmons (2005), cordial relation between trading partners helps them to enjoy joint gains from trade. As for trade between the states of the United States, political polarizations since the 1970s – as noted by Glaeser and Ward (2006) and Abramowitz and Saunders (2008) – raise the question if such polarization acts as a barrier to domestic trade between the states. Ishise and Matsuo (2015) made an attempt to test this hypothesis and found evidence for the existence of such a barrier.

The reasons why politically similar states in the U.S. may trade more is possibly very different from why political relationships between nations affect international trade. In the case of domestic trade, perhaps network formations have something to do with it. In any case, for reasons mentioned above, it is interesting to test if politically similar states in the United States trade more with each other or not.

For trade between countries, Linder (1961) put forward product quality and intra-industry trade as two reasons why economically similar nations might trade more with each other. Bergstrand (1990) found a greater similarity in per-capita income was associated with more intra-industry trade between nations. Other studies, using bilateral international trade data and the Gravity model, have tested the Linder hypothesis, and found overwhelming support for it (see, for example, Thursby and Thursby, 1987; Tang, 2003; Baltagi et al., 2003). In fact, Baltagi et al. (2003) found that without the Linder's effect, the regression would suffer from misspecification error. Similar arguments might apply to U.S. domestic trade as well. Dingel(2017), using three years CFS data at the micro levels individual product trade between U.S. cities, finds support for Linder's hypothesis.

There are a few other studies that examine interstate trade in the U.S.A., using Gravity analysis (see, for example, Wolf, 2000; Millimet and Osang, 2007). Wolf (2000) and Millimet and Osang (2007) use CFS data for the years 1993 and 1997. Their purpose was to test the existence or otherwise of border effect.

In this paper, we apply the gravity model of trade to analyze U.S. inter-state trade of the years 1993, 1997, 2002, 2007, 2012 and 2017. Presidential, Gubernatorial and Senate election data are used to generate our political similarity variables. For the Linder variable, we follow the literature and consider absolute value of differences in per-capita income.

As mentioned before, Dingel (2017) also tests the Linder's hypothesis using inter-state trade data for the U.S., albeit for three years only and six years as we do. More importantly, his data is much more micro than our data. Although more micro data is useful to check for the validity of the hypothesis for each product and for trade between cities, the state-level data is likely to be subject to less noise because of the law of large numbers and therefore we work with more stable variables. Dingel (2017) does not consider the political issue of trade between blue states and red states. Ishise and Matsuo (2015), on the other hand, uses inter-state trade data like us, though not six years like us but for four years, and tests if political dissimilarities between the states acts as a barrier to trade. They do not consider Linder's hypothesis. There are other important differences between our analysis and that of Ishise and Matsuo (2015).

Using four years CFS data, Ishise and Matsuo (2015) define a blue-red dummy which is time invariant. Like Egger et al.(2011) —study about the bilateral international trade, they use cross-sectional analysis for each of the four years. They include importer and exporter fixed effects. We use a longer time period (six years) and define the political variable as time-dependent. Given the existence of quite a few so-called swing states, our approach seems more reasonable. Not all states can be labeled as a blue or a red state for all years; the distinction between the two is not that black and white. Given that our data is at five year intervals, the dependence of the political variable on time is even more justifiable.[1] We also use two alternative definitions of the red-blue divide in terms of gubernatorial and senate elections, apart from using Presidential elections as the yardstick. There are also differences in terms of the econometric methodology used. Whereas Ishise and Matsuo (2015) use non-linear (Probit) Generalized Method of Moments (GMM) mode with instrumental variable to deal with endogeneity, we follow the recent literature on gravity analysis with our panel data and employ Poisson Pseudo Maximum Likelihood (PPML) method (see, for example, Yotov et al., 2016). Our approach allows us to use pairwise fixed effects and importer-time and exporter-time fixed effects. Thus, we are able to focus on the border effect and at the same time deal with a rich set of fixed effects to deal with endogeneity arising from unobserved heterogeneity.

The rest of the paper is organized as follows. Section 2 describes the estimation methodology and the data. We report our OLS and PPML estimation in various specification and perform several robustness checks with different definitions of politics and Linder and explain our empirical results in Section 3. In section 4 we present our concluding remarks with policy implications.

[1] Given that the adjustment of trade in response to changes in a covariate can take time, Cheng and Wall (2005) suggested the use of interval data even when annual data are available. In gravity analysis, it is common to use data at intervals of 3-5 years (see, for example, Trefler, 2004; Baier and Bergstrand, 2007; Olivero and Yotov, 2012; Anderson and Yotov, 2016). For us, the interval is not a choice; this is how the data are available.

2 Estimation Methodology and Data

2.1 Econometric Specification

The structural gravity equation we use is similar to the one estimated by Anderson and Van Wincoop (2003), Anderson and Yotov (2010), and Bergstrand et al. (2015). The estimable econometric specification of these models have been developed by these author from theoretical micro-foundations, and, *inter alia*, these include multilateral resistances and bilateral transaction costs.

Since bilateral trade data with many countries have many zero observations, according to Silva and Tenreyro (2006, 2011) the Poisson Pseudo-Maximum Likelihood (PPML) estimates generate more robust results than traditional OLS estimates, besides being consistent in the presence of heteroskedasticity. Since in our data set less than 1% of all observations take zero values, we use both the PPML and OLS methods. In order not to lose the zero observations we use linear OLS method. The model that we estimate is:

$$X_{ijt} = \begin{cases} Y_{ijt}, & \text{for OLS} \\ e^{Y_{ijt}}, & \text{for PPML,} \end{cases}$$

where $Y_{ijt} = \beta_0 + \beta_1 \text{POLITICS}_{ijt} + \beta_2 \text{LINDER}_{ijt} + \beta_3 \text{HPOP}_{ijt} + n_{it} + \theta_{it} + \delta_{ij} + \epsilon_{ijt}$, and X_{ijt} is the U.S. domestic trade flows between state i and state j at time t, ϵ_{ijt} is the error term, and n_{it}, θ_{jt} and δ_{ij} are respectively exporter-time, importer-time, and bilateral, fixed effects. As stated by Head and Mayer (2014) and Yotov et al. (2016), the importer-time and exporter-time fixed effects will capture all state-specific, time-dependent variables, and similarly, the bilateral fixed effects will absorb all time-independent, bilateral variables like distance. Therefore, spurious correlation arising because of omitted variables of those kinds will not occur (Baier and Bergstrand, 2007).

POLITICS_{ijt} is one of the main variables of interest, and three different alternative definitions of it – political similarities between states – are derived from Presidential, Gubernatorial, and Senate election results. For Presidential and Gubernatorial elections, it takes the value 1 if both states i and j voted for the same political party in the last election, and 0 otherwise. For Senate elections, it takes the value 0 if both seats were taken by different parties in the two states, 2 if both seats were won by the same parties, and 1 otherwise.

Our second variable of interest is LINDER which represents economic similarities between the states. Following the literature, we take the absolute difference between the per-capita income (PCI) of the states to represent it (see, for example, Baltagi et al., 2003; Tang, 2003). That is, $\text{LINDER}_{ijt} = |\text{PCI}_{it} - \text{PCI}_{jt}|$. For robustness check, we also try a different definition for this variable, namely, $\text{LINDER1}_{ijt} = (\text{PCI}_{it} - \text{PCI}_{jt})^2$.[2]

Since Rauch and Trindade (2002) found ethnic compositions of countries influence trade via network effects, we have added the ratio of the share of Hispanic and Latino population in the two states as an additional variable: $\text{HPOP}_{ijt} = \text{HPOP}_{it}/\text{HPOP}_{jt}$ where HPOP_{it} is the share of Hispanic and Latino population in state i at time t.[3]

2.2 Data Sources

United States inter-state domestic trade flow data of years 1993, 1997, 2002, 2007, 2012, and 2017 are obtained from the Commodity Flow survey (CFS) data, generated by the Bureau of Transportation Statistics (BTS) and the U.S. Census Bureau (USCB). The CFS track shipments, measured in million-dollar value, by the modes of transportation: Truck, Rail, Inland water, Great Lakes, Deep Sea, Air, Pipeline, Parcel, U.S. Postal Service, or Courier. The CFS data covers on shipments originating from selected types of business establishments located in the 50 states and the District of Columbia; it does not cover Puerto Rico and other U.S. possessions and territories. Data on the political variables were obtained from the Mit Election Data Science Lab,[4] and Wikipedia.[5] Data on per-capita income was obtained from the Bureau of Economic Analysis (BEA) and data on Hispanic and Latino

[2]This variable is very large in magnitude, we divide all the values by 10,000.

[3]Note that HPOP_{ijt} is defined as the ratio of two shares. Therefore, this variable does not get absorbed by the importer-time and exporter-time fixed effects.

[4]https://electionlab.mit.edu/data

[5] https://en.wikipedia.org/wiki/1993 and https://en.wikipedia.org/wiki/Alabama_Senate.

population from the U.S. Census Bureau. A table of summery statistics is provided below.

Table 1: Descriptive Statistics

Variables	Observations	Mean	Std. Dev.	Min	Max
X_{ijt} (in million \$)	15276	2177.41	4767.69	0	78028
Linder1$_{ijt}$	15300	6561.67	6027.045	0	43227
Linder$_{ijt}$ (in \$)	15300	7937.84	15407.35	0	186857
HPOP$_{ijt}$	15300	11.83	59.97	0.0005	1871
President$_{ijt}$	15300	0.0505	0.499	0	1
Governor$_{ijt}$	15300	0.492	0.499	0	1
Senators$_{ijt}$	15300	1.17	0.804	0	2

3 Results

The basic results are presented in Table 2. For the Linder's variable, we use absolute difference in per-capita income, and for political similarity we consider similarities in outcome in Presidential elections: the variable takes the value 1 if both states voted for the same political party and 0 otherwise. All the regressions include importer-time, exporter-time, and pair-wise fixed effects. The signs of both coefficients are statistically significant throughout, and the coefficient of Linder is negative (more trade among economically similar states) and that of President positive (more trade among politically similar states). We run both linear OLS and PPML regressions. The coefficient of the ratio of the share of Hispanic and Latio population ($HPOP_{ijt}$) is positive and significant only in the OLS regressions, but not in PPML. We also try an alternative definition of the Linder's variable, $LINDER1_{ijt}$: the square of the difference. The coefficients remain negative and significant.

In terms of the magnitude of the effects, the states which vote for the candidate from the same political party, on an average, trade about $80 million worth more than the other states. The coefficients in the PPML regressions are much smaller as they are non-linear regressions. However, the comparable marginal effect in the PPML regression is $40 million which about half of that in OLS regression. As for the Linder's effect, a difference in $1000 in per-capita income implies a higher trade between the pair by $21.9 million.

Table 3 provides more robustness checks. We replace the variable President by Governor (1 if both states elect a candidate from the same political party, and 0 otherwise) and Senator (2 if both senators are from the same party in both states, 0 if both senators are from different political parties, and 1 otherwise). The qualitative results remain the same. As mentioned before, the inclusion of the different fixed effects take care of possible endogeneity arising from omitted variables. In case there is endogeneity because of two-way causality – which is unlikely in our context, we take one-year lag of the variable President. The qualitative nature of the results remain quite robust.

4 Conclusion

Using recent developments in gravity analysis and using inter-state trade data for the USA for six years (1993, 1997, 2002, 2007, 2012 and 2017), this paper examines if states that economically and politically similar trade more among each other or not. We use different alternative definitions of political and economical similarities. We find, in a fairly robust way, that both politically similarity and economical similarity result in significantly more trade.

Table2: Basic Results

	(OLS)	(PPML)	(OLS)	(PPML)	(OLS)	(OLS)
$President_{ijt}$	79.82**	0.0197**	79.74**	0.0198**	73.26*	73.19*
	(0.039)	(0.024)	(0.040)	(0.023)	(0.058)	(0.058)
$LINDER_{ijt}$	-0.0219***	-0.00000284***	-0.0219***	-0.00000287***		
	(0.000)	(0.000)	(0.000)	(0.000)		
$HPOP_{ijt}$			4.327**	-0.000289		4.367**
			(0.017)	(0.340)		(0.017)
$LINDER1_{ijt}$					-0.0493***	-0.0495***
					(0.000)	(0.000)
Constant	2308.7***	8.829***	2257.6***	8.831***	2462.7***	2412.0***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-Squared	0.9167	0.9787	0.9168	0.9787	0.9165	0.9166
Observations	15276	15276	15276	15276	15276	15276

Table3: Robustness Check

	(OLS)	(PPML)	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)
$Lag\text{-}President_{ijt}$	189.9***	0.0276**	189.4***				
	(0.000)	(0.012)	(0.000)				
$LINDER_{ijt}$	-0.0201***	-0.00000293***	-0.0201***	-0.0205***	-0.0206***	-0.0213***	-0.0214***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$HPOP_{ijt}$			2.962*		4.252**		4.311**
			(0.10)		(0.018)		(0.017)
$Senators_{ijt}$				100.8***	99.44***		
				(0.000)	(0.000)		
$Governor_{ijt}$						68.72**	68.05**
						(0.013)	(0.014)
Constant	2427.6***	8.887***	2393.6***	2229.9***	2181.2***	2310.5***	2260.0***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
R-Squared	0.9325	0.9794	0.9325	0.9168	0.9169	0.9167	0.9168
Observations	12726	12726	12726	15276	15276	15276	15276

All specifications in the Table2 and Table3 include exporter time fixed effects, importer time fixed effects, and pair fixed effects. P-values are in parenthesis. ***, **, and * indicate statistically significant at 1 %, 5% and 10% respectively. Dependent variable is domestic trade.

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