# Agricultural Comparative Advantage and Legislators' Support for Trade Agreements

Francesco Amodio* Leonardo Baccini† Giorgio Chiovelli‡ Michele Di Maio§

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**Abstract**

Does comparative advantage explain legislators' support for trade liberalization? We use data on potential crop yields as determined by weather and soil characteristics to derive a new, plausibly exogenous measure of comparative advantage in agriculture for each district in the US. Evidence shows that comparative advantage in agriculture predicts how legislators vote on the ratification of preferential trade agreements in Congress. We show that legislators in districts with high agricultural comparative advantage are more likely to mention that trade agreements are good for agriculture in House floor debates preceding roll-call votes on their ratifications. Individuals living in the same districts are also more likely to support free trade. Our analysis and results contribute to the literature on the political economy of trade and its distributional consequences, and to our understanding of the economic determinants of legislators voting decisions.

*McGill University and CIREQ; francesco.amodio@mcgill.ca

†McGill University and CIREQ; leonardo.baccini@mcgill.ca

‡Universidad de Montevideo; gchiovelli@um.edu.uy

§Sapienza University of Rome; michele.dimaio@uniroma1.it

Does comparative advantage explain legislators support for trade liberalization? According to classical trade theory, in free trade, countries export or import goods depending on their relative efficiency in producing them. Removing trade tariffs increases the demand for final goods in exporting industries, increasing employment and wages, while it has the opposite effect on importing industries. It follows that comparative advantage shapes the distributional consequences of trade liberalization, but does it explain the extent of political support for it?

There is a large stream of research exploring the determinants of legislators voting in the US (Baldwin and Magee 2000; Karol 2007; Milner and Tingley 2011). The seminal work of Hiscox (2001, 2002) shows that the level of land, labor, and capital mobility across industries shapes trade policy coalitions. More recently, Feigenbaum and Hall (2015) have shown that legislators in areas heavily affected by import penetration from China are less likely to vote in favor of trade liberalization. Relatedly, Owen (2017) shows that legislators from districts with a high presence of offshorable jobs are more likely to oppose preferential trade agreements (PTAs) than legislators from districts with a low presence of offshorable jobs.

While trade theory based on comparative advantage is simple and undisputed (see for instance Costinot and Donaldson 2012), estimating the causal effect of comparative advantage on support for specific policies fostering trade liberalization is not. The observed distribution of economic activity across areas and sectors is shaped by different factors, including the policy preferences of elected officials and voters. Exploiting information on exports, value added, or employment across sectors to measure comparative advantage and relating it to support for trade liberalization may be misleading, as variation in all such observables may be driven by the same underlying distribution of policy preferences, even in the absence of a causal link between them.

As an example, consider a legislator who has strong preferences in favor of trade liberalization and is also committed to defend the interests of agricultural producers in her district. On the one hand, following her preferences, the legislator would vote in favor of PTAs. On the other hand, this same legislator would implement policies  state guaranteed loans, input price subsidies, etc.  that boost the productivity of the agricultural sector relative to the manufacturing sector, increasing comparative advantage in agriculture. In this case, agricultural comparative advantage and PTA voting behavior would be systematically related via legislators preferences and policy actions, even in the absence of a causal relationship between the two.

In this paper, we use data on the suitability of soil to produce different crops to build a new, exogenous measure of comparative advantage in agriculture. We rely on estimates of *potential* crop yields from the Food and Agriculture Organizations (FAO) Global Agro-Ecological Zones (GAEZ) database. These yields are calculated by incorporating local soil and weather characteristics into a model that predicts the maximum attainable yields for each crop in a given district. As such, potential yields are an ideal source of exogenous variation in agricultural productivity because they are independent of *actual* yields from cultivated crops and their determinants, including policy driven ones.

We use this exogenous measure of comparative advantage to explore its effect on US legislators voting on the most important pieces of trade liberalization since the 1990s: PTAs. We find that comparative advantage in agriculture has a strong positive effect on legislators voting in favor of PTAs. Our results are robust to different operationalizations of our measure of comparative advantage and different model specifications. In particular, we construct two other measures of comparative advantage in which we include also information on the manufacturing sector. In an effort to explore the underlying mechanisms, we show that legislators in districts with high comparative advantages in agriculture are more likely to mention that PTAs are good for farmers in House floor debates preceding the vote on the bills. Moreover, survey data on individual attitudes on free trade confirm the role of comparative advantages in agriculture.

This paper makes two contributions. First, our findings indicate that legislators votes on PTAs are in line with the expected economic gains in their own districts: The larger a district's comparative advantage in agriculture, the higher the probability that its legislator will support trade liberalization. To the best of our knowledge, this is the first analysis to show the *causal* effect of comparative advantage in agriculture on legislators support for free trade, casting doubt on the conventional wisdom that US interest groups in agriculture are typically against trade liberalization (Davis 2004). Second, our results document the potential positive role of agriculture in determining trade policy and enhancing free trade. These findings complement recent studies that have shown increasing opposition to trade in the US and other developed economies, especially by manufacturing workers (Feigenbaum and Hall 2015; Colantone and Stanig 2018). In this sense, our results speak to another milestone in trade theory, namely that trade creates winners and losers. The evidence in this paper shows that legislators behave accordingly.

## Data

**Measuring comparative advantage** We construct our measure of comparative advantage in agriculture by combining estimates of potential crop yields across US districts and partner countries from the FAOs GAEZ database with data on PTA agreements from the DESTA dataset. For each US district and PTA, we take the sum of crop suitability across all the crops included in the PTA and divide it by the population of the district at the baseline .[1] This gives us a district-level measure of overall potential efficiency in producing the agricultural goods included in the PTA. This is *also* a measure of the *relative* efficiency in producing these goods insofar as efficiency in producing any other good has limited variation across districts.[2] Then, we compute the same measure for the partner country: We sum crop suitability across all the crops included in the PTA, again standardized by the partner countrys population. Given empirical evidence documenting that non-agricultural productivity varies less than agricultural productivity across countries (Gollin et al. 2014), we interpret the ratio between these two quantities as a measure of the districts comparative advantage in agriculture with respect to the partner country.[3] We label this measure *Agri CA*.

We derive this measure using information on potential yields in agriculture as determined by geographic characteristics. As such, it abstracts from any observed and unobserved district-level characteristics that are possibly influenced by policy preferences, and is therefore exogenous. However, its interpretation as measure of agricultural comparative advantage hinges on the assumption of limited variation in the productivity of non-agriculture across US districts and partner countries. To further validate our results, we construct two additional measures of comparative advantage. These measures are built using information on actual agricultural and manufacturing production in US districts and partner countries. As a result, their interpretation does not rely on any assumption

[1] We use Baccini et al.s (2018) data on preferential tariffs to identify the crops included in each agreement. Crops with zero MFN tariffs or which are not included in the PTA are excluded.

[2] In this case, comparative and absolute advantage in agriculture are positively correlated (Roy 1951).

[3] Appendix A provides a detailed description of how the comparative advantage measure is constructed.

on the distribution of the relative agricultural and manufacturing productivity. This comes at the cost of them being potentially endogenous.

To construct these measures, we first derive a measure of relative productivity in manufacturing. We weight US total export in each manufacturing industry included in each PTA by the baseline share of workers in the same industry in each US district, then sum these values across all manufacturing industries for each district. We divide this measure by US partners total manufacturing exports weighted by the sectors GDP.[4] We then divide our initial measure of efficiency in agriculture  based on potential yields  by this revealed measure of efficiency in manufacturing. We label this measure *Agri CA1*. Finally, we build a third measure where we replace weighted exports in agriculture  calculated as just explained for manufacturing  for the suitability-based measure above, again divided by their homologue for manufacturing. We label this third measure *Agri CA2*.[5]

All these measures of comparative advantage are continuous. Values above one imply that US district $d$ has a comparative advantage in agriculture over partner country $p$ in producing the agricultural goods included in the PTA. The three measures differ in the extent to which they rely on actual exports data and thus their level of endogeneity, with *Agri CA* being the most exogenous. All measures vary across districts depending on their suitability to produce different crops and their assumed or actual productivity in manufacturing. In addition, they also vary according to the partner country, its suitability to produce different crops and its assumed or actual productivity in manufacturing, and the set of goods that are affected by the PTA.

We validate these measures in different ways, as reported in Appendix B. To validate *Agri CA*, we show that (i) non-agricultural productivity varies less than agricultural productivity across US districts and across countries, and that (ii) it correlates with the other measures. We also show that the measure behaves as expected in that (iii) US districts overall have a comparative advantage in agriculture with countries like Bahrain, Oman, and Singapore, and that (iv) its geographical variation across US districts is in line with the actual production capabilities of different parts of the country.

[4] Details on the exact construction of this variable are also provided in Appendix A.

[5] We take the log of all these variables to mitigate the impact of outliers.

**Legislators Votes on Trade Agreements** The outcome variable considers the roll call votes on the ratification of 12 free trade agreements implemented between 1993 and 2011 (from the $103^{rd}$ US Congress to the $112^{th}$ US Congress). Some PTAs involve more than one partner country (e.g. North American Free Trade Agreement (NAFTA)), so that we end up with a total of 18 partner countries. We thus cover the entire universe of US PTAs currently in force except for two PTAs implemented in the 1980s (with Israel and Canada) and the Jordan-US trade agreement, the votes for which were not recorded. Our main analysis focuses on the House of Representatives, which allows us to consider district-level characteristics. The data come from GovTrack (2018).[6]

Figures B7 and B8 in Appendix B show the share of *yes* votes for each PTA signed by the US by partner country and the geographical distribution of the share of *yes* votes for all the PTAs across US districts, respectively. As expected, PTAs seem to face the greatest political resistance in heavy manufacturing districts and with countries posing concrete risks of delocalization.

## Identification Strategy

Our main model specification is the following:

$$Vote_{dp} = \alpha_d + \gamma_t + \beta_0 + \beta_1 Agri\ CA_{dp} + \beta_2 Democrats_{dp} + \beta_3 Offshorable_{dp} + \epsilon_{dp}, \tag{1}$$

where $Vote_{dp}$ is a dummy equal to one if the legislator from district $d$ votes in favor of ratifying the PTA with partner country $p$, and zero otherwise. $Agri\ CA_{dp}$ is our measure of agricultural comparative advantage of district $d$ with respect to partner country $p$. $\alpha_d$ are district fixed effects, which control for and net out time-invariant differences across districts, and $\gamma_t$ are decade fixed effects, which absorb the overall trends in legislators votes. Note that because $Agri\ CA_{dp}$ is specific to each district and partner country, we use variation both across districts and within districts across PTAs to identify the parameter of interest $\beta_1$.

We also include two control variables that have been proven important in previous studies: (i) a dummy scoring one if the legislator is a Democrat (Feigenbaum and Hall 2015), and (ii) the

[6]Senators do not belong to specific districts. We implement this analysis at the state level. We report the corresponding results in Appendix D.

percentage of workers in the congressional district in offshorable occupations (Owen, 2017).[7] We label these controls together as *Main Controls*. In the most saturated specification, we also include manufacturing employment, manufacturing profits, agriculture employment, population density, and a weighted measure of manufacturing trade balance with partner countries, labeling these variables altogether as *Additional Controls*. We obtain coefficient estimates using Ordinary Least Squares regressions (OLS) in order to avoid the incidental parameter problem, which is caused by the presence  as in our case  of a large set of fixed effects. We allow the residual determinants of voting behavior to be correlated within districts across PTA votes by clustering standard errors at that same level, i.e. at the district level.

## Results

Table 1 shows the results of our main analysis. Model 1 is the backbone model with no fixed effects and no controls, Model 2 includes district fixed effects, and Model 3 includes both district and decade fixed effects. Models 4 and 5 further include the *Main Controls* and *Additional Controls* respectively. The coefficient of *Agri CA* is positive and significant at the 1% level across all specifications. In Models 6 and 7, we replace the main *Agri CA* measure with the more endogenous *Agri CA1* and *Agri CA2* measures. The coefficient of interest remains positive and highly significant.

The magnitude of the estimated effect is meaningful. Moving the value of *Agri CA* from the value of the lower quartile (US vs. Canada) to the value of the upper quartile (US vs. South Korea) increases legislators probability to vote in favor of PTAs by (at least) 10%. In the House of Representatives, NAFTA and Dominican Republic-Central America Free Trade Agreement were approved with 3.9% and 0.2% margins, respectively. These findings indicate that US districts comparative advantages in agriculture vis-á-vis partner countries have a large causal effect on legislators probability to support PTAs. Moreover, the magnitude of the effect is larger for *Agri CA* than for *Agri CA1* and *Agri CA2*. This is particularly evident with the most endogenous measure, *Agri CA2*: The magnitude is more than halved compared to our preferred exogenous measure, *Agri CA*. This indicates that using endogenous measures of comparative advantage would underestimate its effect on the politics of PTAs.

[7]We extend the measure created by Owen (2017) to cover the whole period of our analysis.

Table 1: Comparative Advantage in Agriculture and Legislators Votes on PTAs

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | OLS | | | | | | |
| | Legislators' Voting in Favor of PTAs | | | | | | |
| Agri CA | 0.034*** | 0.017*** | 0.016*** | 0.016*** | 0.015*** | | |
| | (0.003) | (0.002) | (0.002) | (0.002) | (0.002) | | |
| Agri CA1 | | | | | | 0.012*** | |
| | | | | | | (0.002) | |
| Agri CA2 | | | | | | | 0.005*** |
| | | | | | | | (0.001) |
| Constant | 0.565*** | 0.953*** | 0.933*** | 1.007*** | 1.038*** | 0.937*** | 1.007*** |
| | (0.017) | (0.005) | (0.022) | (0.033) | (0.271) | (0.034) | (0.033) |
| Pr[p(75)]/Pr[p(25)] | 22% | 11% | 10% | 10% | 10% | 9% | 4% |
| Observations | 7,708 | 7,708 | 7,708 | 7,520 | 6,543 | 7,397 | 7,346 |
| R-squared | 0.045 | 0.557 | 0.560 | 0.595 | 0.647 | 0.600 | 0.596 |
| District FE | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Decade FE | No | No | Yes | Yes | Yes | Yes | Yes |
| Main Controls | No | No | No | Yes | Yes | Yes | Yes |
| Additional Controls | No | No | No | No | Yes | No | No |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Notes: OLS with robust standard errors clustered by district in parentheses. The unit of observation is the district-partner country. The key independent variable are measures of comparative advantage, which vary by district and partner country. Source: FAO-GAEZ, GovTrack, and IPUMS.

We now turn to investigate the mechanisms at play.[8] We use text analysis to record all statements related to agriculture in speeches given by legislators in House floor debates preceding roll-call votes on PTAs. We then manually code whether legislators mentioned that PTAs bring benefits to the agricultural sector, and normalize this count variable by the full length of the speech. We replace this as dependent variable in our main model specification. Table 2 reports the corresponding coefficient estimates. Estimates from Models 1 to 3 show that agricultural comparative advantage increases the probability that legislators mention the PTA benefits for the agricultural sector. Also in this case, the magnitude of the effect is the largest when using our exogenous measure of comparative advantage, namely *Agri CA*.

[8]More details on this part of the analysis are provided in Appendix C.

Table 2: Mechanisms

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | OLS | | | | | |
| | PTAs Good for Agric. | | | Support For Free Trade | | |
| Agri CA | 0.0002** | | | 0.0280** | | |
| | (0.000) | | | (0.011) | | |
| Agri CA1 | | 0.0001*** | | | 0.0296** | |
| | | (0.000) | | | (0.011) | |
| Agri CA2 | | | 0.0002*** | | | 0.0069 |
| | | | (0.000) | | | (0.007) |
| Constant | 0.0037** | 0.0032* | 0.0038** | 1.2621*** | 1.0794*** | 1.2730*** |
| | (0.002) | (0.002) | (0.002) | (0.053) | (0.098) | (0.053) |
| Pr[p(75)]/Pr[p(25)] | 94% | 62% | 80% | 7% | 7% | 2% |
| Observations | 840 | 826 | 825 | 5,548 | 5,548 | 5,548 |
| R-squared | 0.063 | 0.059 | 0.061 | 0.167 | 0.167 | 0.167 |
| District FE | No | No | No | Yes | Yes | Yes |
| Wave FE | No | No | No | Yes | Yes | Yes |
| Main Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Individual Controls | No | No | No | Yes | Yes | Yes |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Notes: OLS with robust standard errors clustered by district in parentheses. The unit of observation is the district-partner country (Models 1-3) and individual-district-wave (Models 4-6). The key independent variable is a measure of comparative advantage, which varies by district and partner country (Models 1-3) and by district and wave (Models 4-6). Source: ANES, FAO-GAEZ, GovTrack, and IPUMS.

Finally, we explore the effect of agricultural comparative advantage on individuals attitudes towards free trade. We use data from the American National Election Studies (ANES) survey and build a dummy variable equal to one if the respondent supports free trade. We replace this as main dependent variable in our main specification, including the *Main Controls* and a set of individual level controls (age, education, gender, and ideology) in addition to district and ANES wave fixed effects. Estimates from Models 4 to 6 show that the coefficient of *Agri CA* and *Agri CA1* is positive and significant, whereas the coefficient of *Agri CA2* is positive but not significant, confirming once again the importance of relying on an exogenous measure of comparative advantage.

Appendix D reports a number of additional tests, e.g. alternative measures of comparative advantage, logit regressions, accounting for the China Shock. Our results are unchanged.

## Conclusion

Comparative advantage is one of the oldest theories in economics. Empirical tests on the validity of the theory in explaining trade policy abound. However, many of these analyses do not go beyond simple correlation due to the presence of confounding factors, and more generally due to the complex relation between economics and politics. We have provided evidence that comparative advantage in agriculture has a *causal* effect on support for PTAs. Legislators from US districts with a greater comparative advantage in agriculture vis-á-vis their trade partners are more likely to vote *yes* to PTAs than US districts with a lower agricultural comparative advantage. In short, evidence shows that comparative advantage is alive and well: Politicians respond to pieces of trade policy consistently with the predictions of simple economic theory.

Our findings also indicate that the US agricultural sector is a key driver of preferential trade liberalization. This result is at odds with conventional wisdom, which sees agriculture as a heavily protectionist sector in developed economies. Indeed, most-favored-nation (MFN) tariffs in agriculture remain significantly higher than MFN tariffs in manufacturing, a fact for which the European Union, the US, and Japan are often blamed. Our analysis indicates that US districts with greater comparative advantages in agriculture than their trade partners push convincingly for the ratification of PTAs. The reason for this support for trade liberalization is simple: Districts with a higher comparative advantage in agriculture have larger expected gains from trade.

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# Appendix A

### Measuring Comparative Advantage in Agriculture: Technical Note

In this section, we provide a detailed description of the methodology used to construct our main measure of comparative advantage $AgriCA$.

#### Data

Our analysis combines different datasets. The first database is the Global Agro-Ecological Zones (GAEZ) dataset provided by food and agriculture organizations (FAO). The dataset provides the global crop suitability index and production yields for 48 crops at the level of high-resolution grid cells covering the entire surface of the Earth. The suitability index and estimated yields are constructed using agronomic models and data on geographic characteristics such as soil, topography, elevation, and climatic conditions. Suitability is then differentiated according to the cost of inputs necessary to produce a given crop. This results in three different global crop suitability indexes and potential yields datasets for crops that require a high amount of input costs, an intermediate amount of input costs, and a low amount of input costs. For each of these crop input cost levels, there are crop-specific measures (e.g. different global crop suitability levels for alfalfa vs. corn). These data have been already used in influential studies in economics (Costinot et al. 2016; Bustos et al. 2016).

The second database is DESTA, which is an original dataset containing the tariff concessions made by trading entities in more than 60 North-South PTAs signed after 1995. Importantly for this study, the sample includes all the PTAs formed by the United States. The dataset includes tariff schedules from the officially negotiated tariff schedules listed in the appendices of the PTAs. All PTAs contain two tariff schedules, one for the US vis--vis partner country, and one partner country vis--vis the US. Tariff data are highly disaggregated, namely at the Harmonized Commodity Description and Coding System (HS) 6-digit level. At this level, we find tariffs for each crop included in the analysis. The dataset is part of the Desta project (Dr et al. 2014 available at `http://www.designoftradeagreements.org/`).

The third dataset is the legislative data records for select preferential trade agreement (PTA) legislature, which was gathered from GovTrack (www.govtrack.us/congress/votes). This data was split into Senate and House voting records. Because only House votes are of interest (as Senators have no electoral geography), Senate votes are not considered in our analysis.

**Main Measure of Agricultural Comparative Advantage:** $AgriCA$

The main explanatory variable in our analysis is $AgriCA_{dp}$, which is the agricultural comparative advantage of district $d$ with respect to country $p$. This is a district-partner country specific measure.

To construct this measure we combine information from both the US districts and the partner countries in each PTA. As a first step, for each US district, we take the sum (and the mean) of the suitability for all the crops facing a tariff reduction as a result of a PTA between the US and the partner country.[9] This variable is then standardized by dividing it by the district total population in 1990. This is:

$$A_{d(p)} = \frac{\sum_{c \in C_p} suit_{cd}}{population_d} \tag{1}$$

where $A_{d(p)}$ is district $d$ per-capita agricultural suitability with respect to country $p$, computed as the sum of suitability for crop $c$ in district $d$ ($suit_{cd}$) for all crops $c$ included in the list $C_p$ of the crops for which the PTA between the US and the country $p$ implies a tariff reduction, divided by the district population at the baseline.[10] Our notation emphasizes that our measure of agricultural suitability for district $d$ is partner country (and implicitly PTA) specific. This is because each PTA may include a different subset of crops and thus a different level of comparative advantage for the same district with respect to different partner countries.

Next, for each partner country (and thus each PTA), we take the sum (and the mean) of the suitability for all the crops facing a tariff reduction as a result of a PTA between the country and the US. This variable is then standardized by dividing by the partner country total population in 1990. This is:

$$A_p = \frac{\sum_{c \in C_p} suit_{cp}}{population_p} \tag{2}$$

[9]To identify for each PTA which crops are subject to tariffs cuts we use the DESTA dataset (Baccini et al. 2018).

[10]When 1990 population values are not available for some districts, which were not formed until after 1990, the next available decennial population value is used.

where $A_p$ is partner country $p$ per-capita agricultural suitability, computed as the sum of suitability for crop $c$ in country $p$ ($suit_{cp}$) for all crops $c$ included in the list $C_p$ of the crops for which the PTA between the US and the country $p$ implies a tariff reduction, divided by country population at baseline.

The ratio between these two measures of agricultural productivity gives us the relative agricultural productivity of district $d$ in the US with respect to country $p$, for crops that face tariff reduction due to the PTA between the US and the partner country, namely:

$$\Psi_{dp} = \frac{A_{d(p)}}{A_p} \tag{3}$$

By definition, district $d$ has a comparative advantage with respect to country $p$ in producing agricultural goods relative to non-agricultural goods if

$$\frac{A_{d(p)}}{A_p} > \frac{M_{d(p)}}{M_p} \quad \text{or} \quad \frac{A_{d(p)}}{M_{d(p)}} > \frac{A_p}{M_p} \tag{4}$$

where $A$ and $M$ are measures of production efficiency respectively in agricultural and non-agricultural goods. Unfortunately, due to data limitations, it is not possible to directly observe $M_{d(p)}$ and $M_p$. Yet, two observations can be useful to relate $\Psi_{dp}$ to comparative advantage in agricultural production for district $d$ with respect to country $p$. First, while $A_d$ is a measure of absolute agricultural efficiency in district $d$, it can be interpreted as a measure of *relative efficiency* in producing agricultural crops with respect to other goods in district $d$ insofar as efficiency in producing any other good (i.e. $M_d(p)$) has limited variation across districts. Indeed, in this case comparative and absolute advantage in producing the agricultural goods included in the PTA are positively correlated (Roy 1951). Second, the direction of the comparative advantage for district $d$ with respect to country $p$ crucially depends on the term $M_p$, i.e. country $p$ productivity in non-agricultural sectors. While it is not possible to directly estimate $M_{d(p)}$, there is consistent empirical evidence documenting that productivity of non-agricultural goods varies less than productivity of agriculture across countries. It follows that the higher the $\Psi_{dp}$, the more likely it is that district $d$ has a comparative advantage in agriculture with respect to country $p$. Based on these observations, we finally define:

$$AgriCA_{dp} = \log(\Psi_{dp}) = \log\left(\frac{A_{d(p)}}{A_p}\right) = \log(A_{d(p)}) - \log(A_p) \tag{5}$$

where we choose to use the natural logarithm of $\Psi_{dp}$ (adding 0.0001 to avoid losing the 0 values) because its distribution is heavily skewed on the left. In any case, no one of our results is sensitive to this transformation.

We also generated non-population standardized versions of the above variable as well as a measure of comparative advantage for these crops excluded by PTAs, which we use as a placebo.

**Alternative Measures of Agricultural Comparative Advantage: $AgriCA1$ and $AgriCA2$**

First, we collect commodity-level trade data between the US and its PTA partners. For the partners, the data comes from UN Comtrade. For each partner country and good at the HS 6-digit level, we have exports to the United States and to the world. For the US, this data comes from the US Census Bureau via Peter K. Schott. This is at the HS 10-digit level, and we have exports to each partner and to the world. The data is downloaded from Comtrades API in the R script comtrade_dl.r, while us_trade.r processes Schotts data.

We also match these product codes to NAICS industry codes. Schotts data are already matched to NAICS codes using his concordance, with one-to-one relationships between NAICS 6-digit codes and HS 10-digit commodities. To merge the partner trade data, we use In Song Kims concordance() package, which uses Schotts crosswalk. Because the crosswalk is at the HS-10 level, there is a one-to-many relationship between HS-6 commodities and NAICS industry codes. Where multiple industries merge, we evenly divide trade flows between them. This is done in the script trade_naics.r.

**Tariffs** In trade_desta.r we then combine partner trade data and US trade data at the HS 6-digit level. Because there are sometimes multiple industries for each commodity, this is at the commodity-industry level, though the majority of HS 6-digit commodities merge with only one NAICS industry. With the trade data complete, we then merge on tariffs. Most of these are available in the DESTA dataset. Because NAFTA is not included, tariffs at HS-6 for Canada and

Mexico are downloaded from the UN TRAINS database and assembled in trains.r, before being added to the DESTA tariff data. After merging trade with DESTA and NAFTA tariffs, we create two measures of trade: one which is the average of exports of that good for three years before PTA ratification, and one for five years. This includes the year of ratification, so for NAFTA, which was ratified in 1994, this is ((x_1992 + x_1993 + x_1994) / 3).

We identify four sets of products: products where MFN is zero and PRF is zero (MFN_zero), products where PRF is zero and MFN is positive (PRF_zero), products where MFN is positive and there is a positive PRF rate (PRF_positive), and products which are excluded from the agreement (Excluded). We group PRF_zero and PRF_positive in the category Included. We use PRF rates from t0 in DESTA, while the available NAFTA rates are from 1995.

**Employment Data** We then need to connect these to regional employment data. To construct this we draw on two sources: the County Business Patterns (CBP) and the Quarterly Census of Employment and Wages (QCEW). In general, the CBP are more complete, so these are our base. We have county-level employment in nearly all NAICS industries. However, the CBP omit farm activity within NAICS codes 111 and 112, which is where most crop production falls. Luckily, these are within the QCEW, so we isolate these industries and add them to the CBP data to create a complete employment profile for each county. Note that about half of the time the QCEW omits 6-digit employment for confidentiality reasons. However, we stick with this because it does not improve at more aggregate levels.

Coverage improves significantly in 2001 and 2002 compared to earlier years, so we use employment from 2002, which is a Census of Agriculture year. Because resulting data must be for congressional districts, not counties, we use a crosswalk to districts from the 108th Congress from geocorr, a tool hosted by the University of Missouri. These districts are based on the 2000 census and are unchanged from the 107th Congress. This is all done in us_emp.r.

**Manufacturing Efficiency of US Districts** We then measure the overall efficiency in manufacturing. This is done in cd_trade.r. First, we compute the baseline share of national employment in each industry which is within each district. We merge on trade data by industry, so that for each county-industry we have exports from the US to the world. We have this measure as the 3-year and 5-year averages, and the below applies to both. We use the 5-year average for the main analysis.[11]

We then multiply the employment share by exports to each partner to calculate that congressional districts exposure to exports in that industry to that partner. In the data, this is named cd_export_dollars_.... We build this for three categories of goods: Manufacturing (NAICS 31-33), Agriculture (NAICS 11), and Crops (a subset of NAICS 11 based on the crops in the suitability measure  this is done separately in cd_trade_crops.r and then merged in). Within each of these groups, we construct the measure separately for the four sets of products based on tariffs identified above.

We also construct the same measure with respect to the world, i.e. considering exports to the rest of the world as a whole. Here we do the same as above, but instead multiply the employment share by total exports in that industry to the world. In the measures datasets, these are named either cd_export_dollars (bilateral) or cd_world_export_dollars (absolute).

In the main analysis, we focus on 5-year average manufacturing exports from the US to the world weighted on employment share in the same manufacturing industries. We sum all manufacturing industries in each district. We label this measure $X^{MANU}$. This is equivalent to $M_{d(p)}$ in equation 4.

**Manufacturing Efficiency of Partner Countries** For the denominator of the measure, we start with data on GDP shares for each partner country. These are from the WDI, which we organize in wdi.r. GDP shares are very aggregate, available for manufacturing and the entire NAICS 11 (Forestry, Fishing, and Agriculture). The data are often incomplete, so we use GDP shares from 1998, the earliest year where we have each country, other than Bahrain. For Bahrain we use shares from 2002, when that indicator becomes available.

For each of the groupings described above (Agri, Manu, Crops, each divided into the four types of groups) we multiple partner exports by this share. This is done once using bilateral exports from the partner to the United States, and once using total exports from the partner to the world in that industry. Again, this is done using both 3- and 5-year averages, within cd_trade.r.

[11] Results are virtually the same if we rely on the 3-year average (available upon request).

In the main analysis, we focus on 5-year average manufacturing exports from partner countries to the world weighted on manufacturing GDP. This variable is aggregated at the country level. We label this measure $Z^{MANU}$. This is equivalent to $M_p$ in equation 4.

**Agri CA1** The measure of manufacturing efficiency is created by dividing $X^{MANU}$ by $Z^{MANU}$. Then we take the log of this ratio, i.e. $ln\left(\frac{X^{MANU}}{Z^{MANU}}\right)$. Finally, we take $Agri\ CA - ln\left(\frac{X^{MANU}}{Z^{MANU}}\right)$. Note that *Agri CA* is already a log and so the difference between two log variables is equivalent to the ratio of their raw value.

**Agri CA2** We follow similar steps to build *Agri CA2*. We take the 5-year average agricultural exports from the US to the world weighted on employment share in the same agricultural industries. We sum all agricultural industries in each district. We label this measure $X^{AGRI}$. This is equivalent to $A_{d(p)}$ in equation 4. Moreover, we take the 5-year average agricultural exports from partner countries to the world weighted on agricultural GDP. This variable is aggregated at the country level. We label this measure $Z^{AGRI}$. This is equivalent to $A_p$ in equation 4.

The measure of agricultural efficiency is created by dividing $X^{AGRI}$ by $Z^{AGRI}$. Then we take the log of this ratio, i.e. $ln\left(\frac{X^{AGRI}}{Z^{AGRI}}\right)$. Finally, we take $ln\left(\frac{X^{AGRI}}{Z^{AGRI}}\right) - ln\left(\frac{X^{MANU}}{Z^{MANU}}\right)$.

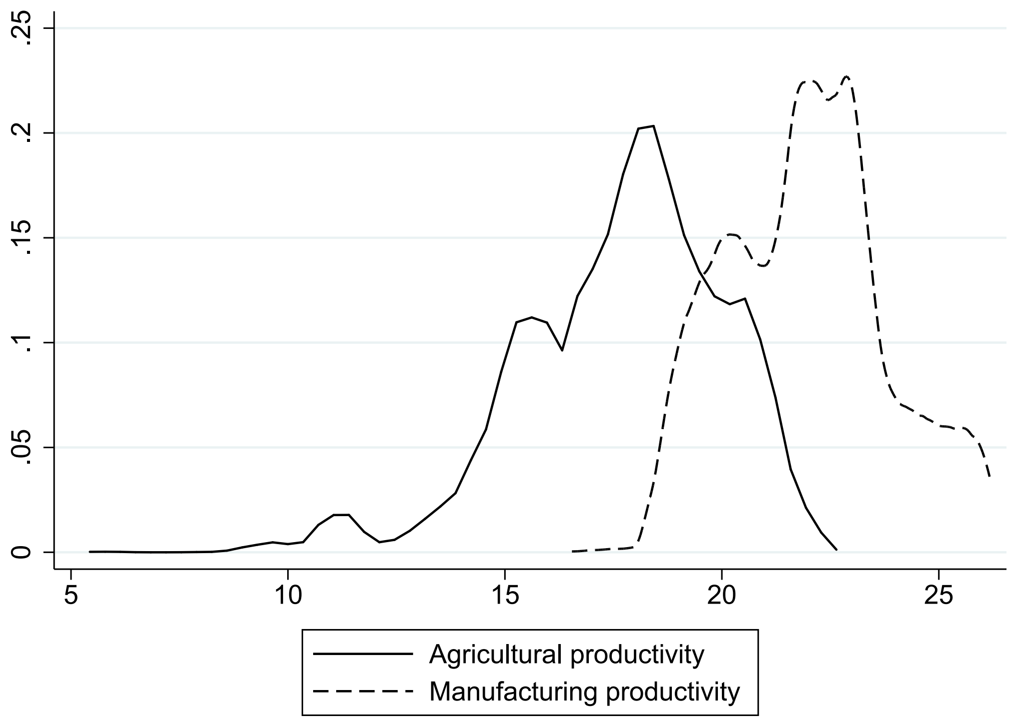
**Manufacturing Trade Balance** To build our measure of manufacturing trade balance, we rely on 5-year average trade balance in manufacturing between the US and partner countries. We weight this measure by employment share in the same manufacturing industry and we sum these values across districts.

Finally, we note that our results are very similar if we rely on 3-year average values. Moreover, we obtain similar results if we rely on bilateral exports from the US to partner countries (and vice versa) rather than on absolute exports, i.e. exports to the world.

# Appendix B

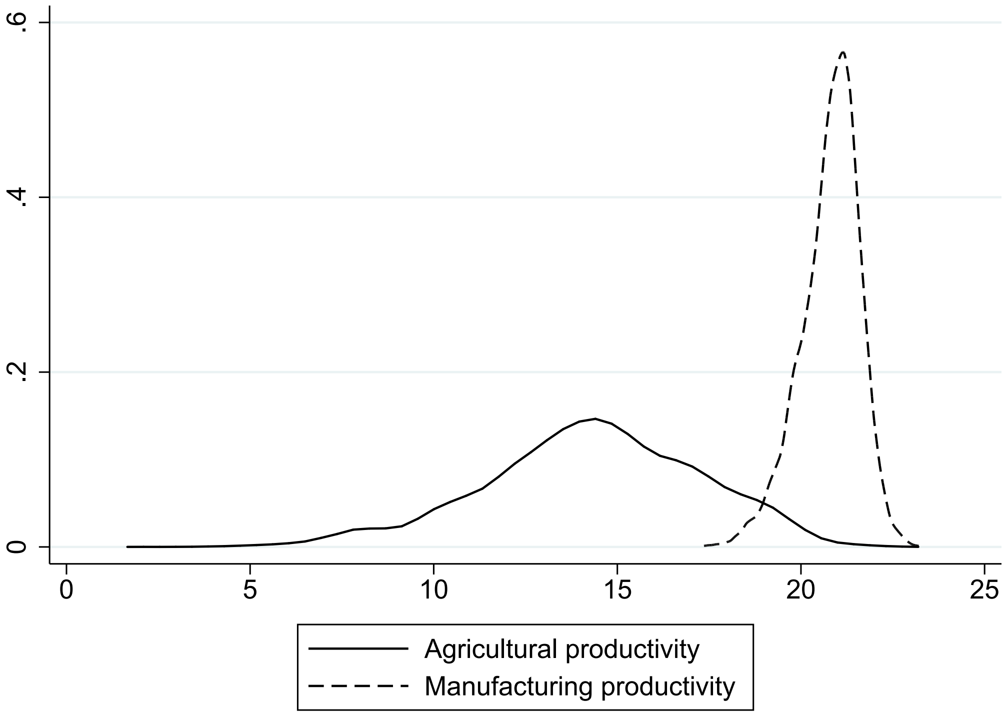
## Descriptive Statistics

Figure B1: Distribution of Revealed Efficiency in Agriculture and Manufacturing in US Districts



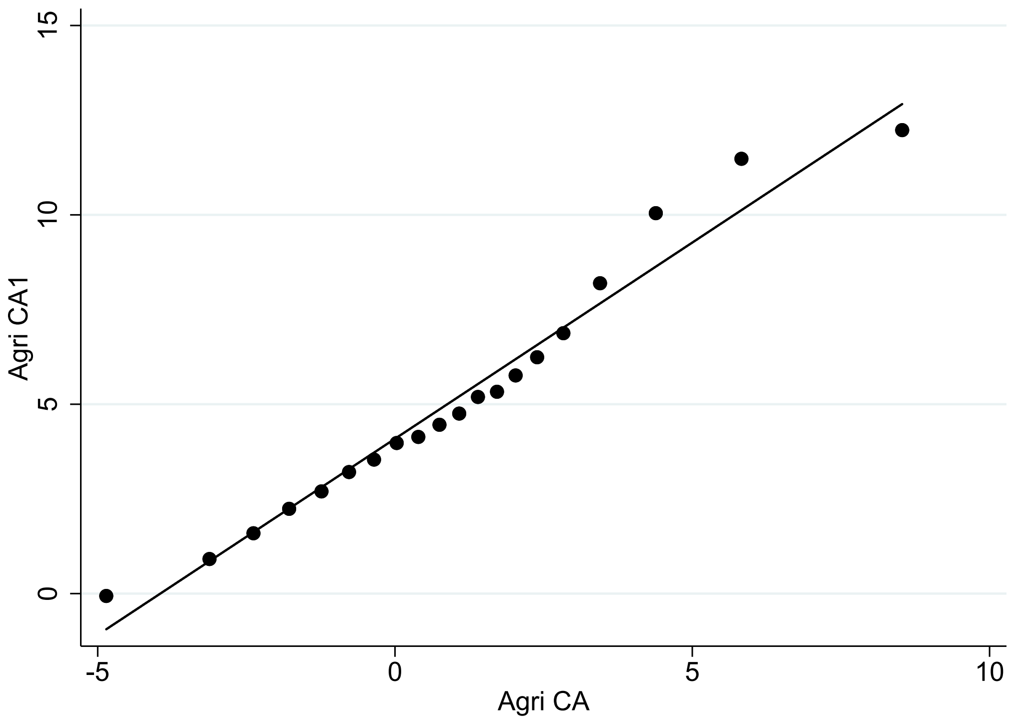

Note: agricultural (manufacturing) productivity is measured by weighting US total exports of agricultural (manufacturing) products by share of workers in a given industry/district. Sources: Comtrade and QCEW.

Figure B2: Distribution of Revealed Efficiency in Agriculture and Manufacturing in Partner Countries



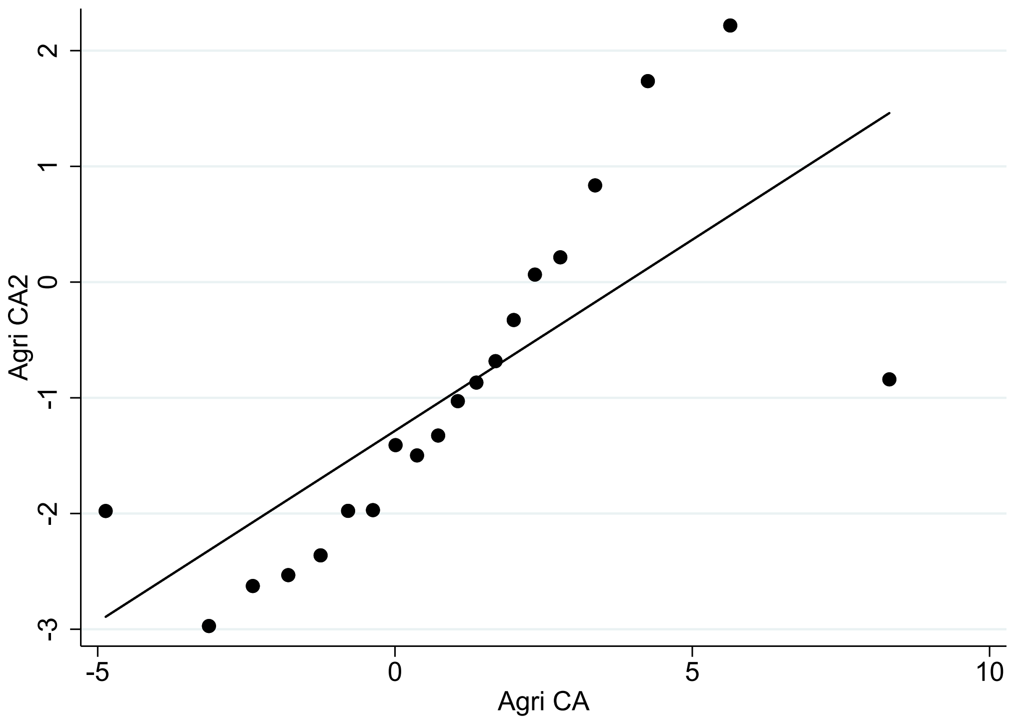

Note: agricultural (manufacturing) productivity is measured by weighting partner countries total exports of agricultural (manufacturing) products by GDP in agriculture (manufacturing). Sources: Comtrade and WDI.

Figure B3: Comparing Measures of Agricultural Comparative Advantage



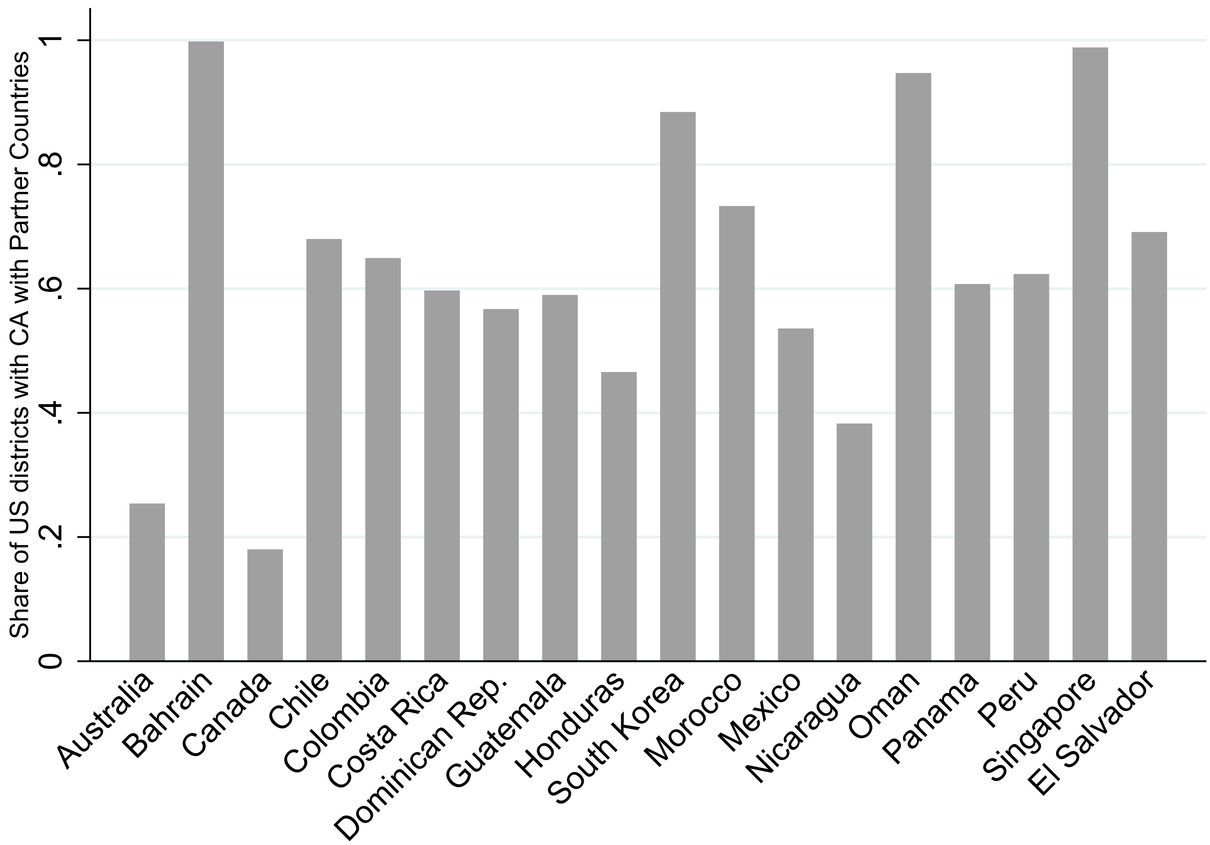

Note: *Agri CA* is a measure of comparative advantage in agriculture using crop suitability. *Agri CA1* is a measure of comparative advantage in agriculture using crop suitability divided by a measure of relative efficiency in manufacturing using export data weighted by share for workers in each industry and district.

Figure B4: Comparing Measures of Agricultural Comparative Advantage



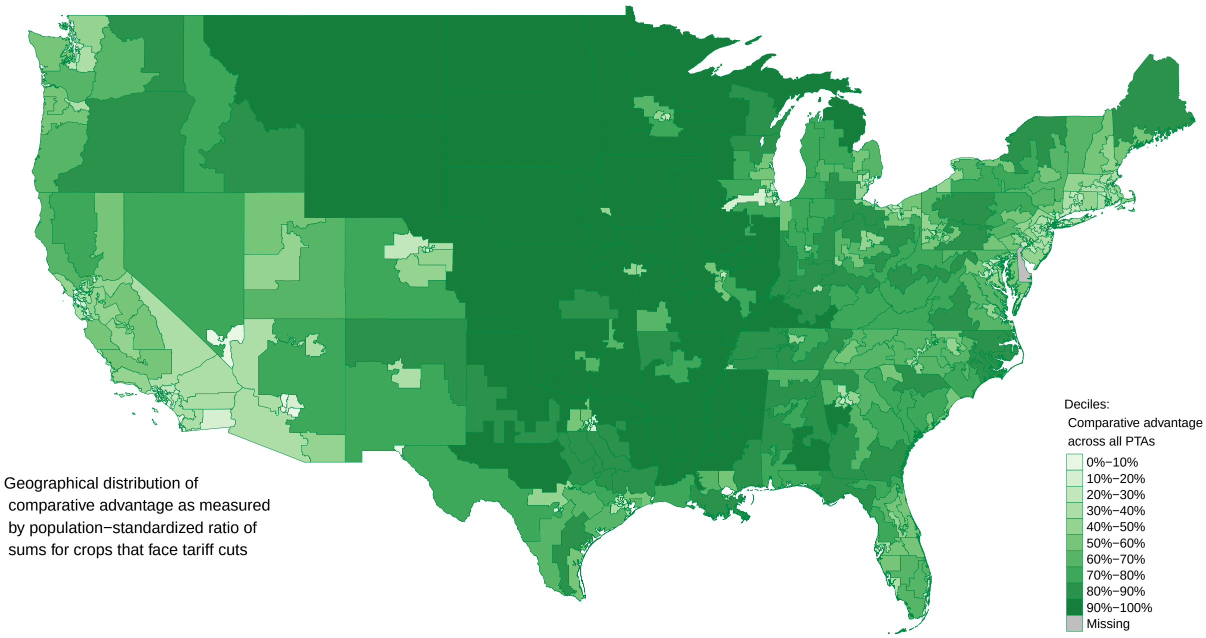

Note: *Agri CA* is a measure of comparative advantage in agriculture using crop suitability. *Agri CA2* is a measure of comparative advantage in agriculture using export data weighted by share for workers in each industry and district divided by a measure of relative efficiency in manufacturing using export data weighted by share for workers in each industry and district.

Figure B5: Share of US districts with Agricultural Comparative Advantage with Partner Countries



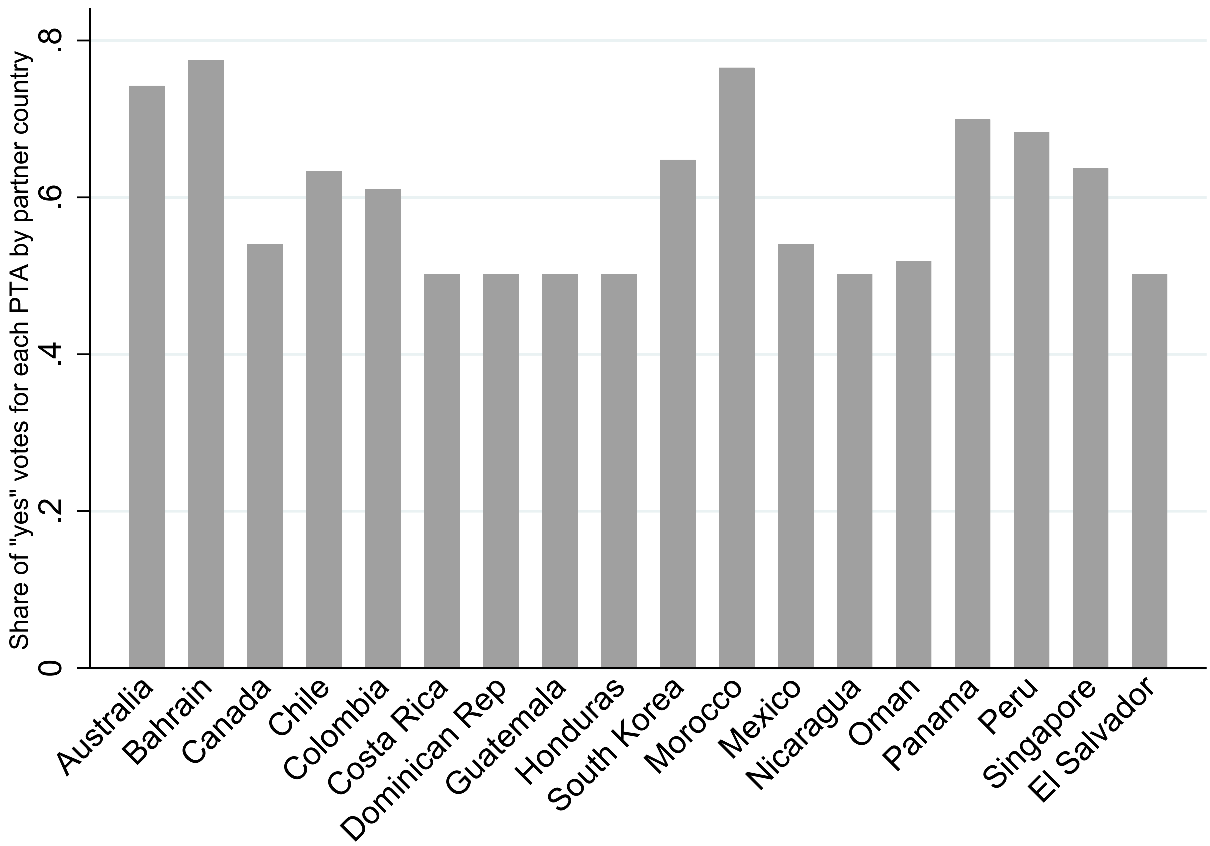

Source: FAO-GAEZ.

Figure B6: Agricultural Comparative Advantage by US District



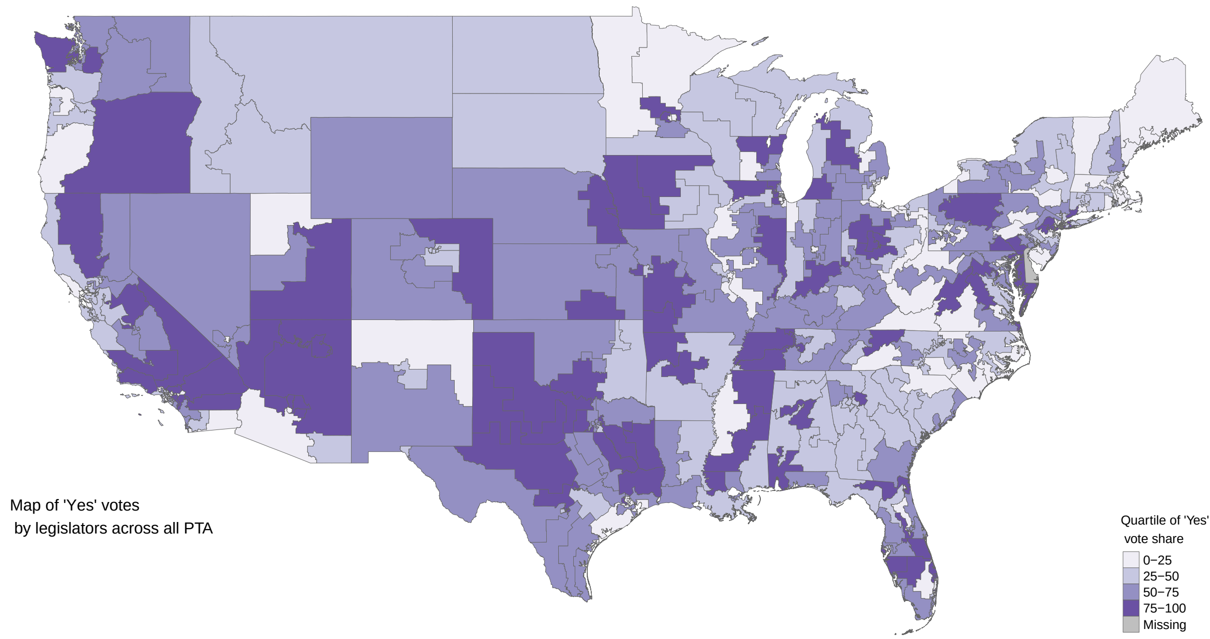

Note: The figure shows the sum of the $AgriCA1_{dp}$ measure across all PTAs ratified between 1993 and 2012. The figure illustrates the decile each district belongs to in the distribution of this variable. Source: FAO-GAEZ.

Figure B7: Share of *yes* Votes for each PTA by Partner Countries




Source: GovTrack.

Figure B8: Share of *yes* Votes for PTAs by US District




Note: The figure shows the share of *yes* votes by legislators across all PTAs ratified between 1993 and 2012. The figure illustrates the quartile each district belongs to in the distribution of this variable. Sources: FAO-GAEZ and GovTrack.

Table B1: Descriptive Statistics (Main)

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Agri CA | 7,708 | 1.03 | 3.10 | -9.21 | 11.66 |
| Agri CA1 | 7,397 | 5.13 | 3.76 | -7.81 | 15.94 |
| Agri CA2 | 7,346 | -0.97 | 3.50 | -10.57 | 13.96 |
| Offshorable | 7,520 | 27.92 | 8.04 | 6.02 | 44.49 |
| Democratic Legislators | 7,708 | 0.48 | 0.50 | 0 | 1 |
| Manufacturing Employment | 7,395 | 0.12 | 0.06 | 0.01 | 0.43 |
| Manufactruing Profit | 6,543 | 0.06 | 0.07 | 0.001 | 0.53 |
| Occupation in Agri | 7,526 | 231.75 | 331.60 | 3.51 | 4432.87 |
| Population Density | 7,397 | 1817.84 | 5032.31 | 9.80 | 42534.19 |
| ID district | 7,708 | 223 | 129 | 1 | 447 |
| Decade | 7,708 | 2001 | 5 | 1990 | 2010 |

Table B2: Descriptive Statistics (ANES)

| Variable | Obs | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| Favor Free Trade | 5548 | 1.37 | 0.48 | 0 | 1 |
| Agri CA | 5548 | 1.10 | 2.31 | -9.21 | 6.29 |
| Agri CA1 | 5548 | 5.92 | 2.47 | -5.03 | 12.04 |
| Agri CA2 | 5548 | -0.10 | 2.53 | -8.03 | 7.32 |
| Democratic Legislators | 5548 | 0.49 | 0.48 | 0 | 1 |
| Offshorable | 5548 | 27.32 | 8.49 | 6.31 | 44.49 |
| Gender | 5548 | 1.45 | 0.50 | 0 | 1 |
| Education | 5548 | 4.78 | 1.57 | 1 | 7 |
| Ideology | 5548 | 5.85 | 2.41 | 0 | 10 |
| Age | 5548 | 51 | 16 | 17 | 92 |
| ID district | 5548 | 214 | 127 | 1 | 427 |
| Anes Year | 5548 | 2009 | 6 | 1996 | 2016 |

# Appendix C

## Mechanisms

**Text analysis on legislators speeches** Transcripts of House floor debates preceding roll-call votes on free trade agreements were obtained directly from the Congressional Record of Proceedings and Debates of the United States Congress. For each bill other than NAFTA, web addresses were collected for digitized versions of the Congressional Record containing the debate on FTA implementation acts. In some cases debate exceeds the two hours of time allotted to a bill, postponing further debate and an eventual vote to later congressional proceedings. When this is the case, all URLs relevant to the implementation act of a particular FTA were collected.

Using the rvest package for R, the html of the relevant pages of the digitized congressional record was scraped. Text was extracted from the html of each webpage, and this was then cleaned to contain only the debate, removing procedures to introduce the bill, the reading of the bill, and the vote on the bill.

In the case of H.R. 3450 (103rd): North American Free Trade Agreement Implementation Act, debate transcript had to be manually extracted from a PDF version of the Congressional Record, as digitization only began in 1995. This is the only bill for which the debate transcript is not web-scraped.

After debate transcripts were obtained, and concatenated where multiple sessions preceded voting on a single bill, texts were then processed to link statements with members of the House of Representatives. Because of the standard format of the Congressional Record, which begins each statement with the upper-case surname of the speaking representative, this process is straightforward. To obtain full speeches by each representative for each bill individual statements were then combined into a single long string of text.

Statements were then automatically coded for mentions of agriculture by counting the number of times the character strings agri or farm appeared in the text. Once FTA-representative level counts were obtained, these were manually reviewed to determine if uses of the terms were in support of the FTA, against the FTA, or not germane to the question, in order to construct two variables at the FTA-representative level: one which is a count of mentions of agri or farm in support of the agreement, and one count of those against.

Examples of statements which match with the terms mentioned above, and which were coded as in support of the agreement, include the following partial quotes:

From Representative Herger on CAFTA:

> Mr. Speaker, I represent one of the richest agricultural districts in the world in Northern California, in the northern Sacramento Valley. And this CAFTA agreement will create important new export opportunities for the Northern California farmers and ranchers I represent.

From Representative Smith of Nebraska on the US-PERU FTA:

> I rise today in support of expanding our Nations export markets by passing the bipartisan Peru Trade Promotion Agreement. The agreement will create significant new opportunities for American farmers, ranchers, businesses and certainly consumers by opening new markets and reducing trade barriers, leveling that playing field. More than two-thirds of current U.S. farm exports to Peru will become duty free immediately. This trade agreement gives U.S. farmers an advantage over competitors. For example, U.S. exporters of wheat and white corn currently pay a 17% tariff in Peru, while Argentina pays only 3.4% and controls two-thirds of Perus market.

As our outcome is a count for the statement, the first would record two mentions, the first of agri and the second of farm. The second quote would record three mentions, all of farm, and in each case in support of the agreement.

Examples of statements made against agreements which match these terms include the following:

From Representative Costa on CAFTA:

> Mr. Speaker, I fully support global commerce. Almonds, which I grow on my land in Fresno, have become one of Californias most valuable exports through development of foreign markets. In fact, more than two-thirds of this $1 billion a year crop is shipped

> outside of the United States every year. So, I truly understand the benefit of opening the world to the abundance of U.S. products. Of the producers in my district, some will win and some will lose with CAFTA. I am here to speak on behalf of Americas best interest. That interest is a trade policy that is free and, more importantly, fair. Unfortunately, regardless of the diligent work and excellent intentions of our trade negotiators, the bi-lateral and multi-lateral agreements we have entered into are not serving America well, especially not American agriculture, if you use the last 10 years of increasing trade deficit as the standard [...]. In light of our trade deficits, how can we approve another agreement and expect different, better results for the American farmer? In conclusion, my vote today against CAFTA is a vote of protest, a vote of dissatisfaction, a line in the sand. My nay vote today is a message on behalf of American agriculture, American businesses, and American workers to the administration and my colleagues in Congress that we absolutely must develop a new trade strategy, a strategy that reverses, over time, our trade deficit. This new trade strategy must be straight with the American public. It must define whoover the next 10, or 20, or 30 yearswill be the winners and losers. Because, for America to be economically strong in the 21st century, we must have a plan to address the transitions and shifts in our domestic economy. As participants in the 21st century economy that Thomas Friedman refers to as the new flat earth,' American workers and businessmen deserve to know what their chances are in the global economy. They need to know who among them will be the winners and losers. And, throughout that deliberation, American agriculture must have a seat at the table.

From Representative Carson of Oklahoma, on the US-Australia FTA:

> Mr. Speaker, today unfortunately, I rise to voice my opposition to this trade agreement. I do feel that trade is essential to Americas sustained economic vitality and I also feel that we must make every effort to ensure that international markets are open to U.S. goods. Exports have accounted for almost 30% of American growth over the last decade. In fact, my state of Oklahoma sold more than $3 billion worth of exports to more than 100 foreign markets last year. With these statistics in mind, it pains me to vote against this agreement. When casting my vote, I must think of the many Oklahoma farmers

> and ranchers that I have spoken with about this agreement and I must take into consideration how this agreement will severely cripple their ability to support themselves and their families. In particular, the provisions of this agreement will unfairly disadvantage the beef and wheat industries, which comprise two-thirds of Oklahomas agricultural exports. This agreement would allow increased quantities of Australian beef to flood the U.S. market, which will result in unacceptably low market prices for American cattlemen. In Oklahoma alone, more than 105,000 jobs associated with the cattle industry will be put in jeopardy by the adverse effects of this agreement. In addition to the beef industry, the continued existence of the Australian Wheat Board under this agreement will force Americas wheat farmers to continue their export competition in the international markets against a state run monopoly. A government backed monopoly, like the Australian Wheat Board, which dictates the price of wheat rather than allowing the free market to take its course, thereby allows Australian wheat to consistently undercut the price of American wheat in international markets. Once again, American farmers must be able to sell their products if they are going to support themselves and their families. This agreement does not afford them that opportunity.

In the same manner as those statements made in support of the agreement, the count of those mentions against the agreement in both of these speeches would be four. The first speech mentions agri three times, and farm' once, while the latter mentions agri once and farm three times.

Last, some speeches mention the terms, but not in a way that clearly supports or opposes the agreement in question. For example, on the US-Chile FTA, Representative Frank of Massachusetts begins with the following:

> Mr. Speaker, first I do want to comment on the irony of many of us being lectured about the value of free trade by supporters of the most anti-free trade, anti-poor people policy that the United States has, our agriculture policy. People who have voted for the American agriculture bill have less credentials to preach to the rest of us about being fair to poor people than anyone I can think of.

Though Representative Frank goes on to explain his opposition to the FTA, he does not again make recourse to agriculture. Thus the count for this segment of text is zero for both of our variables.

We divide the positive count variables for the full length of the speech and we use it as outcome. We include bill fixed effects, *Democratic Legislators*, and *Offshoring* and run OLS regressions with standard errors clustered by district. Note that we are unable to run a Heckman model to account for the selection into speaking about the bill, since we have a limited number of observations in the outcome equation and the Heckman model does not converge. As such, the estimates should be interpreted as local average effects, since the sample is made by only these legislators who have spoken during floor debates preceding roll-call votes on PTAs. More formally, we estimate the following model:

$$PTAs\ Good\ Agri_{dp} = \eta_b + \beta_0 + \beta_1 Agri\ CA_{dp} + \beta_2 Democrats_{dp} + \beta_3 Offshorable_{dp} + \epsilon_{dp}, \quad (1)$$

where $PTAs\ Good\ Agri_{dp}$ is the ratio between the number of times that a legislator mentions that PTAs are good for farmers and the full length of the speech. We observe this outcome at the level of the district $d$ for a partner country $p$. $Agri\ CA_{dp}$ is our measure of the comparative advantage in agricultural production of district $d$ with respect to partner country $p$. $\eta_b$ are bill fixed effects, which control for and net out time-invariant differences across PTA bills. $\beta_0$ is a constant, $\beta_1$, $\beta_2$, and $\beta_3$ are the variable coefficients and $\epsilon_{dp}$ accounts for all the residual determinants of the outcome.

Results are reported in Table C1. Both measures of comparative advantage (solo measure and ratio) have a positive coefficient, which is significant. In sum, there is evidence that legislators in districts with high comparative advantage in agriculture make explicit connections between trade liberalization of agricultural products and benefits for the farming community they represent.

**Individual attitude towards free trade** We rely on the ANES survey, which has been regularly administrated to US citizens since the 1990s. The survey is particularly useful for us for a couple of reasons. First, it includes a question on support for free trade in most of the waves. Second,

Table C1: Legislators Speeches Mentioning that PTAs are Good for Agriculture

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | OLS | | | | | |
| | PTAs Good for Agric. | | | | | |
| Agri CA | 0.0003*** | | | 0.0002** | | |
| | (0.000) | | | (0.000) | | |
| Agri CA1 | | 0.0002*** | | | 0.0001*** | |
| | | (0.000) | | | (0.000) | |
| Agri CA2 | | | 0.0002*** | | | 0.0002*** |
| | | | (0.000) | | | (0.000) |
| Constant | 0.0012*** | 0.0006*** | 0.0018*** | 0.0037** | 0.0032* | 0.0038** |
| | (0.000) | (0.000) | (0.000) | (0.002) | (0.002) | (0.002) |
| Observations | 869 | 826 | 825 | 840 | 826 | 825 |
| R-squared | 0.034 | 0.028 | 0.031 | 0.063 | 0.059 | 0.061 |
| Main Controls | No | No | No | Yes | Yes | Yes |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS with robust standard errors clustered by district in parentheses. The unit of observation is the district-partner country. The outcome variable counts the number of times that a legislator in district $d$ mentions that PTAs are good for the agricultural sector of the district in their declaration of vote for a specific PTA. This count variable is divided by the length of the speech. The key independent variables are measures of comparative advantage in agriculture, which vary by district and partner country. Sources: Comtrade, FAO-GAEZ, GovTrack, IPUMS, and QCEW.

it reports the district in which respondents live, which allows us to match survey data to our comparative advantage measures.

Unfortunately, the survey contains a question on the support for free trade agreement, but only in 2016, which is of no use for our analysis. The assumption that we make is that in assessing their support for free trade, respondents have in mind costs and benefits generated by trade agreements. This assumption seems plausible, since PTAs are the most important piece of trade policy since the 1990s, widely discussed in the media and thoroughly scrutinized by trade union, business associations, etc.

We use the 1996, 2004, 2008, 2012, and 2016 waves. We did not use the 2000 wave, since the US signed a PTA only with Jordan between 1996 and 1999 and there is no voting record for this PTA. If we include the 2000 wave the results are unchanged. We include the 2016 wave since we have PTAs ratified in 2012, which are not included in the 2012 wave to avoid post-treatment bias. This is because we do not know the exact day on which respondents answered the survey in 2012.

We run a model in which the outcome scoring is one if respondents support free trade; zero, otherwise. Our main independent variables are our measures of comparative advantage. We also include district and wave fixed effects, our two controls, and some individual-level controls (age, education, gender, and ideology). Note that our unit of analysis is district-wave in this test. Our measure of comparative advantage varies across waves, since the US signs PTAs with different partner countries in each wave. More formally, we estimate the following model:

$$\begin{aligned} Support\ Free\ Trade_{idw} = & \alpha_d + \gamma_w + \beta_0 + \beta_1 Agri\ CA_{dw} + \beta_2 Democrats_{dw} \\ & + \beta_3 Offshorable_{dw} + \mathbf{X_{iw}} \zeta^{'} + \epsilon_{idw}, \end{aligned} \tag{2}$$

where $Support\ Free\ Trade_{idw}$ is a dummy equal to one if the respondent $i$ from district $d$ supports free trade in wave $w$. $Agri\ CA_{dw}$ is our measure of the comparative advantage in agricultural production of district $d$ in wave $w$. $\alpha_d$ are district fixed effects, which control for and net out time-invariant differences across districts, and $\gamma_w$ are wave fixed effects, which absorb the overall trends in legislators votes. $Democrats_{dw}$ and $Offshorable_{dw}$ are the two main controls at the district level. $\mathbf{X_{iw}}$ is a vector with individual level controls, i.e. age, education, gender, and ideology.

$\beta_0$ is a constant, $\beta_1$, $\beta_2$, $\beta_3$, and $\zeta_4$ are the variable coefficients and $\epsilon_{idw}$ accounts for all the residual determinants of the outcome. Note that because $Agri\ CA_{dw}$ is specific to each district and each wave, we use variation both across districts and within districts across waves to identify the parameter of interest $\beta_1$. We cluster robust standard errors by district.

Table C2 shows the result of this test. Both measures of comparative advantage (solo measure and ratio) have a positive coefficient, which is significant. Thus, respondents living in districts with high comparative advantage are more likely to support free trade. This is an important result, which allows us to link legislators voting to the preferences of the community that they represent.

Table C2: Support for Free Trade

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| | OLS | | | | | | | | |
| | Support For Trade | | | | | | | | |
| Agri CA | 0.0298*** | | | 0.0328*** | | | 0.0280** | | |
| | (0.011) | | | (0.012) | | | (0.011) | | |
| Agri CA1 | | 0.0340*** | | | 0.0353*** | | | 0.0296** | |
| | | (0.011) | | | (0.011) | | | (0.011) | |
| Agri CA2 | | | 0.0045 | | | 0.0035 | | | 0.0069 |
| | | | (0.007) | | | (0.007) | | | (0.007) |
| Constant | 1.1150*** | 0.9054*** | 1.1384*** | 1.1449*** | 0.9268*** | 1.1658*** | 1.2621*** | 1.0794*** | 1.2730*** |
| | (0.027) | (0.082) | (0.027) | (0.034) | (0.084) | (0.036) | (0.053) | (0.098) | (0.053) |
| Observations | 6,467 | 6,467 | 6,467 | 6,467 | 6,467 | 6,467 | 5,548 | 5,548 | 5,548 |
| R-squared | 0.111 | 0.111 | 0.111 | 0.111 | 0.112 | 0.111 | 0.167 | 0.167 | 0.167 |
| District FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Wave FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Main Controls | No | No | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Individual Controls | No | No | No | No | No | No | Yes | Yes | Yes |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS with robust standard errors clustered by district in parentheses. The unit of observation is the district-survey wave. The outcome variable is scored one if respondents oppose limits to imports from other countries to the US. The key independent variables are measures of comparative advantage in agriculture, which vary by district and survey wave. Sources: ANES, Comtrade, FAO-GAEZ, GovTrack, IPUMS, and QCEW.

# Appendix D

## Robustness Checks

We perform the following robustness checks:

- Results are not sensitive to log transformation (Table D1);
- Results hold if we take into account the fact that different crops command different prices by multiplying absolute suitability by the price of each crop (Costinot et al. 2016) (Table D2);
- Results are similar if we take the sum of the ratios for each crop rather than the ratio of the sum across all crops (Table D3);
- Results of *Agri CA1* and *Agri CA2* hold even if we use other model specifications, including the one in which we add all the additional controls (Tables D4 and D4);
- Results hold even if we take into account the service sector (Tables D6 and D7);
- Results hold if we account for the China shock (Table D8);
- Results hold if we rely on logistic regressions (Table D9);
- Results are similar though weaker when we explore legislators voting in the Senate (Table D10);
- We build a placebo that captures comparative advantage for crops excluded from PTAs. This variable has no effect on the outcome, implying that legislators are well aware of the design of trade agreements (Table D11).

## Alternative Measures of Comparative Advantage

Table D1: Comparative Advantage (No Log) and Legislators Vote for PTAs

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | | | | OLS | | | |
| | | | | Legislators' Voting in Favor of PTAs | | | |
| Agri CA | 0.000009*** | 0.000005*** | 0.000006*** | 0.000005*** | 0.000005*** | | |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | | |
| Agri CA1 | | | | | | 0.000000*** | |
| | | | | | | (0.000) | |
| Agri CA2 | | | | | | | 0.000000 |
| | | | | | | | (0.000) |
| Constant | 0.595165*** | 0.996508*** | 0.943896*** | 1.011776*** | 1.144924*** | 1.010596*** | 1.014793*** |
| | (0.017) | (0.001) | (0.023) | (0.033) | (0.273) | (0.034) | (0.034) |
| Observations | 7,708 | 7,708 | 7,708 | 7,520 | 6,543 | 7,397 | 7,346 |
| R-squared | 0.004 | 0.552 | 0.556 | 0.591 | 0.643 | 0.594 | 0.595 |
| District FE | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Decade FE | No | No | Yes | Yes | Yes | Yes | Yes |
| Main Controls | No | No | No | Yes | Yes | Yes | Yes |
| Additional Controls | No | No | No | No | Yes | No | No |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS with robust standard errors clustered by district in parentheses. The unit of observation is district-partner country. The outcome variable scores one if a legislator in district $d$ votes in favor of PTA $j$. The key independent variable is a measure of comparative advantage, which varies by district and partner country. Sources: FAO-GAEZ, GovTrack, and IPUMS.

Table D2: Comparative Advantage (Weighted on Prices) and Legislators Vote for PTAs

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | OLS | | | | | |
| | Legislators' Vote in Favor of PTAs | | | | | |
| Agri CA (weighted on prices) | 0.04** | 0.01** | 0.01** | 0.01** | 0.01** | 0.01** |
| | (0.004) | (0.003) | (0.002) | (0.002) | (0.003) | (0.002) |
| Constant | 0.61** | 0.98** | 0.93** | 1.00** | 0.98** | 1.00** |
| | (0.016) | (0.004) | (0.022) | (0.034) | (0.026) | (0.034) |
| District fixed effects | No | Yes | Yes | No | Yes | Yes |
| Decade fixed effects | No | No | Yes | No | No | Yes |
| Controls | No | No | No | Yes | Yes | Yes |
| Observations | 6,001 | 6,001 | 6,001 | 5,861 | 5,861 | 5,861 |
| R-squared | 0.045 | 0.539 | 0.543 | 0.586 | 0.585 | 0.586 |

Robust standard errors in parentheses ** p<0.01, * p<0.05

Note: OLS with robust standard errors clustered by district in parentheses. The unit of observation is district-partner country. The outcome variable scores one if a legislator in district $d$ votes in favor of PTA $j$. The key independent variable is a measure of comparative advantage weighted on prices, which varies by district and partner country. Sources: FAO-GAEZ, GovTrack, and IPUMS.

Table D3: Comparative Advantage (Sum of Ratios) and Legislators Vote for PTAs

| | (1) | (2) | (3) | (4) | (5) | (6) |
|---|---|---|---|---|---|---|
| | OLS | | | | | |
| | Legislators' Vote in Favor of PTAs | | | | | |
| Agri CA (sum of ratios) | 0.02** | 0.01** | 0.01** | 0.01** | 0.01** | 0.01** |
| | (0.003) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Constant | 0.45** | 0.95** | 0.92** | 0.98** | 0.96** | 0.98** |
| | (0.024) | (0.014) | (0.025) | (0.035) | (0.028) | (0.035) |
| District fixed effects | No | Yes | Yes | No | Yes | Yes |
| Decade fixed effects | No | No | Yes | No | No | Yes |
| Controls | No | No | No | Yes | Yes | Yes |
| Observations | 7,708 | 7,708 | 7,708 | 7,520 | 7,520 | 7,520 |
| R-squared | 0.030 | 0.552 | 0.555 | 0.591 | 0.590 | 0.591 |

Robust standard errors in parentheses ** p<0.01, * p<0.05

Note: OLS with robust standard errors clustered by district in parentheses. The unit of observation is district-partner country. The outcome variable scores one if a legislator in district $d$ votes in favor of PTA $j$. The key independent variable is a measure of comparative advantage built as sum of ratios, which varies by district and partner country. Sources: FAO-GAEZ, GovTrack, and IPUMS.

Table D4: AgriCA1 and PTA Voting

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | OLS | | | | |
| | Legislators' Voting in Favor of PTAs | | | | |
| Agri CA2 | 0.026*** | 0.013*** | 0.012*** | 0.012*** | 0.012*** |
| | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Constant | 0.467*** | 0.917*** | 0.868*** | 0.937*** | 0.978*** |
| | (0.023) | (0.011) | (0.023) | (0.034) | (0.272) |
| Observations | 7,397 | 7,397 | 7,397 | 7,397 | 6,543 |
| R-squared | 0.039 | 0.559 | 0.562 | 0.600 | 0.648 |
| District FE | No | Yes | Yes | Yes | Yes |
| Decade FE | No | No | Yes | Yes | Yes |
| Main Controls | No | No | No | Yes | Yes |
| Additional Controls | No | No | No | No | Yes |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS with robust standard errors clustered by district in parentheses. The unit of observation is the district-partner country. The outcome variable scores one if a legislator in district $d$ votes in favor of PTA $j$. The key independent variable is the ratio between comparative advantage in agriculture and in manufacturing, which varies by district and partner country. Sources: Comtrade, FAO-GAEZ, GovTrack, IPUMS, and QCEW.

Table D5: AgriCA2 and PTA Voting

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | OLS | | | | |
| | Legislators' Voting in Favor of PTAs | | | | |
| Agri CA2 | 0.013*** | 0.005*** | 0.006*** | 0.005*** | 0.005*** |
| | (0.003) | (0.002) | (0.001) | (0.001) | (0.001) |
| Constant | 0.610*** | 1.004*** | 0.942*** | 1.007*** | 1.102*** |
| | (0.017) | (0.001) | (0.023) | (0.033) | (0.279) |
| Observations | 7,346 | 7,346 | 7,346 | 7,346 | 6,492 |
| R-squared | 0.009 | 0.554 | 0.557 | 0.596 | 0.644 |
| District FE | No | Yes | Yes | Yes | Yes |
| Decade FE | No | No | Yes | Yes | Yes |
| Main Controls | No | No | No | Yes | Yes |
| Additional Controls | No | No | No | No | Yes |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS with robust standard errors clustered by district in parentheses. The unit of observation is the district-partner country. The outcome variable scores one if a legislator in district $d$ votes in favor of PTA $j$. The key independent variable is the ratio between comparative advantage in agriculture and in manufacturing, which varies by district and partner country. Sources: Comtrade, FAO-GAEZ, GovTrack, IPUMS, and QCEW.

Table D6: AgriCAS1 and PTA Voting

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | OLS | | | | |
| | Legislators' Voting in Favor of PTAs | | | | |
| Agri CAS1 | 0.034*** | 0.016*** | 0.015*** | 0.014*** | 0.015*** |
| | (0.003) | (0.002) | (0.002) | (0.002) | (0.002) |
| Constant | 0.568*** | 0.956*** | 0.935*** | 1.005*** | 1.043*** |
| | (0.017) | (0.005) | (0.023) | (0.033) | (0.271) |
| Observations | 7,397 | 7,397 | 7,397 | 7,397 | 6,543 |
| R-squared | 0.049 | 0.559 | 0.561 | 0.598 | 0.647 |
| District FE | No | Yes | Yes | Yes | Yes |
| Decade FE | No | No | Yes | Yes | Yes |
| Main Controls | No | No | No | Yes | Yes |
| Additional Controls | No | No | No | No | Yes |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS with robust standard errors clustered by district in parentheses. The unit of observation is the district-partner country. The outcome variable scores one if a legislator in district $d$ votes in favor of PTA $j$. The key independent variable is the ratio between comparative advantage in agriculture and in services, which varies by district and partner country. Sources: Comtrade, FAO-GAEZ, GovTrack, IPUMS, and QCEW.

Table D7: AgriCAS2 and PTA Voting

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | OLS | | | | |
| | Legislators' Voting in Favor of PTAs | | | | |
| Agri CAS2 | 0.017*** | 0.001 | 0.000 | -0.001 | -0.002 |
| | (0.004) | (0.002) | (0.002) | (0.002) | (0.002) |
| Constant | 0.686*** | 1.004*** | 0.950*** | 1.009*** | 1.155*** |
| | (0.028) | (0.009) | (0.025) | (0.035) | (0.274) |
| Observations | 7,346 | 7,346 | 7,346 | 7,346 | 6,492 |
| R-squared | 0.010 | 0.553 | 0.556 | 0.595 | 0.644 |
| District FE | No | Yes | Yes | Yes | Yes |
| Decade FE | No | No | Yes | Yes | Yes |
| Main Controls | No | No | No | Yes | Yes |
| Additional Controls | No | No | No | No | Yes |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS with robust standard errors clustered by district in parentheses. The unit of observation is the district-partner country. The outcome variable scores one if a legislator in district $d$ votes in favor of PTA $j$. The key independent variable is the ratio between comparative advantage in agriculture and in services, which varies by district and partner country. Sources: Comtrade, FAO-GAEZ, GovTrack, IPUMS, and QCEW.

**Accounting for the China Shock**

A possible concern is that our measure of comparative advantage in agriculture correlates with the presence/absence of other industries which are also affected by PTAs.[12]

Remember that the China shock variable is a Bartik measure capturing rising Chinese imports to the United States in each industry $i$ weighted by baseline share of workers in the same industry $i$ in each commuting zone. This variable varies both across CZs and over time, i.e. pre- and post-China accession to the WTO. This variable is instrumented using import from China to other high-income countries (weighted on share of workers as well). The two trade flows (imports from China to the US and from China to other high-income countries) are highly correlated due to Chinas rising comparative advantage and falling trade costs.

To explore whether a correlation between comparative advantage in agriculture and manufacturing production may drive our results, we rely on the same model specification as in Feigenbaum and Hall (2015). The results are reported in Table 2. In columns 1 and 2, we run both OLS and 2SLS, instrumenting the *China Shock* variable as in Autor et al. (2013). In columns 3 and 4, we include our two controls: *Democrats* and *Offshoring*. In columns 5 and 6, we also add district fixed effects.[13]

All the results validate our previous findings. Specifically, the three measures of agriculture comparative advantage remain positive and significant in every model. Moreover, the coefficient of *China Shock* is negative and significant in every model except Model 3, confirming the results of Feigenbaum and Hall (2015).

[12]For instance, Feigenbaum and Hall (2015) show that districts affected by the China shock, i.e. the dramatic surge in imports to the US following Chinas entry into the WTO, are significantly less likely to vote in favor of trade liberalization agreements than districts not affected by the China shock.

[13]Feigenbaum and Hall (2015) do not include district fixed effects since they rely on double first-difference models, i.e. first differences of both the outcome and *China Shock*, which is equivalent to including district fixed effects.

Table D8: Comparative Advantage, the China Shock and Legislators Votes on PTAs

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| | OLS | 2SLS | OLS | 2SLS | OLS | 2SLS | OLS | 2SLS | OLS | 2SLS |
| | Legislators' Voting in Favor of PTAs | | | | | | | | | |
| Agri CA | 0.03491*** | 0.03554*** | 0.01161*** | 0.01315*** | 0.01543*** | 0.01539*** | | | | |
| | (0.004) | (0.004) | (0.003) | (0.003) | (0.002) | (0.002) | | | | |
| Agri CA1 | | | | | | | 0.01147*** | 0.01145*** | | |
| | | | | | | | (0.002) | (0.002) | | |
| Agri CA2 | | | | | | | | | 0.00531*** | 0.00535*** |
| | | | | | | | | | (0.001) | (0.001) |
| China Shock | -0.02006** | -0.03326** | -0.01101 | -0.03170*** | -0.04052** | -0.07560* | -0.04096** | -0.07543* | -0.04264** | -0.07909* |
| | (0.010) | (0.013) | (0.008) | (0.011) | (0.020) | (0.044) | (0.020) | (0.044) | (0.020) | (0.044) |
| Constant | 0.60218*** | 0.61827*** | 0.90053*** | 0.90686*** | 1.04499*** | | 0.98036*** | | 1.05046*** | |
| | (0.027) | (0.029) | (0.034) | (0.034) | (0.041) | | (0.042) | | (0.041) | |
| Observations | 7,634 | 7,634 | 7,446 | 7,446 | 7,446 | 7,446 | 7,359 | 7,359 | 7,308 | 7,308 |
| R-squared | 0.051 | 0.049 | 0.373 | 0.370 | 0.597 | 0.107 | 0.601 | 0.107 | 0.598 | 0.097 |
| District fixed effects | No | No | No | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Decade fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Controls | No | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS and 2SLS with robust standard errors clustered by district in parentheses. The unit of observation is the district-partner country. The outcome variable scores one if the legislator from district $d$ votes in favor of PTA $j$. The key independent variables are measures of comparative advantage, which vary by district and partner country. *China Shock* is instrumented using the same identification strategy as in Autor et al. (2013). Sources: Autor et al. (2013), FAO-GAEZ, GovTrack, and IPUMS.

**Logit Regressions**

Table D9: Main Analysis Using Logit

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | OLS | | | | | | |
| | Legislators' Voting in Favor of PTAs | | | | | | |
| Agri CA | 0.150*** | 0.166*** | 0.158*** | 0.168*** | 0.188*** | | |
| | (0.017) | (0.019) | (0.018) | (0.020) | (0.023) | | |
| Agri CA1 | | | | | | 0.130*** | |
| | | | | | | (0.016) | |
| Agri CA2 | | | | | | | 0.059*** |
| | | | | | | | (0.014) |
| Constant | 0.272*** | 15.027*** | 14.865*** | 15.722*** | 85.767*** | 14.980*** | 15.469*** |
| | (0.073) | (1.002) | (1.021) | (1.046) | (5.972) | (1.051) | (1.046) |
| Observations | 7,708 | 5,189 | 5,189 | 5,109 | 3,609 | 4,986 | 4,935 |
| District FE | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Decade FE | No | No | Yes | Yes | Yes | Yes | Yes |
| Main Controls | No | No | No | Yes | Yes | Yes | Yes |
| Additional Controls | No | No | No | No | Yes | No | No |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: logit with robust standard errors clustered by district in parentheses. The unit of observation is the district-partner country. The outcome variable scores one if a legislator in district $d$ votes in favor of PTA $j$. The key independent variables are measures of comparative advantage in agriculture, which vary by district and partner country. Sources: Comtrade, FAO-GAEZ, GovTrack, IPUMS, and QCEW.

### Analysis of the Senate

We run our main models for the Senate. Table D10 shows that, while the coefficient remains positive, it is only significant when accounting for relative efficiency in manufacturing. To us the weaker significance is the result of a smaller variation in both the outcome variable and our measure of comparative advantage in agriculture, since the analysis is at the state-partner country level for the Senate. These results are in line with previous studies pointing out that the heterogeneity of the district electorate matters for trade policy (Bailey, 2001; Bailey and Brady, 1998).

Table D10: Main Analysis (Senate)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | OLS | | | | | | |
| | Legislators' Voting in Favor of PTAs | | | | | | |
| Agri CA | 0.003*** | 0.001 | 0.001 | 0.001 | 0.001 | | |
| | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | | |
| Agri CA1 | | | | | | 0.001* | |
| | | | | | | (0.000) | |
| Agri CA2 | | | | | | | 0.001** |
| | | | | | | | (0.000) |
| Constant | 0.497*** | 0.687*** | 0.691*** | 0.748*** | -15.073*** | 0.728*** | 0.712*** |
| | (0.046) | (0.001) | (0.070) | (0.103) | (3.821) | (0.101) | (0.102) |
| Observations | 798 | 798 | 798 | 798 | 602 | 798 | 798 |
| R-squared | 0.022 | 0.448 | 0.455 | 0.470 | 0.548 | 0.472 | 0.473 |
| State FE | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Decade FE | No | No | Yes | Yes | Yes | Yes | Yes |
| Main Controls | No | No | No | Yes | Yes | Yes | Yes |
| Additional Controls | No | No | No | No | Yes | No | No |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS with robust standard errors clustered by state in parentheses. The unit of observation is the state-partner country. The outcome variable scores one if a legislator in state $d$ votes in favor of PTA $j$. The key independent variables are measures of comparative advantage in agriculture, which vary by state and partner country. Sources: Comtrade, FAO-GAEZ, GovTrack, IPUMS, and QCEW.

**Placebo**

Table D11: Comparative Advantage in Agriculture with Crops both Included and Excluded from PTAs

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| | OLS | | | | | | |
| | Legislators' Voting in Favor of PTAs | | | | | | |
| Agri CA | 0.036*** | 0.015*** | 0.015*** | 0.014*** | 0.015*** | | |
| | (0.004) | (0.002) | (0.002) | (0.002) | (0.002) | | |
| Agri CA1 | | | | | | 0.012*** | |
| | | | | | | (0.002) | |
| Agri CA2 | | | | | | | 0.008*** |
| | | | | | | | (0.002) |
| Agri CA excluded crops | -0.000** | 0.000 | 0.000 | 0.000* | 0.000 | | |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | | |
| Agri CA1 excluded crops | | | | | | -0.000 | |
| | | | | | | (0.000) | |
| Agri CA2 excluded crops | | | | | | | -0.000 |
| | | | | | | | (0.000) |
| Constant | 0.563*** | 0.953*** | 1.000*** | 0.960*** | 1.038*** | 0.884*** | 0.996*** |
| | (0.019) | (0.006) | (0.013) | (0.096) | (0.271) | (0.099) | (0.033) |
| Observations | 6,842 | 6,842 | 6,842 | 6,654 | 6,543 | 6,543 | 6,927 |
| R-squared | 0.048 | 0.616 | 0.618 | 0.641 | 0.647 | 0.647 | 0.591 |
| District FE | No | Yes | Yes | Yes | Yes | Yes | Yes |
| Decade FE | No | No | Yes | Yes | Yes | Yes | Yes |
| Main Controls | No | No | No | Yes | Yes | Yes | Yes |
| Additional Controls | No | No | No | No | Yes | No | No |

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Note: OLS with robust standard errors clustered by district in parentheses. The unit of observation is the district-partner country. The outcome variable scores one if a legislator in district $d$ votes in favor of PTA $j$. The key independent variables are measures of comparative advantage in agriculture for crops both included and excluded from PTAs. These measures vary by district and partner country. Sources: Comtrade, FAO-GAEZ, GovTrack, IPUMS, and QCEW.

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