# Pre-Analysis Plan for "The Electoral Consequences of the 'China Shock' in Brazil"

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## 1 Introduction

This document presents a pre-analysis plan for an observational study that will be conducted on the results of the 2018 Brazil General election run-off to be held on October 28, 2018. The results of the run-off election will be analyzed as part of a larger study of the impact of the "China shock" in Brazilian elections. Following the guidelines presented in Burlig (1), this pre-analysis plan only covers the intended analysis for the 2018 Brazil General election run-off because the results of this election are not available at the moment of submitting this pre-analysis plan.

The goal of this study is to investigate how rising import competition and commodity demand from China affected the results of the 2018 Brazil General election run-off. Were local labor markets affected by Chinese import competition or by Chinese commodity demand more likely to shift right/left when compared with previous elections? Were these local labor markets more likely to increase the share of supporters of their previous political views conducing to increase polarization of the electoral landscape? Do import competition and commodity demand have opposite electoral effects with respect to each other? Are the electoral consequences of rising trade exposure documented for the U.S. (2) generalizable to other countries?

## 2 Motivation

The seminal paper by Autor et al. (3) showed that Chinese import competition had a significant negative effect on U.S. local labor market outcomes. The authors then connected import competition to electoral consequences in Dorn et al. (2) by showing that import competition contributed to the polarization of the U.S. political landscape. In particular, they found that in U.S. counties with greater trade exposure shifted towards the Republican candidate in presidential elections. The effect of the "China shock" in Brazil, however, is slightly different.

Together with the import competition effect there is a positive effect of Chinese commodity demand on Brazilian local labor markets (4–6). In particular, Costa et al. (6) observe faster wage growth in locations benefiting from rising Chinese commodity demand between 2000 and 2010. Can the rising commodity demand have an opposite electoral effect than rising import competition? Will the effect be sizable in magnitude?

In the last decade, Brazilian economy has been characterized by a series of ups and downs. First, the country lived through an era of prosperity that lifted millions out of poverty through government subsidies (7). This era of prosperity was followed by the corruption scandal uncovered by the anti-corruption effort known as "Operation Car Wash." This scandal lead to the impeachment of their president and the arrest of their former president, both from the same party. Brazilians now face the dilemma of staying with the incumbent party (the Worker's Party), whose members have been involved in large corruption scandals, or choosing the "anti-establishemnt" right-wing candidate from the Social Liberal Party.

Whether the rising import and export exposure pushed political choices towards the right or left wing is not clear. On the one hand, one might think that because the rise in commodity demand had and opposite labor market effect than the rise of competition, it should also have an opposite electoral effect, making people more likely to lean away from conservative politicians. On the other hand, one might think that those regions that were positively affected by the commodity demand were also the regions where corruption increased fastest due to the increase in revenue of local governments. Given that a lot of the loss of support of the incumbent government is due to the multiple

corruption scandals, regions that were positively affected by commodity demand would also be the regions that shifted away from supporting the incumbent left-wing government.

This pre-analysis plan remains agnostic to the precise causal mechanism, and is restricted to the hypotheses that can be empirically tested with the methodology outlined in the next section.

## 2.1 Design

In broad strokes, the proposed empirical strategy is based on a shift-share methodology (8) and closely follows Costa et al. (6).

## 2.2 Data sources

I will use labor force participation information from the RAIS dataset, covering the period from 2003 to 2015. From RAIS I extract information about employment in each microregion[1] and industry[2] in Brazil. Trade data comes from the UN Comtrade, and uses the HS classification for products at the 4-digit level. To map industries with products I use the crosswalk between HS and NAICS developed by Datawheel (9) using the International Standard Industrial Classification. Because the crosswalk is many to many, I aggregate some industries and products into larger groups until the mapping is one to one, yielding a total of 116 traded industries and corresponding 116 products.

The electoral results at the municipal level are available in the website of the "Tribunal Superior Eleitoral" (www.tse.jus.br). The results of the 2018 General Election run-off should become available once the election is finalized on Sunday October 28, 2018.

## 2.3 Main Hypotheses

The main set of hypotheses relates to the shift in political choices over a long period of time as a consequence of Chinese import competition and Chinese commodity demand. In particular, I will compare the results of the 2018 run-off election with the results of the 2006 General Election. 2006 is a good benchmark year because it was right before a big boom in trade relations between Brazil and China.

- *Hypothesis 1a:* People in regions that were more exposed to *Chinese trade competition* are more likely to shift their support to the right-wing candidate (Social Liberal Party candidate) in the 2018 Brazil General election run-off as compared to the 2006 General election.
- *Hypothesis 1b:* People in regions that were more exposed to **Chinese commodity demand** are less likely to shift their support the right-wing candidate (Social Liberal Party candidate) in the 2018 Brazil General election run-off as compared to the 2006 General election.

## 2.4 Additional Hypotheses

The second set of hypotheses aims at exploring the "anti-establishment" feeling in current Brazilian electoral landscape by comparing the results of the first round of the 2018 General Election with the results of the run-off. The first round of the 2018 general election had a total of 13 candidates, of which only one belonged to the incumbent political party. If regions that leaned to the political left on the first round ended up supporting the right-wing candidate in the run-off, this is a signal of an anti-establishment feeling. I will explore whether regions that were positively affected by trade (Chinese import competition and commodity demand), were less likely to shift their support away from the incumbent party.

- *Hypothesis 2a:* People in regions that were more exposed to Chinese commodity demand are less likely to shift their support the right-wing candidate (Social Liberal Party candidate) in the 2018 Brazil General election run-off as compared to the 2018 General election first round.
- *Hypothesis 2b:* People in regions that were more exposed to trade competition with China are more likely to shift their support to the right-wing candidate (Social Liberal Party candidate) in the 2018 Brazil General election run-off as compared to the 2018 General election first round.

[1] Microregions are defined by the Brazilian Institute of Statistics by aggregating municipalities together. It is the same level of spatial aggregation used in Costa et al. (6).

[2] This study uses the CNAE classification of industries at the 3-digit level, which includes 280 different industries of which 116 are matched to a product in the HS classification.

Most of Brazilian politics in the last few years have been dominated by one of the largest corruption scandals in its history. This scandal exploded right after the 2014 election. The third set of hypotheses explores how Brazilians shifted their support away from the incumbent Workers' Party before and after the corruption scandals. Did regions that were more exposed to trade become less likely to shift their support away from the Workers' party?

- *Hypothesis 3a:* People in regions that were more exposed to Chinese commodity demand are less likely to shift their support the right-wing candidate (Social Liberal Party candidate) in the 2018 Brazil General election run-off as compared to the 2014 General election.
- *Hypothesis 3b:* People in regions that were more exposed to trade competition with China are more likely to shift their support to the right-wing candidate (Social Liberal Party candidate) in the 2018 Brazil General election run-off as compared to the 2014 General election.

The fourth and final set of hypotheses relates to the heterogeneity of the effect across regions with different initial characteristics. For example, in the U.S. initially moderately liberal counties that were exposed to Chinese import competition shifted their support towards more extreme liberal politicians. I will follow Dorn et al. (2) in hypotheses 3a and 3b, and add an additional hypothesis about poor vs. rich regions. This last hypothesis is very important in the context of Brazil due to its significant spatial inequality.

- *Hypothesis 4a:* The effects associated with hypotheses 1, 2, and 3 are stronger for initially right-leaning microregions.
- *Hypothesis 4b:* The effects associated with hypotheses 1, 2, and 3 are stronger for microregions with predominantly white racial composition.
- *Hypothesis 4c:* The effects associated with hypotheses 1, 2, and 3 are stronger for microregions with median wage below the median of all microregions.

## 2.5 Analysis

Following Costa et al. (6), I will use two main right-hand-side variables capturing the import exposure to competition with China and the export exposure:

$$\Delta \text{IPW}_{r,t,\tau} = \sum_i \frac{L_{ri,t}}{L_{i,t}} \frac{\Delta X^{CHN \to BRA}_{i,t,\tau}}{L_{r,t}} \tag{1}$$

$$\Delta \text{EPW}_{r,t,\tau} = \sum_i \frac{L_{ri,t}}{L_{i,t}} \frac{\Delta X^{BRA \to CHN}_{i,t,\tau}}{L_{r,t}}, \tag{2}$$

where $\Delta X^{CHN \to BRA}_{i,t,\tau}$ is the change in imports from China to Brazil in industry $i$ between year $t$ and $t+\tau$, and $\Delta X^{BRA \to CHN}_{i,t,\tau}$ is the change in exports from Brazil to China. $L_{ri,t}$ is the number of workers in microregion $r$ in industry $i$ and year $t$. Given the time coverage of the labor data I will use $t = 2005$ and $\tau = 10$ for all specifications.

The main specification for our analysis is as follows:

$$\Delta Y_r = \beta_0 + \beta_1 \Delta \text{IPW}_r + \beta_2 \Delta \text{EPW}_r + Z_r' \beta_3 + \varepsilon_r, \tag{3}$$

where $\Delta Y_r$ is the change in electoral outcomes in microregion $r$, between 2006 and the run-off election of 2018 (for hypotheses 1), between the first round and the run-off of the 2018 Brazilian General election (for hypotheses 2), and between 2014 and the run-off election of 2018 (for hypotheses 3). $Z_r$ is a vector of microregion controls calculated at the start of the period in which $\Delta Y_r$ is calculated. As controls, I will use population, GDP, a dummy variable indicating whether the microregion is part of a state capital, percentage of employment in manufacturing, percentage of employment in commodities, percentage of college-educated, percentage of foreign-born, percentage of white workers, macroregion dummies (5 macroregions), and the fraction of votes for a right wing candidate. We will exclude from the analysis microregions in which the voter turnout is too low (below 10%) or where there is a large difference in voter turnout between the 2018 run-off and the reference year (more than 50 percentage points).

To address endogeneity concerns, I construct two instruments akin to the shift-share methodology (8). In particular, I follow Costa et al. (6) and take the product of the initial levels of trade and the fixed effects from a set of

auxiliary regressions, while controlling for start-of-the-period conditions. The two instruments are:

$$\Delta \text{IPW}^{\text{iv}}_{r,t,\tau} = \sum_i \frac{L_{ri,t}}{L_{i,t}} \frac{X^{CHN \to BRA}_{i,t} \hat{\delta}_{CHN,i}}{L_{r,t}} \tag{4}$$

$$\Delta \text{EPW}^{\text{iv}}_{r,t,\tau} = \sum_i \frac{L_{ri,t}}{L_{i,t}} \frac{X^{BRA \to CHN}_{i,t} \hat{\psi}_{CHN,i}}{L_{r,t}}. \tag{5}$$

I use these two variables with $t = 2005$ and $\tau = 10$ to instrument for $\text{IPW}_r$ and $\Delta\text{EPW}_r$. The coefficients $\hat{\psi}_{CHN,j}$ and $\hat{\delta}_{CHN,j}$ are calculated according to the following auxiliary regressions:

$$\frac{\Delta X^{c \to O}_{i,t,\tau}}{X^{c \to O}_{i,t}} = \alpha_i + \delta_{CHN,i} + \nu_{ic} \tag{6}$$

$$\frac{\Delta X^{O \to c}_{i,t,\tau}}{X^{O \to c}_{i,t}} = \gamma_i + \psi_{CHN,i} + \mu_{ic}, \tag{7}$$

where $\Delta X^{c \to O}_{i,t,\tau}$ is the change in the imports from country $c$ to all countries other than Brazil between $t$ and $t + \tau$, and $\Delta X^{O \to c}_{i,t,\tau}$ is the change in the exports from all countries other than Brazil to country $c$. $\delta_{CHN,i}$ and $\psi_{CHN,i}$ are China specific dummies.

Finally to test hypotheses 4, I add an interaction term between the two main explanatory variables and the relevant regional characteristics:

$$\Delta Y_r = \beta_0 + \beta_1 \Delta\text{IPW}_r + \beta_2 \Delta\text{EPW}_r + Z_r' \beta_3 + \beta_4 H_r \Delta\text{IPW}_r + \beta_5 H_r \Delta\text{EPW}_r + \varepsilon_r, \tag{8}$$

where $H_r$ is a dummy variable denoting whether microregion $r$: is right-leaning (for hypothesis 4a), is predominantly white (for hypothesis 4b), or has a GDP below the median (for hypothesis 4c). Note that the $H_r$ controls are already included in the original specification as part of the $Z_r$ region controls.

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