Linguistic Bridge: The Impact of New Official Languages on International Trade

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Abstract

This paper investigates the causal impact of official language adoption on international trade, leveraging exogenous variation from recent language policy changes across 211 countries from 1996 to 2019. Using a difference-in-differences approach combined with propensity score matching, we isolate the effect of adopting a shared official language on trade flows. We find that this policy increases bilateral exports by an average of 18.77%, with the effect robust across multiple sensitivity tests. The magnitude of the effect varies by industry: the effect is stronger in communication-intensive sectors and when the adopted language signals a targeted commitment to specific trading partners. A counterfactual general equilibrium analysis suggests that the effect is equivalent to a reduction of 5.45% in non-tariff barriers. Our findings show the importance of language policy as a tool for reducing trade frictions and offer new insights into the heterogeneity of policy impacts across industries.

Introduction

Does official language causally affect international trade? While existing literature suggests a correlation(Anderson and van Wincoop, 2003; Melitz and Toubal, 2014), robust causal evidence remains sparse. This paper fills this gap by examining official language adoption across 211 countries.

Contributions:

- We move beyond correlation to establish robust causal evidence on the trade-enhancing effects of language policy, complementing prior studies that are limited in spatial or contextual scope(Brynjolfsson, Hui, and Liu, 2019; Egger and Lassmann, 2015).
- We uncover heterogeneity across industries and products, offering strategic insights for developing countries seeking economic integration.

Table 1. Selected Countries with New Official Languages

Country	Language Adopted	Year	Common Usage
Uganda	Swahili	2000	No
Tajikistan	Russian	2009	No
Rwanda	English, Swahili	2003, 2017	Yes, No

Table 2. Selected Matching Control Countries

Type I		Type II			
Treatment Countries	Matching Control Countries	Treatment Countries	Official Language of Treatment Countries	Matching Control Countries	Common Language of Matching Control Countries
Algeria	Colombia Jordan Turkey	Chad	Arabic(1996)	Israel	Hebrew, Arabic, English, French, Russian
Equatorial Guinea	Haiti Chile Latvia	Kenya	Swahili(2010)	Congo	Swahili, Lingala, Kikongo, ...

Empirical Specifications & Data

1. **Empirical Specifications**

$$Export_{ijt} = \exp[\beta_1 Treat_{ij} \times Post_t + \mu_{ij} + \mu_{it} + \mu_{jt}] + \epsilon_{ijt} \quad (1)$$

- $Export_{ijt}$: Bilateral export volume from country i to country j in year t.
- $Treat_{ij} \times Post_t$: Equals 1 if at least one of the countries adopted a new official language, resulting in a shared language between i and j in year t.
- Fixed Effects: Country-pair FE (μ_{ij}) and country-year FE (μ_{it}, μ_{jt}).
- Estimator: PPML preferred to account for heteroskedasticity and zero trade flows (Silva and Tenreyro, 2006); OLS for robustness.

2. **Data Sources**
   - Bilateral Trade : ITPD-E (USITC) and BACI Database (CEPII).
   - Language Data: (1) Official Language Shocks: Hand-collected from CIA World Factbook and government archives. (2) Common spoken languages (CEPII GeoDist, >9% population threshold) and linguistic distance indices (Melitz and Toubal, 2014).

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PSM-DID

1. **Treatment Definition** Shocks are classified into two types:
   - Type I ($treat^1$): Adopting a non-common official language (Control: No new official language).
   - Type II (treat^2): Upgrading a common language to official status (Control: Common language remains unofficial).

   Note: Common language defined as spoken by >9% of population (CEPII GeoDist).
2. **Propensity Score Estimation** We estimate the Propensity Score (ps) for country c using a Cross-Sectional Probit model estimated separately for each year:

$$P(treat_c^{1,2} = 1) = \Phi(\beta_0 + \beta X_c + \epsilon_c) \quad (2)$$

   - Covariates (X_c): GDP per capita, unemployment rate, access to electricity, landlocked status, colonial history and net migration.
3. **Matching Procedure** We use 1:3 Nearest Neighbor Matching based on the entire sequence of propensity scores (1996–2019):
   - Dynamic Matching: Minimizes the Euclidean distance between the treated country (a) and control country (b) over the full sample period.

$$\min_b \left\{ \frac{1}{T} \sum_{t=1996}^{2019} (ps_{bt} - ps_{at})^2 \right\} \quad (3)$$

   - Stratification: Control countries are restricted to those sharing the same common language as the treated country.
   - Stability: Control country assignment remains fixed pre- and post-shock to satisfy DID assumptions. The matching results are shown in Table 2.

Main Results

1. **Baseline Results**
   The adoption of a shared official language by either country i or j boosts bilateral exports by approximately 18.77%. The results remain robust when estimating Type I and Type II shocks separately using PSM-DID.
2. **Mechanism: Communication Costs** The trade-promoting effect is amplified in sectors with higher communication requirements and differentiated goods.

   ① **Communication Intensity Index (t_k)** We construct an industry-level index (t_k) by applying PCA to the 8 specific sub-skills within the "Communicating and Interacting" category of the O*NET database.

$$t_k = \sum_{o=1}^{M_k} s_{ko} \times t_o^q$$

   t_o^q : Importance score of skill q in occupation o (Source: O*NET).
   s_{ko}: Employment share of occupation o in industry k (Source: BLS).
   Results: The increase effect is significantly stronger for industries with higher communication intensity.

   ② **Differentiated Goods**
   Result: The increase effect is driven by differentiated Goods (Rauch,1999), consistent with the theory that differentiated goods face higher information frictions than homogeneous and listed goods.
3. **Robustness** We validate our identification strategy using Event Studies, Parallel Trend Tests, and Placebo Tests.
   Fig 1–3 demonstrate that the parallel trends assumption holds and the results are not driven by spurious correlations.

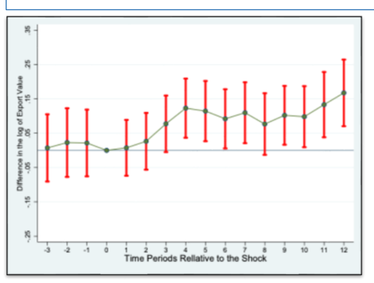

Figure 1. Event Study

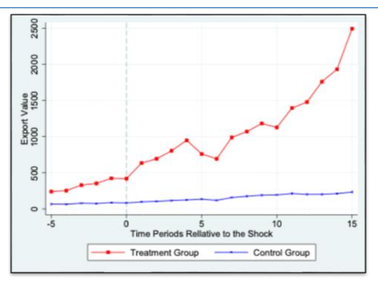

Figure 2. Parallel Trend

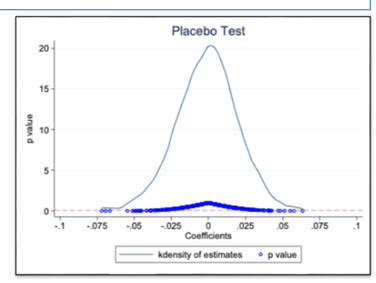

Figure 3. Placebo Test

Conclusions

- Substantial Impact: Adopting a shared official language acts as a "Linguistic Bridge," boosting exports by 18.77%, comparable to a 5.45% cut in non-tariff barriers.
- Channel: The effect is driven by reduced information friction, specifically favoring differentiated goods and communication-intensive industries.
- Insight: Official language status serves as a credible commitment device, signaling targeted economic integration and effectively reducing border effects.

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