Language Barriers and Trade Disputes: evidence from WTO Trade Disputes cases

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Abstract: Existing literature frequently indicated language barriers among trading countries adversely impact their trade relationship. But its impact on trade disputes and disputes related activities are not yet studied well. This paper investigates the impact of language barriers on trade disputes using a detailed data set of 129 countries and 565 WTO trade dispute cases from 1995 to 2018. The empirical results of panel probit model suggest that trading partners language barrier increases their trade disputes likelihood implying that language barriers increase trade costs and hamper bilateral trade relations. The rise of trade costs acts as tariff equivalent barriers and adverse trade relationships motivate countries to impose trade restrictions. The empirical study further indicates that trading countries with linguistic differences in their official languages more frequently participate in trade disputes. Overall, robust results also confirmed that trading countries language barriers increase trade disputes likelihood.

1. Introduction

Language barriers are particularly critical during international trade conflicts as trade partners fight to communicate what they want or even get essential information regarding policies or regulations. Different languages, norms, and perceptions create difficulties for trading countries to correctly recognize each other's trade regulations and guidelines (Korneliussen & Blasius, 2008). Misunderstanding (Gokan, Kichko, & Thisse, 2019) and ambiguity of information (Konara, 2020) about trade rules, regulations create uncertainty, increase trade costs and hamper trade relationships. Besides, communication incapability arises when countries have no similarity in their spoken as well as official languages. Language barriers cause uncertainty, a lack of detail, and a loss of trust in countries embroiled in trade disputes. Due to linguistic barriers, governments must employ people to perform a trade dispute resolution process that increases trade costs.

Several attempts have been made to more precisely estimate the effect of language barriers on trade. Language barriers intuitively increase costs due to communication gaps, flawed

information, vagueness (Guiso, Herrera, & Morelli, 2016), doubt, and misunderstanding (Li & Sai, 2020). The study of Fink, Mattoo, and Neagu (2005) and Gokan et al. (2019) define communication and information costs incurred from language barriers negatively affect trade-related activities. Language barriers can impose high costs on bilateral trade between countries that do not share any common language, either an official language or a widely spoken foreign language in terms of communication and information. In light of falling tariffs and transport costs, the importance of language barriers to trade has captured much attention in recent research.

This paper aims to examine the impact of language barriers in trade disputes. This paper uses a large dataset of 129 countries, 8,256 country pairs, and 565 WTO trade conflict cases from 1995 to 2018. To measure the language barriers between trading partners use Language barrier index (LBI) developed by Lohmann (2011), which reflects no similarities in the major official languages. Using panel probit regression, it is shown that the language barrier has a positive effect on trade disputes at the 1% significance level. The average marginal probability effects imply that countries having language barriers with trading partners have an average 0.17% higher probability of trade disputes. The additional estimations further support these findings and therefore act as a robustness check. The key contribution of this paper is to provide empirical evidence of the impact of language differences in trade conflicts for the first time.

Thus, the Armington model is used to describe the theoretical background of the impact on language barriers on trade disputes considering trade costs as the channel. Trade costs arise from language barriers have tariff equivalent impact on trade and deteriorate the trade relationship that leads to disputes. Trade flows are subject to trade costs which increase price of related goods as well reduce trade volume. Due to language differences, exporting countries face extra costs such as language barriers raise contact and information costs, and countries face difficulties in communication. Therefore, the language barriers hypothesis is proposed to explain this positive relationship between language barriers and trade disputes.

The rest of the article is organized as follows. Section 2 explains the theoretical frameworks and hypothesis. Section 3 describes the data used, and the research methods applied. Section 4 presents the empirical analysis with robust checks. Finally, section 5, describes the concluding remarks.

2. Theoretical Frameworks and Hypothesis

2.1 Basic Model

In this paper, to describe the effects of language barriers on trade disputes through trade costs as channel use Armington model. Thus, consider a world with two countries that have a different language from each other. Each worker inelastically supplies one unit of labor and spends income on domestic and imported varieties of differentiated goods. Languages have a significant impact on all tradable goods. Each country is populated by a representative agent whose preferences are represented by a Constant Elasticity of Substitution (CES) utility function. Preferences are given by

$$U_j = \left(\sum_{i=1}^n \psi_{ij}^{1-\sigma/\sigma} \, C_{ij}^{\sigma-1/\sigma} \right)^{\frac{\sigma}{\sigma-1}} \dots\dots\dots\dots (1)$$

Where C_{ij} is the demand for good i in country; $\psi_{ij} > 0$ is an exogenous preference parameter $\sigma > 1$ is the elasticity of substitution between goods from countries. The associated consumer price index is given by

$$P_j = \left(\sum_{i=1}^n \psi_{ij}^{1-\sigma} \, P_{ij}^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \qquad \dots\dots\dots\dots (2)$$

Where P_{ij} is the price of good i in country j.

International trade between countries is subject to trade costs. To sell one unit of a good in country j, firms from country i must ship $\tau_{ij} \geq 1$ units, with $\tau_{ii} = 1$. For there to be no arbitrage opportunities, the price of good i in country j must be equal to $P_{ij} = \tau_{ij} P_{ii}$. The domestic price P_{ii} of good i, in turn, can be expressed as a function of country i's total income, Yi, and its endowment $P_{ii} = Yi/Qi$. Combining the two previous expressions can get

$$P_{ij} = \frac{Y_i \tau_{ij}}{Q_i} \qquad \dots\dots\dots\dots (3)$$

Let X_{ij} denote the total value of country j's imports from country i. Given CES utility, bilateral trade flows satisfy

$$X_{ij} = \left(\frac{\psi_{ij} P_{ij}}{P_j} \right)^{1-\sigma} E_j \qquad \dots\dots\dots\dots (4)$$

Where $E_j = \sum_{i=1}^n X_{ij}$ is country j's total expenditure. Combining equations (2)–(4), can obtain

$$X_{ij} = \frac{(Y_i \tau_{ij})^{1-\sigma} \chi_{ij}}{\sum_{l=1}^n (Y_l \tau_{lj})^{1-\sigma} \chi_{lj}} E_j$$

Where $\chi_{ij} = \left(Q_i / \psi_{ij} \right)^{\sigma-1}$, In order to prepare further analysis, consider $\varepsilon \equiv \partial \ln(\frac{X_{ij}}{X_{jj}}) / \partial \ln\tau_{ij}$ denote the elasticity of imports relative to domestic demand, $\frac{X_{ij}}{X_{jj}}$, with respect to

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bilateral trade costs τ_{ij}, holding income levels fixed. I will refer to ε as the *trade elasticity*. In the Armington model it is simply equal to $\sigma - 1$. Using the previous notation, can rearrange the expression above as

$$X_{ij} = \frac{(Y_i \tau_{ij})^{-\varepsilon} \chi_{ij}}{\sum_{l=1}^{n} (Y_l \tau_{lj})^{-\varepsilon} \chi_{lj}} E_j \quad \dots\dots\dots\dots\dots\dots\dots (5)$$

In a competitive equilibrium, budget constraint and goods market-clearing imply $Y_i = E_i$ and $Y_i = \sum_{i=1}^{n} X_{ij}$, respectively, for both countries. Together with equation (5), these two conditions imply

$$Y_i = \sum_{j=1}^{n} \frac{(Y_i \tau_{ij})^{-\varepsilon} \chi_{ij}}{\sum_{l=1}^{n} (Y_l \tau_{lj})^{-\varepsilon} \chi_{lj}} Y_j \quad \dots\dots\dots\dots\dots\dots\dots. (6)$$

Trade costs arise from language barriers:

Now consider costs that arise from language barriers have tariff equivalent impact on trade and deteriorate the trade relationship. Trade flows are subject to trade costs which increase price of related goods as well reduce trade volume. Due to language differences, exporting countries face extra costs. Then the price of good i is

$$P_{ij} = \frac{Y_i \tau_{ij} \theta_{ij}}{Q_i} \quad \dots\dots\dots\dots\dots.. (7)$$

Given CES utility, the value of bilateral trade flows is this given by the following gravity equation

$$X_{ij} = \frac{(Y_i \tau_{ij} \theta_{ij})^{-\varepsilon} \chi_{ij}}{\sum_{l=1}^{n} (Y_l \tau_{lj} \theta_{lj})^{-\varepsilon} \chi_{lj}} E_j \quad \dots\dots\dots\dots\dots\dots (8)$$

In the competitive equilibrium,

$$Y_i = \sum_{j=1}^{n} \frac{(Y_i \tau_{ij} \theta_{ij})^{-\varepsilon} \chi_{ij}}{\sum_{l=1}^{n} (Y_l \tau_{lj} \theta_{lj})^{-\varepsilon} \chi_{lj}} Y_j \quad \dots\dots\dots\dots\dots\dots (9)$$

Here, θ_{ij} is treated as a cost by the producer and hence from the firm's perspective a θ_{ij} works exactly like an iceberg trade cost.

Welfare:

In the Armington model, changes in real consumption only depend on the change in the relative price of imported versus domestic goods P_j^M / P_{jj} (where $P_j^M = \left[\sum_{i \neq j} P_{ij}^{1-\sigma} \right]^{1/1-\sigma}$ is the component of the price index associated with imports.) which depends on the share of expenditure on domestic goods λ_{jj} and the elasticity of substitution σ thus changes in real consumption

$$U_j = (d \ln E_j - d \ln P_{jj}) + (d \ln \lambda_{jj} / (1 - \sigma))$$

The definition of the trade elasticity $\varepsilon \equiv \sigma - 1$ and get from the above equation

$$d\, lnU_j = -d \ln \lambda_{jj}\, /\varepsilon$$

Welfare changes due to trade costs:

$$U_j = \lambda_{jj}^{-1/\varepsilon}$$

Due to costs arise from language barriers increase in trade costs. The welfare consequences of large changes $\tau_{ij}\ to\ \tau_{ij}\ \theta_{ij}$ can be inferred by integrating

$$\widehat{U}_j = \hat{\lambda}_{jj}^{-1/\varepsilon}$$

This establishes that for any change in trade costs, two statistics—the trade elasticity ε, and the changes in the share of expenditure on domestic goods λ_{jj}—are sufficient to infer welfare changes.

Possible proposition: Lower trade elasticity increase trade disputes likelihood.

1. As no extra trade costs

$\varepsilon = 1$, Countries have no possibility to involve in trade disputes

2. As costs arise due to language barriers, increase in trade costs

$\varepsilon < 1$, Countries possibility to involve in trade disputes increase.

As the rise of trade costs due to language barriers have significant impact on trade elasticity. Any sort of trade distortions leads to initiate trade complaint and trade disputes. Trade elasticity is significantly connected with trade disputes. This elasticity is important because if one wants to understand how a bilateral trade agreement will impact aggregate trade or to simply understand the magnitude of the trade friction between two countries, then a stand on this elasticity is necessary. This is what mean by the elasticity of trade. Recent work on the gains from trade (Arkolakis, Costinot, Rodr, & guez-clare, 2012) has highlighted the importance of the reduced-form trade elasticity in computing the aggregate gains from trade. Given that the trade elasticity relates—by its very definition—changes in trade flows to changes in trade costs, exploiting observable changes in trade policy seems an obvious way to credibly estimate it.

2.2 Language Barriers hypothesis

Trading countries' ongoing participation in trade disputes with partners having language dissimilarity raise the concern about the importance of languages as member countries' participation in WTO trade disputes settlement affected by their people language skills (Wilkinson, 2009). Countries with dissimilar languages face challenges to understand WTO

rules and regulations. A country having language barriers with trade partners often initiate a trade complaint or involve in trade disputes due to improper communication, misunderstanding, information costs, ambiguity, and uncertainty (Casella & Rauch, 1998; Zhang, Luo, Zhang, & Lee, 2020). Langugae barriers continuously increase trade costs.

Language barriers between trading countries significantly influence their probability to participate in trade disputes. In general, language barriers between countries are a basis of indistinctness that is deteriorating bilateral trade ties. Language barriers intuitively increase trade costs due to communication gaps, flawed information (Fink et al., 2005), vagueness (Guiso et al., 2016), doubt, and misunderstanding (Li & Sai, 2020). As, countries with language barrier don't comprehend each other cultural values, beliefs and customs, consider foreign culture to be harmful and create threat for their national culture. The language barrier is the emblem of cultural difference. The studies indicate that countries often raise the issue of trade protectionism to those countries with whom they have language barriers. Countries with language barriers often involved in trade, as dependencies increase in foreign products, they feel a threat to lose their national culture, these feelings are more acute when they have language barriers. Language barriers are very significant issue during trade disputes as countries face challenges to communicate and to get essential information regarding policies or regulations. Due to language barriers, norms and values create difficulties for trading countries to properly recognize each other's trading views and perceptions (Korneliussen & Blasius, 2008). Language barriers further increase misunderstanding (Gokan et al., 2019) create uncertainty and ambiguity of information (Konara, 2020) about trade rules and regulations, increase trade costs and leading to trade disputes. Therefore, propose the following hypothesis,

Hypothesis 1: *Trading countries with language barriers (LB) has a higher probability of being involved in trade disputes.*

3. Data and Methodology

3.1 Data and Variables

From 1995 to 2018, a comprehensive collection of data on the language barriers and trade conflicts between WTO members was used, with 8,256 country pairs from 129 WTO members and 565 dispute cases. Data collected from the WTO trade disputes database on each country pairs participation in a trade dispute. The multi-plaintiff cases were divided into several bilateral cases, all involving the same defendant country (WTO, 2019). Therefore, set Trade

Dispute (TD) as binary variable equal to one if country i is engaged in at least one trade dispute with country j in the year t.

This paper employs the language barrier index as a proxy of language barriers, which uses the main official languages. The language barrier index (LBI) for a country pair is calculated using World Atlas of Languages' language data, which gives 2650 languages data (Lohmann, 2011). The $LBI_{i,j}(i,j = 1,2,....129)$ takes 1 if country i and country j have no common language features in terms of official language, otherwise 0. LBI takes one indicates that the two countries have greater language differences. The two languages are identical, and one means two languages have no features in common (e.g., Brazil -Indonesia). Table A in the appendix describes the trade disputes and language barriers data of country pairs from 1995 to 2018.

Moreover, control country-level economic and international trade variables, GDP, FTA, trade, and the trade freedom index. Thus, use $GDP_{i,t}$ to consider the economic growth of a country, and use the GDP ratio $GDP_{i,t}/GDP_{j,t}$ to measure relative market size. The Free Trade Agreement ($FTA_{i,j,t}$) is used to check how FTA helps to reduce trade disputes. The trade freedom index ($TFI_{i,t}$) is a widely used proxy for the trade policy of a country. Therefore, use World Bank GDP data, the WTO database used for FTA data, and the trade freedom index is collected from 'The Index of Economic Freedom by The Heritage Foundation and The Wall Street Journal'. Street Journal'. Trade ($Trade_{i,j,t}$) is the sum of export and import.

Table 1 describes the descriptive statistics. Since TD can take a value of 1 or 0, a mean of 0.0044 indicates that from 1995 to 2018, an average of 0.44 percent of WTO member countries was engaged in at least one trade dispute. According to Table 1, the average value of LBI is 0.4145, indicating that 41.45 percent of WTO members face language barriers with trading partners.

Table 1. Summary of descriptive statistics

Variable	Obs.	Mean	Median	Std. Dev.	Min	Max
$TD_{i,j,t}$	181,134	0.0044	0	0.0578	0	1
$LBI_{i,j}$	181,135	0.4145	0	0.4950	0	1
$TFI_{i,t}$	181,134	1.8509	1.8943	0.2661	1.1209	4.1427
$Trade_{i,j,t}$	181,134	4.5975	4.7572	1.6097	-0.4948	8.8238
$FTA_{i,j,t}$	181,134	1.3309	1.0096	7.6141	-860.6950	980.7872
$GDP_{i,t}$	181,134	3.9946	4.1357	0.6183	2.0525	4.9472
$GDP_{i,t}/GDP_{j,t}$	181,134	1.1381	1.1017	0.3002	0	11.0900

3.2 Research Method

This study uses the panel probit regression model to empirically assess the effect of the language barriers on trade dispute occurrence due to binary dependent variable. More specifically, assume that the probability country i be involved in a trade dispute with the country j in a year t stated as follows,

$$\text{Prob}(TD_{i,j,t} = 1 | LBI, \text{controls} = \phi(\beta_0 + \beta_1 LBI_{i,j} + \gamma \text{controls}_{i,j,t} + \varepsilon_{i,j,t}) \quad (1)$$

Where LBI is language barrier index, *controls* is the vector of country-level control variables. $\varepsilon_{i,j,t}$ is an error term capturing unobserved factors, with $\varepsilon \sim N(0,1)$. $\Phi(\cdot)$ is the CDF of the standard normal distribution. β s and γ s are the parameters to be measured. Therefore, this study considers the average marginal probability effects to examine the effects of language barriers on trade disputes.

4. Empirical Results

4.1 Base Regression Results

Discuss the empirical findings in this section. The findings of the panel probit model are shown in Table 2, and the results substantially validate the hypothesis. The empirical findings of model (1) show that, at the 1% significance level, the likelihood of a trade conflict is substantially positively linked to language barriers. Trading partners with language barriers more likely to participate in trade disputes. This finding supports the hypothesis that having language barriers increases the probability of trade conflicts.

Table 2. Regression results of panel probit model

Model	(1)
Dependent	TD
$LBI_{i,j}$	0.2303***
	(0.0652)
$\log(TFI_{i,t})$	-0.6476***
	(0.1806)
$\log(Trade_{i,j,t})$	0.6493***
	(0.0395)
$\log(GDP_{i,t})$	-0.5283***
	(0.0665)
$GDP_{i,t}/GDP_{j,t}$	0.4588***
	(0.1603)
$FTA_{i,j,t}$	-0.6719***
	(0.0126)
Constant	-4.5273***

Observations	173,960
Country –Pairs	8,097

Notes: Robust standard errors clustered at country pairs level in parentheses. ***/**/* specify significance at the 1%, 5% and 10% levels, respectively

Table 2 shows the effects of the controls, which are largely compatible with the current literature. At a substantial level of 1%, the trade freedom index $(TFI_{i,t})$ is negatively correlated with trade conflicts. The findings are consistent with economic intuition that the freer trade policy and less trade protectionism discourage trade disputes (Kitson & Michie, 1995), also lower the likelihood of trading partners being involved in trade disputes (Oatley, 2017). According to several current literature references, the more bilateral trade there is, the greater the likelihood of trade disputes (Chad P. Bown, 2005; Horn, Mavroidis, & Nordström, 1999).

Trade $(Trade_{i,j,t})$ is positively associated with trade tensions at a 1% significant level, meaning that more significant trade contributes to more trade conflicts. Free Trade Agreements $(FTA_{i,j,t})$ is negatively associated with trade conflicts at a significant level of 1%. FTA reduce trade disputes among trading partners and encourage less restrictive trade regulations and exemptions of trade barriers (Kitson & Michie, 1995). Countries that have FTA with trading partners less likely involved in trade disputes (Tan Li & Qiu, 2019).

$GDP_{i,t}$ measures total production, which represents the scale of a country's international market. Table 2 shows a negative relationship between, $GDP_{i,t}$ and trade conflicts. Trade has inevitably slowed due to trade tensions or disputes, as well as the country's economic development. Slow economic development has been adversely correlated with trade tensions because it dampens the country's business relations and trade flows (Fang, Kuo, & Lee, 2020; Matteis, 2004). This outcome supports Lee (2012), finding that the risk of trade disputes is negatively linked to its trading partner market size. Table 2 also shows a statistically significant and positive correlation between GDP ratio $GDP_{i,t}/GDP_{j,t}$ and trade disputes at a level of 1%. This result's economic instinct is defined in the theory of power where Guzman and Simmons (2005) and later, Chad P Bown and McCulloch (2009) explain that a country with a comparatively greater market size appears to have more market strength and to engage in trade disputes more efficiently.

4.2 Probability Effects

Further, calculate and report the average marginal probability effects of language barriers (LBI) in Table 3 to examine its economic significance on trade disputes. The average marginal likelihood effects of LBI on TD is 0.0017, respectively, which are statistically and economically important as compared to the mean values of TD (0.44%). According to the probability effects, countries having language barriers (LBI) with their trading partners have an average 0.17 percent higher likelihood of trade conflicts. The probability effect results for LBI confirm the language barriers hypothesis.

Table 3. The probability effects of Language barriers (LBI) on Trade Disputes

Model	(1)
Dependent	TD
$LBI_{i,j}$	0.0017***
	(0.0005)
$\log(TFI_{i,t})$	-0.0046***
	(0.0014)
$\log(Trade_{i,j,t})$	0.0047***
	(0.0004)
$\log(GDP_{i,t})$	-0.0038***
	(0.0005)
$GDP_{i,t}/GDP_{j,t}$	0.0033***
	(0.0012)
$FTA_{i,j,t}$	-0.0045***
	(0.0000)
Observations	173,960
Country –Pairs	8,097

Notes: Robust standard errors clustered at country pairs level in parentheses. ***/**/* specify significance at the 1%, 5% and 10% levels, respectively.

4.3 Robust Tests

4.3.1 Alternative Models

WTO members engage in trade disputes several times a year. The number of conflicts varies significantly between partner countries. Simultaneously, not all WTO members are involved in trade disputes. This paper estimates the Poisson model to check the frequency of conflicts and count aspects of trade dispute data. Given the rarity of the TD case, further, estimate the rare event logistic model for the robustness test. The average likelihood outcome of LBI, resulting in using the Poisson model and rare event logistic model, is reported in Table 4. The empirical results indicate LBI significantly and positively affect trade disputes at a significant level of 1%. The average probability effects implying that LBI effects on TD are 0.0019, and 0.0016, respectively, and consistent with base results in Table 3.

In certain instances, the dependent variable has the value zero since a country does not usually have trade disputes with many countries for a long period. To fix the question of unnecessary zeros, the zero-inflated Poisson model (ZIP) used. Table 4 shows the ZIP regression findings, and these are consistent with base results. As the inflated attribute, use a dummy, Major Trading Partners, which means whether the two countries are major trade partners or not. The idea behind this though countries are major trading partners, their language barriers negatively affect their trade relationships. The ZIP results indicate LBI have significant positive effects on trade disputes at a 1% significant level, and the average probability effects of LBI on TD are 0.0024 respectively. Other explanatory factors have comparable results to those seen in the baseline model and certain that unnecessary zeros are unlikely to be present in the study.

Table 4. Probability Effects with Alternative Models

	Poisson Model	Rare-Event Logistic Model	Zero-Inflated Poisson Model
Model	(1)	(1)	(1)
Dependent	TD	TD	TD
$LBI_{i,j}$	0.0019***	0.0016***	0.0024***
	(0.0003)	(0.0005)	(0.0007)
$\log(TFI_{i,t})$	0.0045***	0.0063***	0.0053***
	(0.0006)	(0.0009)	(0.0010)
$\log(Trade_{i,j,t})$	0.0043***	0.0046***	0.0046**
	(0.0002)	(0.0004)	(0.0014)
$\log(GDP_{i,t})$	-0.0023***	-0.0038***	-0.0033***
	(0.0004)	(0.0006)	(0.0013)
$GDP_{i,t}/GDP_{j,t}$	0.0013***	0.0028**	0.0046**
	(0.0004)	(0.0006)	(0.0023)
$FTA_{i,j,t}$	-0.0052***	-0.0052***	-0.0069***
	(0.0014)	(0.0014)	(0.0025)
Observations	180,044	180,044	180,007
Country –Pairs	8,106	8,106	8,106

Notes: Robust standard errors clustered at country pairs level in parentheses. ***/**/* specify significance at the 1%, 5% and 10% levels, respectively

4.3.2 Different Subsamples

Thus, the United States and the European Union have a huge impact on foreign trade, not only because they have the world's largest economies but also because they have a massive trade volume with the rest of the globe. The US and EU are the most important participants of the WTO trade dispute settlement. Rerun the panel probit regression models for the following two sub-samples to ensure that the findings are not influenced by outliers: sample without the US and sample without the EU. The average marginal likelihood effects are shown in Table 5. Table 5 indicates that without the United States and European Union (EU), the average

probability effects of LBI on TD is 0.0010, and 0.0011, respectively, and significant at the 1% level. These empirical results are robust, with the results indicated in Table 3.

Table 5. Probability Effects with different subsamples

	Without US	Without EU
Model	(1)	(1)
Dependent	TD	TD
$LBI_{i,j}$	0.0010***	0.0011***
	(0.0005)	(0.0004)
$\log(TFI_{i,t})$	-0.0039***	-0.0037***
	(0.0002)	(0.0010)
$\log(Trade_{i,j,t})$	0.0041***	0.0039***
	(0.0004)	(0.0005)
$\log(GDP_{i,t})$	-0.0039***	-0.0038***
	(0.0005)	(0.0007)
$GDP_{i,t}/GDP_{j,t}$	0.0038***	0.0032***
	(0.0011)	(0.0010)
$FTA_{i,j,t}$	-0.0044***	-0.0043***
	(0.0010)	(0.0020)
Observations	173,969	173,969
Country –Pairs	7,880	7,880

Notes: Robust standard errors clustered at country pairs level in parentheses. ***/**/* specify significance at the 1%, 5% and 10% levels, respectively.

5. Conclusion

This paper investigates the effect of language barriers in trade disputes. Using a comprehensive data set consists of 8,256 country pairs of 129 countries and 565 WTO trade dispute cases from 1995 to 2018, evidenced that the language barrier had a substantial and positive effect on trade conflicts. When trading countries have language barriers, it is more probable that confusion, distrust, misinterpretation, uncertainty, facts, and communication costs arise that increase overall trade costs. The findings suggest that the language barrier significantly and positively affected countries' involvement in trade disputes. Further, the findings indicate that trading nations with little experience with the world's most commonly spoken languages faced greater obstacles in interpreting foreign trade laws and practices and connectivity and negotiating difficulties and involved more often in trade disputes with trading partners.

This study's main contribution is to highlights the impact of language barriers on trade disputes empirically. As language plays a significant role in international trade, further study can be conducted to explore the role of language skills in trade disputes.

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Appendix:

Table A. Country-pairs with Trade Disputes and Language Barrier Index (1995-2018)

Country-Pairs	No. of Trade Disputes Cases	LBI	Country-Pairs	No. of Trade Disputes Cases	LBI
US-China	38	1	Colombia-US	1	1
US-Korea	20	1	Greece-China	1	1
US-Brazil	15	1	Bangladesh-India	1	1
EU-China	15	1	Costa Rica-US	1	1
US-Japan	11	1	Croatia-Hungary	1	1
Mexico-US	10	1	Cuba-Australia	1	1
EU-Russia	8	1	Czech Republic-Poland	1	1
Japan-Korea	7	1	Dominican Republic-Australia	1	1
EU-Korea	7	1	Egypt-Thailand	1	1
EU-Japan	7	1	Egypt-US	1	1
Argentina-Brazil	6	1	Egypt-Pakistan	1	1
Japan-Canada	6	1	Honduras-Australia	1	1
EU-Indonesia	6	1	Hong Kong-Turkey	1	1
Brazil-Canada	5	1	Hungary-Slovak Republic	1	1
Mexico-China	5	1	Hungary-Czech Republic	1	1
EU-Thailand	5	1	Hungary-Romania	1	1
Australia-India	4	1	Hungary-Turkey	1	1
Australia-Indonesia	4	1	Hungary-Argentina	1	1
Canada-China	4	1	Hungary-Australia	1	1
China-Japan	4	1	Hungary-Canada	1	1
France-US	4	1	Hungary-New Zealand	1	1
Germany-US	4	1	Hungary-Thailand	1	1
Greece-US	4	1	Hungary-US	1	1
Indonesia-Korea	4	1	Indonesia-Vietnam	1	1
New Zealand-Indonesia	4	1	Indonesia-Brazil	1	1
Norway-US	4	1	Indonesia-Chinese Taipei	1	1
Pakistan-Indonesia	4	1	Indonesia-Japan	1	1
Pakistan-US	4	1	Indonesia-South Africa	1	1
Russia-US	4	1	Indonesia-Argentina	1	1
Spain-US	4	1	China-Italy	1	1
Thailand-Turkey	4	1	Ukraine-Australia	1	1
Ukraine-Armenia	4	1	Chinese Taipei-US	1	1
Vietnam-US	4	1	Chinese Taipei-India	1	1
Mexico-China	4	1	Chinese Taipei-EU	1	1
Chile-US	3	1	Chinese Taipei-Canada	1	1
Peru-Brazil	3	1	Switzerland-India	1	1
EU-Norway	3	1	Srilanka-Brazil	1	1
Belgium-US	3	1	Slovak Republic-Switzerland	1	1
Turkey-US	3	1	Romania-US	1	1
South Korea-Canada	3	1	Portugal-US	1	1
EU-Turkey	2	1	Philippines-Brazil	1	1
EU-Pakistan	2	1	Philippines-Thailand	1	1

Costa Rica-Trinidad & Tobago	2	1	Philippines-Korea	1	1
Spain-US	2	1	Poland-Thailand	1	1
Russia-Japan	2	1	Poland-Slovak Republic	1	1
Pakistan-EU	2	1	Poland-India	1	1
Japan-Brazil	2	1	Moldova-Ukraine	1	1
Japan-China	2	1	Morocco-Turkey	1	1
Colombia-Thailand	1	1	Netherlands-India	1	1
Malaysia-US	1	1	Netherlands-Brazil	1	1
Mexico-Venezuela	1	1	New Zealand-India	1	1
Mexico-Brazil	1	1	Pakistan-South Africa	1	1
Japan-India	1	1	Japan-Thailand	1	1
Japan-Argentina	1	1			

Source: WTO Trade Disputes Cases and World Atlas Language Data