Economic Policy Uncertainty as a determinant of international trade flows

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Abstract

This paper dwells on a model of international trade which includes economic policy uncertainty. It has been shown by previous research papers that uncertainty is harmful for the macroeconomic equilibrium. Hence, a theoretical model relying on the gravity theory is derived ; it is completed by a quantification through a Poisson Pseudo-Maximum Likelihood (PPML) estimator. The sample covers 21 countries through 10 years. Results point that economic policy uncertainty has a weak negative impact on trade flows.

Keywords: Economic Policy Uncertainty, international trade, gravity.

1 Introduction

The question of the impact of uncertainty on the global economy has been a key issue in common contemporaneous economic debates. The seminal work of Bloom 2009 lets us understand that it is harmful for macroeconomic conditions. The impact of uncertainty on trade has already been analyzed, the main finding being that is is harmful for such flows. An empirical measure of Trade Policy Uncertainty (TPU) is derived by Caldara *et al.* 2020 to show that such uncertainty dampens trade flows.

Behind the measure of TPU presented above, some measures of uncertainty are derived at a global level (see, for example, Jurado, Ludvigson, and Ng 2015). Country-specific Economic Policy Uncertainty (EPU) indices are also settled by numerous papers quoted in Table 1.

Countries	Reference
Australia, Brazil, Canada, France Germany, India, Italy, Mexico South Korea, Russia, United Kingdom, United States	Baker, Bloom, and Davis 2016
Chile	Cerda, Silva, and Valente 2016
China	Baker *et al.* 2013
Colombia	Gil and Silva 2018
Greece	Hardouvelis *et al.* 2018
Ireland	Zalla 2016
Japan	Arbatli *et al.* 2019
Netherlands	Kroese, Kok, and Parlevliet 2015
Spain	Ghirelli, Perez, and Urtasun 2019
Sweden	Armelius, Hull, and Köhler 2019

Table 1. A survey of available EPU indices per country (source: policyuncertainty.com).

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The question dwelling on how does Economic Policy Uncertainty affects trade flows has already been investigated by the literature through papers such as Jia *et al.* 2020 and Mawusi 2020, where the conclusions differ between a significant impact or not. Yet, to my knowledge, there is a gap as theoretical developments of such impact are not defined. This paper is then the first to offer a theoretical model of the interaction between Economic Policy Uncertainty and trade flows.

The paper is settled as follows. **Section 2** presents a model of international trade including economic policy uncertainty. **Section 3** provides a quantitative estimation of such model using a Poisson Pseudo-Maximum Likelihood (PPML) estimator. **Section 4** concludes.

2 A theoretical model of international trade with uncertainty

The model heavily follows the theoretical framework presented in Yotov 2016 and differs from the literature by the integration of an economic policy uncertainty component. On the demand side, we express a simple CES function considering two countries denoted as i and j :

$$\left[\sum_i \alpha_i^{\frac{1-\sigma}{\sigma}} c_{ij}^{\frac{\sigma-1}{\sigma}}\right]^{\frac{\sigma}{\sigma-1}} \tag{1}$$

Where $\sigma > 1$ denotes the elasticity of substitution between two goods, α_i is the preference parameter and c_{ij} represents the consumption of good from country i in country j. The consumer maximizes equation (1) while taking into account the budget constraint in its simplest shape:

$$\sum_i c_{ij} p_{ij} = E \tag{2}$$

Having E as the total expenditure. Hence, by solving this problem, we can express trade flows from country i to j as:

$$X_{ij} = \left(\frac{\alpha_i p_i t_{ij}}{P_j}\right)^{1-\sigma} E_j \tag{3}$$

P_j represents a CES consumer price index while we express t_{ij}, bilateral trade costs, as:

$$t_{ij} = \frac{p_{ij}}{p_i} \zeta_i \zeta_j \tag{4}$$

It can be denoted that bilateral trade costs are distorded by economic policy uncertainty parameters ζ_i and ζ_j. These costs t_{ij} are defined, as in Melitz 2003, as iceberg costs ; hence we have a binding constraint stating that $t_{ij} \geq 1$. Finally, we apply a market clearance condition to the model:

$$Y_i = \sum_j \left(\frac{\alpha_i p_i t_{ij}}{P_j}\right)^{1-\sigma} E_j \tag{5}$$

Thus, we end up with a structural gravity model, both detailing multilateral resistance terms and exports, as :

$$X_{ij} = \frac{Y_i E_j}{Y} \left(\frac{t_{ij}}{\Pi_i P_j}\right)^{1-\sigma} \tag{6}$$

$$\Pi_i^{1-\sigma} = \sum_j \left(\frac{t_{ij}}{P_j}\right)^{1-\sigma} \frac{E_j}{Y} \tag{7}$$

$$P_j^{1-\sigma} = \sum_i \left(\frac{t_{ij}}{\Pi_i}\right)^{1-\sigma} \frac{Y_i}{Y} \tag{8}$$

Where $Y = \sum_i Y_i$. Hence, recalling equation (4), the key ingredient of the model is the distortion of trade costs by an uncertainty component, affecting trade flows and multilateral resistances.

3 An empirical estimate

In order to quantify the impact of economic policy uncertainty on trade flows, an empirical model is necessary. This paper will then try to estimate an equation that is robust to heteroskedasticity[1]. Then, an empirical estimate is done. To do so, a panel of 21 countries[2] over 18 years, from 2000 to 2019, is analysed. It has been deemed necessary to skip one year out of two: the reason is that it will make the model able to better capture adjustments in trade. The Economic Policy Uncertainty is represented for each country by the respective index drawn from Table 1. As this data is issued monthly, the yearly mean is considered. As for any decent estimation of a gravity model, two issues need to be addressed:

1. Multilateral resistance terms are unknown.
2. Bilateral trade costs need a decent proxy.

The solution to problem 1 is to include importer-year and exporter-year fixed effects to the regression. As for the second issue, we deem bilateral trade costs to be subject to the following proxies: the existence of a common religion, contiguity and a combined measure of economic policy uncertainty ($EPU_i + EPU_j$), replaced in equation (2) by the two separate indices. Results of such estimation using the Poisson Pseudo-Maximum Likelihood method are reported in Table 2.

1. It is important to notice that the dataset is not plagued by zero-trade flows.
2. They are the same as the ones mentioned in Table 1.

Variable	(1)	(2)
GDP Exporting	$6.627e^{-14}$***	$6.509e^{-14}$***
	(0.000)	(0.000)
GDP Importing	$1.642e^{-13}$***	$1.567e^{-13}$***
	(0.000)	(0.000)
Log distance	-1.497***	-0.867***
	(0.052)	(0.064)
Common religion	-0.385***	-0.146
	(0.091)	(0.090)
Contiguity	0.649***	1.109***
	(0.067)	(0.077)
EPU combined	0.000	-
	(0.000)	
EPU Exporting	-	-0.001**
		(0.000)
EPU Importing	-	-0.001***
		(0.000)
Number of observations	3420	3420

Table 2. Results of the dual estimation

*Notes: *, ** and *** denote a significativity at the 10%, 5% and 1% levels. Standard errors are reported into parentheses.*

4 Conclusion

This paper derived a theoretical model that is then quantified to discuss on the impact of Economic Policy Uncertainty (EPU) on bilateral trade flows. The first part of the paper derives a model close to Yotov 2016, the major difference being that Economic Policy Uncertainty distords iceberg trade costs. Then, an empirical model is settled, covering 21 countries on 10 years between 2000 and 2019. Results show that economic policy uncertainty has a weak negative effect on trade flows. This could be expected as there are more specific measures of uncertainty (as the one derived in Caldara *et al.* 2020).

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Data Availability Statement. The code along with the data are both open-source and can be found at this URL: https://github.com/GaetanLF/EPU-Trade-flows.

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