Universal Template[*]

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Abstract

Keep it short and clean.

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1 Introduction

What is the best way to reduce trade frictions when resources are scarce?

2 Theoretical properties

We first consider the theoretical properties of the

Theorem 1. *Consider any general equilibrium gravity model. If $\alpha + \beta \neq 1$, then:*

i) The model has a positive solution and all possible solutions are positive;

ii) If $\alpha, \beta \leq 0$ or $\alpha, \beta \geq 1$, then the solution is unique; and

iii) If $\alpha, \beta < 0$ or $\alpha, \beta > 1$, then the unique solution can be computed as the uniform limit of a simple iterative procedure.

Proof. See Appendix A.1. □

3 Conclusion

There is a neat way to put citations Allen, Arkolakis, and Takahashi (2014). See also the bibliography file. Notice that citations come out blue, I do not like it and I can change it by interfeering on the tex code, but I need to leave you some homework at the end of the day!

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Table 1: Mapping of trade models to Universal Gravity framework

Model	Citation	Subs. Elast.	Hetero. Param.	Labor Share in Production	Additional Param.	Trade Elast.	Integrability Restrictions	Mapping to ρ	Mapping to σ	Mapping to β	Condition for uniqueness (general)	Condition for uniqueness (quasi-symmetry)
Trade Models												
Armington, intermediate inputs	Armington (1969); Anderson (1979); Anderson and Van Wincoop (2003)	σ	N/A	ζ	N/A	$\sigma-1$	N/A	$(\sigma-1)(1-\zeta)$	$\frac{1}{1-\sigma\zeta}$	$\frac{1-\zeta}{1-\sigma\zeta}$	$\sigma \geq 1$	$\sigma \geq \frac{1}{2}$
Monopolistic competition, homogeneous firms, intermediate inputs	Krugman (1980) (with intermediates inputs)	σ	N/A	ζ	N/A	$\sigma-1$	N/A	$(\sigma-1)(1-\zeta)$	$\frac{1}{1-\sigma\zeta}$	$\frac{1-\zeta}{1-\sigma\zeta}$	$\sigma \geq 1$	$\sigma \geq \frac{1}{2}$
Perfect competition, intermediate inputs	Eaton and Kortum (2002); Dekle, Eaton, and Kortum (2008)	σ	θ (Frechet)	ζ	N/A	θ	$\theta > \sigma-1, \theta > 0$	$\theta(1-\zeta)$	$\frac{1}{1-(\theta+1)\zeta}$	$\frac{1-\zeta}{1-(\theta+1)\zeta}$	$\theta > 0$	$\sigma \geq \frac{1}{2}$
Monopolistic competition, heterogeneous firms, exporting fixed costs in destination	Melitz (2003); Eaton, Kortum, and Kramarz (2011); Arkolakis, Demidova, Klenow, and Rodriguez-Clare (2008); Chaney (2008)	σ	θ (Pareto)	1	N/A	θ	$\theta > \sigma-1, \theta > 0$	θ	$-\frac{1}{\theta}$	0	$\theta > 0$	$\theta > 0$
Monopolistic competition, heterogeneous firms, exporting fixed costs in origin	Di Giovanni and Levchenko (2009)	σ	θ (Pareto)	1	N/A	θ	$\theta > \sigma-1, \theta > 0$	θ	$-\frac{\sigma-1}{\theta\sigma-\sigma+1}$	0	$\sigma \geq 1$	$\sigma \geq 1$ or $\sigma \leq 1$ and $2\frac{1-\sigma}{\sigma} \geq \theta > \frac{1-\sigma}{\sigma}$
Monopolistic competition, heterogeneous firms, flexible exporting fixed costs, intermediate inputs	Arkolakis (2010) (with intermediate inputs)	σ	θ (Pareto)	ζ	η: share of exporting in foreign labor	θ	$\theta > \sigma-1, \theta > 0$	$\theta(1-\zeta)$	$-\frac{(\sigma-1)}{(\theta+1)(\sigma-1)\zeta-(\sigma-1)+(1-\eta)(\theta-\sigma+1)}$	$\frac{(\sigma-1)(1-\zeta)}{(\theta+1)(\sigma-1)\zeta-(\sigma-1)+(1-\eta)(\theta-\sigma+1)}$	$\sigma \geq 1$ or $\sigma < 1$ and $(1-\sigma)(1-\zeta) >$ $(1-\sigma)(1-\zeta) +$ $\theta(\sigma-1)\zeta +$ $(1-\eta)(\theta-\sigma+1) > 0$	previous regions or $\sigma < 1$ and $2(1-\sigma)(1-\zeta) >$ $(1-\sigma)(1-\zeta) +$ $\theta(\sigma-1)\zeta +$ $(1-\eta)(\theta-\sigma+1) > 0$
Extensions												
Multiple sectors	Chor (2010); Costinot, Donaldson, and Komunjer (2010)	σ	θ (Frechet)	1	η: sector spending share (assumed constant across sectors)	θ	N/A	θ	$-\frac{1}{\theta}$	0	$\theta > 0$	$\theta > 0$
Multiple sectors with intermediate goods	Caliendo and Parro (2010) (with symmetric IO structure and constant σ)	σ	θ (Frechet)	ζ	η: sector spending share (assumed constant across sectors)	θ	N/A	$\theta(1-\zeta)$	$\frac{1}{1-(\theta+1)\zeta}$	$\frac{1-\zeta}{1-(\theta+1)\zeta}$	$\theta > 0$	$\theta > 0$
Economic geography models	Allen and Arkolakis (2014); Helpman (1998); Redding (2014)	σ	N/A	1	a: productivity spillover; b: amenity spillover	$\sigma-1$	N/A	$\sigma-1$	$\frac{1-b}{1+b(\sigma-1)+\sigma a}$	$\frac{a+1}{1+b(\sigma-1)+\sigma a}$	(sufficient conditions) $\sigma \geq 1$, $a+b \leq 0$, $a > -1$, $b < 1$	(sufficient conditions) $\sigma \geq \frac{1}{2}$, $a+b \leq 0$, $a > -1$, $b < 1$

Notes: This table includes a (non-exhaustive) list of trade models that can be examined within the universal gravity framework.

Figure 1: Welfare gains from world optimal multilateral trade friction reduction
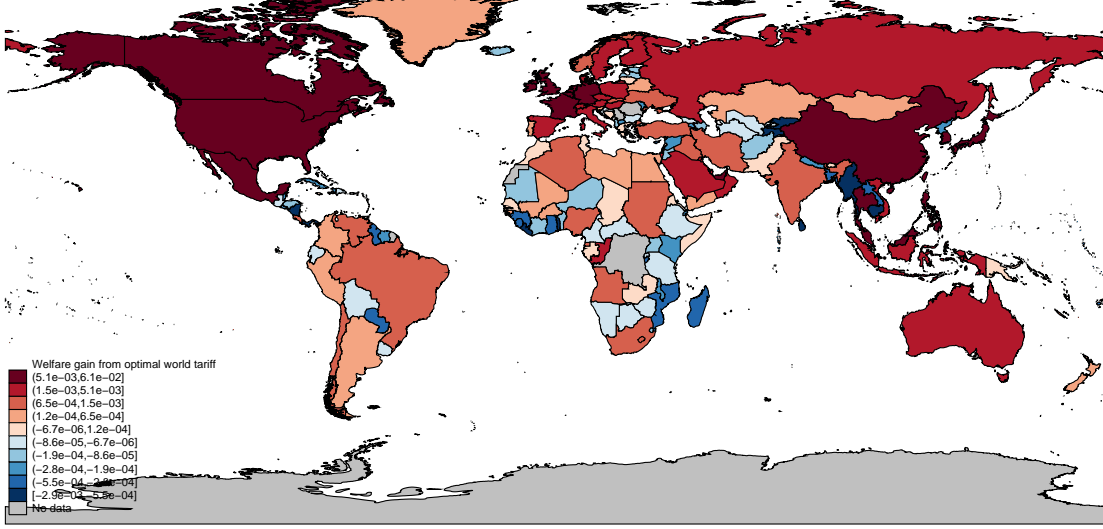
Notes: This figure shows distribution of welfare gains from an optimal non-discriminatory multilateral trade friction reduction. In particular, we report the welfare gain each country would achieve if all countries in the world were to alter their trade frictions in order to maximize world welfare (where the country Pareto weights are those imposed by the competitive equilibrium. Countries are sorted by deciles; red indicates a greater increase in welfare while blue indicates a smaller increase in welfare.

A Proofs

A.1 Proof of Theorem 1 (It is quoted automatically from the text)

We analyze a transformed system by defining $x_i \equiv B_i \gamma_i^{\alpha-1} \delta_i^{\beta}$ and $y_i \equiv B_i \gamma_i^{\alpha} \delta_i^{\beta-1}$. Then it can be shown that $\delta_i = x_i^{\frac{\alpha}{\beta+\alpha-1}} y_i^{\frac{1-\alpha}{\beta+\alpha-1}} B_i^{\frac{1}{1-\alpha-\beta}}$ and $\gamma_i = x_i^{\frac{1-\beta}{\beta+\alpha-1}} y_i^{\frac{\beta}{\beta+\alpha-1}} B_i^{\frac{1}{1-\alpha-\beta}}$ so that for any set of $\{B_i\} \in \mathbb{R}_{++}^N$, $\{K_{ij}\} \in \mathbb{R}_{++}^{N \times N}$, $\{\alpha, \beta\} \in \{(\alpha,\beta) \in \mathbb{R}^2 | \alpha + \beta \neq 1\}$, the equilibrium of a general equilibrium gravity model can be written using

$$x_i = \sum_j K_{ij} B_j^{\frac{1}{1-\alpha-\beta}} x_j^{\frac{\alpha}{\alpha+\beta-1}} y_j^{\frac{1-\alpha}{\alpha+\beta-1}}, \tag{1}$$
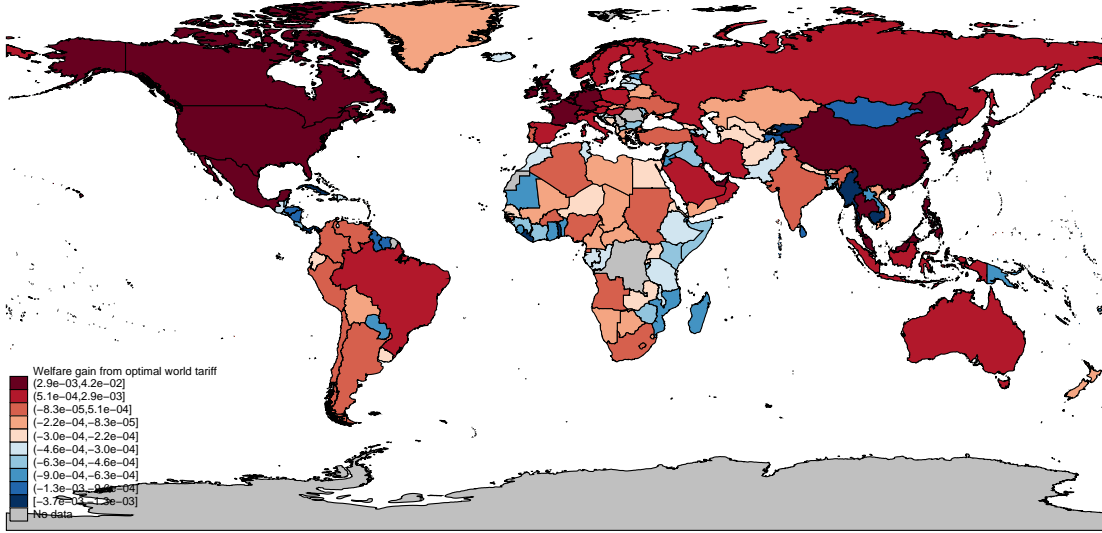
and

$$y_i = \sum_j K_{ji} B_j^{\frac{1}{1-\alpha-\beta}} x_j^{\frac{1-\beta}{\alpha+\beta-1}} y_j^{\frac{\beta}{\alpha+\beta-1}}, \tag{2}$$

and the world income is taken to be 1 as numeraire,

$$1 = \sum_i B_i^{\frac{1}{1-\alpha-\beta}} x_i^{\frac{\alpha}{\beta+\alpha-1}} y_i^{\frac{\beta}{\beta+\alpha-1}}. \tag{3}$$

We can automatically reference any named equations such as the above one, (3).

Figure 2: Here is how you put figures

Notes: This figure shows distribution of welfare gains from an optimal multilateral trade friction. In particular, we report the welfare gain each country would achieve if all countries in the world were to alter their trade frictions in order to maximize world welfare (where the country Pareto weights are those imposed by the competitive equilibrium. Countries are sorted by deciles; red indicates a greater increase in welfare while blue indicates a smaller increase in welfare. The gravity constants used are those in Alvarez and Lucas (2007).