

Welfare effects of Preferential Trade Agreements

Course “Text-as-data analysis of international trade”

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- ① Preferential Trade Agreements and International Economic Order
- ② Gravity and Gravitas
- ③ Text factorisation — I: Bag-of-words methods
- ④ Text factorisation — II: Distributive semantics
- ⑤ **Welfare effects of Preferential Trade Agreements**

Outline

- 1 Trade and Welfare
 - Baseline setup
 - Gains from trade
- 2 Preferential Trade and Welfare
 - Why preferentialism?
 - PTAs in gravity framework

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Setup (slides follow Arkolakis (2015))

- Assume two-country world, Home and Foreign producing two differentiated goods: corn (c) and feta (f)
- Each country has one consumer who derives utility from consumption and earns labour income
- Let w and w^* be wages at Home and in Foreign country, respectively
- Price of corn at home is $p_c = w$, price of local good in Foreign is $p_f^* = w^*$
- There are iceberg trade costs τ , τ^* so that $p_c^* = w\tau$, $p_f = w^*\tau^*$
- Usually in trade 3 assumptions are made:
 - perfect competition \Rightarrow price of a good is its marginal cost
 - Bertrand competition \Rightarrow price of a good is that of the least cost producer
 - monopolistic competition \Rightarrow firm's actions are affected by the overall level of competition

Consumers

- Consumers have CES “love of variety” preferences:

$$U(c_c, c_f) = \left(c_c^{\frac{\sigma-1}{\sigma}} + c_f^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}$$

- Home Consumer's problem is to

$$\max_{c_c, c_f} U_c(c_c, c_f) \quad s.t. \quad p_c c_c + p_f c_f = wL,$$

where L is labour endowment of individual, w is wage, $y \equiv wL$ is therefore labour income

- Marginal rate of substitution:

$$MRS_{c,f} \equiv \frac{\frac{\partial U}{\partial c}}{\frac{\partial U}{\partial f}} = \left(\frac{c_c}{c_f} \right)^{-\frac{1}{\sigma}}$$

- At optimum, MRS between two goods is their relative prices (where are τ ?):

$$\frac{c_c}{c_f} = \left(\frac{p_c}{p_f} \right)^{-\sigma}$$

Optimal demand

- Plugging in budget constraint we obtain Home consumer's optimal demand

$$\begin{aligned}c_f &= \left(\frac{p_f^{-\sigma}}{P^{1-\sigma}} \right) wL \\c_c &= \left(\frac{p_c^{-\sigma}}{P^{1-\sigma}} \right) wL\end{aligned}\tag{1}$$

where we define the price index as $P \equiv (p_c^{1-\sigma} + p_f^{1-\sigma})^{\frac{1}{1-\sigma}}$

- Total Home expenditure on corn is

$$p_c c_c = \left(\frac{p_c}{P} \right)^{1-\sigma} wL$$

- Price elasticity of demand

$$\frac{\partial \log p_c c_c}{\partial \log p_c} = 1 - \sigma$$

- Volume of trade between countries hinges on σ , substitutability of goods

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Production

- Now assume no trade costs $\tau = \tau^* = 1$ and different technologies in countries, A , so that

$$p_c = p_c^* = \frac{w}{A}$$
$$p_f = p_f^* = \frac{w^*}{A^*}$$

- Then $P = P^*$ (why?)
- Labour market clearing (aggregate demand equals aggregate supply):

$$c_c + \tau c_c^* = L$$
$$\tau^* c_f + c_f^* = L^*$$
(2)

- Recalling (1), we can rewrite and combine labour market clearing conditions into

$$\frac{w}{w^*} = \left(\frac{A}{A^*} \right) \left(\frac{L}{L^*} \right)^{-\frac{1}{\sigma}}$$
(3)

- Relative wages depend on relative productivity of the two countries

Is international trade a zero-sum game?

- Is international trade a zero-sum game? Would $A^* \uparrow$ lead to a decreased welfare at home?
- Define Home welfare simply as the real wage $W \equiv \frac{w}{P}$.
- Putting (3) into labour market conditions (2) one obtains

$$W \equiv \frac{w}{P} = \frac{A}{\left(A + A^* \left(\frac{L^*}{L} \right)^{\frac{\sigma-1}{\sigma}} \right)^{\frac{1}{1-\sigma}}}$$

- Welfare is increasing in productivity and decreasing in labour endowment ratio
- Increase in A^* will drive P down \Rightarrow increase in foreign and domestic wages $\Rightarrow W \uparrow$

Gains from trade — I

- Gains from trade are changes in welfare W when a country goes from autarky to free trade
- Domestic trade share is defined as

$$\lambda \equiv \frac{p_c c_c}{p_c c_c + p_f p_f}$$

- Now recall that total expenditure on good is proportional to labour income and prices

$$p_c c_c = \left(\frac{p_c}{P} \right)^{1-\sigma} wL$$

therefore

$$\lambda \equiv \frac{p_c c_c}{wL}$$

Gains from trade — II

- Welfare is the real wage. We are in differentiated goods world, so $p_c = w$.
As a result

$$\begin{aligned} W &\equiv \frac{w}{P} \\ &= \frac{p_c}{P} \\ &= \left(\frac{p_c^{1-\sigma}}{P^{1-\sigma}} \right)^{\frac{1}{1-\sigma}} \\ &= \lambda^{\frac{1}{1-\sigma}} \end{aligned}$$

- Welfare is a function of the domestic trade share and the elasticity of demand (Eaton and Kortum, 2002)
- Ex-post gains from trade at Home in two hypothetical scenarios λ and λ' are then

$$\frac{W'}{W} = \left(\frac{\lambda'}{\lambda} \right)^{\frac{1}{1-\sigma}}$$

Back-of-the-envelope calculation (Arkolakis, 2015)

- To compute welfare gains from going from autarky into free trade, recall that $\lambda_{autarky} = 1$
- Literature estimates trade elasticity at $1 - \sigma = [-10, -5]$
- Import penetration in 2007's Russia was $\sim 25\%$ (OECD, 2010), so that domestic trade share $\lambda_{trade} = 0.75$
- Then

$$\text{gains from trade} = \left(\frac{0.75}{1} \right)^{-\frac{1}{10}} = 1.0292 = 2.92\% \text{ of income}$$

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Reasons for preferential trade (slides follow Baldwin (2011))

- Why are concepts “trade diversion” and “trade creation” not helpful when studying reasons for preferential trade?
- One can hypothesise different effects of preferential trade:
 - “Adam Smith’s certitude”: “the merchants and manufacturers of the country whose commerce is so favoured must necessarily derive great advantage”
 - “Haberler’s spillover”: all members of a preferential trade agreement must gain, rest of world loses
 - “Viner’s ambiguity”: preferential tariff liberalisation has ambiguous welfare effects on the preference-granting nation
- Consider a two-member PTA and Rest of World

Figure 1: Source: Baldwin (2011, fig. 3.1)

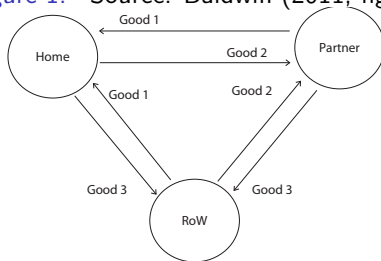
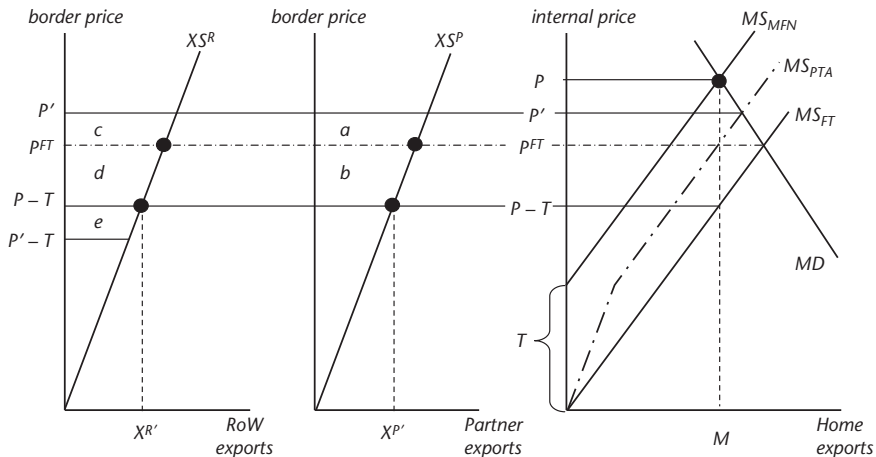


Figure 2: Equilibrium in PTA for Home. Source: Baldwin (2011, fig. 3.2)



Under free trade domestic/border price is P^{FT} . Then all nations impose MFN tariff T , internal price at home is P , border price is $P - T$. Home imports drop, exports at Partner/RoW drop equally. When PTA(H,P) is formed, the total supply is MS^{PTA} . Price at home falls to P' . Two border prices emerge: for partner it goes from MFN's $P - T$ to P' , the price for RoW falls from $P - T$ to $P' - T$. Partner exports more, RoW Exports less. Smith's certitude is Partner's gains $a + b$. Haberler's spillover is RoW's loss e . a is also called the preference rate because under MFN cutting the Partner would gain only b .

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PTAs in gravity

- Recall from Anderson and Van Wincoop (2003) that when $\tau_{i,j} = \tau_{j,i}$ (symmetric trade costs) export equation can be written as

$$X_{i,j} = \left\{ \frac{\tau_{i,j}}{P_j P_i} \right\}^{1-\sigma} \frac{Y_i Y_j}{Y_{world}}$$

where

$$P_j = \left\{ \sum_{i=1}^N P_i^{\sigma-1} \tau_{i,j}^{1-\sigma} \theta_i \right\}^{\frac{1}{1-\sigma}},$$

and θ_i is income share of country i

- From Anderson and Yotov (2016) you've learned that PTAs can have the direct effect through τ and indirect effects through P . To measure the total effect of PTAs on trade one needs to estimate their effects on multilateral resistance terms, output, expenditures, and sectoral linkages

Figure 3: Welfare Effects from NAFTA's tariff reductions (Caliendo and Parro, 2015, tab. 2)

Country	Welfare			Real wages
	Total	Terms of trade	Volume of Trade	
Mexico	1.31%	-0.41%	1.72%	1.72%
Canada	-0.06%	-0.11%	0.04%	0.32%
U.S.	0.08%	0.04%	0.04%	0.11%

Figure 4: Welfare Effects from NAFTA's tariff reductions (Anderson and Yotov, 2016, tab. 5)

Country Name	All FTAs	No NAFTA	No FTAs Mexico
Argentina	2.115 (.062)	2.12 (.053)	1.955 (.046)
Australia	-.059 (.002)	-.049 (.002)	-.045 (.006)
Austria	7.868 (.296)	7.874 (.266)	7.87 (.261)
Bulgaria	11.079 (.349)	11.088 (.32)	11.074 (.32)
Blgm-Lxmbrg	.311 (.011)	.315 (.006)	.308 (.011)
Bolivia	6.743 (.187)	6.741 (.166)	6.457 (.151)
Brazil	.331 (.01)	.337 (.009)	.251 (.009)
Canada	.043 (.002)	-.007 (.003)	-.003 (.007)
Switzerland	.172 (.009)	.178 (.019)	.174 (.027)
Chile	3.012 (.092)	2.998 (.083)	2.77 (.071)
China	-.18 (.006)	-.171 (.01)	-.155 (.011)

Take-aways

- International trade is not a zero-sum game
- Domestic trade share and elasticity of substitution drive international trade
- Ambiguous welfare effects of PTAs on ROW
- Naïve gravity will measure only a fraction of the total effect of PTAs on welfare

Thank you for your attention!

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