

# **Labor Market Effects of Non-Tariff Measures in Latin America**

Guido G. Porto

Universidad Nacional de La Plata

# Motivation

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- NTMs are a major instrument of trade protection
  - own NTMs can protect wages and employment at home
  - foreign NTMs can de-protect wage and employment
  - prices may also be affected
- I provide a quantification of the removal of NTMs for 16 Latin American countries:
  - Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Honduras, Mexico, Nicaragua, Peru, Paraguay, El Salvador and Uruguay

# Motivation

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- I explore different assumptions about the functioning of labor markets:
  - fully flexible labor
  - immobile labor
  - imperfectly mobile labor
- Not really a CGE

# Impacts on Real Wages

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- Household welfare is real income  $x^h$

$$x^h = \frac{y^h}{P^h}$$

- nominal income is wage income across members  $m$ :

$$y^h = \sum_m w_m^h + O^h$$

- price Index:

$$P = \prod_i (p_i)^{s_i}$$

- Standard approach in the literature: households as consumers and as income earners: Deaton (1989)

## Impacts on Real Wages

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- Welfare effect of a change in price  $p_i$  (due to NTMs):

$$\frac{\partial \ln x^h}{\partial \ln p_i} = \sum_m \phi_m^h \frac{\partial w_m^h}{\partial p_i} \frac{p_i}{w_m^h} - s_i$$

- Counterfactual income distributions

$$x_{post}^h = x_{pre}^h (1 + d \ln x^h)$$

# Modeling Labor Markets

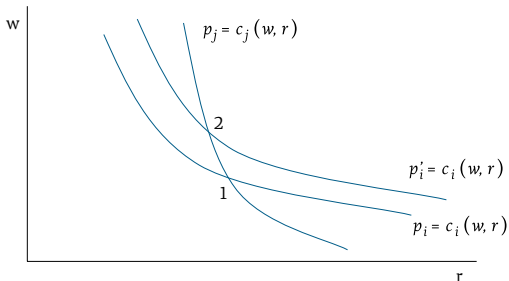
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- Major focus of this analysis: impacts depend on how labor market work
  - fully flexible labor markets
  - fixed labor
  - imperfectly mobile labor

# Fully Flexible Labor Markets

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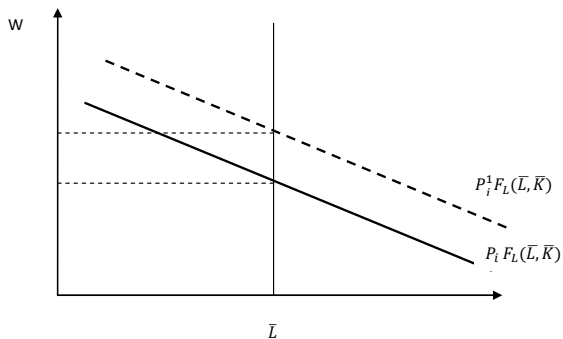
Figure 1: Wage adjustment under flexible labour markets



wage elasticity = 0.8 (Porto, 2010)

# Fully Fixed Factors

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own wage elasticity = 1  
cross wage elasticity = 0



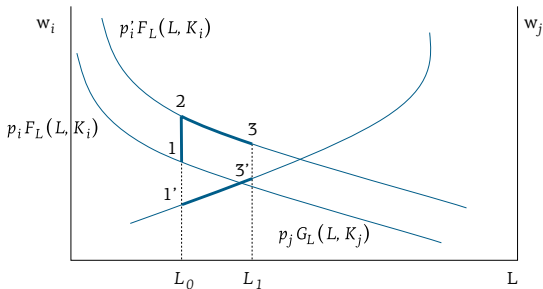
# Imperfectly Mobile Labor

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- Work with Artuc, Chaudhuri and McLaren (AER, 2010) & Artuc, Lederman and Porto (JIE, 2015)
  - there are  $N$  sectors in the economy
  - workers are initially in a sector earning wages  $w_t^g$
  - workers can move across sectors at a cost  $C$
  - there are equilibrium inter-industry wage differences because of moving costs
  - after a shock, workers reallocate until a new equilibrium is reached

# Imperfectly Mobile Labor

Figure 4: Wage adjustment and imperfect labour mobility



time-varying elasticities from model simulation

## Price Changes: Own NTMs

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- Simple (very) procedure to calculate price changes:
  - consider good  $i$  facing non-tariff measures  $NTM_i$
  - transform  $NTM_i$  into ad-valorem  $t_i^n$
  - all this (NTMs data, ad-valorem equivalent) are in Kee, Nicita, Olarreaga (EJ, 2009)
  - allow for a full pass-through assumption

$$p_i = p_i^*(1 + t_i^n)$$

- Thus, the price change is

$$d \ln p_i = -\frac{t_i^n}{1 + t_i^n}$$

## Price Changes: Foreign NTMs

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- For foreign NTMs, need (even) more structure:
  - international price is  $p_i^*$  and ad-valorem equivalent of foreign NTMs is  $t_i^*$
  - assume bilateral preferences
  - assume exporters rip the arbitrage opportunities
- Pre-preference, the producer price is  $p_i^*$
- Post-preference, it is  $p_i^*(1 + t_i^*)$
- Thus, the price change is

$$d \ln p_i = \frac{t_i^*}{1 + t_i^*}$$

# Price Changes: Food and Beverages

**Table 1: Price Changes of Food and Beverages from NTM removal Latin America**

	Own NTMs		MA NTMs	
	NTM	Price Change	NTM	Price Change
Argentina	7.10	-6.63	19.50	16.32
Bolivia (Plurinational State of)	19.56	-16.36	12.28	10.94
Brazil	20.84	-17.25	22.11	18.11
Chile	17.21	-14.68	19.25	16.14
Colombia	30.53	-23.39	22.21	18.17
Costa Rica	0.74	-0.73	15.32	13.28
Dominican Republic	-	-	12.45	11.07
Ecuador	-	-	11.55	10.35
Guatemala	36.06	-26.50	13.11	11.59
Honduras	7.18	-6.70	20.89	17.28
Mexico	26.13	-20.72	19.94	16.62
Nicaragua	29.63	-22.86	13.94	12.23
Peru	22.49	-18.36	17.76	15.08
Paraguay	37.84	-27.45	16.51	14.17
El Salvador	1.33	-1.31	20.59	17.07
Uruguay	25.84	-20.53	38.99	28.05

Source: Author's calculations

# Summary Statistics

**Table 3: Descriptive Statistics Latin America Household Surveys**

	Employment Shares				Income Shares		
	Number of hhs	Food & Beverages	Other Manufactures	Non Tradables	Food & Beverages	Other Manufactures	Non Tradables
Argentina	5569120	0.115	0.030	0.855	0.128	0.031	0.841
Bolivia (Plurinational State of)	1004421	0.000	0.165	0.835	0.000	0.138	0.862
Brazil	47566676	0.117	0.022	0.861	0.136	0.019	0.845
Chile	3515380	0.099	0.036	0.866	0.107	0.028	0.865
Colombia	7040891	0.115	0.039	0.846	0.115	0.029	0.855
Costa Rica	1001920	0.105	0.037	0.858	0.106	0.038	0.857
Dominican Republic	2022494	0.123	0.033	0.844	0.121	0.036	0.843
Ecuador	2922155	0.082	0.028	0.890	0.069	0.025	0.907
El Salvador	1418031	0.114	0.054	0.832	0.112	0.049	0.839
Guatemala	2327407	0.097	0.038	0.865	0.101	0.038	0.860
Honduras	1312746	0.103	0.057	0.840	0.132	0.057	0.812
Mexico	23122440	0.132	0.052	0.816	0.151	0.046	0.804
Nicaragua	943351	0.083	0.058	0.859	0.086	0.040	0.874
Paraguay	1175343	0.087	0.026	0.887	0.103	0.026	0.871
Peru	5808399	0.074	0.018	0.908	0.108	0.042	0.851
Uruguay	572627	0.098	0.042	0.860	0.085	0.037	0.879

Source: Author's calculations

# Welfare Effects: Fully Inflexible Labor

Table 4: Trade Shocks with Fully-Inflexible Labor Markets Latin America

	Own			MA		
	F&B workers	All Households	All Households (with wage income)	F&B workers	All Households	All Households (with wage income)
Argentina	-4.77	1.66	1.64	16.32	0.49	0.53
Bolivia (Plurinational State of)	-10.93	2.64	2.61	10.94	1.87	1.89
Brazil	-11.52	5.33	5.33	18.11	0.41	0.41
Chile	-11.70	2.45	2.45	16.14	0.58	0.58
Colombia	-15.97	6.62	6.60	18.17	0.61	0.63
Costa Rica	-0.60	0.11	0.10	13.28	0.50	0.53
Dominicana				11.07	0.39	0.39
Ecuador				10.35	0.30	0.30
Guatemala	-17.70	7.57	7.45	11.59	0.54	0.59
Honduras	-4.47	1.99	1.97	17.28	0.61	0.65
Mexico	-13.84	5.45	5.44	16.62	1.14	1.15
Nicaragua	-15.27	6.48	6.47	12.23	0.60	0.60
Paraguay	-12.26	5.22	5.22	15.08	0.72	0.72
Peru	-18.34	8.32	8.32	14.17	0.41	0.41
El Salvador	-0.88	0.41	0.41	17.07	0.36	0.36
Uruguay	-13.72	5.94	5.93	28.05	1.19	1.21

Source: Author's calculations

Note: summary statistics from Household Surveys

# Welfare Effects: Fully Flexible Labor

Table 5: Trade Shocks with Fully-Flexible Labor Markets Latin America

	Own			MA		
	F&B workers	All Households	All Households (with wage income)	F&B workers	All Households	All Households (with wage income)
Argentina	-3.45	-3.12	-3.45	13.05	12.24	13.05
Bolivia (Plurinational State of)	-7.66	-7.53	-7.66	8.75	8.67	8.75
Brazil	-8.07	-8.07	-8.07	14.49	14.49	14.49
Chile	-8.77	-8.77	-8.77	12.91	12.91	12.91
Colombia	-11.30	-10.85	-11.30	14.54	14.19	14.54
Costa Rica	-0.45	-0.42	-0.45	10.63	10.05	10.63
Dominicana				8.86	8.85	8.86
Ecuador				8.28	8.17	8.28
Guatemala	-12.40	-10.52	-12.40	9.27	8.45	9.27
Honduras	-3.14	-2.83	-3.14	13.82	13.03	13.82
Mexico	-9.70	-9.58	-9.70	13.30	13.21	13.30
Nicaragua	-10.70	-10.66	-10.70	9.79	9.77	9.79
Paraguay	-8.59	-8.51	-8.59	12.07	11.99	12.07
Peru	-12.85	-12.85	-12.85	11.34	11.34	11.34
El Salvador	-0.61	-0.61	-0.61	13.66	13.66	13.66
Uruguay	-9.61	-9.39	-9.61	22.44	22.15	22.44

Source: Author's calculations



# Welfare Effects: Imperfectly Mobile $t = 1$

Table 6: Trade Shocks with Imperfect Labor Markets (t=1) Latin America

	Own			MA		
	F&B workers	All Households	All Households (with wage income)	F&B workers	All Households	All Households (with wage income)
Argentina	-3.60	1.46	1.45	13.44	0.97	1.06
Bolivia (Plurinational State of)	-6.66	1.10	1.04	8.08	2.90	2.94
Brazil	-7.02	3.62	3.62	13.38	2.21	2.21
Chile	-9.17	1.95	1.95	13.36	1.14	1.14
Colombia	-11.90	5.50	5.45	15.01	1.49	1.52
Costa Rica	-0.42	0.10	0.09	9.94	0.66	0.83
Dominicana				8.18	1.46	1.46
Ecuador				7.85	1.45	1.49
Guatemala	-14.52	4.97	4.63	10.20	1.67	1.82
Honduras	-2.73	1.38	1.28	12.77	2.18	2.45
Mexico	-8.43	3.91	3.87	12.29	2.38	2.41
Nicaragua	-9.30	4.56	4.55	9.04	1.62	1.63
Paraguay	-7.47	3.26	3.22	11.15	2.33	2.36
Peru	-11.17	5.23	5.23	10.47	2.00	2.00
El Salvador	-0.53	0.24	0.24	12.62	2.49	2.49
Uruguay	-8.36	3.85	3.77	20.73	4.05	4.16

Source: Author's calculations

# Welfare Effects: Imperfectly Mobile $t = 3$

Table 7: Trade Shocks with Imperfect Labor Markets (t=3) Latin America

	Own			MA		
	F&B workers	All Households	All Households (with wage income)	F&B workers	All Households	All Households (with wage income)
Argentina	-0.82	1.50	1.50	6.59	0.86	0.88
Bolivia (Plurinational State of)	-2.58	1.96	1.91	5.36	2.32	2.35
Brazil	-2.72	3.37	3.37	8.87	2.47	2.47
Chile	-5.99	1.94	1.94	9.87	1.15	1.15
Colombia	-7.33	5.45	5.41	11.46	1.52	1.56
Costa Rica	-0.31	0.10	0.09	7.95	0.67	0.83
Dominicana				5.42	1.57	1.57
Ecuador				6.19	1.47	1.50
Guatemala	-4.63	5.15	4.88	5.87	1.59	1.71
Honduras	-1.06	1.34	1.24	8.46	2.29	2.54
Mexico	-3.27	3.80	3.76	8.14	2.47	2.50
Nicaragua	-3.60	4.32	4.31	5.99	1.75	1.76
Paraguay	-2.90	3.29	3.26	7.39	2.31	2.33
Peru	-4.33	5.10	5.10	6.94	2.07	2.07
El Salvador	-0.21	0.24	0.24	8.36	2.52	2.52
Uruguay	-3.24	3.80	3.73	13.74	4.12	4.21

Source: Author's calculations

# Welfare Effects: Imperfectly Mobile $t = 20$

Table 8: Trade Shocks with Imperfect Labor Markets (t=20) Latin America

	Own			MA		
	F&B workers	All Households	All Households (with wage income)	F&B workers	All Households	All Households (with wage income)
Argentina	0.39	1.49	1.47	3.61	0.91	0.96
Bolivia (Plurinational State of)	1.81	2.73	2.68	2.42	1.81	1.84
Brazil	1.91	3.16	3.16	4.00	2.69	2.69
Chile	1.74	2.00	2.00	1.37	1.07	1.07
Colombia	4.67	5.45	5.41	2.13	1.52	1.55
Costa Rica	0.07	0.10	0.09	1.15	0.63	0.76
Dominicana				2.45	1.66	1.66
Ecuador				1.83	1.52	1.55
Guatemala	2.38	5.30	5.11	2.81	1.53	1.61
Honduras	0.74	1.31	1.21	3.82	2.36	2.62
Mexico	2.30	3.78	3.75	3.68	2.48	2.51
Nicaragua	2.53	4.18	4.17	2.71	1.83	1.83
Paraguay	2.04	3.31	3.28	3.33	2.29	2.31
Peru	3.04	4.95	4.95	3.13	2.15	2.15
El Salvador	0.15	0.24	0.24	3.78	2.60	2.60
Uruguay	2.28	3.76	3.69	6.20	4.18	4.27

Source: Author's calculations

## Final Remarks

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- Use NTMs data in models of labor markets to illustrate potential impacts
- Results are very sensitive to the assumptions about labor markets
- For own NTMs:
  - large impacts on affected sector, especially in fixed labor model
  - smaller but widespread effects in the fully flexible model
  - intertemporal effects in the imperfect mobility model
- Foreign NTMs can generate even larger effects
  
- Improved model (the “Global Model”): Multicountry model of trade with labor market frictions
- Better modeling of NTMs and price changes
- Other impacts (standards, quality)