

Trading-off the Income Gains and the Inequality Costs of Trade Policy

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Motivation: The Trade-off

- Recent renewed interest in the gains from trade
 - Dixit and Norman (1986); Arkolakis, Costinot, Rodriguez-Clare (AER, 2012); Costinot, Donaldson, Komunjer (ReStud, 2012); Costinot, Rodriguez-Clare (2014); Artuc, Lederman, Porto (JIE, 2015); Caliendo and Parro (ReStud, 2015); Melitz and Redding (AER, 2015); Arkolakis, Costinot, Donaldson, Rodriguez-Clare (2015); Caliendo, Dvornik, Parro (2015)
- Growing interest in the distribution of the gains
 - Porto (JIE, 2006); Nicita, Olarreaga, Porto (JIE, 2014); Fajgelbaum and Khandelwal (QJE, 2015); Atkin, Faber, Gonzalez-Navarro (JPE, 2016); Faber (2014); Atkin and Donaldson (2015)
 - Goldberg and Pavcnic (JEL, 2007); Topalova (AEJ, 2010); Kovak (AER, 2013); Autor, Dorn, Hanson (AER, 2013); Autor, Dorn, Hanson, Song (QJE, 2014); Dix-Carneiro and Kovak (2015)

Motivation: The Trade-off

- This paper: we combine these two questions
 - assess the income gains relative to the inequality costs of trade policy
 - explore the (potential) trade-off
 - does the trade-off exist?
 - how much of one thing in exchange for the other?
- This is arguably an interesting contribution to the literature (Antras, de Gortari, Itskhoki, 2017; Galle, Rodriguez-Clare, Yi, 2017)
- Often, free trade is opposed on inequality grounds (even for those that acknowledge the gains from trade)
- Is this so? Are countries worried about distribution when setting trade policy?

Context

- Gains from trade literature: sufficient statistic for the gains of going from autarky to status quo, ACR

$$\widehat{V} = (\widehat{\lambda})^{(-1/\theta)}$$

- $\widehat{\lambda}$: change in domestic expenditure share
- θ : trade elasticity
- For US: from 0.7 to 1.4 percent (of real aggregate expenditure)
- Various corrections to this formula:
 - imperfect competition: Arkolakis, Costinot, Donaldson, and Rodriguez-Clare (2015)
 - labor market frictions: Caliendo, Dvorknik, Parro (2015)
 - productivity advantages (sufficient statistics may not be enough): Melitz and Redding (2015)

Context

- Distributional effects: winners and losers from trade

$$[\widehat{V}^1, \dots, \widehat{V}^h, \dots, \widehat{V}^H]$$

- Deaton's FO effects, expenditures and incomes
 - Porto (JIE, 2006): distribution of \widehat{V}^h along the income distribution
 - Nicita, Olarreaga, Porto (JIE, 2014), poverty bias: $\widehat{V}^P > \widehat{V}^R?$
 - Atkin, Faber, Gonzalez-Navarro (2016): distribution of \widehat{V}^h from FDI

Context

- Distributional effects in ACR
 - Only expenditures:
 - Fajgelbaum and Khandelwal (2015): 'ACR' approach with non-homothetic preferences
 - Expenditures and wages: Ricardo-Roy
 - Costinot, Donaldson, Komunjer (2012)
 - Galle, Rodriguez-Clare, Yi (20157)

$$\widehat{V} = \Pi_s(\widehat{\lambda}_s)^{(-\beta_s/\theta_s)} \Pi_s(\widehat{m}_{hs})^{(-\beta_s/\kappa_s)}$$

β_s : expenditure share

\widehat{m}_{hs} : changes in sectoral employment shares

κ : labor supply elasticity

What Do We Do?

- Study aggregate gains from trade as well as the distribution of losers and winners
- Estimate \widehat{V}^h with expenditure and income effects at a very detailed level (FO approximation)
- We do it for a wide set of 54 developing countries
- Use a Social Welfare Function to explore the trade-off

$$W = W(\widehat{V}^1, \dots, \widehat{V}^h, \dots, \widehat{V}^H)$$

Building Blocks

- A Structure: a welfare metric
 - to derive/describe how trade policy affects real income at household level
- Data
 - trade data (tariffs)
 - household survey data (household expenditures and incomes)
- A shock: full tariff liberalization
 - use the structure, with the tariff and the household survey data, to measure the change in the real income of each household → pre- and post-income distribution
- A Social Welfare Function a-la-Atkinson (Atkinson, 1970)
 - it is a *tool* to assess the trade-off between equality and mean income, or growth, across households (Deaton, 1997)

Household Welfare

- Define a metric for the gains or losses from trade
- Household welfare is real expenditure/income
- Standard approach in the literature
- Households as consumers and as income earners: Deaton (1989) and extensions in Porto (2006)
- Welfare V^h :

$$V^h = y^h(\mathbf{p}, v^h) - e(\mathbf{p}, u^h)$$

Household Incomes and Expenditures

- Expenditures:

$$e(\mathbf{p}^T, \mathbf{p}^{NT}, u^h) = \sum_{j \in T} p_j c_j^h + \sum_{k \in NT} p_k c_k^h$$

- Nominal income is:

$$y^h = l_w^h + \sum_{j \in T} \pi_j^h(\mathbf{p}^T) + \sum_{k \in NT} \pi_k^h(\mathbf{p}^{NT}(\mathbf{p}^T)) - T^h$$

- labor income (depends on wages)
- profits in farm/enterprises on traded goods (cotton, tobacco)
- profits non-traded family businesses (retail, construction)
- taxes and transfers

Tariff Liberalization

- After a tariff change, the prices of traded goods change

$$p_i^T = p_i^*(1 + \tau_i)$$

- expenditures on traded goods change

$$e^h = e(\mathbf{p}^T, \cdot)$$

- income from sales of traded goods changes

$$\pi_i^h = \pi_i(\mathbf{p}^T, \cdot)$$

- income from labor

$$l_w^h = l_w(\mathbf{p}^T, \cdot)$$

- transfers Ψ_i^h

Wage Responses & Tariff Revenue

- Wage Responses

- fixed labor
- nominal wages respond one-to-one with sector prices:

$$\frac{\partial w^i}{\partial p^i} \frac{p^i}{w^i} = 1$$

$$\frac{\partial w^j}{\partial p^i} \frac{p^i}{w^j} = 0$$

- Tariff Revenue

- compensation assuming proportional income taxes

First Order Effects

- Change in price of good i

$$\frac{dV_i^h}{e^h} = - \left(\phi_i^h - s_i^h + \phi_{wi}^h \right) \frac{\tau_i}{1 + \tau_i} + \Psi_i^h$$

- impacts on consumption can be approximated with budget shares
 - s_i for the shocked traded sector
- impacts on income can be approximated with income shares
 - ϕ_i for the shocked traded sector
 - ϕ_{wi} for labor income in the shocked sector i
 - tariff revenue transfers

The Model

- The objects dV_i^h/e^h are the welfare effects $\forall h$
- Do this for all traded goods

$$\frac{dV^h}{e^h} = \sum_i \frac{dV_i^h}{e^h}$$

- We can study these objects
- We can compare the ex-ante and ex-post distributions of real per capita income

$$\mathbf{x}_1^h = \mathbf{x}_0^h(1 + dV^h/e^h)$$

Estimation: What do we Need?

- Trade and Tariff data: trade shock and price changes
- Household survey data: budget shares, income shares, household wellbeing

Tariff Data & Household Survey Data

- Big measurement issue: the classification of goods in household surveys is different from the HS classification of goods in tariff databases (COMTRADE, TRAINS)
- Need a concordance
 - we first aggregate goods in hh surveys to 2-digit and 4-digit categories
 - then aggregate tariff data at those categories

Expenditure Template

Total Expenditure	1) Agriculture/Food	11) Staple food / livestock	111) Cereals/Flours/Bread 112) Legumens 113) Fruits 114) Vegetables 115) Oils / Fats 116) Fish 117) Meat/livestock 118) Dairy/Milk/Cheese/Eggs 119) Other Staple Food/Other Processed food	1111) Corn 1112) Beans 1113) Banana 1114) Tomato 1115) Vegetable o 1116) Fish 1117) Pork (Pig) 1118) Milk 1119) Other staple	1112) Wheat 1122) Other 1132) Grapes 1142) Potato 1152) Animal fats 1162) shrimp 1172) Beef (Cattle 1182) Eggs 1192) Other Processed Food	1113) Rice 1134) Citrus 1143)greens 1153) Other oils/fats 1163) Other crustacean 1173) Poultry (chic 1183) Cheese 1184) Other Dairy	1114) Other Cereals 1135) Other fruit 1144)Other vegetables					
		12) Non Staple food	121) Alcohol 122) Tobacco Plant/Cigarettes 123) Oil Seeds 124) Spices/Herbs 125) Coffee/Tea/Cocoa 126) Nuts 127) Cotton 128) Other Non-Staple	1211) Wine 1221) Cigarettes 1231) Soya 1241) Cloves 1251) Coffee 1261) Cashew	1212) beer 1222) Other tobacco 1232) Other oil seeds 1242) Pepper 1252) Tea 1262) Coconut	1213) Other alcohol 1243) Vanilla 1253) Cocoa 1263) Other nuts	1244) Saffron 1245) qat (chat) 1246) Other Spi					
		2) Manufacturing/HH items	21) Energy 22) Textiles / Apparel 23) Electric / Electronics 24) Household items / Furniture 25) Other Physical goods									
		3) Services	31) Transportation 32) Health 33) Education 34) Communication 35) Other Services									
		4) Other Expenditures	41) Remittances/ Transfers given 42) Investment of any sort 43) Festivities 44) Other disbursement									
					1281) Sugar(any k 1282) Other non-staple							

Trade Policy and Price Changes

- TTRI: Tariff Trade Restrictiveness Index

$$\tau_i = \sum_{x,n \in i} t_{x,n} \frac{m_{x,n}}{\sum_{x,n \in i} m_{x,n}}$$

- Full Pass-through

$$\Delta \ln p_i = \frac{p_i^* - p_i^*(1 + \tau_i)}{p_i^*(1 + \tau_i)} = -\frac{\tau_i}{1 + \tau_i}$$

Average Tariffs & Price Changes

Country	Staple Agric.	Non-Staple Agric.	Manufactures	Country	Staple Agric.	Non-Staple Agric.	Manufactures
Benin	12.2	16.9	10.8	Armenia	6.9	7.3	6.7
Burkina Faso	12.0	18.3	9.3	Bangladesh	7.4	4.9	18.8
Burundi	23.8	21.6	10.8	Bhutan	43.7	46.1	23.5
Cameroon	13.8	22.5	23.0	Cambodia	13.0	6.4	10.1
Central African Rep.	16.6	23.7	21.8	Indonesia	6.0	1.9	6.1
Comoros	1.8	10.4	8.9	Iraq	5.0	5.0	5.0
Côte d'Ivoire	10.4	10.2	9.2	Jordan	7.9	18.6	8.3
Egypt	7.1	28.0	18.0	Kyrgyz Republic	6.1	6.1	4.0
Ethiopia	10.1	13.3	12.4	Mongolia	5.3	6.5	4.9
The Gambia	6.6	13.5	13.9	Nepal	9.0	11.7	13.9
Ghana	16.4	11.6	14.3	Pakistan	3.7	8.1	17.4
Guinea	13.9	18.9	9.5	Papua New Guinea	4.7	12.4	0.9
Guinea Bissau	13.5	15.7	12.8	Sri Lanka	7.8	16.3	15.3
Kenya	18.7	25.1	11.0	Tajikistan	7.4	5.8	8.3
Liberia	6.3	5.6	16.4	Uzbekistan	14.8	11.4	8.5
Madagascar	8.3	9.6	14.8	Vietnam	11.1	6.3	9.8
Malawi	8.2	22.0	9.3	Yemen	4.4	7.6	7.7
Mali	11.2	16.8	8.8				
Mauritania	9.2	14.8	15.9	Azerbaijan	5.7	4.0	10.4
Mozambique	8.8	13.9	7.4	Georgia	6.0	6.4	0.5
Niger	12.2	17.6	9.3	Moldova	7.9	10.7	3.3
Nigeria	11.3	19.8	11.0	Ukraine	4.8	5.1	4.8
Rwanda	21.0	30.1	11.0				
Sierra Leone	11.8	16.2	9.7	Bolivia	11.0	12.6	15.1
South Africa	7.1	6.4	16.8	Ecuador	10.3	10.2	7.4
Tanzania	12.6	29.1	10.7	Guatemala	14.4	15.4	14.0
Togo	11.6	18.6	9.5	Nicaragua	12.1	9.8	9.1
Uganda	11.4	29.7	10.0				
Zambia	17.1	19.7	6.8	Average	10.8	14.4	10.9

Estimation: What do we Need?

- Trade and Tariff data: trade shock and price changes
- Household survey data: budget shares, income shares, household wellbeing

Household Surveys

Country	Year	Obs	Survey
Benin	2003	5296	Questionnaire Unifié sur les Indicateurs de Base du Bien-Être
Burkina Faso	2003	8413	Enquête sur les Conditions de Vie des Ménages
Burundi	1998	6585	Enquête Prioritaire, Etude Nationale sur les Conditions de Vie des Populations
Cameroon	2001-2002	10881	Deuxième Enquête Camerounaise Auprès des Ménages
Central African Republic	2008	6828	Enquête Centrafricaine pour le Suivi-Evaluation du Bien-être
Comoros	2004	2929	Enquête Intégrale auprès des Ménages
Côte d'Ivoire	2008	12471	Enquête sur le Niveau de Vie des Ménages
Egypt	2008-2009	23193	Household Income, Expenditure and Consumption Survey
Ethiopia	1999-2000	16505	Household Income, Consumption and Expenditure Survey
The Gambia	1998	1952	Household Poverty Survey
Ghana	2005-2006	8599	Living Standards Survey V
Guinea	2012	7423	Enquête Légère pour l'Evaluation de la Pauvreté
Guinea Bissau	2010	3141	Inquerito Ligeiro para a Avaliçao da Pobreza
Kenya	2005	13026	Integrated Household Budget Survey
Liberia	2014-2015	4063	Household Income and Expenditure Survey
Madagascar	2005	11661	Permanent Survey of Households
Malawi	2004-2005	11167	Second Integrated Household Survey
Mali	2006	4449	Enquête Légère Intégrée auprès des Ménages
Mauritania	2004	9272	Enquête Permanente sur les Conditions de Vie des Ménages
Mozambique	2008-2009	10696	Inquérito sobre Oramento Familiar
Niger	2005	6621	Enquête Nationale sur les Conditions de Vie des Ménages
Nigeria	2003-2004	18603	Living Standards Survey
Rwanda	1998	6355	Integrated Household Living Conditions Survey
Sierra Leone	2011	6692	Integrated Household Survey
South Africa	2000	25491	General Household Survey
Tanzania	2008	3232	Household Budget Survey
Togo	2011	5464	Questionnaire des Indicateurs de Base du Bien-être
Uganda	2005-2006	7350	National Household Survey
Zambia	2004	7563	Living Conditions Monitoring Survey IV

Household Surveys

Country	Year	Obs	Survey
Armenia	2014	5124	Integrated Living Conditions Survey
Bangladesh	2010	12117	Household Income and Expenditure Survey
Bhutan	2012	8879	Living Standards Survey
Cambodia	2013	3801	Socio-Economic Survey
Indonesia	2007	12876	Indonesian Family Life Survey
Iraq	2012	24895	Household Socio-Economic Survey
Jordan	2010	11110	Household Expenditure and Income Survey
Kryrgyz Republic	2012	4962	Intergrated Sample Household Budget and Labor Survey
Mongolia	2011	11089	Household Socio-Economic Survey
Nepal	2010-2011	5929	Living Standards Survey
Pakistan	2010-2011	16178	Social and Living Standards Measurement Survey
Papua New Guinea	2009	3776	Household Income and Expenditure Survey
Sri Lanka	2012-2013	20335	Household Income and Expenditure Survey
Tajikistan	2009	1488	Tajikistan Panel Survey
Uzbekistan	2003	9419	Household Budget Survey
Vietnam	2012	9306	Household Living Standard Survey
Yemen	2005-2006	12998	Household Budget Survey
Azerbaijan	2005	4797	Household Budget Survey
Georgia	2014	10959	Household Integrated Survey
Moldova	2014	4836	Household Budget Survey
Ukraine	2012	10394	Sampling Survey of the Conditions of Life of Ukraine's Households
Bolivia	2008	3900	Encuesta de Hogares
Ecuador	2013-2014	11420	Encuesta de Condiciones de Vida
Guatemala	2014	28680	Encuesta Nacional de Condiciones de Vida
Nicaragua	2009	6450	Nicaragua - Encuesta Nacional de Hogares sobre Medición de Niveles de Vida

Budget Shares: s_i^h

Country	Staple Agric.	Non-Staple Agric.	Manuf.	Non-Traded	Other Cons.	Home	Country	Staple Agric.	Non-Staple Agric.	Manuf.	Non-Traded	Other Cons.	Home
Benin	34.4	3.8	23.3	10.7	6.1	21.6	Armenia	55.5	8.0	7.1	21.2	0.0	8.2
Burkina Faso	24.4	12.3	16.1	8.8	8.3	30.1	Bangladesh	45.3	9.0	14.1	16.2	4.4	11.0
Burundi	41.8	9.9	20.2	12.7	10.8	4.6	Bhutan	26.9	7.2	25.5	15.8	12.4	12.3
Cameroon	46.8	6.1	17.1	14.7	5.9	9.4	Cambodia	31.2	12.4	16.0	18.8	8.5	13.0
C. Africa Rep.	40.4	18.5	21.3	7.9	0.2	11.7	Indonesia	29.3	11.7	11.4	22.8	13.5	11.3
Comoros	48.1	9.5	10.8	17.4	5.1	9.2	Iraq	32.3	5.2	35.2	23.0	3.4	0.8
Côte d'Ivoire	35.7	3.9	22.2	20.5	6.5	11.3	Jordan	35.1	15.2	19.1	29.1	1.2	0.2
Egypt	45.5	4.9	13.8	31.4	2.0	2.4	Kyrgyz Republic	42.3	5.5	25.5	13.6	3.4	9.7
Ethiopia	23.1	9.1	17.0	2.9	10.1	37.7	Mongolia	47.6	8.9	14.3	8.8	1.1	19.3
The Gambia	45.3	11.5	11.3	12.0	10.4	9.6	Nepal	27.3	4.8	11.7	27.6	4.7	23.9
Ghana	7.7	1.4	30.8	33.0	15.5	11.5	Pakistan	28.2	7.7	23.4	12.9	6.6	21.3
Guinea	33.0	11.9	18.3	12.6	5.0	19.2	Papua New Guinea	36.2	12.2	5.8	5.0	13.7	27.1
Guinea Bissau	50.7	6.3	6.6	7.4	4.2	24.7	Sri Lanka	32.6	10.2	9.4	19.4	21.7	6.7
Kenya	30.2	9.7	23.4	24.9	2.4	9.4	Tajikistan	37.8	5.5	24.8	14.8	3.2	13.9
Liberia	47.1	7.2	12.4	15.2	2.5	15.6	Uzbekistan	36.5	5.1	7.5	10.5	1.9	38.5
Madagascar	37.2	7.2	12.0	3.6	0.7	39.4	Vietnam	37.3	6.5	19.6	15.3	10.6	10.7
Malawi	25.8	5.7	29.1	6.9	0.7	31.8	Yemen	39.2	20.4	17.5	15.5	4.4	3.1
Mali	25.6	7.6	4.2	4.9	0.5	57.1							
Mauritania	47.2	11.5	14.6	6.7	0.7	19.3	Azerbaijan	51.1	5.9	20.9	11.6	1.6	9.0
Mozambique	44.7	5.3	14.7	3.9	1.5	29.9	Georgia	34.1	7.8	23.7	27.6	4.7	2.1
Niger	35.7	8.8	17.1	6.5	10.2	21.7	Moldova	16.4	2.2	32.1	15.3	7.0	27.1
Nigeria	47.9	3.6	18.0	9.4	0.5	20.6	Ukraine	44.8	11.4	20.0	16.3	0.1	7.4
Rwanda	24.3	4.9	10.6	9.0	29.0	22.1							
Sierra Leone	46.2	10.4	12.4	10.8	4.4	15.8	Bolivia	44.0	7.7	16.8	23.9	1.3	6.4
South Africa	31.6	8.3	31.8	16.4	11.8	0.1	Ecuador	42.2	3.9	16.8	21.5	8.5	7.2
Tanzania	29.4	6.6	19.1	9.9	6.2	28.8	Guatemala	37.7	5.3	19.8	17.8	4.8	14.6
Togo	39.0	7.8	15.1	26.2	5.8	6.1	Nicaragua	40.8	4.9	16.6	19.1	1.0	17.7
Uganda	24.2	7.6	16.4	17.9	2.0	31.9							
Zambia	53.5	4.8	6.3	10.1	0.6	21.8	Average	37.0	8.0	17.4	15.1	5.8	16.6

Income Shares: ϕ_i^h

Country	Staple Agric.	Non-Staple Agric.	Wages	Family Enterp.	Other	Home Cons.	Country	Staple Agric.	Non-Staple Agric.	Wages	Family Enterp.	Other	Home Cons.
Benin	14.2	10.0	13.1	0.0	40.9	21.8	Armenia	9.2	0.1	35.1	6.5	40.6	8.5
Burkina Faso	19.3	2.9	13.6	17.8	12.1	34.2	Bangladesh	33.0	2.1	31.4	14.3	12.1	7.1
Burundi	39.5	29.4	8.1	7.5	11.0	4.5	Bhutan	12.9	0.0	44.2	9.3	8.6	25.1
Cameroon	15.4	0.1	27.3	23.1	0.0	34.1	Cambodia	24.2	0.5	30.8	23.6	5.3	15.6
C. African Rep.	42.5	9.3	2.4	3.4	4.3	38.1	Indonesia	4.6	1.2	38.2	0.6	20.9	34.4
Comoros	24.3	3.7	26.8	16.4	10.8	17.9	Iraq	8.1	1.6	49.2	11.9	28.4	0.8
Côte d'Ivoire	7.1	13.7	16.8	28.4	15.8	18.2	Jordan	1.7	2.1	45.2	8.9	41.0	1.0
Egypt	6.9	6.9	41.1	15.1	29.8	0.2	Kyrgyz Rep.	12.2	1.4	40.4	12.0	27.4	6.6
Ethiopia	14.3	0.5	5.2	24.3	10.9	44.8	Mongolia	10.1	0.3	38.1	8.7	31.6	11.1
The Gambia	2.7	6.8	46.8	22.1	7.2	14.3	Nepal	4.1	1.2	25.8	10.9	22.1	35.8
Ghana	8.5	5.5	58.5	0.0	12.0	15.6	Pakistan	7.6	3.1	45.9	12.1	13.8	17.5
Guinea	17.5	3.2	7.0	18.2	13.5	40.5	P.N. Guinea	13.8	6.5	14.8	9.6	17.9	37.2
Guinea Bissau	5.5	21.9	21.7	7.8	10.4	32.8	Sri Lanka	13.1	4.6	48.8	19.3	0.0	14.2
Kenya	21.8	3.1	35.4	5.3	17.8	16.6	Tajikistan	0.9	1.5	38.7	8.5	22.4	28.0
Liberia	10.2	3.4	22.2	29.2	9.9	25.1	Uzbekistan	7.4	0.2	20.3	11.2	20.7	40.2
Madagascar	27.1	3.0	23.0	13.1	5.1	28.8	Vietnam	21.1	3.5	35.3	19.6	13.1	7.4
Malawi	18.4	4.6	21.4	12.7	3.8	39.0	Yemen	7.8	9.2	43.7	15.3	21.2	2.8
Mali	8.7	2.8	8.3	10.5	15.4	54.3	Azerbaijan	28.8	1.9	26.1	2.9	26.2	14.1
Mauritania	13.4	0.0	3.7	10.1	30.8	42.0	Georgia	7.3	1.9	29.2	7.8	51.9	1.9
Mozambique	10.4	7.1	15.1	10.4	10.0	46.9	Moldova	5.5	2.1	30.4	1.7	26.3	33.9
Niger	17.3	3.1	4.0	1.5	38.2	35.9	Ukraine	2.8	0.0	43.5	0.1	48.0	5.6
Nigeria	11.6	5.7	41.6	12.8	3.9	24.3	Bolivia	6.3	7.6	36.1	27.3	16.2	6.5
Rwanda	10.5	3.7	24.9	5.7	11.8	46.8	Ecuador	10.6	1.1	48.4	16.7	17.3	5.8
Sierra Leone	18.7	4.6	11.0	13.3	19.6	32.7	Guatemala	6.4	2.9	45.2	18.0	14.1	13.4
South Africa	0.6	0.0	54.9	0.0	43.6	0.8	Nicaragua	10.9	2.8	40.4	18.4	13.5	14.0
Tanzania	10.9	3.0	23.0	5.5	11.6	46.0	Average	12.8	4.2	29.2	12.6	18.6	22.7
Togo	8.7	6.5	30.2	37.2	9.7	7.7							
Uganda	9.7	2.9	21.6	18.7	13.9	33.1							
Zambia	5.7	1.7	20.7	13.1	18.4	39.0							

The Gains from Trade

- One view of the literature: Average Aggregate Gains
 - Arkolakis et al. (2012)
 - Costinot, Rodriguez-Clare (2014)

The Gains from Trade: Winners

	Gains				Expenditure					Income				
		agric.	manuf.	total	agric.	wage	enter.	rev.	total	agric.	wage	enter.	rev.	total
Cameroon	6.8	8.9	3.6	12.5	-1.7	-1.3	-0.7	-1.9	-5.6					
Zambia	5.8	7.8	1.2	9.0	-1.1	-0.5	-0.7	-0.8	-3.1					
Sierra Leone	4.2	5.8	1.7	7.4	-1.6	-0.1	-0.1	-1.5	-3.2					
Central Africa Republic	4.2	7.1	3.7	10.8	-4.5	-0.0	0.0	-2.1	-6.6					
Tanzania	4.2	4.7	4.1	8.8	-1.7	-1.1	-0.2	-1.7	-4.6					
Jordan	4.0	6.2	2.1	8.3	-0.4	-0.4	-0.1	-3.4	-4.3					
Nigeria	3.9	6.1	2.2	8.3	-1.0	-1.9	-0.2	-1.3	-4.4					
Mozambique	3.6	6.0	1.2	7.2	-1.1	-0.3	-0.1	-2.0	-3.6					
Cote d'Ivoire	3.4	4.6	2.6	7.2	-1.7	-0.6	-0.4	-1.1	-3.8					
Uzbekistan	3.3	5.0	1.9	7.0	-0.9	-1.1	-0.4	-1.2	-3.7					
Ukraine	3.2	3.7	0.9	4.6	-0.2	-0.2	-0.0	-0.9	-1.4					
Ecuador	3.0	5.9	1.5	7.3	-1.6	-1.4	-0.3	-1.0	-4.4					
Kenya	2.9	6.1	2.5	8.6	-2.8	-1.2	-0.1	-1.6	-5.7					
Ethiopia	2.7	4.7	1.9	6.6	-1.4	-1.1	-0.4	-1.0	-3.8					
Bolivia	2.7	4.2	2.3	6.5	-1.2	-0.6	-0.6	-1.3	-3.8					
Guinea	2.7	4.9	2.9	7.8	-2.0	-0.1	-0.2	-2.9	-5.1					
Yemen	2.6	4.1	1.3	5.4	-0.8	-0.4	-0.1	-1.5	-2.8					
Armenia	2.5	3.8	0.4	4.1	-0.5	-0.3	-0.0	-0.9	-1.7					
Azerbaijan	2.4	3.9	2.3	6.2	-2.4	-0.1	0.0	-1.3	-3.8					
Malawi	2.4	4.1	2.8	6.9	-2.4	-0.6	-0.3	-1.2	-4.5					
South Africa	2.4	1.2	2.9	4.2	-0.1	-1.0	0.0	-0.7	-1.8					
Pakistan	2.4	2.0	3.7	5.7	-1.4	-0.8	-0.3	-0.8	-3.3					
Papua New Guinea	2.2	4.3	0.4	4.7	-2.3	-0.2	-0.0	0.0	-2.5					
Benin	2.2	4.8	2.9	7.7	-2.0	-0.2	0.0	-3.2	-5.5					

The Gains from Trade: Winners

	Gains	Expenditure			Income				
		agric.	manuf.	total	agric.	wage	enter.	rev.	total
Egypt	2.2	3.7	3.6	7.3	-2.9	-0.0	-0.7	-1.4	-5.1
Togo	2.1	5.3	1.8	7.1	-0.9	-1.0	-0.9	-2.3	-5.0
Guinea Bissau	2.0	4.7	0.8	5.5	-0.9	-0.3	-0.0	-2.3	-3.6
Tajikistan	1.9	3.3	1.4	4.7	-0.2	-0.6	-0.0	-2.0	-2.8
Gambia	1.9	6.5	1.5	8.0	-0.7	-1.1	-0.6	-3.7	-6.0
Nicaragua	1.9	5.0	1.1	6.1	-1.7	-0.9	-0.3	-1.3	-4.2
Niger	1.9	4.3	2.0	6.3	-2.5	-0.0	-0.0	-1.9	-4.4
Guatemala	1.9	3.6	1.2	4.8	-0.8	-1.0	-0.2	-0.9	-2.9
Indonesia	1.9	2.8	0.5	3.2	-0.2	-0.6	-0.0	-0.6	-1.4
Uganda	1.8	5.4	1.1	6.6	-2.2	-1.0	-0.3	-1.4	-4.7
Iraq	1.6	1.5	2.0	3.5	-0.4	-0.3	-0.1	-1.2	-1.9
Liberia	1.5	3.3	1.3	4.6	-0.8	-0.4	-0.5	-1.3	-3.1
Nepal	1.4	2.7	1.6	4.4	-0.5	-0.3	-0.1	-2.0	-3.0
Vietnam	1.1	5.1	2.0	7.1	-2.8	-1.0	-0.4	-1.8	-6.0
Georgia	1.0	2.1	0.1	2.2	-0.6	-0.0	-0.0	-0.6	-1.2
Moldova	0.7	1.4	1.5	2.9	-0.6	-0.1	-0.0	-1.4	-2.1
Burkina Faso	0.7	3.8	2.3	6.1	-2.5	-0.6	-0.5	-1.9	-5.4
Kyrgyz Republic	0.6	1.8	1.4	3.2	-0.7	-0.2	-0.0	-1.6	-2.6
Bangladesh	0.4	4.9	2.3	7.2	-3.9	-1.5	-0.1	-1.3	-6.8
Burundi	0.4	6.9	2.2	9.0	-6.2	-0.5	-0.0	-1.8	-8.6
Average	2.5	4.5	1.9	6.4	-1.6	-0.6	-0.2	-1.5	-3.9

The Gains from Trade: Losers

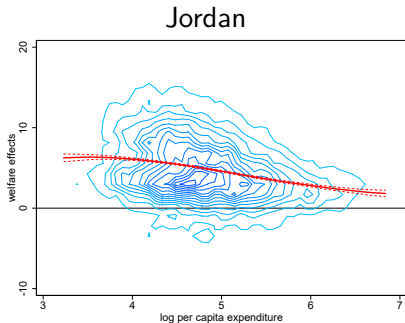
	Gains	Expenditure			Income				
		agric.	manuf.	total	agric.	wage	enter.	rev.	total
Cambodia	-3.1	4.4	0.9	5.4	-4.5	-0.8	0.0	-3.1	-8.4
Ghana	-2.0	1.0	2.9	3.9	-1.2	-2.8	0.0	-1.8	-5.9
Mauritania	-1.3	4.5	1.8	6.3	-1.1	-0.1	-0.0	-6.5	-7.6
Madagascar	-1.1	3.2	0.8	3.9	-2.3	-0.9	-0.1	-1.7	-5.0
Bhutan	-0.9	8.5	5.3	13.8	-3.2	-2.8	0.0	-8.7	-14.7
Mali	-0.4	2.4	0.2	2.6	-1.0	0.0	-0.0	-2.0	-3.0
Sri Lanka	-0.3	3.3	0.8	4.1	-1.4	-1.2	-0.7	-1.0	-4.4
Comoros	-0.3	1.6	1.3	3.0	-0.7	-0.3	-0.3	-2.0	-3.2
Rwanda	-0.2	3.7	1.4	5.1	-2.6	-1.1	-0.0	-1.6	-5.3
Mongolia	-0.0	2.7	0.6	3.4	-0.7	-0.2	-0.1	-2.4	-3.4
Average	-0.9	3.5	1.6	5.1	-1.9	-1.0	-0.1	-3.1	-6.1

The Distributional Effects

- The other view: Porto (2006); Nicita, Olarreaga and Porto (2014); Fajgelbaum and Khandelwal (2016); Atkin, Faber and Gonzalez-Navarro (2016); Faber (2014); Atkin and Donaldson (2015)
- Unequal gains from trade & Inequality Implications
 - estimate kernel averages conditional on well-being
 - estimate bivariate densities
- Many patterns in the data:

Countries with a Pro-Poor Bias

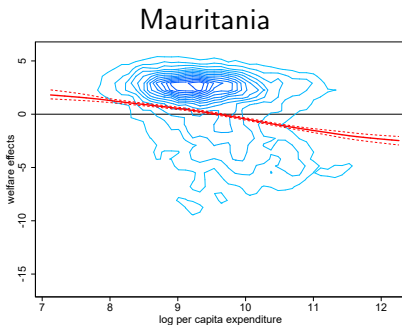
- average gains across the income distribution; the poor gain proportionately more than the rich (inequality may be reduced)
- not necessarily Pareto improving: high dispersion



Azerbaijan, Central African Republic, Ecuador, Indonesia, Moldova, Nepal, Pakistan, Papua New Guinea, Rwanda, Yemen and Zambia

Countries with a Pro-Poor Bias

- average gains for the poor; average losses for the rich
- stronger pro-poor bias

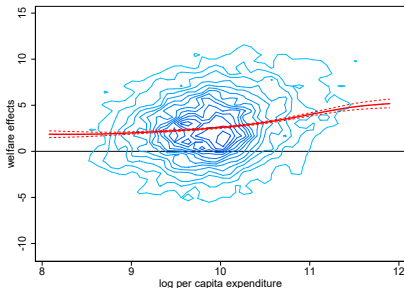


Guinea Bissau, Mali, Mongolia and Sri Lanka

Countries with a Pro-Rich Bias

- average gains across the income distribution; the rich gain proportionately more than the poor
- on average, better-off but with potential increases in inequality

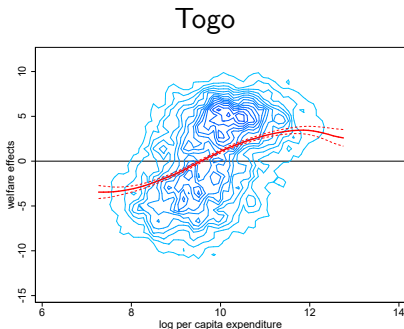
Uzbekistan



Armenia, Bolivia, Cameroon, Côte d'Ivoire, Egypt, Ethiopia, Georgia, Guatemala, Guinea, Iraq, Kyrgyz Republic, Liberia, Malawi, Mozambique, Nicaragua, Niger, Sierra Leone, South Africa, Tajikistan, Tanzania, Uganda, and Ukraine

Countries with a Pro-Rich Bias

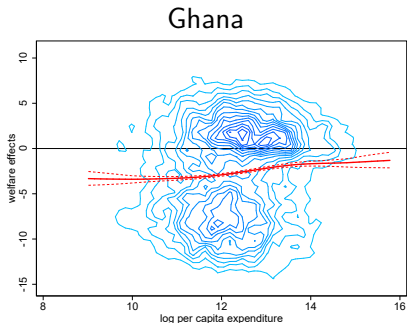
- average gains for the rich; average losses for the poor
- stronger pro-rich bias



Bangladesh, Benin, Burkina Faso, Burundi, The Gambia, Kenya, Nigeria, and Vietnam

Countries with a Pro-Rich Bias

- average losses across the income distribution; the poor lose proportionately more than the rich
- on average, worse-off but with potential increases in inequality



Bhutan, Cambodia, Comoros and Madagascar

Assessing the Trade-Off

- Atkinson Social Welfare Index

$$W = \frac{1}{H} \sum_h \frac{(x_h)^{1-\varepsilon}}{1-\varepsilon}, \varepsilon \neq 1$$

- The parameter ε measures the dislike for inequality
 - when $\varepsilon=0$, every household counts the same and social welfare is just the sum (average) of per capita income/expenditures
 - as ε increases, the weight towards the poorer households increases
- Use Atkinson decomposition to illustrate the trade-off

$$W = \mu * (1 - I)$$

$$I = 1 - \left(\frac{1}{H} \sum_{h=1}^H (x^h / \mu)^{1-\varepsilon} \right)^{1/(1-\varepsilon)}$$

The Trade-off

- Define $G(\varepsilon)$: the inequality-adjusted gains from trade
- A measure of the gains from trade, including a correction for the inequality costs

$$G(\varepsilon) = \frac{W_1(\varepsilon) - W_0(\varepsilon)}{W_0(\varepsilon)}$$

- for $\varepsilon = 0$: comparison of mean incomes
- for $\varepsilon > 0$: comparison of mean incomes with the inequality correction

The Trade-off

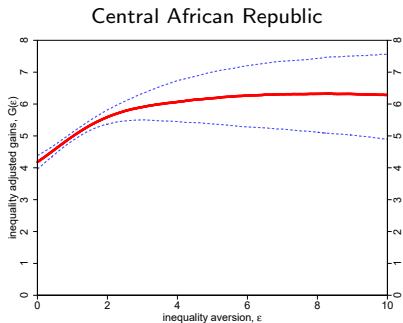
- Using the decomposition: average income gains + equality gains

$$G(\varepsilon) = G(0) + \frac{\mu_1}{\mu_0} \frac{I_0(\varepsilon) - I_1(\varepsilon)}{1 - I_0(\varepsilon)}$$

- may depend non-monotonically on ε
- if inequality increases for some ε_a ($I_1(\varepsilon_a) > I_0(\varepsilon_a)$): downward correction for inequality costs
- if inequality decreases for some ε_b ($I_1(\varepsilon_b) < I_0(\varepsilon_b)$): upward correction for equality gains
- Trade-offs arise when the income gains and the equality gains move in opposite direction, i.e. when $G(0)$ and $\frac{\mu_1}{\mu_0} \frac{I_0(\varepsilon) - I_1(\varepsilon)}{1 - I_0(\varepsilon)}$ have opposite signs

No-Trade-off Countries

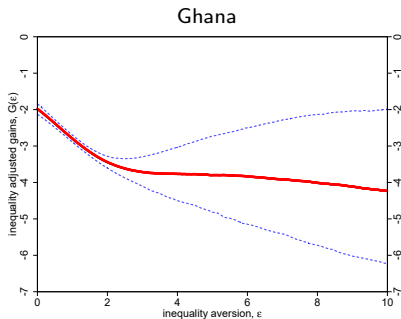
- average income gains and equality gains: liberalization is unambiguously social welfare enhancing



Guinea Bissau, Jordan and Yemen

No-Trade-off Countries

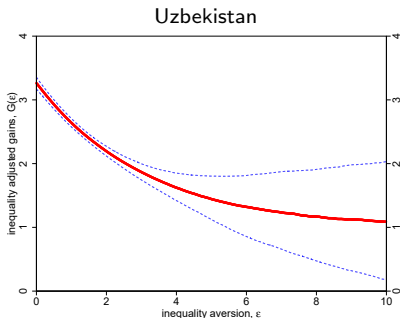
- average income losses and inequality costs: liberalization is unambiguously social welfare reducing



Comoros, Madagascar, Rwanda

Trade-Off without Trade Policy Reversals

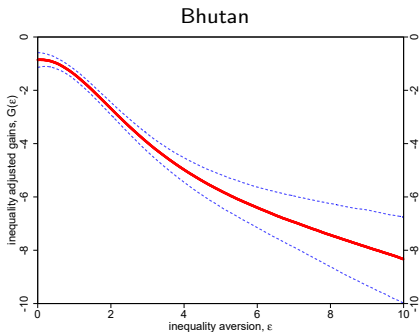
- the trade-off is not strong enough to generate reversals of trade policy: liberalization dominates protection at all levels of ε



Armenia, Azerbaijan, Cameroon, Egypt, Guinea, Indonesia, Iraq, the Kyrgyz Republic, Moldova, Pakistan, Tajikistan, Uganda, Ukraine, South Africa, and Zambia

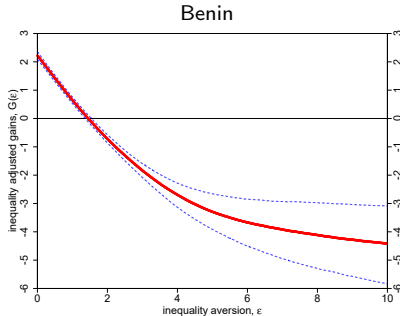
Trade-Off without Trade Policy Reversals

- the trade-off is not strong enough to generate reversals of trade policy: protection dominates liberalization at all levels of ε



Trade-Off with Trade Policy Reversals

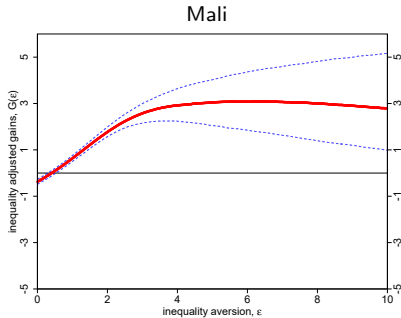
- average income gains with increasing inequality costs



Bangladesh, Bolivia, Burkina Faso, Burundi, Ethiopia, The Gambia, Guatemala, Kenya, Liberia, Malawi, Mozambique, Nigeria, Papua New Guinea, Togo, and Vietnam

Trade-Off with Trade Policy Reversals

- average income losses with decreasing inequality costs



Mauritania, Sri Lanka

Quantifying the Trade Policy Reversals

- Define value ε^* such that $G(\varepsilon^*) = 0$
- ε^* : inequality aversion to trade liberalization
- ε^* : sufficient statistic to describe the trade-off
- in terms of the gains from trade:
 - trade- ε shows how intolerant towards inequality a society **would have** to be in order to make the gains not worthwhile
 - or how much a society **would have** to value equality the average gains
 - a **high** trade- ε implies a **soft** trade-off: a society needs to put a lot of weight on the cost of higher inequality to forgo the gains
 - when trade- $\varepsilon \rightarrow \infty$ or trade- $\varepsilon \nrightarrow$, no-trade-off, no policy reversal
 - a **low** trade- ε implies a **hard** trade-off: relatively low weights on inequality costs are enough to offset the gains

$$\varepsilon^*$$

	Trade Policy Preference Reversals		Potential Reversals		
	ε^*	Lower Bound	Upper bound	Lower Bound	Upper Bound
A) Countries with Income Gains					
Bangladesh	0.37	0.51	0.64		
Burkina Faso	0.46	0.56	0.65		
Gambia, The	1.06	1.17	1.28		
Togo	1.17	1.23	1.30		
Benin	1.38	1.47	1.56		
Nigeria	1.81	1.87	1.95		
Vietnam	1.72	1.91	2.09		
Kenya	2.34	2.49	2.71		
Ethiopia	2.72	3.06	3.58		
Mozambique	2.88	3.51	8.49		
Guatemala	6.98	5.24	–		
Liberia	3.50	4.42	–		
Papua New Guinea	3.35	4.79	–		
Malawi	4.05	7.06	–		
Sierra Leone				4.01	–
Niger				6.01	–
Nicaragua				6.33	–
Cote d'Ivoire				7.02	–
Georgia				7.09	–
Nepal				8.79	–
Tanzania				8.85	–
Ecuador				9.92	–

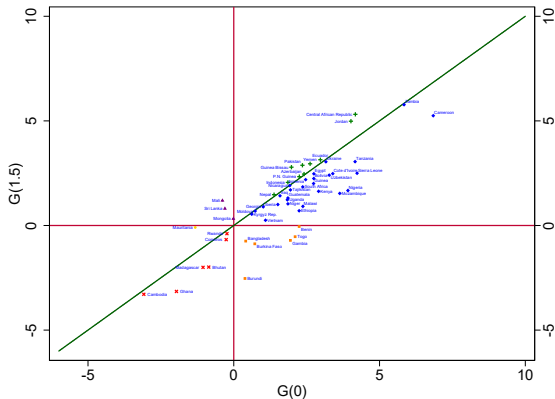
ε^*

	Trade Policy Preference Reversals			Potential Reversals	
	ε^*	Lower Bound	Upper bound	Lower Bound	Upper Bound
B) Countries with Income Losses					
Mongolia	0.05	0	0.24		
Mali	0.43	0.31	0.54		
Mauritania	1.63	1.49	1.80		
C) Countries with multiple (potential) reversals					
<u>Countries with Income Gains</u>					
Burundi	0.10	0	0.21	5.60	7.11
Bolivia	5.81	3.94	-		
	8.78	3.94	-		
<u>Countries with Income Losses</u>					
Sri Lanka	0.30	0.21	0.38		
	8.88	7.13	-		

Assessing the Trade-Off

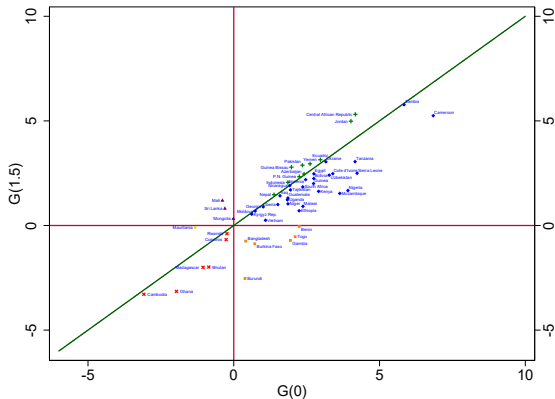
- Assessing the trade-offs requires value judgements (ε)
- Which is a plausible ε ?
 - in the range $[1, 2]$
 - $\varepsilon = 1.5$ gives I close to Gini
- We plot the inequality adjusted gains from trade $G(\varepsilon)$ against the gains from trade $G(0)$
- Small corrections for inequality if the pairs $(G(1.5), G(0))$ would lie along the 45° line
- Robust to $\varepsilon = 2$ and $\varepsilon = 1$

No Trade-Off



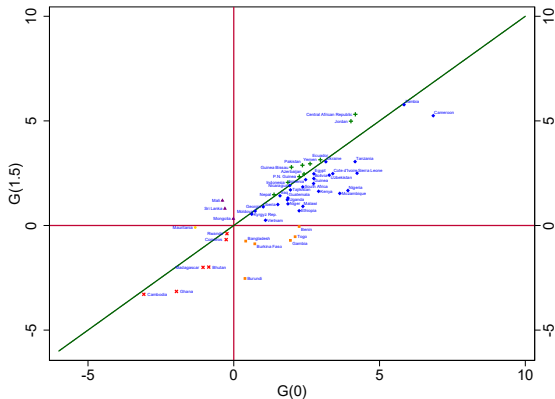
- 10 countries with income gains and inequality gains (I, above 45°);
liberalization
- 6 countries with income losses and inequality costs (III, below 45°);
protection

Trade-Off, Liberalization



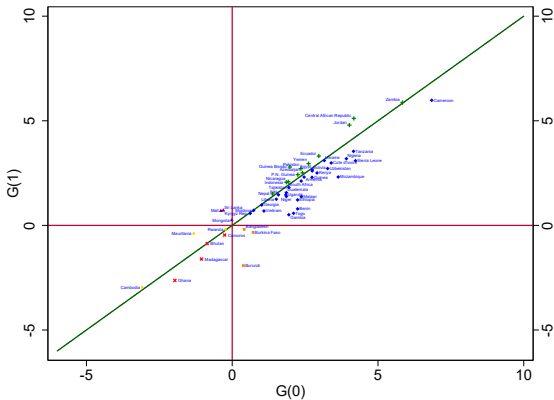
- 28 countries with income gains and inequality costs, but inequality-adjusted gains (I, below 45°)
- 3 countries with income losses and equality gains, with inequality-adjusted gains (II)

Trade-Off, Protection

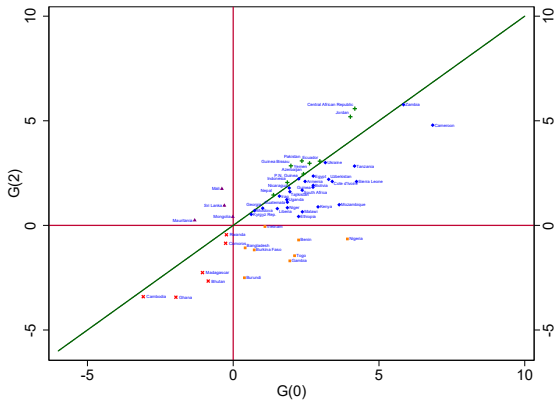


- 1 country with income losses and insufficient equality gains (III, above 45°)
- 6 countries where the inequality costs dominate the income costs (IV)

$$G(1) - G(0)$$



$$G(2) - G(0)$$



Assessing the Trade-Off

- There is evidence of a trade-off between the income gains and the inequality costs of trade
- The trade-off “resolves” in favor of liberalization
 - tariff cuts enhance social welfare in 39 countries
 - tariff cuts reduce social welfare in only 9 countries
 - in 6 countries, policy implications are more equivocal

Why Do These Countries Protect Their Economy?

- Why is W a relevant metric?
 - maybe countries are not maximizing the Atkinson W
 - maybe they are maximizing W , but subject to a different set of economic and political constraints
 - political economy and non-labor income (Grossman and Helpman, 1994; Krueger, 1974)
 - need for government revenues when income taxes are difficult to collect (Besley and Persson, 2013)
- Fairness, anger in trade relationship
 - social mobility, redistribution, psychology and political economy (Piketty, 1995; Benabou and Tirole, 2006)
- Limitations of the model
 - impacts our model does not account for (e.g., dynamics)
 - limitations of the household surveys

Final Remarks

- Large effort to study the trade off between the income gains and the inequality costs of trade
- 54 countries, detailed incomes and expenditures effects
- There is generally a trade-off (inequality matters)
- W “favors” liberalization, unless extreme views about redistribution
- Need to think about why we see protection