Free Trade Agreements, Customs Unions in Disguise?

Gabriel Felbermayr, Feodora Teti and Erdal Yalcin

ifo Institute
Leibniz Institute for Economic Research at the University of Munich

teti@ifo.de

January 13, 2018

What are RoOs and why are they necessary?

- Multilateral trade liberalizations on a deadlock $\rightarrow$ regional trade agreements Definitions
- FTA $\Leftrightarrow$ CU: CU same external tariff
- Tariff differences $\rightarrow$ trade deflection More
- RoOs prevent trade deflection; without them FTAs are de facto CUs
- Products need to undergo a "substantial transformation"
  - Minimum value added content requirement, change in tariff chapter, combination of those or a special rule

An Example for RoOs

Canada-EU Trade Agreement (CETA):

HS heading 19.01 Malt Extract

> *"A change from any other heading, provided that: (a) the net weight of non-originating material of heading 10.06 or 11.01 through 11.08 used in production does not exceed 20 per cent of the net weight of the product, (b) the net weight of non-originating sugar used in production does not exceed 30 per cent of the net weight of the product, (c) the net weight of non-originating material of Chapter 4 used in production does not exceed 20 per cent of the net weight of the product, and (d) the net weight of non-originating sugar and non-originating material of Chapter 4 used in production does not exceed 40 per cent of the net weight of the product."*

RoOs: Costly Red Tape

Why is complying with RoOs costly?

- Build up of (legal) know-how
- Little overlap in different FTAs (Estevadeordal and Suominen 2006)
- Change in global value chains (Krishna 2006; Krishna and A. O. Krueger 1995)

RoOs reduce the Gains from FTAs

- Compliance costs associated with meeting RoOs requirement range from 3-15% of the final product prices (Anson et al. 2005; Cadot, Estevadeordal, et al. 2006; Carrère et al. 2006; Estevadeordal 2000)
- Especially intermediate goods are affected (Andersson 2015; Conconi et al. 2016)
- Heterogeneity across firms (Cadot, Graziano, et al. 2014; Demidova et al. 2012)

$\Rightarrow$ **Costs are only justified when trade deflection is profitable**

Related Literature

- The theoretical literature points out the protective effects of RoOs on intermediates (Deardorff 2016; Krishna 2006; Krishna and A. O. Krueger 1995; A. O. Krueger 1993)
- Consensus in the literature that RoOs lower utilization rates of tariff preferences (e.g. Anson et al. 2005)
- Empirical evidence shows negative effect of RoOs on trade in general and in intermediates in particular (e.g. Augier et al. 2005; Bombarda et al. 2013; Carrère et al. 2006; Conconi et al. 2016)
- Theoretical literature on the choice between FTAs and CUs: autonomy over external tariffs make it easier to actually conclude a trade agreement (Appelbaum et al. 2012; Facchini et al. 2013; A. Krueger 1997)

$\Rightarrow$ **So far, nobody has questioned the necessity of RoOs**

Research Question & main Findings

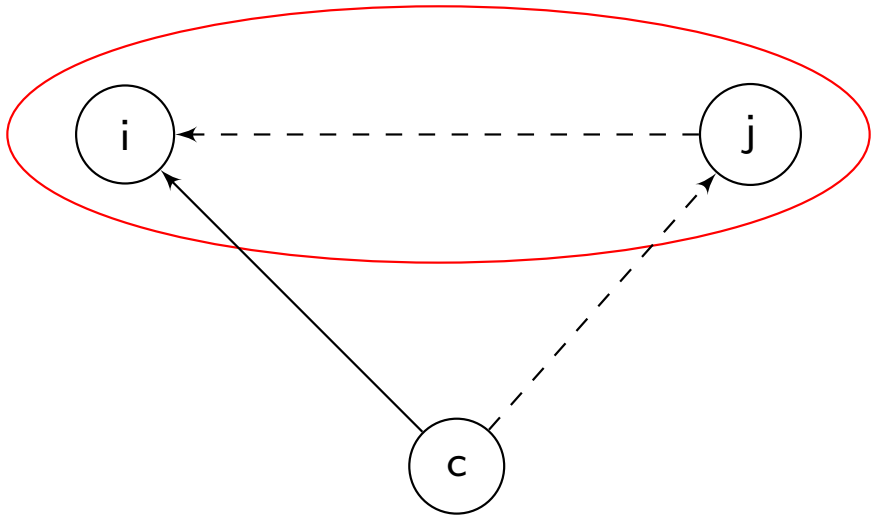
Are RoOs economically justified?

- Is trade deflection profitable?
- Is trade deflection systematically less profitable for country-pairs with an FTA? If so why?

Preview of Results

- In 2014 for 78% of all product-pair combinations trade deflection is unprofitable
  - in 10%: identical tariffs
  - in 45%: no tariff savings possible because transshipment entails paying a higher tariff than direct route
  - in 23%: additionally arising transportation costs exceed tariff savings
- The deeper an FTA, the lower the profitability of trade deflection, mostly due to positive selection
- Findings suggest a fundamental re-thinking of the use of RoOs in FTAs

The Simple Economics of Trade Deflection



Trade deflection only profitable if

$$p^0_{ck}\, t_{ick}\, \tau_{ick} > p^0_{ck}\, t_{jck}\, \tau_{jck}\, t_{ijk}\, \tau_{ijk}$$

$$1 > \frac{\tau_{ick}}{\tau_{ijk}\, \tau_{jck}} > \frac{t_{ijk}\, t_{jck}}{t_{ick}}$$

Tariff Data t

- Combine TRAINS and IDB data on MFN & preferential tariffs for more than 150 countries on the 6-digit product level (1988-2014)
- Problem: missing data
- MFN Tariffs
  - missing values are set equal to nearest preceding observation, if there is no preceding observation, tariffs are set equal to nearest observation
- Preferential Tariffs
  - cross-check with data on RTAs to minimize errors
  - phasing-in makes interpolation harder: we use information on the agreed phasing-in of more than 500 RTAs to impute the data in the most adequate way

$\rightarrow$ Bilateral data on the effectively applied tariff t_{ijkt} for 24,180 pairs, 5,018 products, and 27 years (over 120 Million observations in 2014)

Measure for Transportation Costs τ

Bilateral Transportation Costs τ_{ij}

- Anderson et al. (2004) propose cif/fob-ratios as a way to approximate τ_{ijk} but: data not readily available
- τ_{ijk} observable for the US (cif/fob-ratios)
- Assume: $\tau_{ij} = \alpha D_{ij}^{\delta} \leftrightarrow ln(\tau_{ij}) = ln(\alpha) + \delta ln(D_{ij})$
  - estimate $ln(\alpha)$ and δ for every product k for the US
  - out-of-sample prediction for all other pair-product combinations

  estimation | in-sample | out-of-sample

$\rightarrow$ 4,215 ij – *product*-specific transportation costs

Measure of the Profitability of Trade Deflection

Balanced Sample: 125 countries, 4,215 products with information on tariffs and transportation costs

- Curse of dimensionality: $125 \times 124 \times 123 \times 4,215 > 8$ billion observations per year
- Solution: simple mean over third country dimension

$$
\begin{aligned}
t_{ick}\tau_{ick} - t_{jck}\tau_{jck}\,t_{ijk}\tau_{ijk} &> 0 \\
\frac{1}{|C|}\sum_{c \in C}\{t_{ick}\tau_{ick} - t_{jck}\tau_{jck}\,t_{ijk}\tau_{ijk}\} &> 0 \\
\bar{t}_{ik}\bar{\tau}_{ik} - \bar{t}_{jk}\bar{\tau}_{jk}\,t_{ijk}\tau_{ijk} &> 0
\end{aligned}
$$

Two measures for the Profitability of Trade Deflection:

$\Rightarrow \Delta t_{ijkd} = max\{0, \bar{t}_{ikd} - \bar{t}_{jkd}\}$

$\Rightarrow \Delta T_{ijkd} = max\{0, \bar{t}_{ikd}\bar{\tau}_{ikd} - \bar{t}_{jkd}\bar{\tau}_{jkd}\tau_{ijkd}\}$

Measurement Error

RTA Data

DESTA

- The Design of International Trade Agreements Database (DESTA) (Dür et al. 2014)
- Most comprehensive database in terms of number of agreements included
- Distinguish between deep and shallow PTAs (seven provisions)

$$\rightarrow \; deep_{ijd} = \begin{cases} 1, & \# \text{ provisions} \geq 4 \\ 0, & \text{otherwise} \end{cases}$$

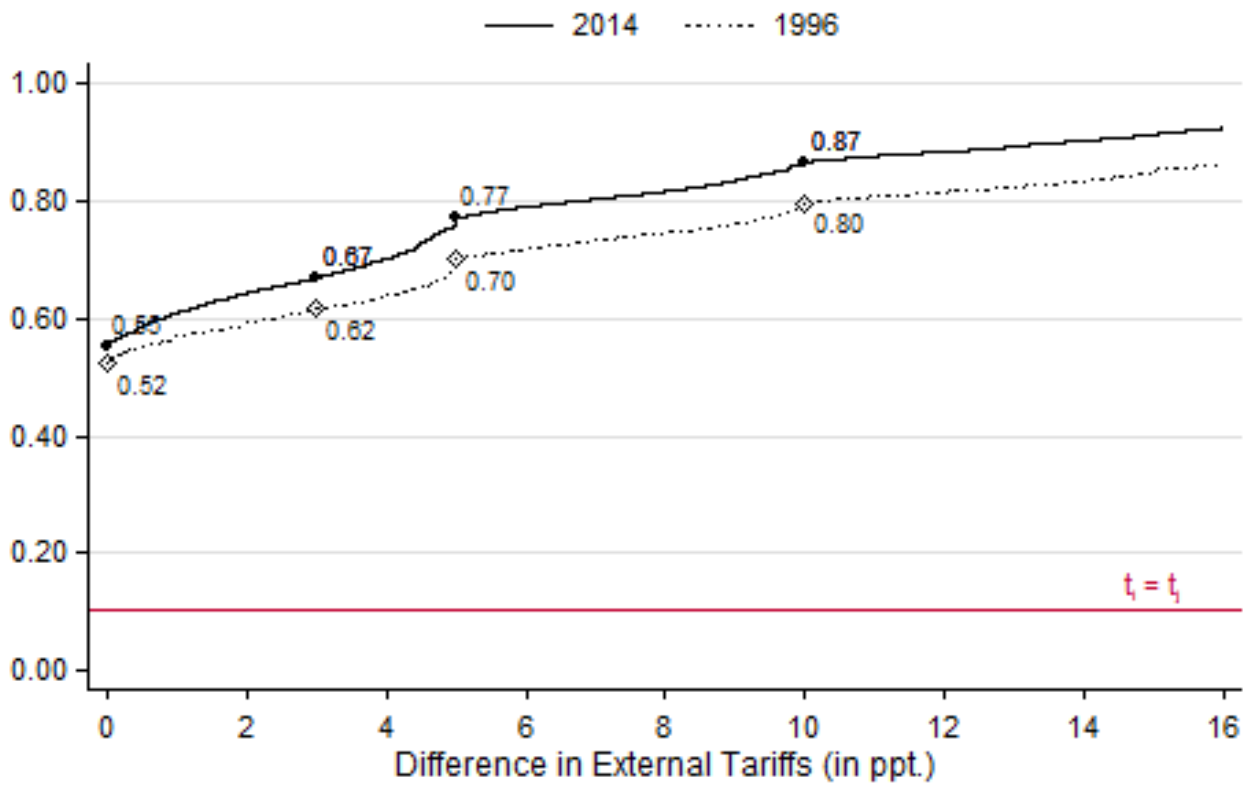
Sample

- Tariffs: poor data quality before 1996 More
- Again, curse of dimensionality: 19 year, 4,215 products, and $(125 \times 124) = 15{,}500$ pairs
- Solution: compare 2014 with 1996

$\Rightarrow$ Over 130 Million observations: 125 countries, 2 years (1996 & 2014), on average 4,213 products

Little Potential for Trade Deflection...

Figure 1: C.D.F. of Δt_{ijkd}

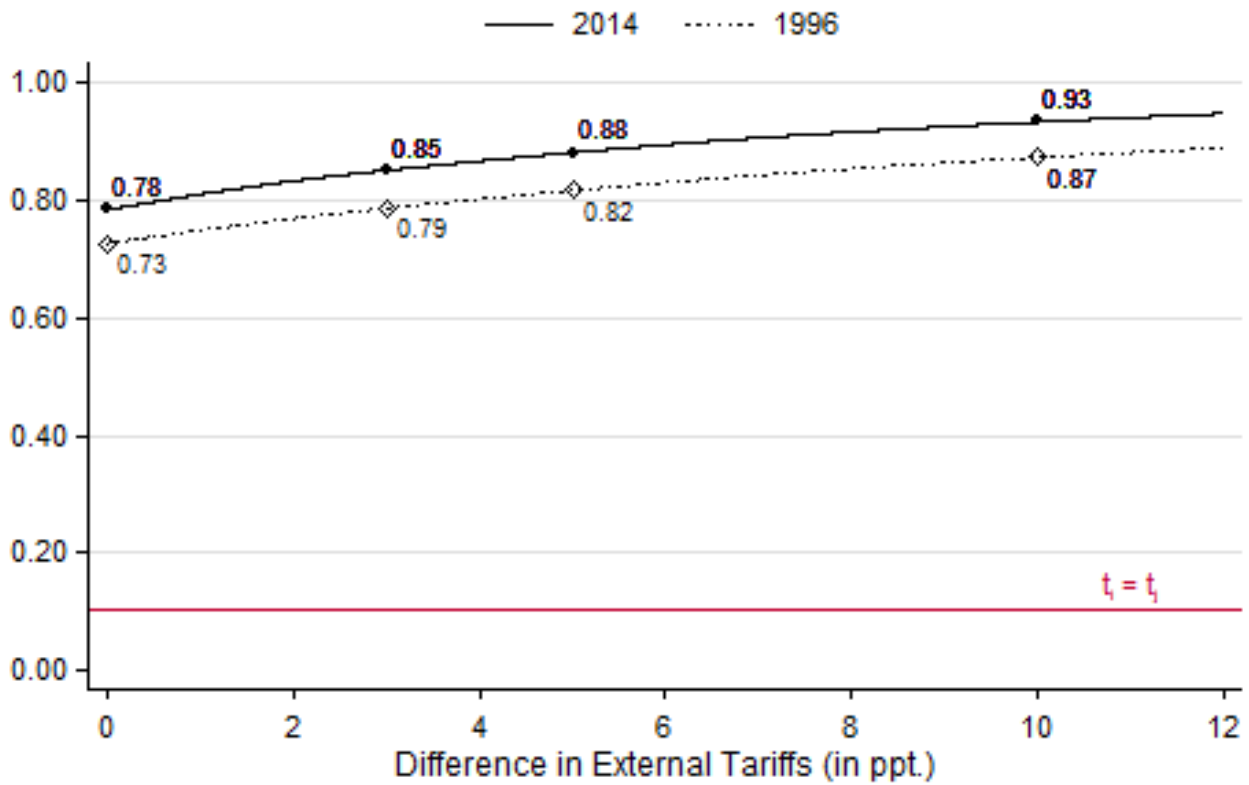


$\Delta t_{ijkd} = max\{0, \bar{t}_{ikd} - \bar{t}_{jkd}\}$ with country i, country j, product k, and time d. Truncated to values $\leq$ 16. We show data for 2014 and 1996. The red line shows the share of identical tariffs $t_{ik} = t_{jk}$ in 2014.

More

... and even less when accounting for Transportation Costs

Figure 2: C.D.F. of ΔT_{ijkd}

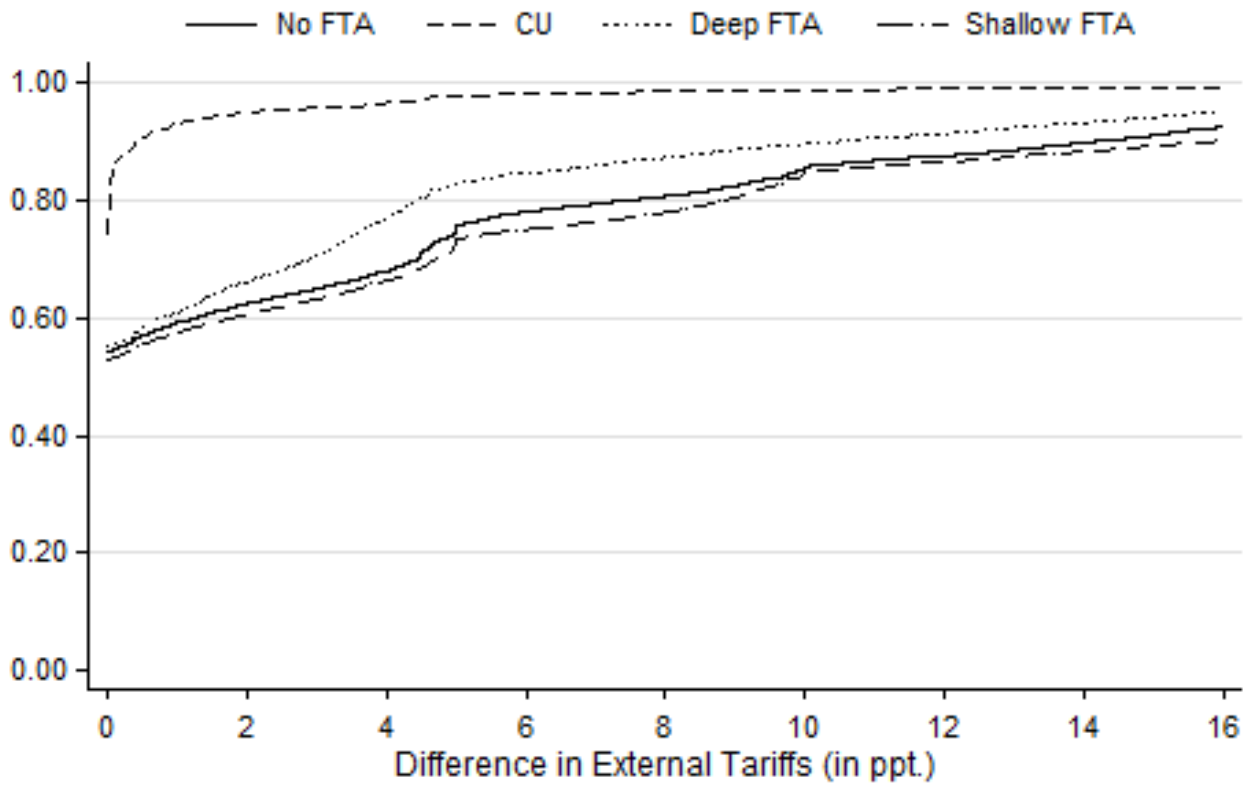


$\Delta T_{ijkd} = max\{0, \bar{t}_{ikd}\bar{\tau}_{ikd} - \bar{t}_{jkd}\bar{\tau}_{jkd}\tau_{ijkd}\}$ with country i, country j, product k, and time d. Truncated to values ≤ 12. We show data for 1996 and 2014. The red line shows the share of identical tariffs $t_{ik} = t_{jk}$ in 2014.

More

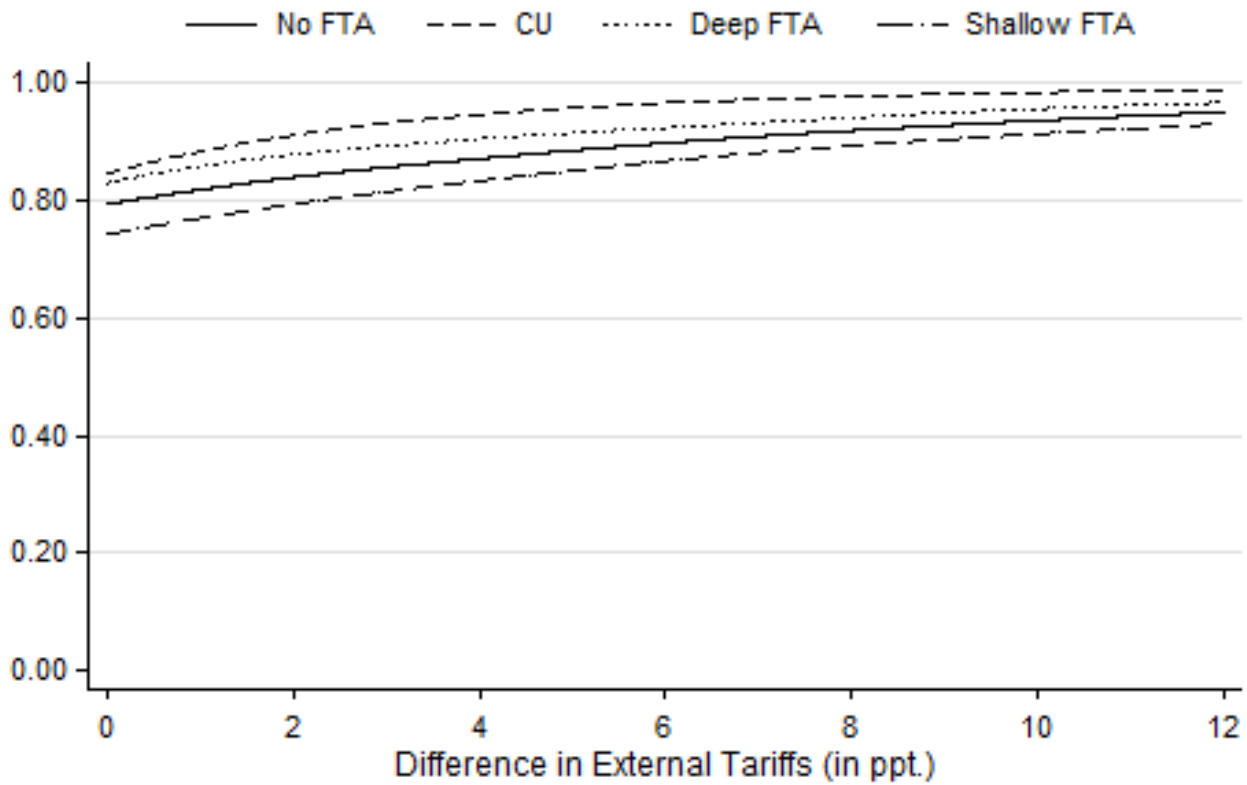
Trade Deflection less profitable for Pairs with a deep FTA

Figure 3: C.D.F. of Δt_{ijkd} by Type of RTA (2014)



$\Delta t_{ijkd} = max\{0, \bar{t}_{ikd} - \bar{t}_{jkd}\}$ with country i, country j, product k, and time d. Truncated to values $\leq$ 16. The data on RTAs stems from DESTA. We show data for the year 2014.

... also when accounting for Transportation Costs (ΔT)



$\Delta T_{ijkd} = max\{0, \bar{t}_{ikd}\bar{\tau}_{ikd} - \bar{t}_{jkd}\bar{\tau}_{jkd}\tau_{ijkd}\}$ with country i, country j, product k, and time d. The information about the RTAs stems from DESTA (Dür et al. 2014). Truncated to values ≤ 12. We show data for the year 2014.

Tariff Similarity highest for Pairs with a deep FTA

Table 1: Probability of Identical Tariffs

	1996		2014	
	$t_i = t_j$	$\Delta t_{ij} = 0$	$t_i = t_j$	$\Delta t_{ij} = 0$
	(1)	(2)	(3)	(4)
all	4.65%	52.32%	10.36%	55.18%
no FTA	3.71%	51.94%	8.25%	54.25%
shallow FTA	2.89%	51.26%	6.17%	52.90%
deep FTA	2.77%	51.39%	10.36%	55.18%
Customs Union	39.30%	69.65%	48.06%	74.03%

In column (1) and (3) the table shows the probability of country-pair i and j having an identical tariff for product k in 1996 and 2014 respectively. In column (2) and (4) we show the share of cases in which trade deflection is unprofitable.

Let's Recap

Very little Potential for Trade Deflection

- In 2014 for 78% of all product-pair combinations trade deflection is unprofitable
  - in 10%: identical tariffs
  - in 45%: no tariff savings possible because transshipment entails paying a higher tariff than direct route
  - in 23%: additionally arising transportation costs exceed tariff savings

Heterogeneity across Types of FTAs

- Profitability of trade deflection is lower for deep FTAs
- The opposite is true for shallow FTAs

⇒ **Result in itself interesting and policy relevant**

Channels

Selection Channel

- Same covariates correlate with the probability of having a FTA and $\Delta t_{ijkd}/\Delta T_{ijkd}$
  - developing vs. developed countries
  - open economy
  - intra-industry trade

FTA-Effect

- The FTA might also have a causal effect on $\Delta t_{ijkd}/\Delta T_{ijkd}$
  - Technology transfer & FDI
  - Commitment Theory (Maggi et al. 1998, 2007)
  - Juggernaut Effect (Baldwin et al. 2015)

Empirical Strategy to disentangle Channels

$$\Delta Y_{ijkd} = \beta_0 + \beta_1 fta_{ijd} + \beta_2 deep_{ijd} + \beta_3 cu_{ijd} + \gamma_{ikd} + \gamma_{jkd} + \mu_{ijk} + u_{ijkt}$$

- dependent variable (with country i, country j and product k)
  - $\Delta t_{ijkd} = max\{0, \bar{t}_{ikd} - \bar{t}_{jkd}\}$
  - $\Delta T_{ijkd} = max\{0, \bar{t}_{ikd}\bar{\tau}_{ikd} - \bar{t}_{jkd}\bar{\tau}_{jkd}\tau_{ijkd}\}$
- main explanatory variables
  - $fta_{ijd} = \begin{cases} 1, & \text{if i and j have an RTA} \\ 0, & \text{otherwise} \end{cases}$
  - $deep_{ijd}/cu_{ijd} = \begin{cases} 1, & \text{if RTA between i and j is deep/CU} \\ 0, & \text{otherwise} \end{cases}$
- Fixed-Effects
  - γ_{ikd} importer-product-year FE & γ_{jkd} exporter-product-year FE
  - μ_{ijk} pair-product-FE

Results

Table 2: Baseline Results

	Δt		ΔT	
	(1)	(2)	(3)	(4)
FTA	0.455***	0.266***	0.654***	0.229***
	(0.110)	(0.064)	(0.091)	(0.061)
Deep FTA	-1.527***	-0.656***	-1.053***	-0.609***
	(0.113)	(0.057)	(0.081)	(0.059)
Customs Union	-4.849***	-3.113***	-2.399***	-2.154***
	(0.104)	(0.116)	(0.090)	(0.105)
R^2	0.040	0.989	0.033	0.988
product-time FE	✗		✗	
i-product-time FE		✗		✗
j-product-time FE		✗		✗
ij-product FE		✗		✗

Twoway clustered (country-pairs and products) standard errors in ( ). ***/**/* Indicate significance at the 1%/5%/10% level. The number of observations equals 130,652,688.

Mechanisms

What drives results?

- Identical Tariffs
  - $P_{ijkd}^{identical} = \begin{cases} 1, & \text{if } \bar{t}_{ikd} = \bar{t}_{jkd} \\ 0, & \text{otherwise} \end{cases}$
- Decrease in the overall level of tariffs
  - $P_{ijkd}^{low} = \begin{cases} 1, & \text{if } \bar{t}_{ikd} \leq 5 \cap \bar{t}_{jkd} \leq 5 \\ 0, & \text{otherwise} \end{cases}$
- Convergence in the structure of tariffs
  - rank $\bar{t}_{ikd}$ and $\bar{t}_{jkd}$
  - normalize ranks: $rank_{ikd}^{norm} = \frac{rank_{ikd} - rank_{ikd}^{min}}{rank_{ikd}^{max} - rank_{ikd}^{min}}$
  - $P_{ijkd}^{same} = \begin{cases} 1, & \text{if } rank_{ikd}^{norm} = rank_{jkd}^{norm} \\ 0, & \text{otherwise} \end{cases}$

$\Rightarrow$ pairs with similar tariffs, lower levels of tariffs and more similar tariff structures self-select themselves into having a deep FTA

$\Rightarrow$ ex-post convergence can be attributed to further tariff reductions

Results on Mechanisms

	$P^{identical}$		P^{low}		P^{same}	
	(1)	(2)	(3)	(4)	(5)	(6)
FTA	-0.015***	-0.031***	-0.056***	-0.024***	-0.005***	-0.043***
	(0.001)	(0.004)	(0.003)	(0.004)	(0.001)	(0.005)
Deep FTA	0.033***	0.004	0.243***	0.016***	0.026***	-0.044***
	(0.003)	(0.005)	(0.005)	(0.004)	(0.003)	(0.004)
Customs Union	0.399***	0.408***	0.494***	0.245***	0.299***	0.288***
	(0.010)	(0.018)	(0.009)	(0.009)	(0.010)	(0.014)
R^2	0.196	0.793	0.301	0.935	0.183	0.813
product-time FE	✗		✗		✗	
i-product-time FE		✗		✗		✗
j-product-time FE		✗		✗		✗
ij-product FE		✗		✗		✗

Twoway clustered (country-pairs and products) standard errors in ( ). ***/**/* Indicate significance at the 1%/5%/10% level. The number of observations equals 130,652,688.

Robustness Checks

- Restrictiveness of RoOs More
- Do RoOs change transportation costs? More
- Aggregation bias More
- Sensitivity to measure of transportation costs More
- Does the collapsing of the data bias results? betas Δt ΔT
- Measurement error in FTA data More
- How sensitive are results to data cleaning process? More
- How sensitive are results to the specific choice of years? 3 Year Avg Yearly

Summary

- In 2014 for 78% of all product-pair combinations trade deflection is unprofitable
  - in 10%: identical tariffs
  - in 45%: no tariff savings possible because transshipment entails paying a higher tariff than direct route
  - in 23%: additionally arising transportation costs exceed tariff savings
- The deeper an FTA, the lower the profitability of trade deflection; mostly due to positive selection

$\Rightarrow$ Economic justification of RoOs by the objective of avoiding trade deflection at least questionable

$\Rightarrow$ Findings suggest a fundamental re-thinking of the use of RoOs in FTAs

But why do FTAs unconditionally impose proof of origin when there is no economic rationale?

$\rightarrow$ Protectionism? Rent seeking?

Policy Implications

- Relax requirements to prove origin of goods without risking any trade deflection
  - Negotiators should agree of a full set of RoOs for all products
  - But prove of origin is only required if external tariffs of FTA members differ by some minimum amount
  - Threshold should be periodically evaluated, since applied tariffs may change over time
- Bhagwati's spaghetti bowl could be a bit disentangled
- Countries could exit a CU without unduly endangering existing production networks (Brexit)

References I

Anderson, James E. and Eric Van Wincoop (2004), "Trade Costs." *Journal of Economic Literature* 42(3), pp. 691–751.

Andersson, Anna (2015), "Export Performance and Access to Intermediate Inputs: The Case of Rules of Origin Liberalisation." *The World Economy* 39(8), pp. 1048–1079.

Anson, José, Olivier Cadot, Antoni Estevadeordal, Jaime De Melo, Akiko Suwa-Eisenmann, and Bolormaa Tumurchudur (2005), "Rules of Origin in North-South Preferential Trading Arrangements with an Application to NAFTA." *Review of International Economics* 13(3), pp. 501–517.

Appelbaum, Elie and Mark Melatos (2012), "Camouflaged Trade Agreements." Economics Working Paper Series No. 2012-11, University of Sydney.

References II

Augier, Patricia, Michael Gasiorek, and Charles Lai-Tong (2005), "The Impact of Rules of Origin on Trade Flows." *Economic Policy* 20(43), pp. 586–624.

Baldwin, Richard and Frédéric Robert-Nicoud (2015), "A Simple Model of the Juggernaut Effect of Trade Liberalisation." *International Economics* 143, pp. 70–79.

Bombarda, Pamela and Elisa Gamberoni (2013), "Firm Heterogeneity, Rules of Origin, and Rules of Cumulation." *International Economic Review* 54(1), pp. 307–328.

Cadot, Olivier, Antoni Estevadeordal, and Akiko Suwa-Eisenmann (2006), "Rules of Origin as Export Subsidies." *The Origin of Goods: Rules of Origin in Regional Trade Agreements*. Ed. by Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann, and Thierry Verdier.

References III

Cadot, Olivier, Alejandro Graziano, Jeremy Harris, and Christian Volpe (2014), "Do Rules of Origin Constrain Export Growth ?" IDB Integration and Trade Sector No. IDB-DP-350.

Carrère, Céline and Jaime *de* Melo (2006), "Are Different Rules of Origin Equally Costly? Estimates from NAFTA." *The Origin of Goods: Rules of Origin in Regional Trade Agreements*. Ed. by Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann, and Thierry Verdier.

Conconi, Paola, Laura Puccio, Manuel García-Santana, and Roberto Venturini (2016), "From Final Goods to Inputs: the Protectionist Effect of Rules of Origin." Working Papers ECARES No. ECARES 2016-04.

Deardorff, Alan V (2016), "Rue the ROOs : Rules of Origin and the Gains (or Losses) from Trade Agreements."

References IV

Demidova, Svetlana, Hiau Looi Kee, and Kala Krishna (2012), "Do Trade Policy Differences Induce Sorting? Theory and Evidence from Bangladeshi Apparel Exporters." *Journal of International Economics* 87(2), pp. 247–261.

Dür, Andreas, Leonardo Baccini, and Manfred Elsig (2014), "The Design of International Trade Agreements: Introducing a New Dataset." *Review of International Organizations* 9(3), pp. 353–375.

Estevadeordal, Antoni (2000), "Negotiating Preferential Market Access: The Case of the North American Free Trade Agreement." *Journal of World Trade* 34(1).

References V

Estevadeordal, Antoni and Kati Suominen (2006), "Mapping and Measuring Rules or Origin around the World." *The Origin of Goods: Rules of Origin in Regional Trade Agreements*. Ed. by Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann, and Thierry Verdier.

Facchini, Giovanni, Peri Silva, and Gerald Willmann (2013), "The Customs Union Issue: Why do we Observe so Few of Them?" *Journal of International Economics* 90(1), pp. 136–147.

Krishna, Kala (2006), "Understanding Rules of Origin." *The Origin of Goods: Rules of Origin in Regional Trade Agreements*. Ed. by Olivier Cadot, Antoni Estevadeordal, Akiko Suwa-Eisenmann, and Verdier Thierry.

References VI

Krishna, Kala and Anne O. Krueger (1995), "Implementing Free Trade Areas: Rules of Origin and Hidden Protection." NBER Working Paper Series No. 4983.

Krueger, Anne (1997), "Free Trade Agreements Versus Customs Unions." *Journal of Development Economics* 54(1), pp. 169–187.

Krueger, Anne O. (1993), "Free Trade Agreements as Protectionist Devices: Rules of Origin."

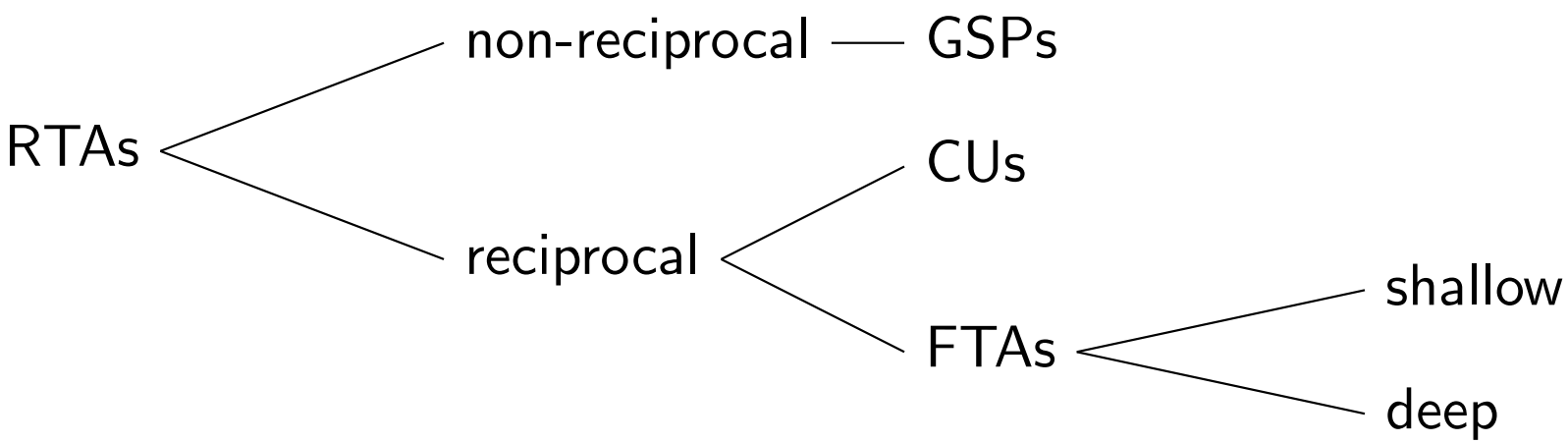
Maggi, Giovanni and Andrés Rodríguez-Clare (1998), "The Value of Trade Agreements in the Presence of Political Pressures." *Journal of Political Economy* 106(3), pp. 574–601.

— (2007), "A Political-Economy Theory of Trade Agreements." *American Economic Review* 97(4), pp. 1374–1406.

References VII

Schott, Peter K. (2008), "The Relative Sophistication of Chinese Exports." *Economic Policy* 23(53), pp. 5–49.

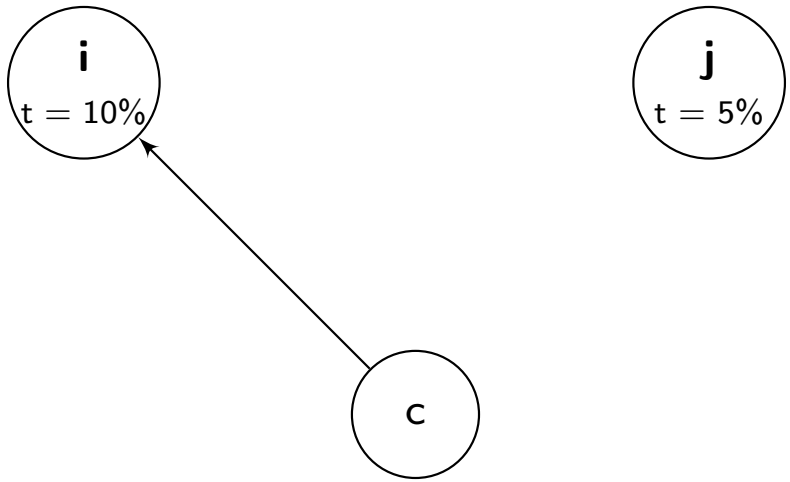
Vocabulary: RTA vs. FTA vs. CU



back

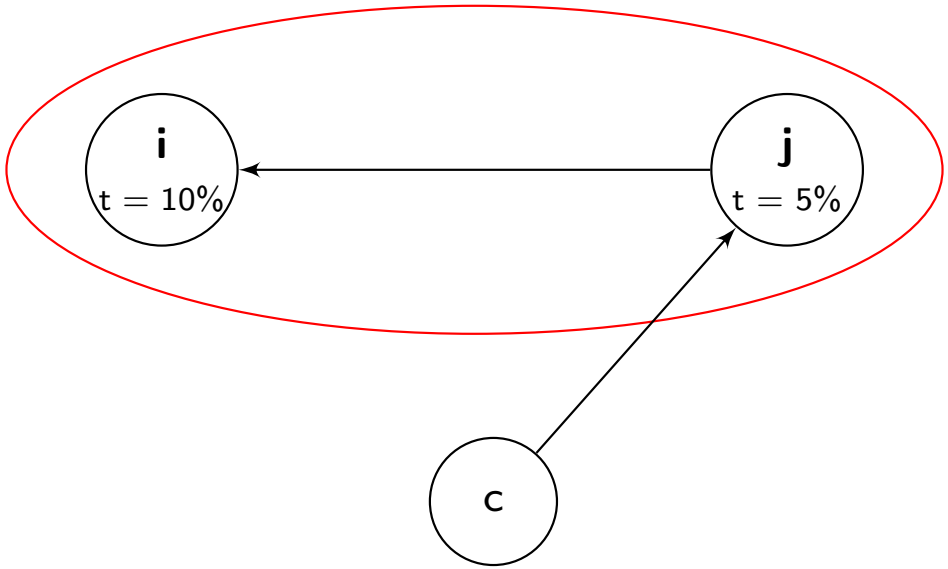
Threat of Trade Deflection in FTAs

No FTA



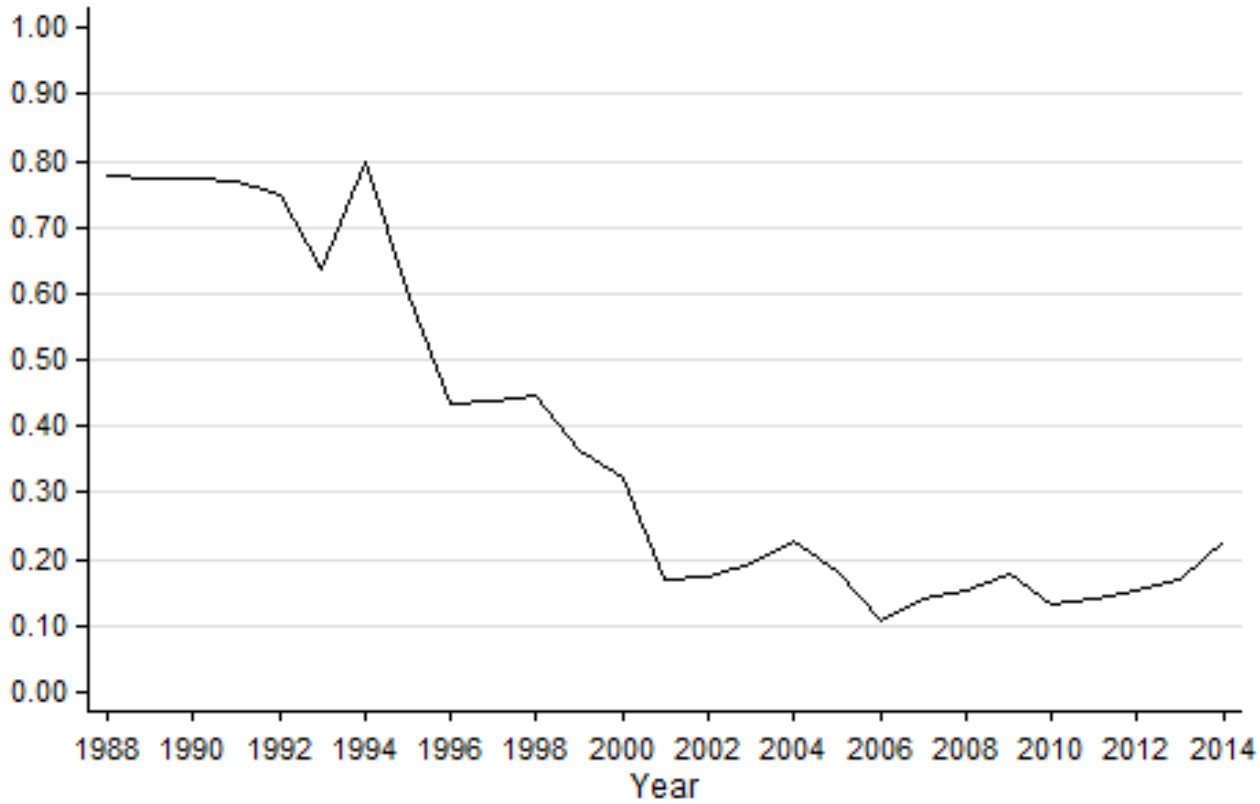
Threat of Trade Deflection in FTAs

FTA



Back

Share of Imputed Data



We show the share of imputed data for each year. With the entry into force of the WTO in 1995 the availability of tariff data increased substantially. Before that, especially developing countries did not report any tariffs. The data uses all available tariffs provided by the UN and the World Bank (downloaded in November 2016).

Back

Tariff Data t

New Database

- Combine TRAINS and IDB data on MFN & preferential tariffs for more than 150 countries on the 6-digit product level (1988-2014)
- Problem: missing data & measurement error
- MFN Tariffs
  - missing values are set equal to nearest preceding observation, if there is no preceding observation, tariffs are set equal to nearest observation
- Preferential Tariffs
  - cross-check with data on RTAs to minimize errors
  - phasing-in makes interpolation harder: we use information on the agreed phasing-in of more than 500 RTAs to impute the data in the most adequate way

$\rightarrow$ Bilateral data on the effectively applied tariff t_{ijkt} for 24,180 pairs, 5,018 products, and 27 years (over 120 Million observations in 2014)

back

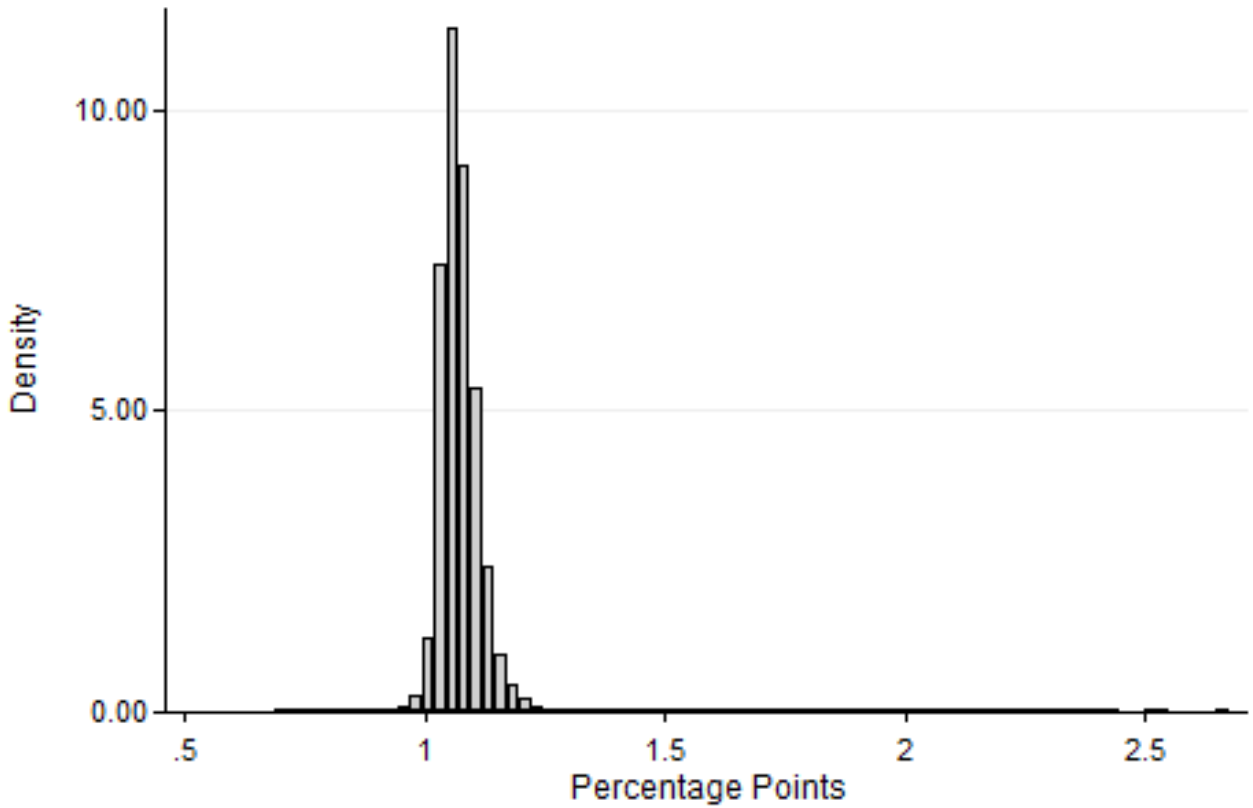
cif/fob-ratios for the US

$$ln(\tau_{US,j}) = ln(\alpha) + \delta ln(D_{USj})$$

- Data
  - bilateral import-values for the US on the 10 digit level by entry-port and entry-mode (Schott 2008)
  - aggregate to 6-digit flows by calculating the median
- Procedure
  - regress for every 6-digit product $\rightarrow$ predictions for transportation costs for pair-product combinations
- Results
  - Mean $R^2 = 0.1$, ranges between 0.003 and 0.93
  - Mean $\delta = 0.02$, with average $ln(D_{US,j}) = 9.04$
  - Mean $\alpha = 1.02$

Back

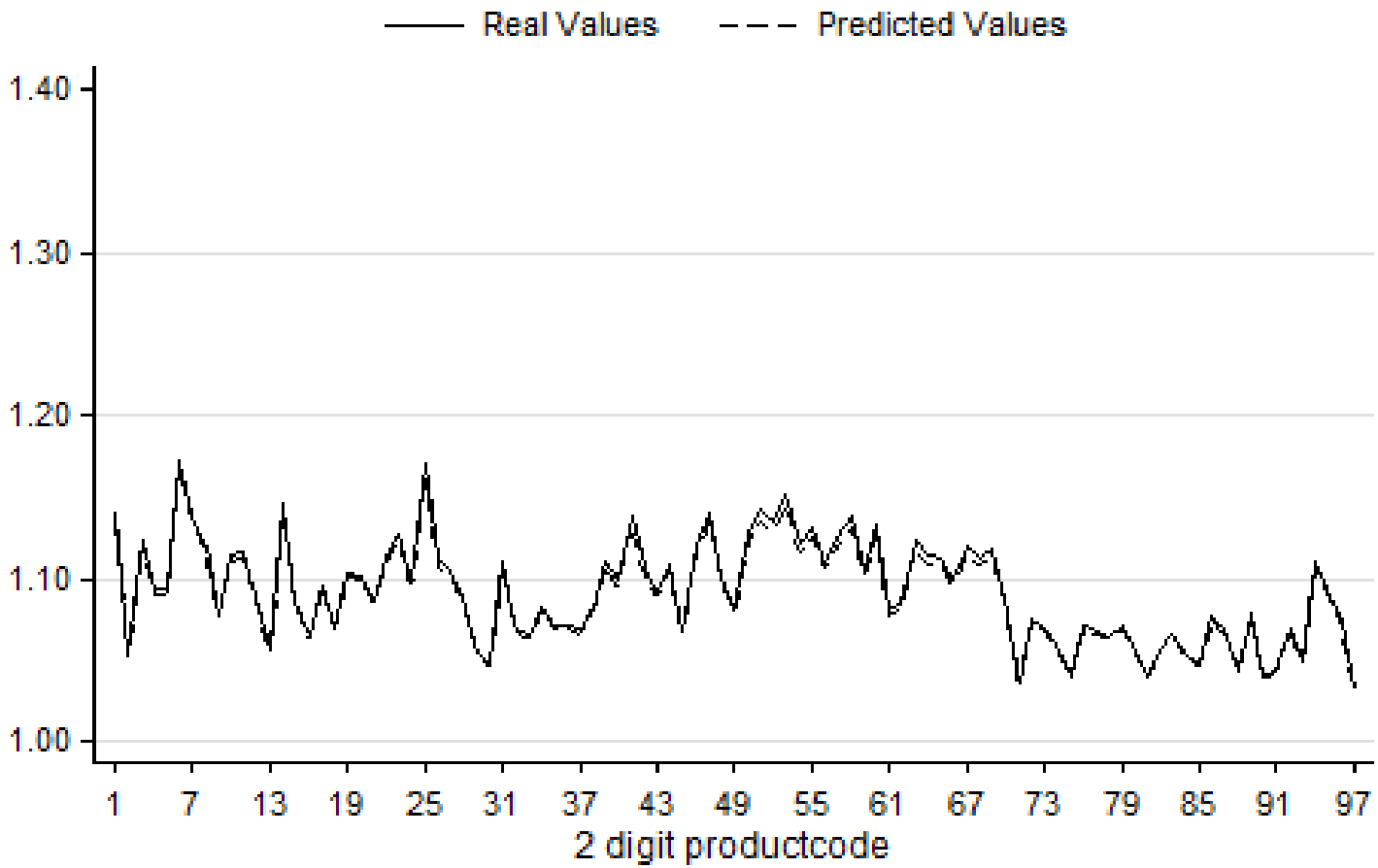
Distribution of Transportation Costs



We show data for 2014. 2.58% of the transportation cost estimates are negative or larger than 25.

Back

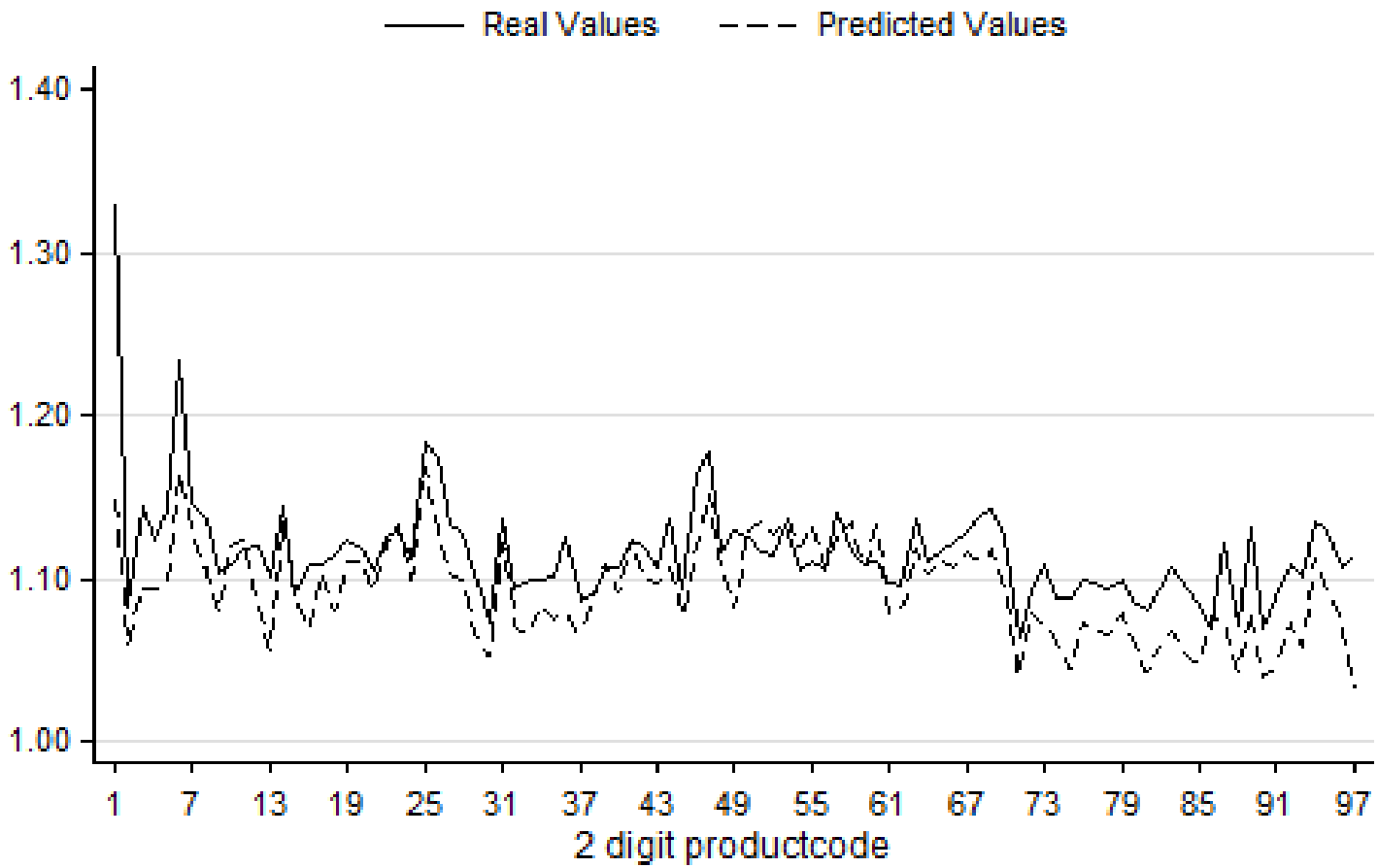
In-Sample Prediction: USA



The graphs shows the observed cif/fob ratios and the predicted values for the US $\hat{\tau}_{US,j} = exp(ln(\hat{\alpha}) + \hat{\delta} ln(D_{US,j}))$. We aggregate by taking the simple mean over sections. The data stem from the US Census and CEPII.

Back

Out-of-Sample Prediction: New Zealand



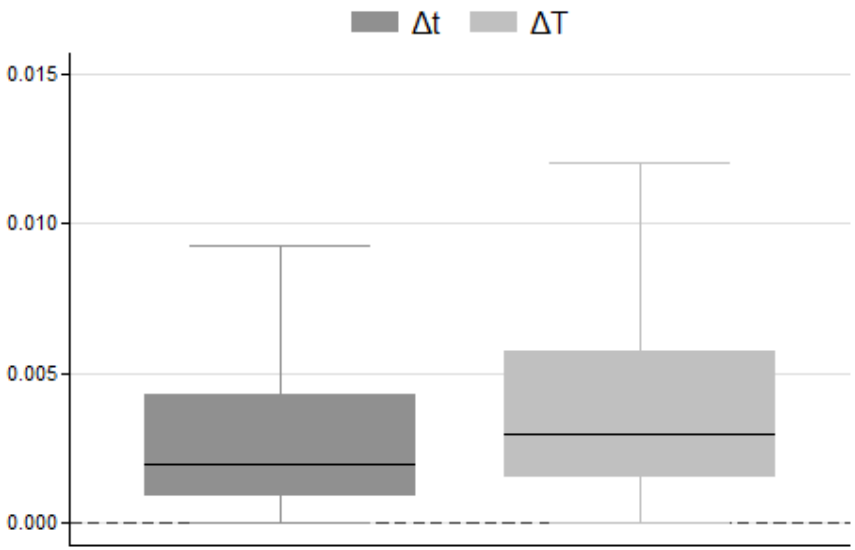
The graphs shows the observed cif/fob ratios and the predicted values for New Zealand $\hat{\tau}_{NZ,j} = exp(ln(\hat{\alpha}) + \hat{\delta} ln(D_{NZ,j}))$. We aggregate by taking the simple mean over sections. The data stem from the Statistics New Zealand and CEPII.

Back

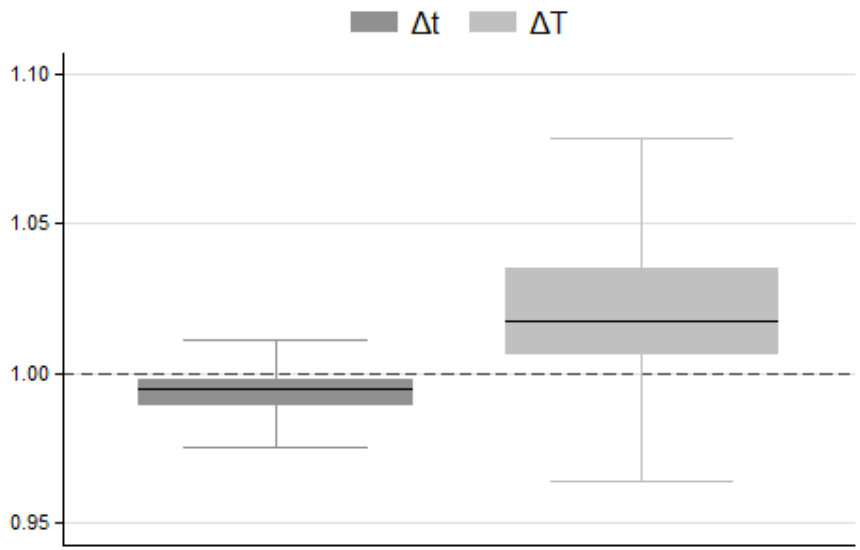
Aggregation Bias: Simple Mean vs. First Best

Figure 4: Quantification of the Potential Aggregation Bias

(a) Constant δ_0



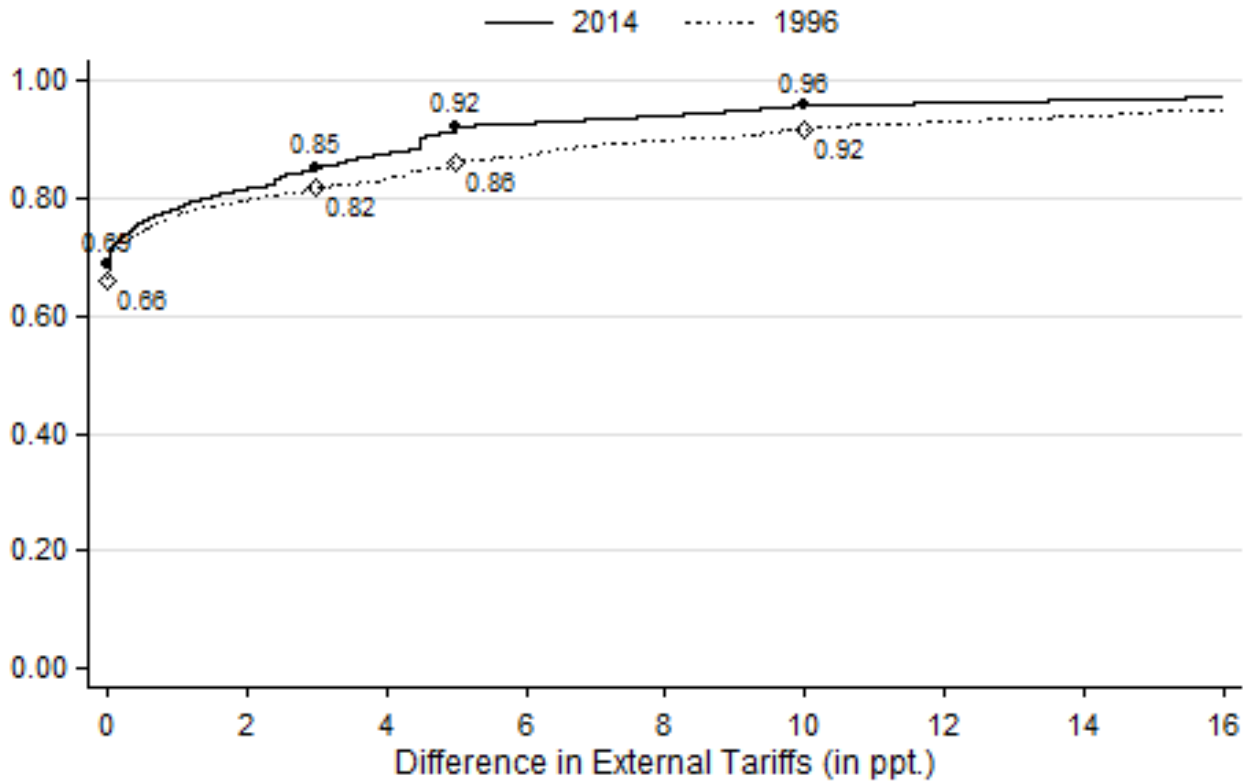
(b) δ_1 Coefficient



The boxplots show the results of the comparison of the first best solution for the differences in external tariffs Δt^c_{ijkt} and the aggregated measure Δt_{ijkt}. We regress for every product the first best solution on the aggregate measure, $\Delta t^c_{ijk} = \delta^k_0 + \delta^k_1 \Delta t_{ijk} + u^c_{ijk} \forall k$. The analysis is based on the year 2014. The figure shows the distribution of the constants δ^k_0 and the slope-coefficients δ^k_1 for all 4,215 products k and for both measures of tariff similarity.

Back (Dep. Variable) Back (Robustness Checks)

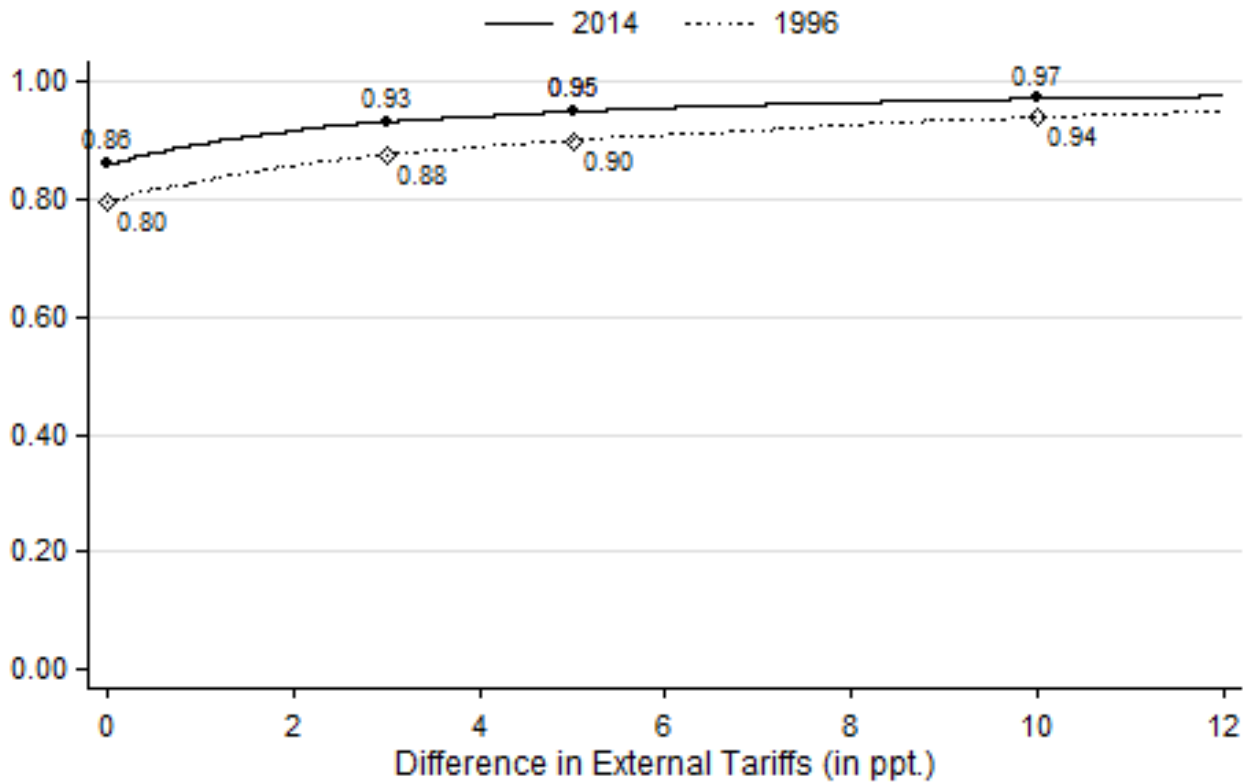
Tariff Differences are Low for most of the Imports Δt



$\Delta t_{ijkd} = max\{0, \bar{t}_{ikd} - \bar{t}_{jkd}\}$ with country i, country j, product k, and time d. Truncated to values $\leq$ 16. The trade data stem from BACI. We show data for 1996 and 2014.

Back

Tariff Differences are Low for most of the Imports ΔT



$\Delta T_{ijkd} = max\{0, \bar{t}_{ikd}\bar{\tau}_{ikd} - \bar{t}_{jkd}\bar{\tau}_{jkd}\tau_{ijkd}\}$ with country i, country j, product k, and time d. Truncated to values ≤ 12 (95% of the values). The trade data stem from BACI. We show data for 1996 and 2014.

Back

Sensitivity Analysis: Restrictiveness of RoOs

	Δt				ΔT			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FTA	0.518*	2.359***	-1.139***	-1.285***	1.077***	1.874***	-0.820***	-0.823***
	(0.298)	(0.291)	(0.092)	(0.107)	(0.249)	(0.248)	(0.082)	(0.097)
RoOs		-1.277***		0.083***		-0.553***		0.002
		(0.032)		(0.032)		(0.029)		(0.029)
R^2	0.044	0.046	0.990	0.990	0.040	0.040	0.989	0.989
product-time FE	✗	✗			✗	✗		
i-product-time FE			✗	✗			✗	✗
j-product-time FE			✗	✗			✗	✗
ij-product FE			✗	✗			✗	✗

Twoway clustered (country-pairs and products) standard errors in ( ). ***/**/* Indicate significance at the 1%/5%/10% level. Column (1), (3), and (5) report the results for the unconditional comparison in means. In the remaining columns importer-time, exporter-time, product-time, and pair-product fixed-effects are included. The number of observations equals 69,246,064. The information about the restrictiveness of RoOs is from Estevadeordal and Suominen (2006). CUs are excluded because RoOs are not applicable.

Back

Sensitivity Analysis: Aggregation Bias

	Δt^{simple}				Δt^{t}			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FTA	3.546***	3.552***	-0.372***	-0.402***	2.913***	2.889***	-0.229***	-0.234***
	(0.733)	(0.767)	(0.085)	(0.090)	(0.611)	(0.642)	(0.078)	(0.079)
Deep FTA	-4.248***	-4.358***	-0.017	0.015	-3.394***	-3.467***	-0.032	-0.025
	(0.677)	(0.703)	(0.147)	(0.149)	(0.569)	(0.595)	(0.167)	(0.167)
Customs Union	-6.622***	-6.620***	-2.273***	-2.239***	-4.202***	-4.168***	-1.236***	-1.224***
	(0.694)	(0.727)	(0.300)	(0.302)	(0.585)	(0.615)	(0.248)	(0.250)
SD		0.009		0.203		0.027		0.111
		(0.312)		(0.161)		(0.282)		(0.117)
SD × FTA		0.005		0.314***		0.318		0.056
		(1.001)		(0.069)		(0.888)		(0.095)
SD × Deep		2.099*		-0.620***		1.628*		-0.138
		(1.114)		(0.184)		(0.959)		(0.169)
SD × CU		1.346		-0.234		0.421		0.063
		(1.084)		(0.340)		(0.985)		(0.300)
R^2	0.153	0.153	0.999	0.999	0.110	0.110	0.993	0.993
product-time FE	✗	✗			✗	✗		
i-product-time FE			✗	✗			✗	✗
j-product-time FE			✗	✗			✗	✗
ij-product FE			✗	✗			✗	✗

Twoway clustered (country-pairs and products) standard errors in ( ). ***/**/* Indicate significance at the 1%/5%/10% level. Column (1), (3), and (5) report the results for the unconditional comparison in means. In the remaining columns the full set of fixed-effects (importer-time, exporter-time, product-time, and pair-product fixed-effects) is included. The number of observations equals 3,628,280. *SD* equals 1 if the standard deviation within the HS6 product is > 0.

Back

Sensitivity Analysis: FTA Data

	Δt				ΔT			
	(1) DESTA	(2) WB-Core	(3) WB-All	(4) WB-Legal	(5) DESTA	(6) WB-Core	(7) WB-All	(8) WB-Legal
Depth Measure	-0.070***	-0.070***	-0.038***	-0.071***	-0.007	-0.028***	-0.017***	-0.027***
	(0.014)	(0.005)	(0.003)	(0.005)	(0.009)	(0.004)	(0.002)	(0.003)
R^2	0.000	0.001	0.001	0.001	0.000	0.000	0.000	0.000
N	6.11e+07	6.07e+07	6.07e+07	6.07e+07	6.11e+07	6.07e+07	6.07e+07	6.07e+07
mean(Depth)	1.656	2.522	4.362	2.368	1.656	2.522	4.362	2.368
Marginal Effect(Depth)	-0.116	-0.177	-0.166	-0.169	-0.012	-0.069	-0.076	-0.065

Clustered (country-pairs) standard errors in ( ). ***/**/* Indicate significance at the 1%/5%/10% level. We use different data for the "depth" of the FTAs, namely data from the DESTA database and the World Bank's Global Preferential Trade Agreement Database. The number of observations equals 65,527,362 and we show unconditional comparison in means for the year 2014.

Back

Sensitivity Analysis: Transportation Costs

	ΔT	ΔT^{NZ}	ΔT	ΔT^{NZ}	ΔT	ΔT^{cf}	ΔT	ΔT^{cf}
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FTA	0.734***	0.580***	0.297***	0.254***	1.696***	1.465***	0.072	0.044
	(0.097)	(0.092)	(0.069)	(0.065)	(0.162)	(0.164)	(0.081)	(0.079)
Deep FTA	-1.137***	-1.035***	-0.713***	-0.617***	-2.324***	-2.498***	-0.710***	-0.583***
	(0.088)	(0.080)	(0.064)	(0.061)	(0.135)	(0.136)	(0.082)	(0.076)
Customs Union	-2.822***	-2.586***	-2.451***	-1.699***	-4.523***	-5.155***	-2.901***	-2.163***
	(0.098)	(0.093)	(0.117)	(0.108)	(0.145)	(0.144)	(0.138)	(0.140)
R^2	0.029	0.029	0.987	0.987	0.038	0.038	0.986	0.984
product-time FE	✗	✗			✗	✗		
ij-product FE			✗	✗			✗	✗
N	9.01e+07	9.01e+07	9.01e+07	9.01e+07	3.63e+07	3.63e+07	3.63e+07	3.63e+07

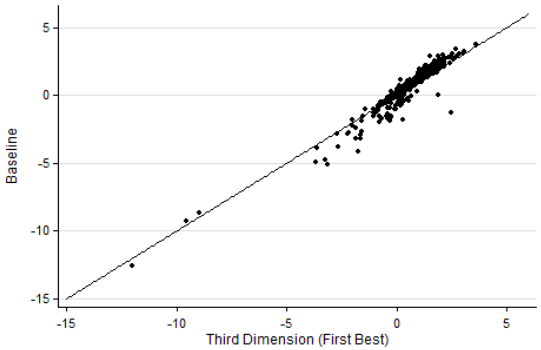
Twoway clustered (country-pairs and products) standard errors in ( ). ***/**/* Indicate significance at the 1%/5%/10% level. Column (1), (3), and (5) report the results for the unconditional comparison in means. In the remaining columns the full set of fixed-effects (importer-time, exporter-time, product-time, and pair-product fixed-effects). For (1)-(4) the number of observations equals 36,200,898 and for the remainder 32,769,988.

Back

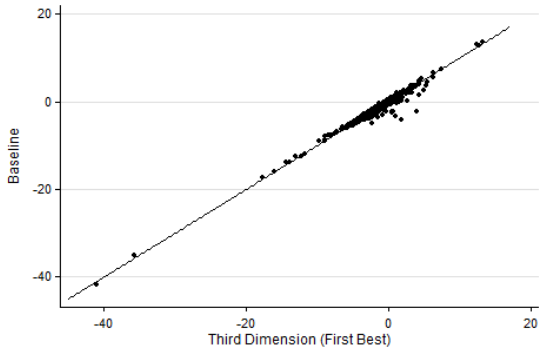
Sensitivity Analysis: First Best vs. Simple Mean (Δt_{ijkd})

Figure 5: Comparison of the Baseline Results with the First Best Solution

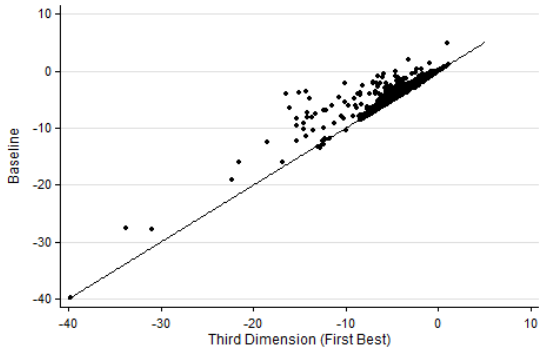
(a) FTA



(b) deep FTA



(c) CU

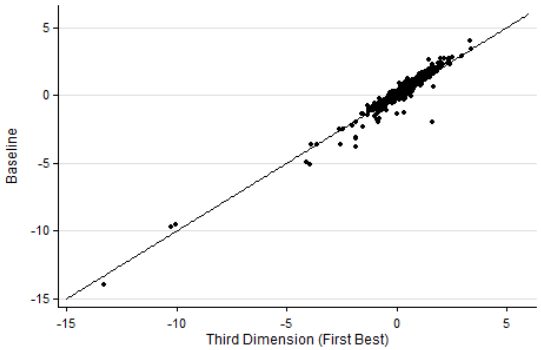


Back

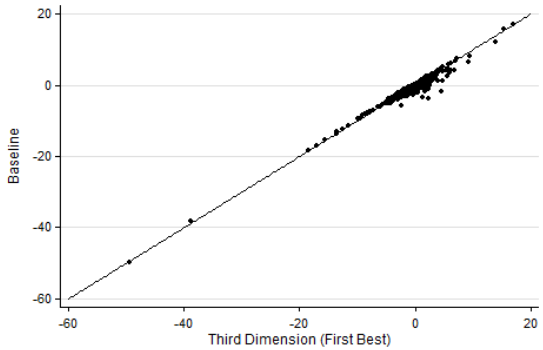
Sensitivity Analysis: First Best vs. Simple Mean (ΔT_{ijkd})

Figure 6: Comparison of the Baseline Results with the First Best Solution

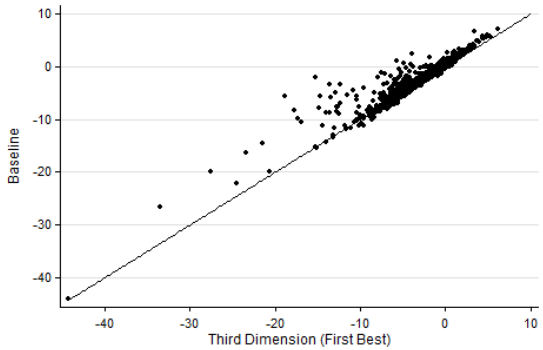
(a) FTA



(b) deep FTA



(c) CU



Back

Sensitivity Analysis: Missings

	Δt				ΔT			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FTA	0.634***	-0.157**	-0.135**	-0.064	0.696***	0.199***	0.224***	0.014
	(0.204)	(0.077)	(0.055)	(0.109)	(0.152)	(0.070)	(0.053)	(0.107)
Deep FTA	-1.460***	0.151	-0.207***	-0.588***	-0.969***	0.099	-0.282***	-0.539***
	(0.185)	(0.129)	(0.057)	(0.086)	(0.128)	(0.112)	(0.052)	(0.090)
Customs Union	-4.748***	-3.543***	-3.958***	-3.268***	-2.301***	-1.745***	-2.069***	-2.083***
	(0.186)	(0.133)	(0.103)	(0.135)	(0.144)	(0.118)	(0.100)	(0.125)
R^2	0.057	0.677	0.960	0.985	0.044	0.655	0.960	0.984
product-time FE	✗				✗			
i-product FE		✗				✗		
j-product FE		✗				✗		
i-product-time FE			✗	✗			✗	✗
j-product-time FE			✗	✗			✗	✗
ij-product FE				✗				✗

Twoway clustered (country-pairs and products) standard errors in ( ). ***/**/* Indicate significance at the 1%/5%/10% level. Column (1), (3), and (5) report the results for the unconditional comparison in means. In the remaining columns the full set of fixed-effects (importer-time, exporter-time, product-time, and pair-product fixed-effects). For (1)-(4) the number of observations equals 36,200,898 and for the remainder 32,769,988.

Back

Sensitivity Analysis: Transportation Costs and RoOs

	(1)	(2)	(3)	(4)	(5)
FTA	-1.688***	-1.777***	-1.801***	-1.910***	0.116***
	(0.075)	(0.077)	(0.076)	(0.076)	(0.040)
RoOs	-0.123***	0.021***	0.025***	0.018	0.002
	(0.009)	(0.007)	(0.006)	(0.011)	(0.006)
R^2	0.007	0.857	0.888	0.899	0.975
product-time FE		✗	✗		
i-product FE			✗		
j-product FE			✗		
i-product-time FE				✗	✗
j-product-time FE				✗	✗
ij-product FE					✗

Twoway clustered (country-pairs and products) standard errors in ( ). ***/**/* Indicate significance at the 1%/5%/10% level. Column (1), (3), and (5) report the results for the unconditional comparison in means. In the remaining columns the full set of fixed-effects (importer-time, exporter-time, product-time, and pair-product fixed-effects). For (1)-(4) the number of observations equals 36,200,898 and for the remainder 32,769,988.

Back

Sensitivity Analysis: 3 Years Averages (1996-98 vs. 2012-14)

	Δt				ΔT			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FTA	0.441***	0.011	-0.095***	0.331***	0.679***	0.422***	0.358***	0.240***
	(0.100)	(0.036)	(0.027)	(0.065)	(0.080)	(0.032)	(0.027)	(0.060)
Deep FTA	-1.322***	-0.221***	-0.536***	-0.514***	-0.798***	-0.055	-0.412***	-0.510***
	(0.123)	(0.078)	(0.041)	(0.053)	(0.085)	(0.062)	(0.040)	(0.053)
Customs Union	-4.705***	-3.811***	-4.120***	-3.051***	-2.130***	-1.573***	-1.830***	-2.023***
	(0.099)	(0.079)	(0.069)	(0.118)	(0.086)	(0.073)	(0.069)	(0.106)
R^2	0.040	0.836	0.971	0.991	0.033	0.839	0.971	0.991
product-time FE	✗				✗			
i-product FE		✗				✗		
j-product FE		✗				✗		
i-product-time FE			✗	✗			✗	✗
j-product-time FE			✗	✗			✗	✗
ij-product FE				✗				✗

For the analysis we calculate three years averages for before and after time periods. Averages over 1996-1998 are used for the "before"-period, averages over 2012-2014 for the " after"-period. Twoway clustered (country-pairs and products) standard errors in parentheses. ***/**/* Indicate significance at the 1%/5%/10% level. The number of observations equals 130,652,688.

Sensitivity Analysis: 3 Years Averages (1996-98 vs. 2012-14)

	Δt				ΔT			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FTA	-0.338***	0.185***	0.018	0.201***	0.306***	0.542***	0.428***	0.111***
	(0.083)	(0.027)	(0.019)	(0.024)	(0.065)	(0.023)	(0.018)	(0.022)
Deep FTA	-0.404***	-0.405***	-0.427***	-0.118***	-0.010	-0.123**	-0.080**	-0.146***
	(0.146)	(0.061)	(0.032)	(0.024)	(0.114)	(0.051)	(0.036)	(0.023)
Customs Union	-3.879***	-3.755***	-4.016***	-2.915***	-1.526***	-1.521***	-1.649***	-1.896***
	(0.091)	(0.064)	(0.055)	(0.071)	(0.083)	(0.059)	(0.056)	(0.064)
R^2	0.037	0.720	0.982	0.994	0.031	0.713	0.983	0.994
product-time FE	✗	✗			✗	✗		
i-product FE		✗				✗		
j-product FE		✗				✗		
i-product-time FE			✗	✗			✗	✗
j-product-time FE			✗	✗			✗	✗
ij-product FE				✗				✗

For the analysis we only use a 5% sample of yearly data. Twoway clustered (country-pairs and products) standard errors in parentheses. ***/**/* Indicate significance at the 1%/5%/10% level. The number of observations equals 66,764,765.