

International Trade I: Theory

Trade Agreements

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Outline of the Lecture

- 1 Introduction: A Brief History of the GATT/WTO
- 2 Has the GATT been a Success?
- 3 The World Trade Organization (WTO)
- 4 Theoretical Rationale for Multilateral Trade Agreements
- 5 Regional Trade Agreements
- 6 Regulatory Cooperation

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The origins of the GATT system

- Great Depression = worldwide economic disaster
 - ▶ Between 1929 and 1932: volume of world trade fell by 26%, world industrial production by 32% and unemployment in many countries topped 20%
 - ▶ As the slump intensified, countries responded by raising trade barriers (tariffs, import quotas...)
- Out of the ruins of the Depression → new approach to US trade policy
 - ▶ At the request of President Roosevelt, Congress enacted the Reciprocal Trade Agreements Act (RTAA) in 1934:
 - ★ the president could enter into tariff agreements with foreign countries and reduce import duties by no more than 50%
 - ★ unconditional most-favored-nation (MFN) clause
- Even as the war raged, American and British officials began exploring postwar trade arrangements
 - ▶ The US aimed to convert the piecemeal, bilateral RTAA approach into a broader, multilateral system based on non-discrimination and the reduction of trade barriers

Postwar institutions

- Bretton Woods 1944:
 - ▶ IMF, IBRD (World Bank) and ITO
- ITO rejected (among others) by U.S. Senate
- Instead: General Agreement on Tariffs and Trade (GATT)
 - ▶ Interim agreement
 - ▶ 23 creating members in 1947 in Geneva
 - ▶ Not a formal international organisation, but “only” a negotiating forum for countries
 - ▶ Negotiations proceeded in rounds according to a pre-agreed set of rules

GATT 1947 Preamble

The Governments of the COMMONWEALTH OF AUSTRALIA, the KINGDOM OF BELGIUM, the UNITED STATES OF BRAZIL, BURMA, CANADA, CEYLON, the REPUBLIC OF CHILE, the REPUBLIC OF CHINA, the REPUBLIC OF CUBA, the CZECHOSLOVAK REPUBLIC, the FRENCH REPUBLIC, INDIA, LEBANON, the GRAND-DUCHY OF LUXEMBURG, the KINGDOM OF THE NETHERLANDS, NEW ZEALAND, the KINGDOM OF NORWAY, PAKISTAN, SOUTHERN RHODESIA, SYRIA, the UNION OF SOUTH AFRICA, the UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND, and the UNITED STATES OF AMERICA:

Recognizing that their relations in the field of trade and economic endeavour should be conducted with a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, developing the full use of the resources of the world and expanding the production and exchange of goods,

Being desirous of contributing to these objectives by entering into reciprocal and mutually advantageous arrangements directed to the substantial reduction of tariffs and other barriers to trade and to the elimination of discriminatory treatment in international commerce,

Have through their Representatives agreed as follows:

Main GATT provisions

- Table from Irwin (2015)

Major Provisions of the General Agreement on Tariffs and Trade

Provision	Description
Article 1	General Most Favored Nation Treatment
Article 2	Schedule of Tariff Concessions
Article 3	National Treatment on Internal Taxes and Regulation
Article 6	Antidumping and Countervailing Duties
Article 10	Transparency of Trade Regulations
Article 11	General Elimination of Quantitative Restrictions
Article 12	Restrictions to Safeguard the Balance of Payments
Article 14	Exceptions to Rule of Nondiscrimination
Article 16	Subsidies
Article 17	State Trading Enterprises
Article 19	Emergency Action on Imports of Particular Products (Safeguards)
Article 20	General Exceptions
Article 21	Security Exceptions
Article 23	Nullification and Impairment
Article 24	Customs Unions and Free Trade Areas

Source: World Trade Organization, http://www.wto.org/english/docs_e/legal_e/legal_e.htm.

GATT/WTO foundational principles

- Three main foundational principles
 - ▶ Principle of Reciprocity
 - ▶ Most-Favoured-Nation Principle (Non-discrimination)
 - ▶ Principle of “Tarification”

GATT negotiating rounds

- Table from Irwin (2015)

GATT Negotiating Rounds

Negotiating round	Dates	Major accomplishments
Geneva	1947	GATT established. About 20 percent tariff reduction negotiated.
Annecy	1949	Accession of 11 new contracting parties. Minor tariff reduction (about 2 percent).
Torquay	1950–51	Accession of 7 new contracting parties. Minor tariff reduction (about 3 percent).
Geneva	1955–56	Minor tariff reduction (about 2.5 percent).
Dillon Round	1960–61	Negotiations involving external tariff of European Community. Minor tariff reduction (4 percent).
Kennedy Round	1964–67	About 35 percent tariff reduction.
Tokyo Round	1973–79	About 33 percent tariff reduction. Six codes negotiated (e.g., subsidies, technical barriers.).
Uruguay Round	1986–94	WTO established. Additional tariff reductions. New agreements on dispute settlement, agriculture, clothing, services, investment, and intellectual property.
Doha Development Round	2001–	To be determined. Agreement on trade facilitation reached in December 2013.

Source: Compiled by the author.

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World exports and production growth

- Figure from Irwin (2015)

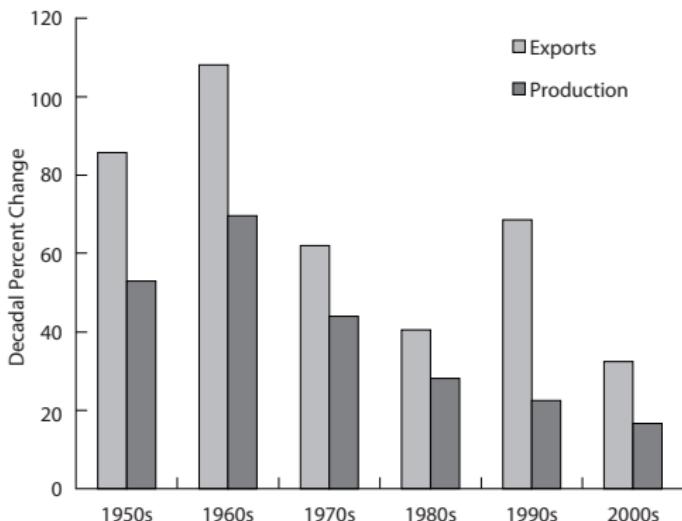


Figure 7.1

Growth in Volume of World Exports and World Production, by Decade, 1950–2010

Source: World Trade Organization, International Trade Statistics 2013, Table A1 (http://wto.org/english/res_e/statis_e/its2013_e/its13_toc_e.htm).

Debate whether GATT has played any role

- Rose (2004a,b) finds no effect of the GATT
 - Rose's findings attacked by a series of papers:
 - ▶ Subramanian and Wei (2007)
 - ▶ Goldstein et al. (2007)
 - ▶ Tomz et al. (2007)
 - ▶ ...
- consensus that GATT did play an important role in bringing about post-war trade liberalization

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The World Trade Organization (WTO)

- Established in 1995, the WTO is an official international organization though it remains relatively small
 - ▶ In 2013, WTO secretariat: 639 employees (1/4 translators), budget \$224 million
 - ▶ In 2013, World Bank staff: about 7000, administrative budget of \$1.9 billion
 - ▶ In 2013, IMF staff: about 2300, administrative budget of \$997 million
- It includes the GATT and “a little bit more”
 - ▶ agreements relating not just to goods, but also to services, investment, and intellectual property
 - ▶ dispute settlement process
- It remains a negotiating forum for the member countries

Current WTO Membership

- 164 members since 29 July 2016 accounting for over 90% of world trade
- 25 observer governments
 - ▶ With the exception of the Holy See, observers must start accession negotiations within five years of becoming observers.



Current Negotiation Round: The “Doha Development Round”

- 9th Round
- Started in 2001
- Initially planned for conclusion in December 2005
- Various challenges:
 - ▶ Incorporating non-trade issues into trade agreements
 - ▶ Clash between developed and developing countries



GATT/WTO put into perspective

- Despite the current difficulties, huge success
- Average ad valorem tariffs reduced from over 40% to less than 4%
- After WWII, merchandise exports grew on average by 6% annually
- Total trade in 2000 was 22-times the level of 1950
- GATT and the WTO have helped to create a strong and prosperous trading system contributing to unprecedented growth

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 - Introduction
 - The Terms-of-Trade Theory
 - Other issues
- 5 Regional Trade Agreements
- 6 Regulatory Cooperation

Explaining Trade Agreements

- Theoretical challenges
 - ▶ Why do countries need trade agreements?
 - ▶ Why do trade agreements have certain particular features?
- Initially: mercantilist explanation (Krugman (1997))

“Anyone who has tried to make sense of international trade negotiations eventually realizes that they can only be understood by realizing that they are a game scored according to mercantilist rules. (...) The implicit mercantilist theory that underlies trade negotiations does not make sense on any level, indeed is inconsistent with simple adding-up constraints; but it nonetheless governs actual policy (...) the economic theory underlying trade negotiations is nonsense.”

Explaining Trade Agreements: main theories

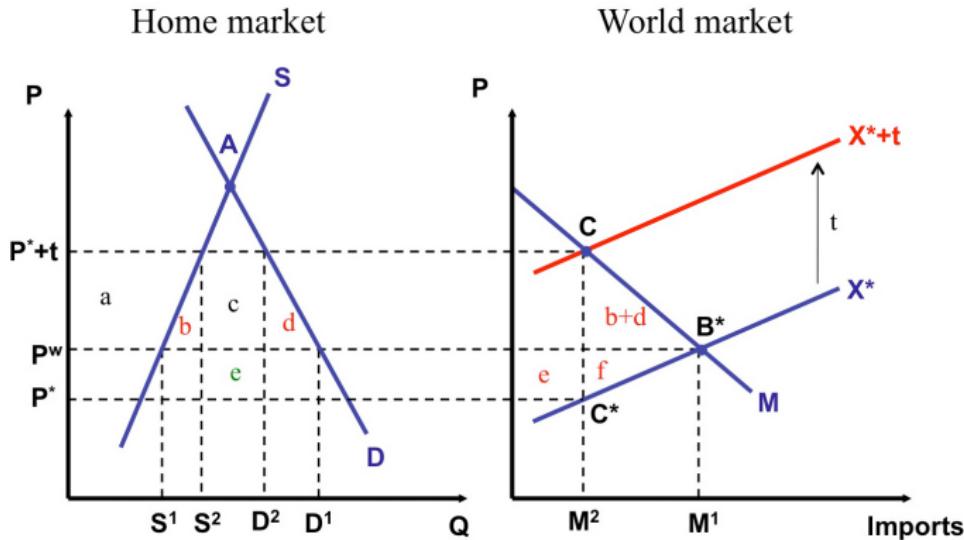
- Addressing **Beggar-My-Neighbor policies**

- ▶ Bagwell and Staiger (1999, 2002, . . .): terms-of-trade theory
 - ★ Seminal contribution
 - ★ Explains negotiations on tariffs
 - ★ Unable to explain negotiations on subsidies
 - ★ Empirical relevance?
 - Recently: new theories based on imperfect competition

- Addressing **Beggar-Myself policies**

- ▶ Maggi and Rodriguez-Clare (1998, 2007): commitment theory

Recap: Effect of an Import Tariff in a LOE



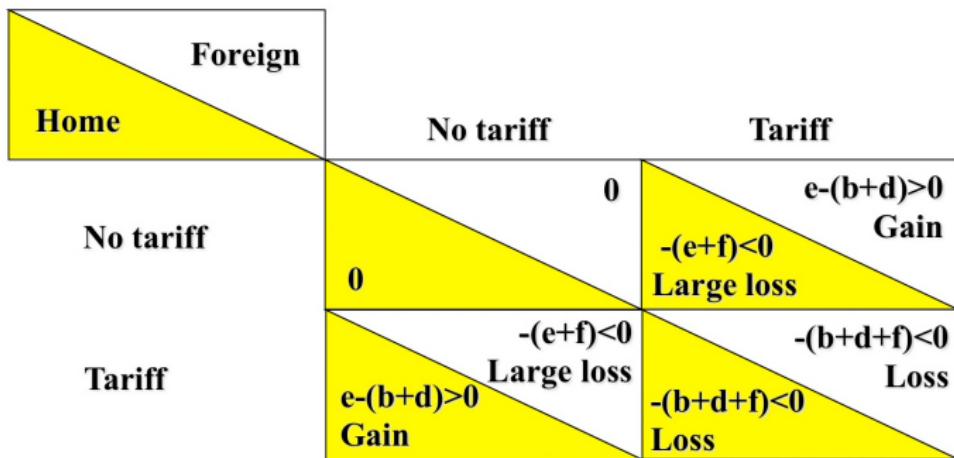
- Home consumers lose: $\Delta CS = -(a + b + c + d)$
- Home producers gain: $\Delta PS = +a$
- Government gains: $\Delta TR = +(c + e)$
- Net effect on Home welfare: $\Delta W = +e - (b + d)$

Interaction among Multiple Countries

- A large country can gain from imposing a tariff (if the ToT gain outweighs the deadweight loss: $e > b + d$)
- But what if there are several large countries imposing import tariffs? Is it still optimal for each country individually to impose a tariff?

Payoffs in a Tariff Game

- Home and Foreign welfare compared with free trade



- Nash equilibrium? \Rightarrow Prisoner's dilemma!

Basic Environment

- All markets are perfectly competitive
- There are no distortions
- Governments only care about welfare
- More specifically:
 - ▶ 2 countries, $c = 1, 2$
 - ▶ 2 goods, $i = 1, 2$
 - ▶ $p^c \equiv p_1^c/p_2^c$ is relative price un country c
 - ▶ $p^w \equiv p_1^w/p_2^w$ is “world” (i.e. untaxed) relative price
 - ▶ $d_i^c(p^c, p^w)$ is demand of good i in country c
 - ▶ $y_i^c(p^c)$ is supply of good i in country c

Are Unilaterally Optimal Tariffs Pareto-Efficient?

- Following Bagwell and Staiger (1999), we introduce

$$W^c(p^c, p^w) \equiv V^c[p^c, R^c(p^c) + T^c(p^c, p^w)]$$

- Differentiating the previous expression we obtain

$$dW^c = \left[W_{p^c}^c \left(\frac{dp^c}{dt^c} \right) + W_{p^w}^c \left(\frac{\partial p^w}{\partial t^c} \right) \right] dt^c + W_{p^w}^c \left(\frac{\partial p^w}{\partial t^{-c}} dt^{-c} \right)$$

- The slope of the iso-welfare curves thus can be expressed as

$$\left(\frac{dt^1}{dt^2} \right)_{dW^1=0} = \frac{W_{p^w}^1 \left(\frac{\partial p^w}{\partial t^2} \right)}{W_{p^1}^1 \left(\frac{dp^1}{dt^1} \right) + W_{p^w}^1 \left(\frac{\partial p^w}{\partial t^1} \right)} \quad (1)$$

$$\left(\frac{dt^1}{dt^2} \right)_{dW^2=0} = \frac{W_{p^2}^2 \left(\frac{dp^2}{dt^2} \right) + W_{p^w}^2 \left(\frac{\partial p^w}{\partial t^2} \right)}{W_{p^w}^2 \left(\frac{\partial p^w}{\partial t^1} \right)} \quad (2)$$

Are Unilaterally Optimal Tariffs Pareto-Efficient?

- **Proposition:** If countries are “large”, unilateral tariffs are not Pareto-efficient.
- **Proof:**
 - ① By definition, unilateral (Nash) tariffs satisfy

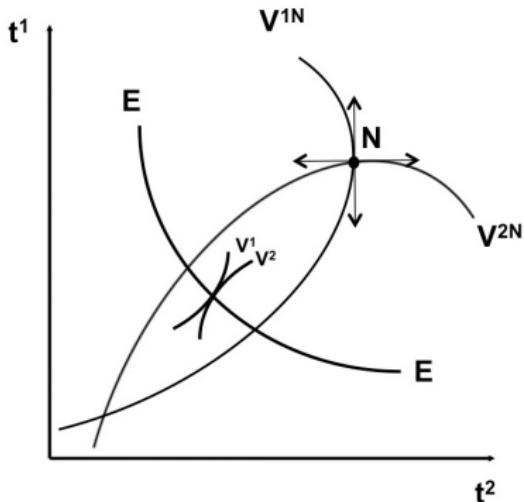
$$W_{p^c}^c \left(\frac{dp^c}{dt^c} \right) + W_{p^w}^c \left(\frac{\partial p^w}{\partial t^c} \right) = 0$$

- ② If $\left(\frac{\partial p^w}{\partial t^1} \right)$ and $\left(\frac{\partial p^w}{\partial t^2} \right) \neq 0$, 1+ (1) and (2) \Rightarrow

$$\left(\frac{dt^1}{dt^2} \right)_{dW^1=0} = +\infty \neq 0 = \left(\frac{dt^1}{dt^2} \right)_{dW^2=0}$$

- ③ The result directly derives from 2 and the fact that Pareto-efficiency requires $\left(\frac{dt^1}{dt^2} \right)_{dW^1=0} = \left(\frac{dt^1}{dt^2} \right)_{dW^2=0}$

Graphical analysis (Johnson 1953-54)



- N corresponds to the unilateral (Nash) tariffs
- $E - E$ corresponds to the contract curve
- If countries are too asymmetric, free trade may not be on contract curve

What is the source of the inefficiency?

- The *only* source of the inefficiency is the terms-of-trade externality
- Formally, suppose that governments were to set their tariffs ignoring their ability to affect world prices:

$$W_{p^1}^1 = W_{p^2}^2 = 0$$

- Then Equations (1) and (2) immediately imply

$$\left(\frac{dt^1}{dt^2} \right)_{dW^1=0} = \left(\frac{\partial p^w}{\partial t^2} \right) / \left(\frac{\partial p^w}{\partial t^1} \right) = \left(\frac{dt^1}{dt^2} \right)_{dW^2=0}$$

- **Intuition:**
 - ▶ In this case, both countries act like small open economies
 - ▶ As a result, $t^1 = t^2 = 0$, which is efficient from a world standpoint
- **Question:** How much does this rely on the fact that governments maximize welfare?

Reciprocity in the WTO

- Using the previous insight, Bagwell and Staiger (1999) rationalize the principle of “reciprocity” within the WTO
- Reciprocity** \equiv Mutual changes in trade policy such that changes in the value of each country’s imports are equal to changes in the value of its exports
- Formally, a change in tariffs $\Delta t^1 \equiv t^{1'} - t^1$ and $\Delta t^2 \equiv t^{2'} - t^2$ is reciprocal if

$$p^w [m_1^1(p^{1'}, p^{w'}) - m_1^1(p^1, p^w)] = [x_2^1(p^{1'}, p^{w'}) - x_2^1(p^1, p^w)]$$

- Using trade balance, this can be rearranged as

$$(p^{w'} - p^w)m_1^1(p^{1'}, p^{w'}) = 0 \Rightarrow p^{w'} = p^w$$

- Hence mutual changes in trade policy that satisfy the principle of reciprocity leave the world price unchanged, which eliminates source of inefficiency

Summing up

- Trade agreements help countries to come out of the terms-of-trade manipulation Prisoner's Dilemma by coordinating countries' trade policy according to a pre-agreed set of rules
 - ▶ Principle of Reciprocity
 - ▶ Most-Favoured-Nation Principle (Non-discrimination)
- Empirical relevance of terms-of-trade manipulation?
- The terms-of-trade theory is not able to explain the WTO ban of export subsidies...

Other issues

- What are the implications of the self-enforcing nature of trade agreements?
 - ▶ Bagwell and Staiger (1990), Maggi (1996)
- What is the rationale for trade agreements in the presence of NTBs?
 - ▶ Bagwell and Staiger (2001) consider the case of product standards (and conclude that only terms-of-trade externality matters)
- How can we rationalize simple rigid rules (e.g. an upper bound on tariffs) within the WTO?
 - ▶ Amador and Bagwell (2010), Horn, Maggi, and Staiger (2010)
- Quantitatively, how large are the gains from the WTO? → see empirical lectures

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- 5 **Regional Trade Agreements**
 - Welfare Effects of Regional Trade Agreements
 - Stepping Stones or Stumbling Blocs?
- 6 Regulatory Cooperation

Article XXIV of the GATT/WTO and Enabling Clause

- Regional Trade Agreements (RTAs) are allowed by Article XXIV of the GATT, under the following conditions:
 - ▶ Removal of all internal barriers (“substantially all trade”)
 - ▶ No increase of barriers on non-members on average
- Enabling Clause for developing countries (goods)

Types of Regional Trade Agreements

Customs Unions (CUs)

- No inside barriers
- Common external tariff

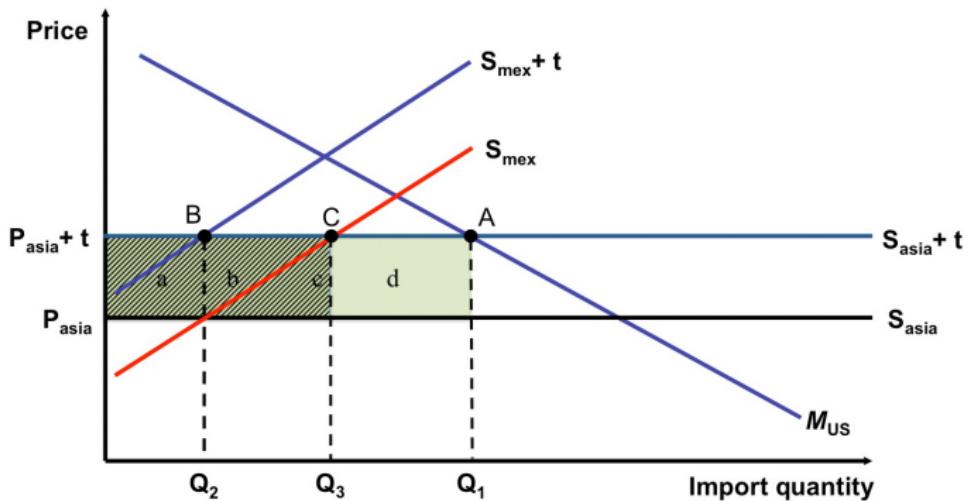
Free Trade Areas (FTAs)

- No inside barriers
- Each member sets its own external tariff
- Rules of Origin

Are RTAs welfare increasing?

- “Exogenous” trade agreement formation approach: Viner (1950) - not necessarily
 - ▶ Trade creation
 - ▶ Trade diversion

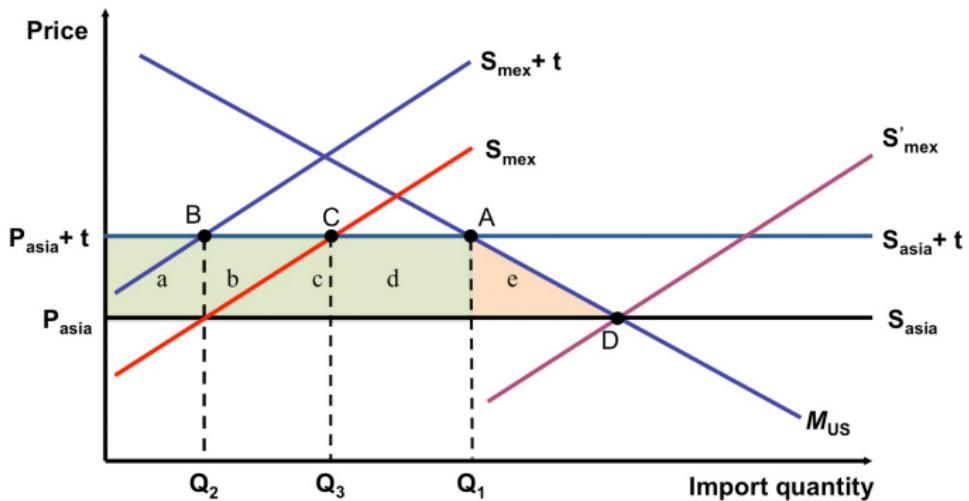
Trade Diversion: Graph



Trade Diversion: Welfare Effects

- Welfare effect for the US:
 - ▶ Loss in U.S. tariff revenue: $\Delta TR = -(a + b + c)$
- Welfare effect for Mexico:
 - ▶ Gain in Mexico's producer surplus: $\Delta PS = +(a + b)$
- Combined effect for NAFTA: $\Delta W_{NAFTA} = -c$

Trade Creation and Trade Diversion: Graph



Trade Creation and Trade Diversion: Welfare Effects

- Welfare effect for the US:

- ▶ Gain in consumer surplus: $\Delta CS = +(a + b + c + d + e)$
- ▶ Loss in tariff revenue: $\Delta TR = -(a + b + c + d)$
- ▶ Net effect on U.S. welfare: $\Delta W_{US} = +e$

Welfare effects of “endogenous” RTAs

- Countries will only form (endogenously) RTAs which improve members' welfare
- What are then the effects on outsiders?
 - ▶ The answer depends on the model!
 - ▶ CUs tend to hurt outsiders (Yi(1996)) as CUs tend to exploit their greater market power through the common external tariff
 - ▶ FTAs may make outsiders better off (Ornelas (2005))
 - Empirical question?

Welfare effects of RTAs under the GATT/WTO bloc formation rules

- Article XXIV
 - ▶ “substantially all the trade”
 - ▶ “general incidence of barriers”
- Necessary reform
 - ▶ vague [McMillan (1993), Srinivasan (1997)]
 - ▶ not sufficient [Syropoulos (1999), Goto and Hamada (1999), Mrázová, Vines and Zissimos (2013)]
- Ohyama (1972), Kemp and Wan (1976): a CU can always be designed to be a Pareto improvement - **existence proof!**
 - ⇒ Difficulty of the reform of Article XXIV
(McMillan (1993), Winters (1997), Bhagwati (1991))

Stepping stones or stumbling blocs question?

- Bhagwati (1991)
- The answer depends again on the model!
- But even when RTAs don't hurt outsiders, they can be stumbling blocs
 - ▶ Yi(1996), Ornelas (2005)
- Current trend: Multilateral trade negotiations are stalling, while regionalism is spreading



How to ‘multilateralise’ regionalism?

“We should not forget that we have a negotiating mandate under Doha to look at the WTO rules governing regionalism [...] if we are concerned about the impact of burgeoning regionalism we should redouble our efforts here as well.”

“Let us [...] ask what the WTO might do to help avoid a situation in which these negative aspects of regional agreements prevail, and ultimately promote multilateralisation?”

(Pascal Lamy, then Director-General, WTO, Conference on “Multilateralising Regionalism”, 10 September 2007, Geneva)

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 - Basic model
 - Non-cooperative equilibrium
 - Cooperative equilibrium
 - Political Economy

Deep Integration: Regulatory Cooperation

- Trade agreements are becoming “deeper”...
- ... and more controversial...
- Much of the debate is about ***harmonization of standards***

Harmonization controversy



Harmonization controversy

The
Guardian
For 200 years

News | Opinion | Sport | Culture | Lifestyle

Environment Climate crisis Wildlife Energy Pollution

The Observer GM

Is chlorinated chicken about to hit our shelves after new US trade deal?



Le Monde

PLANÈTE - ACCORD COMMERCIAL EUROPE-CANADA - CETA

CETA : comment le Canada tente de saper les normes européennes sur les pesticides et les OGM



Harmonization controversy

*"This is why **harmonisation** risks lowering our standards to the lowest common denominator. Again, **harmonisation** was a **demand of big business** that European trade negotiators included with little changes into the regulatory cooperation chapters of CETA and TTIP."*

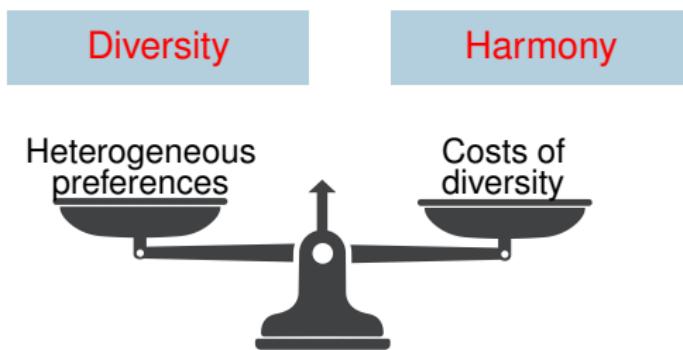
Corporate Europe Observatory (2017)

A trade agreement captured by an alternative set of special interests may make things worse just as easily as it makes them better.

Rodrik (2018)

Key tradeoff

- Benefits versus costs of regulatory diversity



- Costs of regulatory diversity: mostly *fixed costs*

*“...is usually a **fixed cost**. You pay for this certification once from time to time, and this cost is not related to the volume traded.”*

(Lamy, 2015)

Maggi - Mrázová (2004)

- What is the role of international regulatory agreements?
 - ▶ Does non-cooperative behavior lead to diversity when harmony is efficient, or vice-versa? And if so, why?
- Political economy: how does lobbying affect the regulatory regime in the non-cooperative and cooperative scenarios?
 - ▶ Does lobbying lead to pernicious harmonization?

Main takeaways

- Harmonization role of regulatory agreements probably over-emphasized in policy debate
 - ▶ Harmony may arise non-cooperatively
 - ▶ ... but it may be inefficient ... so the role of international agreements may be to diversify standards
- The role of regulatory agreements depends in important ways on whether trade is inter-industry or intra-industry
 - ▶ With intra-industry trade, agreements play more of a *coordination* role
 - ▶ ... and might help govs coordinate on diversity regime
- Politically-pressured harmonizing agreements are not the (main) problem
 - ▶ Lobbying distorts both the Nash and the agreement → not a problem with the agreement per se
 - ▶ Lobbying does not always lead to more harmonization, but it does push for the regime that is bad for consumers

The economic structure

- Two countries, Home and Foreign (*)
 - ▶ symmetric in size and consumer preferences
- Two goods, of which one is an “outside” good → effectively a partial equilibrium model
- The good is vertically differentiated, e.g. in terms of its “dirtiness,” indexed by $e \in [0, \infty)$
- Local consumption externality, worse if e is higher
 - ▶ Consumers are atomistic and get the same utility regardless of e , so demand depends only on price
- Marginal cost of production is decreasing in the dirtiness of the good: $c'(e) < 0$
- Zero trade costs

Regulation

- Home and Foreign govs set product standards for the good sold in the local market (e and e^* respectively)
- No trade taxes and no discrimination in standards (“shallow” integration already achieved)
- A firm incurs a fixed cost F for each supplied variety:
 - ▶ If $e = e^*$, firm incurs F whether it serves one or both markets
 - ▶ If $e \neq e^*$, the firm incurs F for each market served

Two scenarios

- A single firm at Home → *one-way trade* (can interpret as inter-industry trade)
- Cournot duopoly with symmetric firms → *intra-industry trade à la Brander-Krugman* (not covered here - see paper)

Home welfare

$$\tilde{W}(e, e^*) = \textcolor{red}{CS(e) - \alpha E(e) + \pi(e) + \pi(e^*) - n(e, e^*)F}$$

- CS : consumer surplus (in reduced form)
- E : local consumption externality (in reduced form)
 - ▶ e.g. an increasing function of total pollution $e \cdot d(p(e))$
- α captures the weight that Home attaches to this externality
- $\pi(e)$ and $\pi(e^*)$ are the profits made in the Home and Foreign markets respectively
- n is the number of supplied varieties
 - ▶ If $e = e^*$ then $n = 1$
 - ▶ If $e \neq e^*$ then $n = 2$

Home's preferred standard

$$\tilde{W}(e, e^*) = \underbrace{CS(e) - \alpha E(e) + \pi(e) + \pi(e^*)}_{W(e, e^*)} - n(e, e^*)F$$

- W : Home welfare gross of fixed costs
 - ▶ Home's "preferred" standard is $e_W = \arg \max_e W$
 - ▶ Assume W is single-peaked in e

Foreign welfare and preferred standard

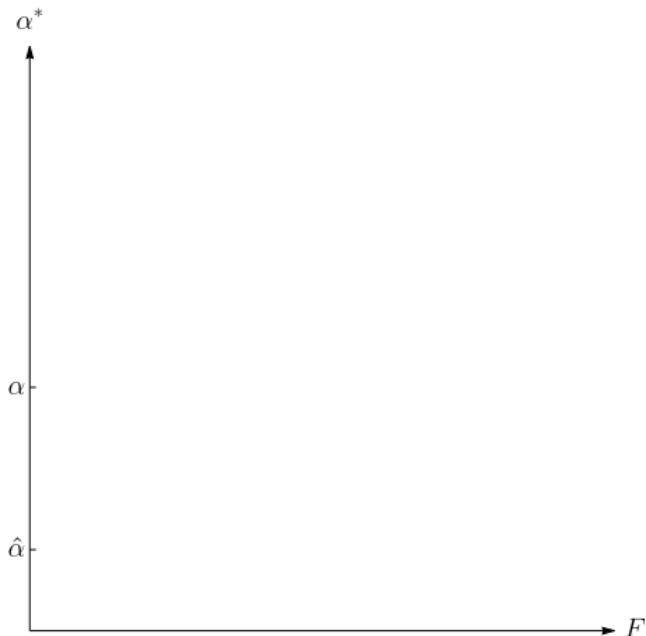
$$\tilde{W}^*(e^*) = W^*(e^*) = CS(e^*) - \alpha^* E(e^*)$$

- α^* captures the weight that Foreign attaches to the externality
- Foreign's "preferred" standard: $e_W^* = \arg \max_{e^*} W^*$
- Note: if countries have the same preferences ($\alpha^* = \alpha$) then $e_W^* < e_W$, because Foreign doesn't care about the firm's profits

Product-standard-setting game

- Simultaneous move game:
 - ▶ Home chooses e to maximize \tilde{W}
 - ▶ Foreign chooses e^* to maximize \tilde{W}^*
- How does the equilibrium outcome depend on three parameters of interest: α , α^* and F ?
 - ▶ α, α^* : “fundamental” preference parameters
 - ▶ F : cost of regulatory diversity

Parameter space of interest



- $|\alpha^* - \alpha|$ captures cross-country difference in *fundamental* preferences
- $|\alpha^* - \hat{\alpha}|$ captures cross-country difference in *regulatory* preferences
 - ▶ $\hat{\alpha}$: value of α^* such that regulatory preferences are the same: $e_W = e_W^*$

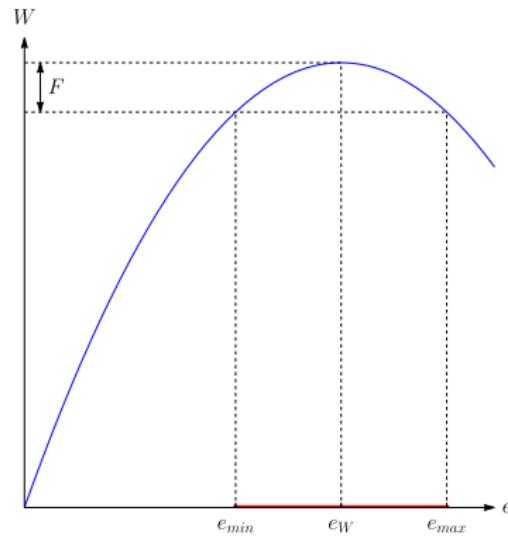
The nature of international policy externalities

- Home's choice of standard does not affect Foreign
- Int'l externalities exerted by Foreign's choice of standard:
 - ▶ Baseline externality: tighter e^* reduces Home profits
 - ▶ Positive "matching externality": given e , if Foreign chooses to match it ($e = e^*$) it reduces the Home firm's fixed cost
- The matching externality might suggest that an agreement should encourage harmonization. But this intuition is not quite correct...

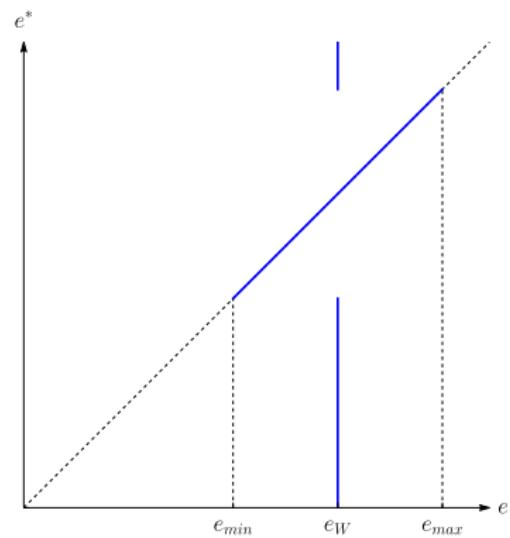
Home government reaction function

$$\arg \max_e [W(e, e^*) - n(e, e^*)F]$$

Tolerance region

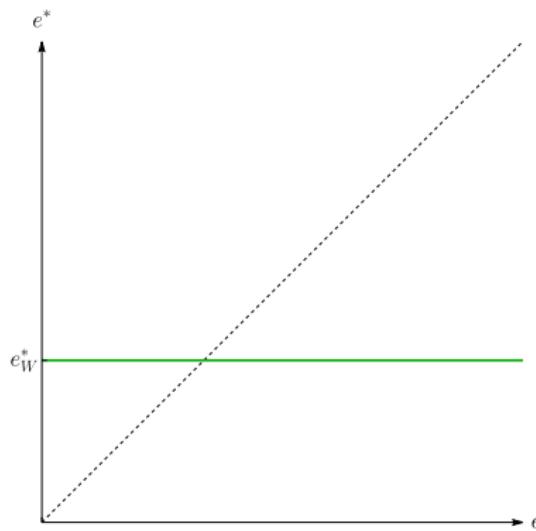


Reaction fuction

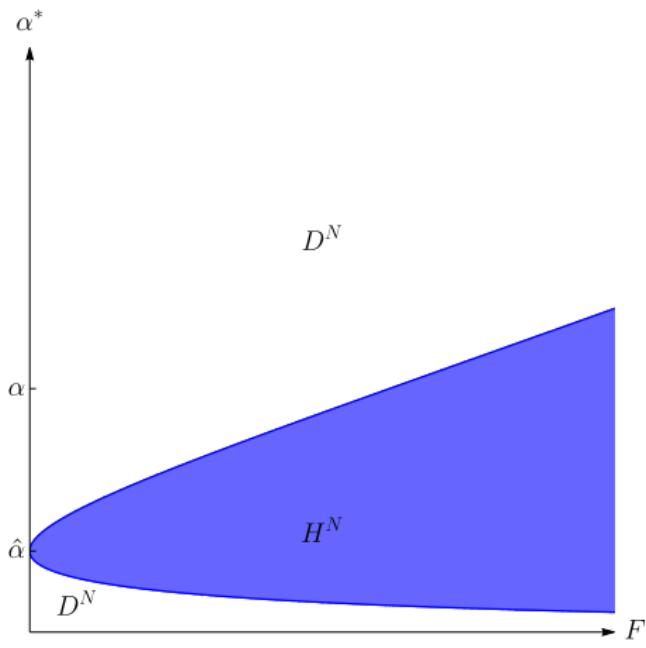


Foreign reaction function

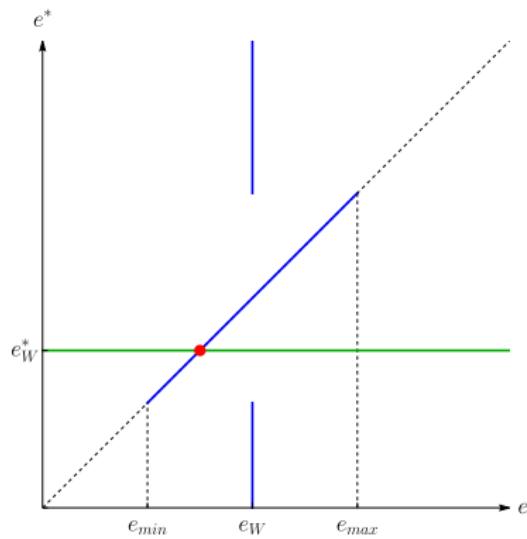
$$\arg \max_{e^*} W^*(e^*)$$



Nash equilibrium



- $\frac{|\alpha^* - \hat{\alpha}|}{F}$ large $\Rightarrow D^N$
- $\frac{|\alpha^* - \hat{\alpha}|}{F}$ small $\Rightarrow H^N$



$\hat{\alpha}$: value of α^* such that *regulatory* preferences are the same: $e_W = e_W^*$

California/Brussels effect

- Do we observe spontaneous harmony in reality?
- Several studies have found evidence of the so-called “California” or “Brussels” effect: a tendency of product standards to ratchet upwards towards levels found in high-regulating states
 - ▶ See for ex. Vogel (1995), Bradford (2019)

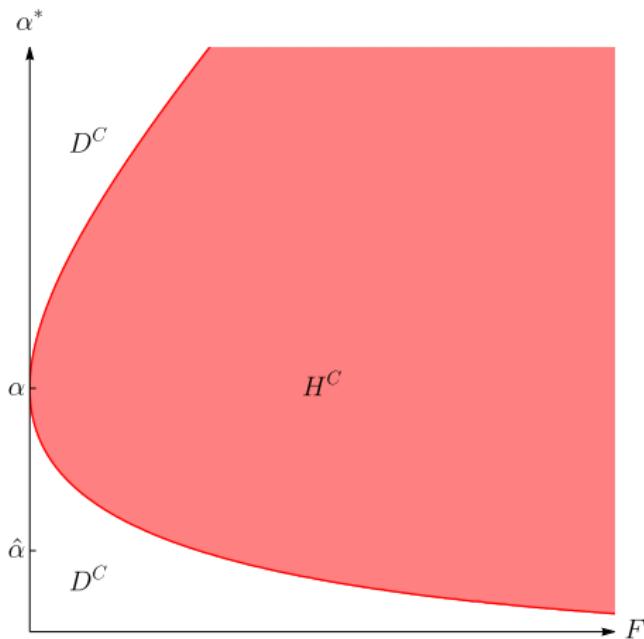
Cooperative standards

- Home and Foreign choose e and e^* to maximize joint welfare

$$\max_{e,e^*} [\tilde{W}(e, e^*) + \tilde{W}^*(e^*)]$$

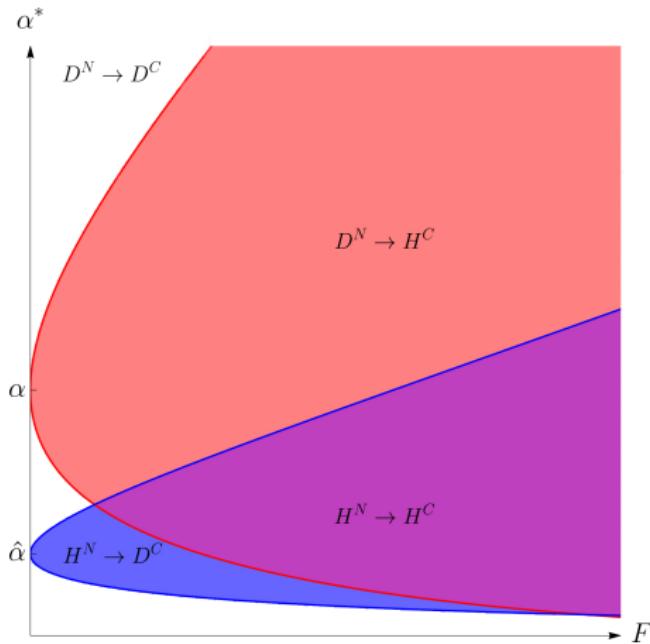
- Implicitly assumes international transfers available

Cooperative regulatory regime



- $\frac{|\alpha^* - \alpha|}{F}$ large $\Rightarrow D^C$
- $\frac{|\alpha^* - \alpha|}{F}$ small $\Rightarrow H^C$

How cooperation affects the regulatory regime



- Harmonization
 $(D^N \rightarrow H^C)$ if

$$\begin{cases} \frac{|\alpha^* - \alpha|}{F} & \text{sufficiently small} \\ \frac{|\alpha^* - \hat{\alpha}|}{F} & \text{sufficiently large} \end{cases}$$
- Diversification
 $(H^N \rightarrow D^C)$ if

$$\begin{cases} \frac{|\alpha^* - \alpha|}{F} & \text{sufficiently large} \\ \frac{|\alpha^* - \hat{\alpha}|}{F} & \text{sufficiently small} \end{cases}$$
- Otherwise cooperation maintains regime and only changes standards levels

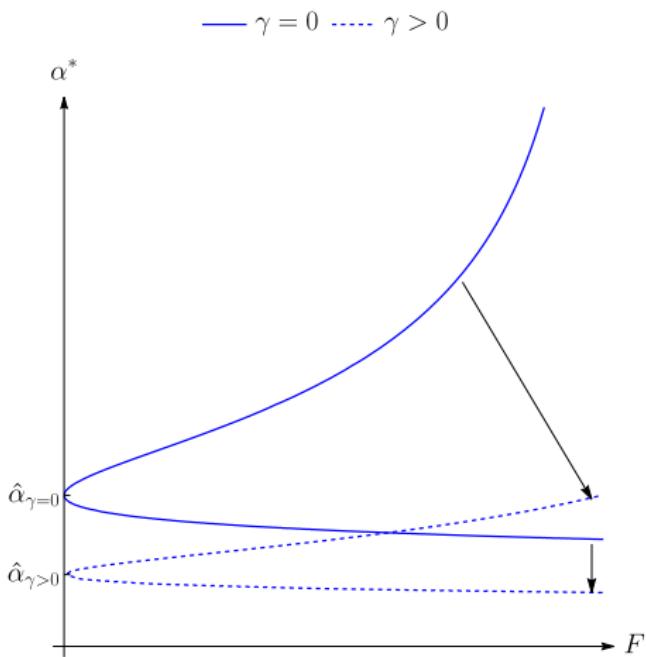
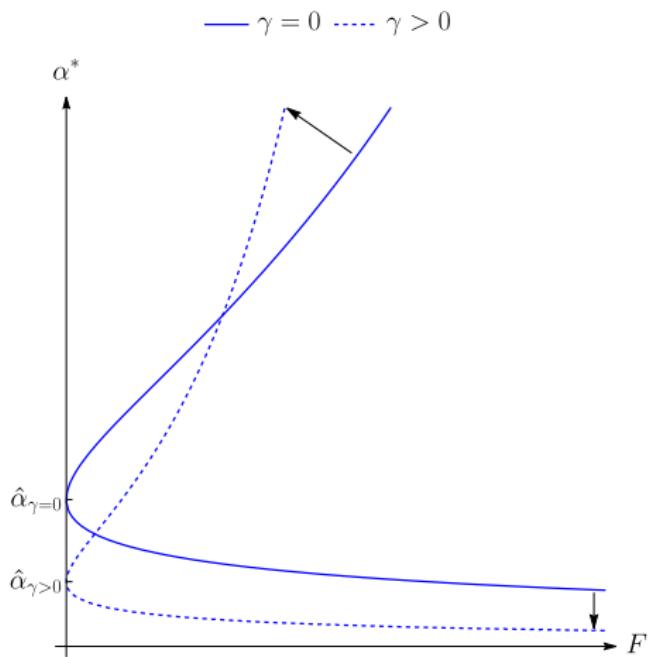
How cooperation affects the regulatory regime

- Why would an agreement *diversify* standards?
 - ▶ Spontaneous harmony occurs when countries have similar *regulatory* preferences
 - ▶ . . . but this implies that *fundamental* preferences are dissimilar (Home cares about π and Foreign does not)
⇒ so if F is not large, harmony is inefficient

Political Economy: Non-cooperative equilibrium

- Home gov's objective under lobbying: $\tilde{W} + \gamma(\pi + \pi^* - nF)$
- Foreign gov's objective as before
- $\uparrow \gamma$ pushes for spontaneous harmony IFF
 - ➊ either $\pi(e_W^*) > \pi(e_W)$,
 - ➋ or $\pi(e_W^*) < \pi(e_W)$ and $\tilde{CS}(e_W^*) < \tilde{CS}(e_W)$ (with $\tilde{CS} \equiv CS - \alpha E$)

Political Economy: Non-cooperative equilibrium



Political Economy: Cooperative equilibrium

- $\uparrow \gamma$ pushes for cooperative harmony IFF
 - ➊ either $2\pi(e_H) > \pi(e_S) + \pi(e_S^*)$,
 - ➋ or $2\pi(e_H) < \pi(e_S) + \pi(e_S^*)$ and $\tilde{CS}^w(e_H) < \tilde{CS}(e_S) + \tilde{CS}^*(e_S^*)$
- Under a second-order approximation of $\pi(e)$, $E(e)$ and $CS(e)$, lobbying pushes toward cooperative harmony if $\pi(e)$ and $E(e)$ are weakly concave, but may push toward cooperative diversity if $\pi(e)$ or $E(e)$ are convex.

Pop critique

- If γ is sufficiently large, the agreement reduces welfare relative to the noncooperative equilibrium, regardless of whether the agreement harmonizes standards.