Does Digital Trade Change the Purpose of a Trade Agreement?

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Motivation

- We live in an increasingly digital world
  - search
  - order and payment
  - delivery of goods and services
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- We have a constitution of the world trading system put in place at the dawn of the Internet
  - GATT covers market access for goods: shallow integration, highly successful
  - GATS covers market access for services: deep integration, much less successful
  - TRIPS covers private rights over trade-related intellectual property
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- Are the WTO’s global trade rules fundamentally out of date for the digital age?
I adopt a basic premise from the literature on the economics of trade agreements

- The design of a trade agreement should reflect its purpose, the “problem” it is supposed to “solve”
- I ask: Does digital trade change the purpose of a trade agreement?
- The answer can illuminate the nature of the challenge that digital trade poses for the WTO and the world trading system
Approach

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- I first present a partial equilibrium model of trade between two countries in a pre-digital world
  - I review what the theoretical literature on the economics of trade agreements has to say about the purpose of a trade agreement in this setting, considering both trade in goods and trade in services
  - I describe how this purpose can be seen to be reflected in the broad design features of both GATT and GATS
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- I then introduce digital trade into the model world economy and revisit the purpose of a trade agreement
  - I assume that a more open digital policy reduces the costs of trade, and that in choosing digital policies governments weigh this effect against any non-pecuniary externalities that may be implied
  - I investigate whether the problem for the agreement to solve has changed
  - From this perspective I evaluate whether the rise of digital trade warrants changes in the design of the WTO
Main Findings

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- Where the non-pecuniary externalities associated with digital openness are purely local:
  - The purpose of a trade agreement for both trade in goods and trade in services is unchanged by the advent of the digital world.
  - This implies that the existing shallow-integration features of GATT can in principle be applied to digital policies impacting goods trade in such a world.
  - And while GATS is a deep-integration agreement, a GATT-like shallow-integration approach to trade in services is possible and could be applied to digital policies impacting services trade as well.
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- Where the non-pecuniary externalities associated with digital openness cross international borders:
  - The purpose of a trade agreement is more complex.
  - But even in this case there may be an approach to integration for goods and services trade in a digital world that lies somewhere between the WTO’s shallow integration approach and a fully deep approach.
For modeling purposes, I adopt the definition of digital trade ("e-commerce") from the WTO’s Work Programme on Electronic Commerce

- “the production, distribution, marketing, sale or delivery of goods and services by electronic means”
- Covers digital aspects of search, order and payment, and delivery of goods and services
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Classification issues:

- A good versus a service (e.g., instructions for 3-D printing of a leather wallet)
- Mode of supply (e.g., visiting a foreign website and making a purchase)
- Consequential because of the different structure of GATT versus GATS, and the different market access commitments across modes of supply within GATS
What is Digital Trade?

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Taxonomy: partition digital trade into "digital trade in goods" and "digital trade in services"

- Trade is "digital" if it involves digital elements in any of the three stages of search, order and payment, or delivery
- A transaction involves a "good" ("service") if at the moment of consumption that transaction is a good (service) as traditionally defined, i.e., as defined in the pre-digital world
- Some transactions (e.g., the importation of a smart appliance) may involve digital trade in both goods and services
What are the Policies that Impact Digital Trade?

- What kinds of policies impact digital trade?
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- Tariffs
  - But subject to a moratorium on customs duties applied to electronic transmissions of digital products and services
  - May require adjustments to de minimis levels
  - Unavailable on mode 3 service imports
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- Regulatory barriers
  - Internet filtering
  - Data localization
  - Source-code transfer requirements
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- A reduced-form approach to modeling regulatory barriers to digital trade
  - Digital ("Internet") policies $I \in [0, \infty)$ and $I^* \in [0, \infty)$, with $I = 0$ ($I^* = 0$) ⇒ absence of workable Internet in the home (foreign) country, higher level of $I$ ($I^*$) ⇒ a more open digital policy environment
  - $I$ and $I^*$ jointly determine the efficiency of trade transactions between the two countries
  - $\iota(I, I^*)$ the per-unit (specific) trade cost for exports from foreign to home, where $\iota(0, 0)$ is non-prohibitive with $\iota(I, I^*)$ decreasing and convex in both arguments and non-negative for all $I$ and $I^*$
Digital Trade in Goods

- The home country imports a competitively produced good from the foreign country

  - Arbitrage: \( P = P^* + \iota(I, I^*) + \tau + \tau^* \)
  - Market clearing: \( M(P^* + \iota(I, I^*) + \tau + \tau^*) = E^*(P^*) \)
  - World prices

\[
\hat{P}^w(\iota(I, I^*) + \tau, \tau^*) \equiv \hat{P}^*(\iota(I, I^*) + \tau + \tau^*) + \tau^*
\]
\[
\hat{P}^w(\iota(I, I^*) + \tau^*, \tau) \equiv \hat{P}(\iota(I, I^*) + \tau + \tau^*) - \tau
\]
\[
\hat{P}^w - \hat{P}^w^* = \iota(I, I^*)
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- World prices
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  \hat{P}^w(I, I^*) + \tau, \tau^*) \equiv \hat{P}^*(I, I^*) + \tau + \tau^* + \tau \\
  \hat{P}^w(I, I^*) + \tau^*, \tau) \equiv \hat{P}(I, I^*) + \tau + \tau^*) - \tau \\
  \hat{P}^w - \hat{P}^w^* \equiv \iota(I, I^*)
  \]

Terms-of-trade effects

- Tariffs: standard
  \[
  \frac{\partial \hat{P}^w}{\partial \tau} = \frac{\partial \hat{P}^w^*}{\partial \tau} = \frac{M'}{E^* - M'} < 0 \\
  \frac{\partial \hat{P}^w^*}{\partial \tau^*} = \frac{\partial \hat{P}^w}{\partial \tau^*} = \frac{E^*}{E^* - M'} > 0
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- **Market clearing:**
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- **World prices**
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  \hat{P}^w(\iota(I, I^*) + \tau, \tau^*) \equiv \hat{P}^*(\iota(I, I^*) + \tau + \tau^*) + \tau^* \\
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  \]

- **Digital policies: novel**
  \[
  \frac{\partial \hat{P}^w}{\partial I} \frac{\partial I}{\partial I} = \frac{E^{*f}}{E^{*f} - M'} \times \frac{\partial I}{\partial I} < 0; \quad \frac{\partial \hat{P}^w^*}{\partial I} \frac{\partial I}{\partial I} = \frac{M'}{E^{*f} - M'} \times \frac{\partial I}{\partial I} > 0 \\
  \frac{\partial \hat{P}^w}{\partial I^*} \frac{\partial I^*}{\partial I^*} = \frac{M'}{E^{*f} - M'} \times \frac{\partial I^*}{\partial I^*} > 0; \quad \frac{\partial \hat{P}^w^*}{\partial I^*} \frac{\partial I^*}{\partial I^*} = \frac{E^{*f}}{E^{*f} - M'} \times \frac{\partial I^*}{\partial I^*} < 0
  \]
Digital Trade in Goods

- Non-pecuniary externality associated with digital openness: $c(I)$ and $c^*(I^*)$
Non-pecuniary externality associated with digital openness: \( c(I) \) and \( c^*(I^*) \)

Home welfare

\[
W = CS(\hat{P}(i(I, I^*) + \tau + \tau^*)) + [\hat{P}(i(I, I^*) + \tau + \tau^*) - \hat{P}^w(i(I, I^*) + \tau^*, \tau)] \times M(\hat{P}(i(I, I^*) + \tau + \tau^*)) - [c(I) + \theta c^*(I^*)] \\
\equiv W(I, I^*, \hat{P}(i(I, I^*) + \tau + \tau^*), \hat{P}^w(i(I, I^*) + \tau^*, \tau))
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Non-pecuniary externality associated with digital openness: $c(I)$ and $c^*(I^*)$

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$$- [c(I) + \theta c^*(I^*)]$$

$$\equiv W(I, I^*, \hat{P}(\iota(I, I^*) + \tau + \tau^*), \hat{P}^w(\iota(I, I^*) + \tau^*, \tau))$$

Foreign welfare

$$W^* = CS^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*)) + PS^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*))$$

$$+ [\hat{P}^{w*}(\iota(I, I^*) + \tau, \tau^*) - \hat{P}^*(\iota(I, I^*) + \tau + \tau^*)] \times E^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*))$$

$$- [c^*(I^*) + \theta c(I)]$$

$$\equiv W^*(I^*, I, \hat{P}^*(\iota(I, I^*) + \tau + \tau^*), \hat{P}^{w*}(\iota(I, I^*) + \tau, \tau^*))$$
Digital Trade in Goods

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W^w = CS(\hat{P}(\iota(I, I^*) + \tau + \tau^*)) + CS^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*)) + PS^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*)) \\
+ [\hat{P}(\iota(I, I^*) + \tau + \tau^*) - \hat{P}^*(\iota(I, I^*) + \tau + \tau^*) - \iota(I, I^*)] \times E^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*)) \\
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The Purpose of GATT in a Pre-Digital World

- Pre-digital world: \( I \equiv 0 \equiv I^* \Rightarrow \iota(0, 0) \equiv \bar{\iota}, \ c(0) = c^*(0) = 0 \)
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W = CS(\hat{P}(\bar{i} + \tau + \tau^*)) \\
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- Efficient tariffs: $\tau^e + \tau^{e*} = 0$. Nash tariffs: $\tau^N = \frac{\hat{P}^{w*N}}{\eta^{E*N}}$ and $\tau^{N*} = \frac{\hat{P}^{w*N}}{\eta^{MN}}$

- Eliminate terms-of-trade manipulation from tariffs and expand market access to efficient levels
With additional non-tariff policies, the purpose of a trade agreement is unchanged

- Nash non-tariff policies efficient, conditional on Nash trade volume
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- Supports the logic of shallow integration (Bagwell and Staiger, 2001, 2002)
The Shallow-Integration Design of GATT

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- A trade agreement could focus on lowering tariffs as a means of expanding market access ("conditions of competition") and trade volumes to efficient levels
  - And put in place various "market access preservation rules" that apply to non-tariff policies and prevent governments from back-sliding on their market access commitments
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Under GATT's approach, countries negotiate tariff bindings to make market access commitments, and GATT Articles provide the accompanying market access preservation rules

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- Findings extend to a variety of economic settings and diverse government policy preferences
  - Do they hold in a world of digital trade in goods?
The Purpose of GATT in a Digital World: Local Spillovers

No cross-border non-pecuniary externality: $\theta \equiv 0$  
(Assumption 1)

- Home welfare

\[
W = CS(\hat{P}(\iota(l, l^*) + \tau + \tau^*)) \\
+ [\hat{P}(\iota(l, l^*) + \tau + \tau^*) - \hat{P}^w(\iota(l, l^*) + \tau^*, \tau)] \times M(\hat{P}(\iota(l, l^*) + \tau + \tau^*)) - c(l) \\
\equiv W(l, \hat{P}(\iota(l, l^*) + \tau + \tau^*), \hat{P}^w(\iota(l, l^*) + \tau^*, \tau))
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The Purpose of GATT in a Digital World: Local Spillovers

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$$\equiv W(I, \hat{P}(\iota(I, I^*) + \tau + \tau^*), \hat{P}^w(\iota(I, I^*) + \tau^*, \tau))$$

- Foreign welfare

$$W^* = CS^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*)) + PS^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*))$$
$$+ [\hat{P}^{w*}(\iota(I, I^*) + \tau, \tau^*) - \hat{P}^*(\iota(I, I^*) + \tau + \tau^*)] \times E^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*)) - c^*(I^*)$$
$$\equiv W^*(I^*, \hat{P}^*(\iota(I, I^*) + \tau + \tau^*), \hat{P}^{w*}(\iota(I, I^*) + \tau, \tau^*))$$
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$$\equiv W^*(I^*, \hat{P}^*(\iota(I, I^*) + \tau + \tau^*), \hat{P}^{w*}(\iota(I, I^*) + \tau, \tau^*))$$

- **World welfare**

$$W^w = CS(\hat{P}(\iota(I, I^*) + \tau + \tau^*)) + CS^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*)) + PS^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*))$$
$$+ [\hat{P}(\iota(I, I^*) + \tau + \tau^*) - \hat{P}^*(\iota(I, I^*) + \tau + \tau^*) - \iota(I, I^*)] \times E^*(\hat{P}^*(\iota(I, I^*) + \tau + \tau^*))$$
$$- c(I) - c^*(I^*)$$
$$\equiv W^w(I, I^*, \hat{P}(\iota(I, I^*) + \tau + \tau^*), \hat{P}^*(\iota(I, I^*) + \tau + \tau^*))$$
The Purpose of GATT in a Digital World: Local Spillovers

- Efficient policies
  - Tariffs \( \tau^e + \tau^{*e} = 0 \)
  - Digital policies

\[
M^e \times \left[ - \frac{\partial I}{\partial I} \right] = c'(I^e); \quad M^e \times \left[ - \frac{\partial I}{\partial I^*} \right] = c^*(I^{*e})
\]
The Purpose of GATT in a Digital World: Local Spillovers

- **Efficient policies**
  - Tariffs \( \tau^e + \tau^*e = 0 \)
  - Digital policies
    \[
    M^e \times [-\frac{\partial l}{\partial l}] = c'(l^e); \quad M^e \times [-\frac{\partial l}{\partial l^*}] = c^*(l^e) \]

- **Nash policies**
  - Tariffs \( \tau^N = \frac{\hat{P}w^N}{\eta E^*N} \) and \( \tau^*N = \frac{\hat{P}w^N}{\eta M^N} \)
  - Digital policies
    \[
    M^N \times [-\frac{\partial l}{\partial l}] = c'(l^N); \quad M^N \times [-\frac{\partial l}{\partial l^*}] = c^*(l^N) \]

⇒ Nash digital policies efficient, conditional on Nash trade volumes
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  - Tariffs: $\tau^e + \tau^{*e} = 0$
  - Digital policies
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  $\Rightarrow$ Nash digital policies efficient, conditional on Nash trade volumes

- Shallow integration
  - Tariffs: negotiate to $\bar{\tau}$ and $\bar{\tau}^*$ such that $M(\hat{P}(l(I^N, I^{*N}) + \bar{\tau} + \bar{\tau}^*)) = M^e$
  - Market access preservation rule, Home: $I$ and $\tau$ subject to $\frac{d\tau}{dl} |_{dM=0} = \left[ -\frac{\partial \hat{P}}{\partial l} \frac{\partial l}{\partial l} / \frac{\partial \hat{P}}{\partial \tau} \right] > 0$
  - Digital policies, Home unilateral choice: $\frac{\partial W}{\partial l} + \frac{\partial W}{\partial \tau} \frac{d\tau}{dl} |_{dM=0} = 0$
  - Outcome
    \[ \tau^e + \tau^{*e} = 0 \]
    \[ M^e \times \left[ -\frac{\partial l}{\partial l} \right] = c'(l^e); \quad M^e \times \left[ -\frac{\partial l}{\partial l^*} \right] = c^*(l^{*e}) \]
Relax Assumption 1: $\Rightarrow \theta > 0$

- Nash policies unchanged: my unilateral choices ignore any non-pecuniary impact I may have on you
- Efficient tariffs unchanged ($\tau^e + \tau^{*e} = 0$), but efficient digital policies now different
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Efficient digital policies

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M^e \times \left[ -\frac{\partial \lambda}{\partial \lambda} \right] = [1 + \theta] \times c'(I^e); \quad M^e \times \left[ -\frac{\partial \lambda}{\partial \lambda^*} \right] = [1 + \theta] \times c^*(I^{*e})
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- Efficiency demands less open digital policies for each country, lower trade volume
The Purpose of GATT in a Digital World: Cross-Border Spillovers

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- Efficient digital policies
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- Now two problems for a trade agreement to solve
  - The cross-border non-pecuniary externality must be addressed
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- Shallow integration could deliver \( M^e \) but implies \( M^e \times \left[ -\frac{\partial I}{\partial I} \right] = c'(I) \), \( M^e \times \left[ -\frac{\partial I}{\partial I^{*}} \right] = c^{*'}(I^{*}) \)

- A middle ground might focus on just those aspects of digital policies that generate cross-border non-pecuniary externalities, then pursue shallow integration to handle market access problem
Focus on mode 3 services trade

- The establishment of a commercial presence in the importing (home) country by a foreign service provider
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A local non-pecuniary externality $\phi(s)$ associated with each unit of service provided

- E.g., dust/noise from construction services
- $\phi(s)$ a decreasing and convex function of standard level $s$
Digital Trade in Services

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- A local non-pecuniary externality $\phi(s)$ associated with each unit of service provided
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  - $\phi(s)$ a decreasing and convex function of standard level $s$

- Cost of compliance $\kappa(s)$ for home service providers and $\kappa^*(s, L) \equiv \kappa(s) + \lambda(L)$ for foreign service providers
  - $\kappa(s)$ increasing and convex in $s$
  - $\lambda(L)$ decreasing and convex in $L$, the home-country investment in design and implementation of standard $s$, at cost $c_0 \times L$
  - Standard $s$ can be discriminatory, $r$ for home service providers and $\rho$ for foreign service providers with $r < \rho$
The home country imports a competitively produced mode 3 service from the foreign country.

For now, allow tariffs $\tau$ and $\tau^*$ to be placed on mode 3 service imports.

- A discriminatory sales tax collected at the point of sale.
- Home government also has a non-discriminatory sales tax $t$. 

\begin{align*}
q_h + t &= P = q_f + \iota(I, I) + \tau + \tau^* + t \\
\text{Market clearing:} & \quad D(P) = S_h(q_h) + S_f(q_f)
\end{align*}
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- “Raw” world prices and terms-of-trade effects:

  $$\hat{P}_0^w \equiv \hat{P}^w - \kappa^*(\rho, L) = \hat{P}_0^w(\iota(I, I^*) + \tau^*, \tau, t, r, \rho, L)$$

  $$\hat{P}_0^{w*} \equiv \hat{P}^{w*} - \kappa^*(\rho, L) = \hat{P}_0^{w*}(\iota(I, I^*) + \tau, \tau^*, t, r, \rho, L)$$

Robert W. Staiger (Dartmouth)
Pre-digital world: $l \equiv 0 \equiv l^* \Rightarrow \iota(0,0) \equiv \bar{\iota}$, $c(0) = c^*(0) = 0$
The Purpose of GATS in a Pre-Digital World

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\tau^e + \tau^{*e} &= 0 \\
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- Eliminate terms-of-trade manipulation from tariffs and expand market access to efficient levels

- Why isn’t GATS structured like GATT as shallow integration?
A “missing tariff instrument” explanation of the structure of GATS (Staiger and Sykes, 2021)

No tariffs on mode 3 services trade: \( \tau = \tau^* \equiv 0 \)  
(Assumption 2)
The Deep-Integration Design of GATS

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- But without tariffs, terms-of-trade manipulation spreads to all other Nash policies

\[

t^N - \phi(r^N) = \left[ \frac{\Theta^N}{S'_h + S'_f} \right] > 0
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\[
[-\phi'(r^N)] - \kappa'(r^N) = \left[ \frac{-\Theta^N}{S'_h + S'_f} \right] \times \left[ \frac{S'_h \times \kappa'(r^N)}{S^N_h} \right] > 0
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- \( \Rightarrow \) Deep-integration approach of GATS seems natural
The possibility of a “two-step” path forward for liberalizing trade in services that has much in common with the shallow-integration approach of GATT (Staiger and Sykes, 2021)

- Step 1: governments agree to a set of blanket rules that apply to services along the lines of the GATT rules that apply to goods
  - national treatment (NT) rule, which prohibits domestic regulatory (and tax) policies that discriminate against foreign trade
  - agreement on technical barriers to trade (TBT), which prohibits unnecessarily trade-restrictive regulatory choices
  - non-violation (NV) clause, which protects the value of market access concessions from erosion due to subsequent and unanticipated changes in non-contracted policies

NT and TBT would induce governments to unilaterally remove protectionist elements from their standards and regulatory policies in the service sector and divert protection into a narrow set of non-regulatory measures.

- Step 2: with international policy inefficiencies concentrated in a limited set of instruments, governments negotiate over these instruments to establish (in concert with the NT, TBT and NV rules) efficient market access commitments in service sectors

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A GATS Re-Design for the Pre-Digital World

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\( \theta = 0 \), Assumption 2 is not imposed
The Purpose of GATS in a Digital World

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- $\theta > 0$: efficiency $\Rightarrow S_f^e \times [-\frac{\partial l}{\partial l}] = [1 + \theta] \times c'(l^e)$ and $S_f^e \times [-\frac{\partial l}{\partial l^*}] = [1 + \theta] \times c^{*'}(l^{*e})$
Digital Trade and the Design of the WTO

Purely local non-pecuniary externalities

- The existing market access orientation of the WTO can provide a useful guardrail to delineate the “depth” of integration that trade agreements should contemplate in the digital world.
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- Digital trade may disrupt the market access implications of existing WTO commitments, which may no longer afford the same degree of protection from imports, or may be undermined by new forms of digital protection, but these kinds of disruptions are not new to the WTO.
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Recent work...
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- The blurring of the distinction between goods and services that digitalization is causing carries two implications.
  - This makes redesigning GATS to look more like GATT all the more attractive.
  - A new classification of goods and services might be attractive: digital or otherwise, traded goods (services) would refer to transactions on which a tariff can (cannot) feasibly be applied, and these transactions would be covered under GATT (GATS).
Cross-border non-pecuniary externalities

- Now two problems for a trade agreement to solve
  - The cross-border non-pecuniary externality must be addressed
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- Users of a digital platform value privacy and impose negative externalities on each other when they share their personal data with the platform, provided that their data is correlated
  - Individual-level data is underpriced and the market economy generates too much data
  - Data de-correlation represents one possible solution to address this problem
Cross-border non-pecuniary externalities

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  - The cross-border non-pecuniary externality must be addressed
  - The insufficient market access problem familiar from the pre-digital world must also be addressed
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- De-correlation mediates (via a trusted third party) data transactions in a way that reduces the correlation between the data of a user who is not sharing her data with the data of others who have shared their data – and thereby mitigates these externality-induced privacy concerns
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- We could think of WTO member governments agreeing to a limited form of this proposal, tailored to address just the correlation with the data of other international users
  - Negotiate over just the cross-border non-pecuniary externality associated with digital privacy issues
  - Leave correlation of users’ data within national borders to the discretion of each national government
The WTO is better designed to deal with digital trade than is commonly believed

Where the non-pecuniary externalities associated with digital openness (related to issues such as privacy, national security and law enforcement) are purely local

- The purpose of a trade agreement for both trade in goods and trade in services is unchanged by the advent of the digital world
- This implies that the existing shallow-integration features of GATT can in principle be applied to digital policies impacting goods trade in such a world
- And while GATS is a deep-integration agreement, a GATT-like shallow-integration approach to trade in services is possible along the lines suggested by Staiger and Sykes (2021), and could be applied to digital policies impacting services trade as well
- With digital trade blurring the distinction between goods and services, the redesign of GATS to bring it closer to the design of GATT could be all the more attractive

Where the non-pecuniary externalities associated with digital openness cross international borders

- The purpose of a trade agreement is more complex
- But even in this case there may be an approach to integration for goods and services trade in a digital world that lies somewhere between the WTO's shallow integration approach and a fully deep approach