TiSMoS - a new global trade in services data set
“What the modes of supply can tell us“
Overview

1. What is TISMOS?
   - Approach
   - Purpose

2. BOP and FATS datasets

3. The “enhanced simplified approach”

4. Build a complete FATS dataset

5. Bridge table and results

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WTO Trade in Services Data Hub

Datasets

**Total trade in services (UNCTAD, ITC and WTO)**
All countries, 2005-18, 12 categories

**Balanced bilateral trade in services**

**Trade in Services by mode of supply**
Experimental dataset, 2005-17
66 EBOPS2010 items
Datasets

**Total trade in services (UNCTAD, ITC and WTO)**
All countries, 2005-18, 12 categories

**Balanced bilateral trade in services**

**Trade in Services by mode of supply**
Experimental dataset, 2005-17
66 EBO PS2010 items

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GATS Modes of Supply and Statistical Domains

The simplified approach

- Mode 1
- Mode 2
- Mode 3
- Mode 4

Balance of Payments

Services Statistics

Mode 4
Remittances and compensation of employees are not measures of mode 4 trade

Foreign Affiliate Statistics

FATS

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Supply of Services by Modes

2011 Statistical Approximation

<table>
<thead>
<tr>
<th>Modes of supply</th>
<th>Estimated share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-border transactions (mode 1)</td>
<td>30%</td>
</tr>
<tr>
<td>Consumption abroad (mode 2)</td>
<td>10%</td>
</tr>
<tr>
<td>Commercial presence in another country (mode 3)</td>
<td>55%</td>
</tr>
<tr>
<td>Presence of individuals in another country (mode 4)</td>
<td>Less than 5%</td>
</tr>
<tr>
<td>(approx. 220 billion USD)</td>
<td></td>
</tr>
</tbody>
</table>

A. Maurer, S. Wettstein, WTO, 29 November 2019
Building TiSMoS: the approach

- **Existing BOP data**
  - Estimation of missing information
  - Allocation by mode
  - Individual country experiences
  - Refinements

- **Existing FATS data**
  - MSITS simplified allocation table
  - EBOPS-ISIC bridge table

Additional data sources (tourism, TEC, STEC...)

Final TiSMoS dataset

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To create and maintain an experimental dataset on international trade in services by mode of supply:
- Based on reported data by national authorities to the extent possible
- Complemented with estimations, as close as possible to MSITS2010 recommendations

Possible applications:
- Orient trade negotiating strategies => commitments under most trade agreements specified according to the four modes of supply
- Monitoring: Better understand world trade developments
- Respond to analytical questions => looking for economic mechanisms, estimating impacts (e.g. effects of RTAs, regulatory heterogeneity, etc.)
**Aims**

Include “all services” as covered by GATS

**#1 Starting point:**
WTO/UNCTAD/ITC dataset
- Imports and exports for 200+
- Reporter countries
- With partner world
- From 2005 to 2017
- 66 services items

**#2 Complete dataset by imputing missing data**
- Simple derivations (using item-subitem relationship), interpolations for missing information within time series
- Average share is used to estimate completely missing breakdowns
  - Mirror Statistics
  - Clusters of similar countries

**Top-down approach**
- Total commercial services
  - goods-related services
  - Travel
  - Transport
  - other commercial services

*already complete in base data*

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Adjustments needed to meet the scope of supply services as defined by the GATS

#3 Disentangling the goods from travel
Goods component estimated using
• Alternative breakdown (SD1)
  For 15 economies
• Internal tourism consumption data (OECD)
Goods component removed from items in the presentation of travel
-6.5% Total commercial services is reduced by around 6.5%

#4 Construction
Construction item is adjusted
• Total construction (SE) recalculated
• Identification of goods not possible
• Only cross-border transactions kept
  $E \text{ exports} = \text{construction abroad (SE1) exports}$
  $SE \text{ imports} = \text{construction in rep. economy (SE2) imports}$
• Both allocated to modes 3 & 4 (50%)
-25% This correction reduces total construction by around 25%

#5 Distribution services
• Trade-related services (SJ 34)
Separately estimated and added in
• Trade margins included in goods’ value
• Figures sourced from OECD TEC
• Figures sourced from Eurostat Structural Business Statistics
  $DS$ allocated Mode 1
• Added to total commercial services
+25% This correction increases M1 by 25% in value terms

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## BOP and simplified allocation (extract)

<table>
<thead>
<tr>
<th>Indicator code</th>
<th>Item EBOPS</th>
<th>DEFAULT ALLOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJ1</td>
<td>Research and development services</td>
<td>M1: 75%, M4: 25%</td>
</tr>
<tr>
<td>SJ2</td>
<td>Professional and management consulting services</td>
<td>M1: 75%, M4: 25%</td>
</tr>
<tr>
<td>SJ21</td>
<td>Legal, accounting, management, consulting and public relations</td>
<td>M1: 75%, M4: 25%</td>
</tr>
<tr>
<td>SJ22</td>
<td>Advertising, market research, public opinion polling</td>
<td>M1: 75%, M4: 25%</td>
</tr>
<tr>
<td>SJ3</td>
<td>Technical, trade-related, and other business services</td>
<td>M1: 75%, M4: 25%</td>
</tr>
<tr>
<td>SJ31</td>
<td>Architectural, engineering, scientific and other technical services</td>
<td>M1: 75%, M4: 25%</td>
</tr>
<tr>
<td>SJ311</td>
<td>Architectural services</td>
<td>M1: 75%, M4: 25%</td>
</tr>
<tr>
<td>SJ312</td>
<td>Engineering services</td>
<td>M1: 75%, M4: 25%</td>
</tr>
<tr>
<td>SJ313</td>
<td>Scientific and other technical services</td>
<td>M1: 75%, M4: 25%</td>
</tr>
<tr>
<td>SJ32</td>
<td>Waste treatment and de-pollution, agricultural and mining services</td>
<td>M1: 50%, M4: 50%</td>
</tr>
<tr>
<td>SJ33</td>
<td>Operating leasing services</td>
<td>M1: 100%</td>
</tr>
<tr>
<td>SJ34</td>
<td>Trade-related services</td>
<td>M1: 100%</td>
</tr>
<tr>
<td>SJ35</td>
<td>Other business services n.i.e.</td>
<td>M1: 75%, M4: 25%</td>
</tr>
</tbody>
</table>

- **For the majority of reporters**
  BOP trade values are distributed among modes following the Simplified Allocation

- **The Simplified Allocation**
  - Each (detailed) service item is allocated to one dominant mode, or, where there are no dominant mode, to the most significant modes of supply
  - e.g. computer services M1: 75%, M4: 25%
### BOP and simplified allocation - "enhanced"

<table>
<thead>
<tr>
<th>Indicator code</th>
<th>Item EBOPS</th>
<th>DEFAULT ALLOCATION</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>SJ1</td>
<td>Research and development services</td>
<td>75 25</td>
<td>59 41</td>
</tr>
<tr>
<td>SJ2</td>
<td>Professional and management consulting services</td>
<td>75 25</td>
<td>77 23</td>
</tr>
<tr>
<td>SJ21</td>
<td>Legal, accounting, management, consulting and public relations</td>
<td>75 25</td>
<td>... ...</td>
</tr>
<tr>
<td>SJ22</td>
<td>Advertising, market research, public opinion polling</td>
<td>75 25</td>
<td>78 22</td>
</tr>
<tr>
<td>SJ3</td>
<td>Technical, trade-related, and other business services</td>
<td>... ...</td>
<td>... ...</td>
</tr>
<tr>
<td>SJ31</td>
<td>Architectural, engineering, scientific and other technical services</td>
<td>75 25</td>
<td>... ...</td>
</tr>
<tr>
<td>1</td>
<td>Architectural services</td>
<td>75 25</td>
<td>80 20</td>
</tr>
<tr>
<td>2</td>
<td>Engineering services</td>
<td>75 25</td>
<td>59 41</td>
</tr>
<tr>
<td>3</td>
<td>Scientific and other technical services</td>
<td>... ...</td>
<td>... ...</td>
</tr>
<tr>
<td>SJ32</td>
<td>Waste treatment and de-pollution, agricultural and mining services</td>
<td>50 50</td>
<td>... ...</td>
</tr>
<tr>
<td>SJ33</td>
<td>Operating leasing services</td>
<td>100</td>
<td>... ...</td>
</tr>
<tr>
<td>SJ34</td>
<td>Trade-related services</td>
<td>100</td>
<td>... ...</td>
</tr>
<tr>
<td>SJ35</td>
<td>Other business services n.i.e.</td>
<td>75 25</td>
<td>... ...</td>
</tr>
</tbody>
</table>

- Results of individual case studies incorporated:
  - United States
  - France
  - Finland
  - Spain
  - Colombia
  - India
International supply of services through Mode 3 approximated by FATS output (or sales)

#1 GATS refers to all foreign-controlled enterprises
FATS does not include minority-owned affiliates (level of ownership between 10 and 50%)

Solution: National data compilation

#2 Product vs activities
FATS classifies companies by primary activity and not by product

Solution: Exclude exports from total output/sales

#3 Goods Vs. Services
The output, which contain only the trade margin realized on goods purchased for resale, is used for two services activities

Solution: output variable

#4 Double-counting of trade flows
There exists the possibility of double counting because some affiliates’ exports may be captures by international trade in BOP

Solution: Exclude exports from total output/sales
Step 1. Assess initial data availability & derive all possible values from the dataset

1. Merge existing FATS data: Eurostat, OECD, national sources
   13 service sectors ISIC Rev. 4 Sections F to S, excluding O

2. Break in series (NACE Rev. 1 and NACE Rev. 2) + other methodological changes

3. Output is a superior measure of the service supply (MSITS 2010, § 5.65)
   Wholesale and retail trade; repair of motor vehicles and motorcycles
   Financial and insurance activities sales in inward
Step 2. Dataset preparation, imputation and estimations

1. Exploit mirror data

2. Impute zeros when FDI stocks are zeroes (Eurostat/IMF CDIS/OECD)

3. Develop a complete FATS dataset for countries that report some FATS (partner world)

4. Data gaps in the reported time series are extrapolated (back/forecasting and interpolation) using the growth rate obtained by the model predictions.

\[
\ln(FATS_{rit}) = \alpha_0 + \beta_0 poly_t + \beta_1 \ln(gdps_{rit}) + \beta_2 \ln(BoF_{rit}) + \\
\gamma_1 \ln(gdps_{rit}) + \gamma_2 \ln(BoF_{rit}) + \\
\delta_f \ln(gdps_{rit}) + \delta_f \ln(BoF_{rit}) + \gamma_i + \delta_f + \varepsilon_{rit}
\]

5. Gravity models to estimate missing sectors
## PORTUGAL, INWARD FATS SALES (MIO USD)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>1,820</td>
<td>1,735</td>
<td>2,085</td>
<td>4,606</td>
<td>4,685</td>
<td>4,767</td>
<td>4,318</td>
<td>2,821</td>
<td>2,594</td>
<td>2,420</td>
<td>1,871</td>
<td>1,447</td>
<td>1,595</td>
</tr>
<tr>
<td>Wholesale and retail trade; repair</td>
<td>8,482</td>
<td>8,481</td>
<td>10,342</td>
<td>13,181</td>
<td>12,012</td>
<td>11,264</td>
<td>10,992</td>
<td>9,429</td>
<td>9,569</td>
<td>10,336</td>
<td>9,026</td>
<td>9,453</td>
<td>10,488</td>
</tr>
<tr>
<td>Transport and storage</td>
<td>1,697</td>
<td>1,988</td>
<td>2,473</td>
<td>2,782</td>
<td>2,331</td>
<td>2,586</td>
<td>2,659</td>
<td>2,256</td>
<td>2,705</td>
<td>3,189</td>
<td>2,704</td>
<td>2,870</td>
<td>3,336</td>
</tr>
<tr>
<td>Accommodation and food services</td>
<td>519</td>
<td>659</td>
<td>780</td>
<td>908</td>
<td>870</td>
<td>804</td>
<td>840</td>
<td>714</td>
<td>715</td>
<td>816</td>
<td>749</td>
<td>848</td>
<td>972</td>
</tr>
<tr>
<td>Information and communication</td>
<td>2,409</td>
<td>2,873</td>
<td>3,453</td>
<td>4,014</td>
<td>3,715</td>
<td>3,422</td>
<td>3,412</td>
<td>2,908</td>
<td>2,812</td>
<td>3,099</td>
<td>4,822</td>
<td>4,913</td>
<td>5,114</td>
</tr>
<tr>
<td>Financial intermediation</td>
<td>831</td>
<td>990</td>
<td>4,087</td>
<td>13,189</td>
<td>13,083</td>
<td>12,717</td>
<td>10,547</td>
<td>7,725</td>
<td>7,775</td>
<td>11,645</td>
<td>9,957</td>
<td>11,040</td>
<td>11,506</td>
</tr>
<tr>
<td>Real estate activities</td>
<td>192</td>
<td>874</td>
<td>1,037</td>
<td>995</td>
<td>1,152</td>
<td>955</td>
<td>848</td>
<td>717</td>
<td>779</td>
<td>833</td>
<td>819</td>
<td>860</td>
<td>929</td>
</tr>
<tr>
<td>Professional, scientific &amp; technical activities</td>
<td>1,036</td>
<td>1,189</td>
<td>1,508</td>
<td>1,910</td>
<td>1,714</td>
<td>1,643</td>
<td>1,533</td>
<td>1,373</td>
<td>1,605</td>
<td>1,725</td>
<td>1,485</td>
<td>1,539</td>
<td>1,789</td>
</tr>
<tr>
<td>Administrative and support activities</td>
<td>1,908</td>
<td>2,214</td>
<td>2,755</td>
<td>3,344</td>
<td>3,302</td>
<td>3,054</td>
<td>3,201</td>
<td>2,863</td>
<td>2,801</td>
<td>3,067</td>
<td>2,588</td>
<td>2,904</td>
<td>3,341</td>
</tr>
<tr>
<td>Education</td>
<td>14</td>
<td>16</td>
<td>15</td>
<td>15</td>
<td>17</td>
<td>19</td>
<td>24</td>
<td>27</td>
<td>31</td>
<td>52</td>
<td>34</td>
<td>45</td>
<td>52</td>
</tr>
<tr>
<td>Health and social work</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>8</td>
<td>15</td>
<td>10</td>
<td>7</td>
<td>15</td>
<td>15</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>Arts, entertainment and recreation</td>
<td>6</td>
<td>8</td>
<td>16</td>
<td>27</td>
<td>27</td>
<td>24</td>
<td>35</td>
<td>31</td>
<td>27</td>
<td>30</td>
<td>21</td>
<td>37</td>
<td>63</td>
</tr>
<tr>
<td>Other service activities</td>
<td>6</td>
<td>5</td>
<td>8</td>
<td>11</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>9</td>
<td>6</td>
<td>37</td>
<td>20</td>
<td>43</td>
<td>29</td>
</tr>
<tr>
<td>Total services</td>
<td>18,923</td>
<td>21,033</td>
<td>28,563</td>
<td>45,619</td>
<td>42,924</td>
<td>41,272</td>
<td>38,433</td>
<td>30,883</td>
<td>31,426</td>
<td>37,265</td>
<td>34,111</td>
<td>36,015</td>
<td>39,237</td>
</tr>
</tbody>
</table>

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Step 3.

Construction of the complete dataset

Step 3. Develop a complete FATS dataset for countries with no available data

Gravity models fit to predict bilateral sales for inward and outward and for each sector

For a total of 26 regressions using Poisson Pseudo Maximum Likelihood (PPML)

\[
FATS_{rst} = \alpha_0 + \beta_1 year_t + \beta_2 \ln(BoP_{rt}) + \beta_3 \ln(gdps_{rt}) + \beta_4 \ln(gdps_{st}) + \beta_5 \ln(GDPpc_{rt}) + \beta_6 \ln(GDPpc_{st}) + \beta_7 \ln(dist_{rs}) + \beta_8 colony_{rs} + \beta_9 contig_{rs} + \beta_{10} comlang_{rs} + \varepsilon_{rst}
\]

where \( FATS_{rst} \): foreign affiliates sales, host country \( r \), in country \( s \) in year \( t \), and \( \varepsilon_{rst} \): the error term.

Derive partner world by summing up values for all partners

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Step 4.

Construction of the complete dataset

Step 4. Estimate local sales – inward

Estimate of exports by foreign-owned firms

Countries averages: clustered for IWA and OWA

Table 11: Available information on output sold locally

**Inward**

<table>
<thead>
<tr>
<th>FATS - national source</th>
<th>Canada</th>
<th>Estonia</th>
<th>Austria</th>
<th>Denmark</th>
<th>United States</th>
<th>Zambia</th>
</tr>
</thead>
<tbody>
<tr>
<td>FATS - OECD</td>
<td>Germany</td>
<td>Israel</td>
<td>Italy</td>
<td>Japan</td>
<td>Sweden</td>
<td>Spain</td>
</tr>
<tr>
<td>STEC</td>
<td>Austria</td>
<td>Belgium</td>
<td>Czech Republic</td>
<td>Estonia</td>
<td>Finland</td>
<td>Luxembourg</td>
</tr>
</tbody>
</table>

**Outward**

<table>
<thead>
<tr>
<th>FATS - national source</th>
<th>Estonia</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>FATS - OECD</td>
<td>Czech Republic</td>
<td>Italy, Slovenia, Japan</td>
</tr>
<tr>
<td>STEC</td>
<td>Not applicable</td>
<td></td>
</tr>
</tbody>
</table>
Step 5. Balancing of inward and outward flows

Two distinct FATS datasets are built for inward and outward.

Large asymmetries arise between the two flows when the data are aggregated for all reporters (i.e. when the total "world" figures are built):
- Level of total services the inward figures are about 25 to 30% higher than the outward ones.
- Heterogeneity across sectors.

These asymmetries are balanced in TiSMoS (and in the accompanying FATS dataset) by benchmarking the final values to the outward "world" totals for:
- Education;
- Health and social work;
- Arts, entertainment and recreation and other service activities.

And to the inward "world" totals for all the remaining sectors.

Only estimated values are rescaled (no reported figure has been changed).
## Bridge table – transformed EBOPS

<table>
<thead>
<tr>
<th>EBOPS-like code</th>
<th>Description</th>
<th>ISIC CODE</th>
<th>ISIC description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA</td>
<td>Manufacturing services on physical inputs owned by others</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SB</td>
<td>Maintenance and repair services not included elsewhere</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>Transport</td>
<td>H</td>
<td>Transport and Storage</td>
</tr>
<tr>
<td>SDB1SK21</td>
<td>Health services</td>
<td>Q</td>
<td>Human health and social work activities</td>
</tr>
<tr>
<td>SDB2SK22</td>
<td>Education services</td>
<td>P</td>
<td>Education</td>
</tr>
<tr>
<td>SDASDB3</td>
<td>Tourism and business travel</td>
<td>I</td>
<td>Accommodation and food service activities</td>
</tr>
<tr>
<td>SE</td>
<td>Construction</td>
<td>F</td>
<td>Construction</td>
</tr>
<tr>
<td>SFSG</td>
<td>Insurance and financial services</td>
<td>K</td>
<td>Financial and insurance activities</td>
</tr>
<tr>
<td>SH</td>
<td>Charges for the use of intellectual property n.i.e.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SISK1</td>
<td>Telecommunications, computer, information and audiovisual services</td>
<td>J</td>
<td>Information and Communication</td>
</tr>
<tr>
<td>SJXSJ34</td>
<td>Other business services (excluding trade-related)</td>
<td>L+M+N</td>
<td>Real estate, Professional, scientific and technical activities, Administrative and support service activities.</td>
</tr>
<tr>
<td>SK23</td>
<td>Heritage and recreational services</td>
<td>R</td>
<td>Arts, entertainment and recreation</td>
</tr>
<tr>
<td>SK24</td>
<td>Other personal services</td>
<td>S</td>
<td>Other service activities</td>
</tr>
<tr>
<td>SWSJ34</td>
<td>Trade-related services (Distribution)</td>
<td>G</td>
<td>Wholesale and retail trade; repair of motor vehicl. and motorcycl.</td>
</tr>
</tbody>
</table>

### Key points
- EBOPS – product based classification and FATS follow a breakdown by activity
- No clear-cut exists
- GATS refers to services as product
- New EBOPS-like classification
- Health-related services as a new item
- Education-related services as a new item
Trade in commercial services
by modes of supply, 2016

Mode 3 accounts for 58%

Mode 3 accounts for 60%

Mode 3 accounts for 57%

Cross-border transactions (mode 1)
Consumption abroad (mode 2)
Commercial presence in another country (mode 3)
Presence of individuals in another country (mode 4)
World trade in commercial services

By mode of supply and by services sector, 2016

Mode 3 is estimated
Bn USD 7,297
Mode 3 accounts for 59%

Other business services (excluding trade-related)
Insurance and financial services
Trade-related services (Distribution)
Telecommunications, computer, information...
Transport
Tourism and business travel
Construction
Charges for the use of intellectual property n.i.e.
Education services
Other personal services
Heritage and recreational services
Health services

A. Maurer, S. Wettstein, WTO, 29 November 2019
World trade by mode of supply – Education

Key points

- Mode 2 is the dominant mode with more than 80%
- Mode 3 is more important than mode 1 in 2017
- Mode 4 has the slowest growth
Trade by mode of supply – Education

Top 10 traders

Exports of Education services through M3 in 2016

Exports of Education services through M2 in 2016
Cross-border trade in IP-related services, 2017

Source: WTO estimates (2019).
Note: The European Union is calculated as the sum of the EU member states and includes intra-EU trade.
EU and US cross-border exports

financial and insurance services and
exports through controlled affiliates abroad (mode 3), 2005-17

Source: WTO estimates (2019).

Note: The European Union is calculated as the sum of the 28 EU member states and includes intra-EU trade.
Where to find TISMOS

- Data files, containing the reported and estimated trade values, for imports and exports according to the four modes of supply.
- A codes file, which explains the codes used in the data file for the different variables.
- The methodological paper, which describes how TISMOS was built.
Road ahead

A global trade in services data set by sector and by mode of supply

Short term
- Validate the results
- Receive feedback from people

Long term
- Gather feedback on the data set
- Build consensus on the assumptions made
- Include country experiences
- Improve the estimations

The OECD-WTO Balanced Trade in services database

Only BOP data

Short term
- Apply developed methodology to BPM6
- 12 main EBOPS items
- Balancing

Long term
- Gather feedback
- Validate the data set

A trade in services dataset broken down by modes and by partner

- The bilateral FATS data set will be balanced and adjusted using a quadratic optimization procedure
- TISMOS methodology will be applied on the completed bilateral trade in services data sets
Thank You

Andreas Maurer  
Andreas.Maurer@wto.org

Steen Wettstein  
Steen.Wettstein@wto.org

International Trade Statistics Section (ITSS)  
Economic Research and Statistics Division  
World Trade Organization

For more information on trade statistics, please contact:  
Statistics@wto.org