

Checking GTAP database

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Objective of this presentation

- Outline a TABLO-generated program that spots oddities in the GTAP database
- Give examples of perils that confront practitioners updating a database
- Cite other data sources that enable a quick comparison with GTAP
- Reminder of some publicly available resources for working with GTAP database

Example of GTAP team conscientiousness

- Angel asked me a couple of years ago why indirect taxes on *b_t* were so high for Australia



“With smokers now paying more than \$50 for a packet of cigarettes ...”

Step 1 of *Howler*: convert to few matrices (11a)

Horridge *GTP2Norm.tab* plus expenditure-side GDP – also convert version 7 to 6 for 2017

m17.har in I:\gtapCheck

Header	Type	Dimension	Coeff	Total	Negs	Min	Max	Name
COM	1C	65 length 12						Set COM Commodities
COST	1C	74 length 12						Set COST All industry costs
DPSM	RE	REG	DPARSUM	158	0	1.00	1.00	Sum of Distribution Parameters in Household Demand System
EVOA	RE	ENDW_COMM*REG	EVOA	57940156	0	0.190	6918139	Endowments - Output at Agents' Prices
FAC	1C	8 length 12						Set FAC Primary factors
IND	1C	65 length 12						Set IND Industries
INV	1C	1 length 12						Set CGDS_COMM Investment good
MAKE	RE*	COM*IND*REG	MAKE	158809382	0	0	4428983	MAKE matrix
MAR	1C	3 length 12						Set MAR International trade margin commodities
NATL	RE	COST*SRC*USER*REG*TYP	NATIONAL	239552282	147735	-139655	3017205	GTAP national data
REG	1C	158 length 12						Set REG Regions
SAVE	RE	REG	SAVE	5682245	68	-211680	2584881	Savings - Net Expenditure at Agents' Prices
TRAD	RE*	TRADES*COM*REG*REG	TRADE	22450999	107575	-2371	165646	GTAP trade data
TRD	1C	6 length 12						Set TRADES Basic, exptax, imptax, margins
USER	1C	68 length 12						Set USER All local users
VDEP	RE	REG	VDEP	14845503	0	18.4	2927538	Capital Stock - Value of Depreciation
VKB	RE	REG	VKB	371137592	0	459	73188456	Capital Stock - Value at Beginning-of-Period
VST	RE	MARG_COMM*REG	VST	625091	0	0.000	39825	Trade - Exports for International Transportation, Market Prices

Step 2: *Howler* search “*NATL*” for oddities

```
Formula (all,r,REG)GDPfac17(r)=  
sum{f,Factors, sum{u,Ind,sum{t,Typ, NATIONAL(f,"dom",u,r,t)}}};
```

```
(all,c,COST)(all,s,SRC)(all,u,USER)(all,r,REG)(all,t,TYP)HwLRnat17(c,s,u,r,t)=  
if{ABS(NATIONAL(c,s,u,r,t))/GDPfac17(r)>0.4,1};
```

```
Write HwLRnat17 to file Outfile header "Hw17"  
longname "Howlers in IO cells, cell >40% of GDP =1, 2017";
```

- The header *HW17* sets a low bar for howlers: an individual cell in the 5 dimension NATIONAL matrix must exceed 40% of GDP to be non-zero

Sufficiently few in number that we can inspect

- Panama construction input to investment: (>40% of GDP) possible but large
- Luxembourg: import financial services nec *ofi* input to *ofi* possibly excessive
- Malawi: fruit & vegetables v_f to HOU: most likely excessive
- Haiti: several checks indicate that present GTAP has disproportionately small activity

Version 11c:

- Panama, Malawi & Luxembourg outliers remain
- Haiti fixed

Lower the cell threshold to 20% of GDP

- When we lower the threshold to 20% of GDP, the number of non-zero cells in the 5D matrix increases to 37 (in earlier version, it was 55 – improvement)
- In 6 very poor countries, v_f/GDP exceeds 20% -- *hti, lao, caf, mwi, rwa, xac* – this may be realistic *Haiti fixed*
- Wary of data for “rest of” regions such as *xac*

Binary marker on oddities: cells >20% of GDP

The image displays three overlapping screenshots of the 'Howler.har' software interface, which is used for analyzing binary markers. The main window shows a table with columns for various markers (H217, HWLRnat17, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19) and rows for different coefficients (49 cns: 17, 4 v_f: 8, 62 osg: 2, 44 otn: 2, 9 cti: 1, 57 ofi: 1, 27 tex: 1, 28 wap: 1, 40 ele: 1, 6 c_b: 1, 32 p_c: 1, 16 oil: 1). The interface includes a menu bar (File, Contents, Edit, Sets, Export, Import, History, Search, Aggregation, Programs, Help) and a toolbar with various filters and sorting options.

The first screenshot shows the main window with the 'None' filter selected. The second screenshot shows a zoomed-in view of the 'HWLRnat17' row, highlighting the '1 dom' filter. The third screenshot shows a zoomed-in view of the 'HWLRnat17' row, highlighting the '6 c_b' filter.

Header: H217 Coefficient: HWLRnat17 Size: [cns] [* dom] [* INV] [* Sum over REG]

Header: H217 Coefficient: HWLRnat17 Size: [v f l [* dom] * USER

Header: H217 Coefficient: HWLRnat17 Size: [c_b] [* dom] [* c_b] * REG [* Sum

- Viewhar: **yellow** = transpose **T** **green** = sparse sort **S**

GTAP v UN GDP:

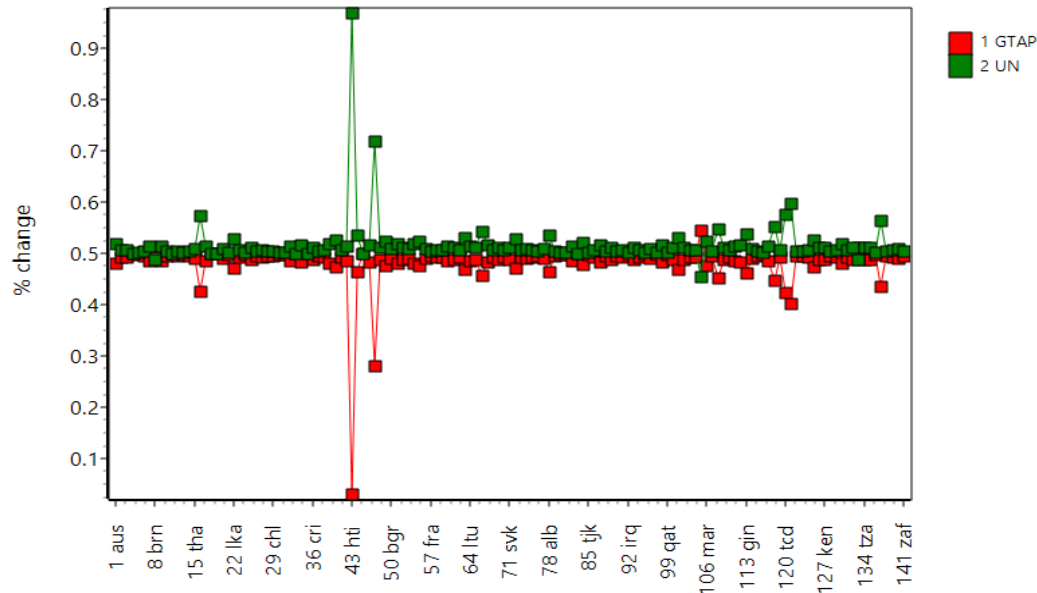
GDP in country c and data source s:

$$\text{GDP}_{cs} = \text{GDP}_{cs} / \sum_s \text{GDP}_{cs}$$

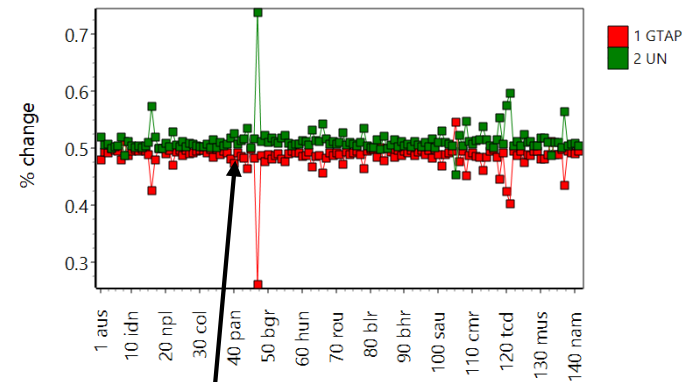
s=GTAP 2017, UN 2017

Viewhar header *COMP*: sum GDP, transpose and select COL

If perfect alignment: both equal 0.5 and graph line would be straight



- Remarkably good alignment with exception of Haiti and *xcb*



- *Haiti fixed in llc*

Haiti

Howler.har in H:\GTAP2017revised

File Contents Edit Sets Export Import History Search Aggregation Programs Help

T None 0 43 hti All Expnd All GTAPun

GDPcomp2017	1 Hou	2 Inv	3 Gov	4 Exports	5 Imports	Total
1 GTAP	487	91	147	218	-458	484
2 UN	14548	2581	1208	1683	-4753	15268
Total	15035	2673	1355	1901	-5211	15753

Header: COMP Coefficient: GDPcomp2017 Size: [hti] * Expnd * GTAPun GTAP v UN

• *Haiti fixed in llc*

Howler.har in H:\GTAP2017revised

File Contents Edit Sets Export Import History Search Aggregation Programs Help

T None 0

GDPcomp2017	1 Hou	2 Inv	3 Gov	4 Exports	5 Imports	Total
1 GTAP	14217	3009	1181	1755	-5873	14288
2 UN	14548	2581	1208	1683	-4753	15268

Vietnam

Howler.har in H:\GTAP2017revised

File Contents Edit Sets Export Import History Search Aggregation Programs Help

T None 0 16 vnm All Expnd All GTAPun

GDPcomp2017	1 Hou	2 Inv	3 Gov	4 Exports	5 Imports	Total
1 GTAP	165298	57780	15813	250891	-274802	214980
2 UN	163179	90892	28515	230042	-222881	289747
Total	328478	148672	44328	480932	-497684	504726

Header: COMP Coefficient: GDPcomp2017 Size: [vnm] * Expnd * GTAPun GTAP v

Singapore

Howler.har in H:\GTAP2017revised

File Contents Edit Sets Export Import History Search Aggregation Programs Help

T None 0 14 sgp All Expnd All GTAPun

GDPcomp2017	1 Hou	2 Inv	3 Gov	4 Exports	5 Imports	Total
1 GTAP	183526	131768	53128	302302	-337032	333691
2 UN	120802	93684	34984	588935	-497447	340958
Total	304328	225452	88112	891236	-834479	674649

Header: COMP Coefficient: GDPcomp2017 Size: [sgp] * Expnd * GTAPun GTAP v UN

Hong Kong

Howler.har in H:\GTAP2017revised

File Contents Edit Sets Export Import History Search Aggregation Programs Help

T None 0 4 hkg All Expnd All GTAPun

GDPcomp2017	1 Hou	2 Inv	3 Gov	4 Exports	5 Imports	Total
1 GTAP	256814	82896	37628	195480	-231433	341384
2 UN	228964	75315	33548	644669	-641225	341271
Total	485778	158211	71176	840149	-872659	682656

Header: COMP Coefficient: GDPcomp2017 Size: [hkg] * Expnd * GTAPun GTAP v UN

GTAP v UN household consumption:

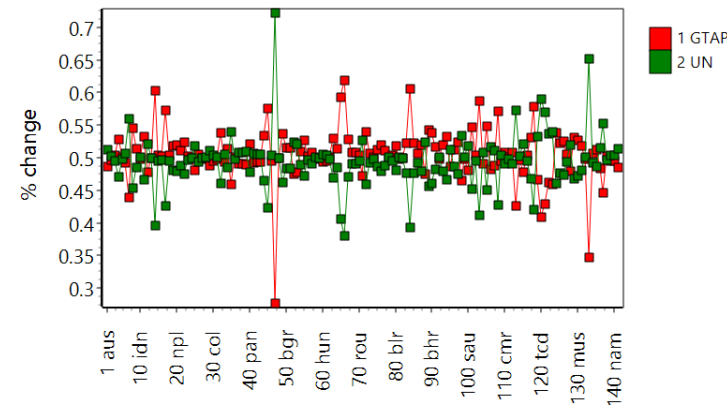
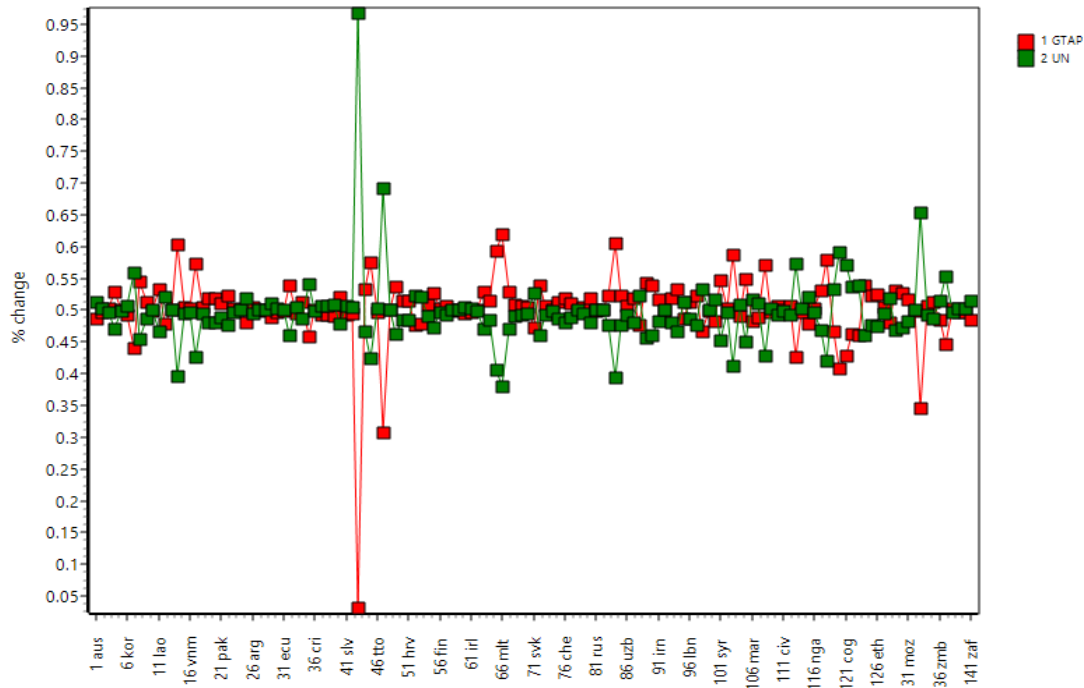
CONR in country c and data source s:

$$\text{CONR}_{cs} = \text{CON}_{cs} / \sum_s \text{CON}_{cs}$$

s=GTAP 2017, UN 2017

- We might expect inconsistencies to grow with, for example, remittances from foreign workers

- Haiti fixed in llc*

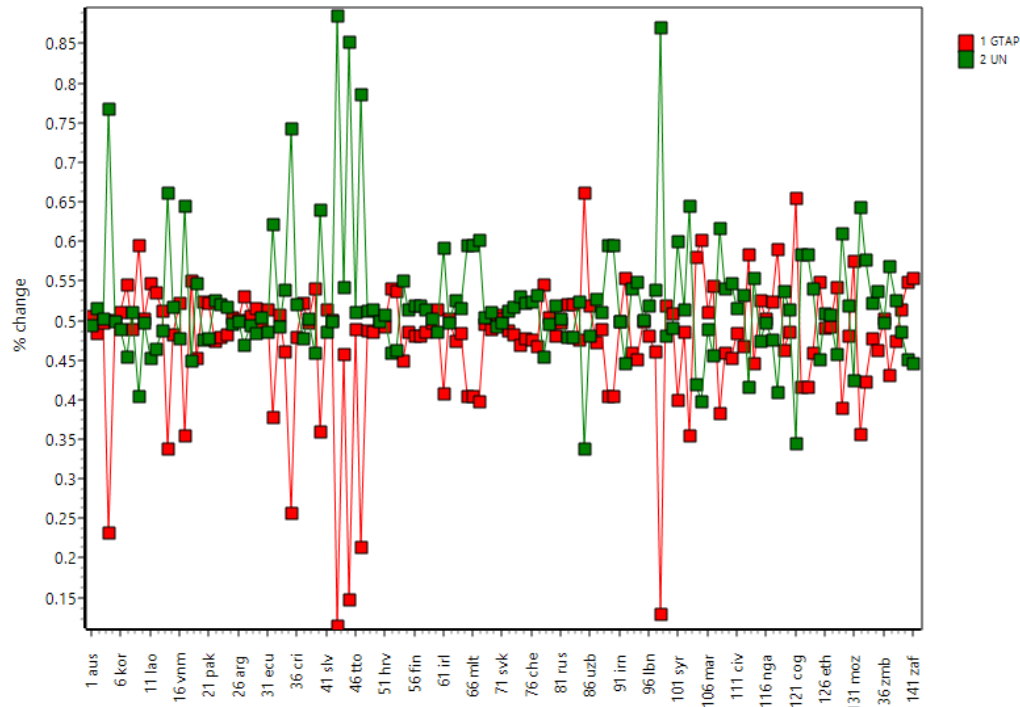


GTAP v UN macro exports:

EXPR in country c and data source s:

$$\text{EXPR}_{cs} = \text{EXP}_{cs} / \sum_s \text{EXP}_{cs}$$

s=GTAP 2017, UN 2017

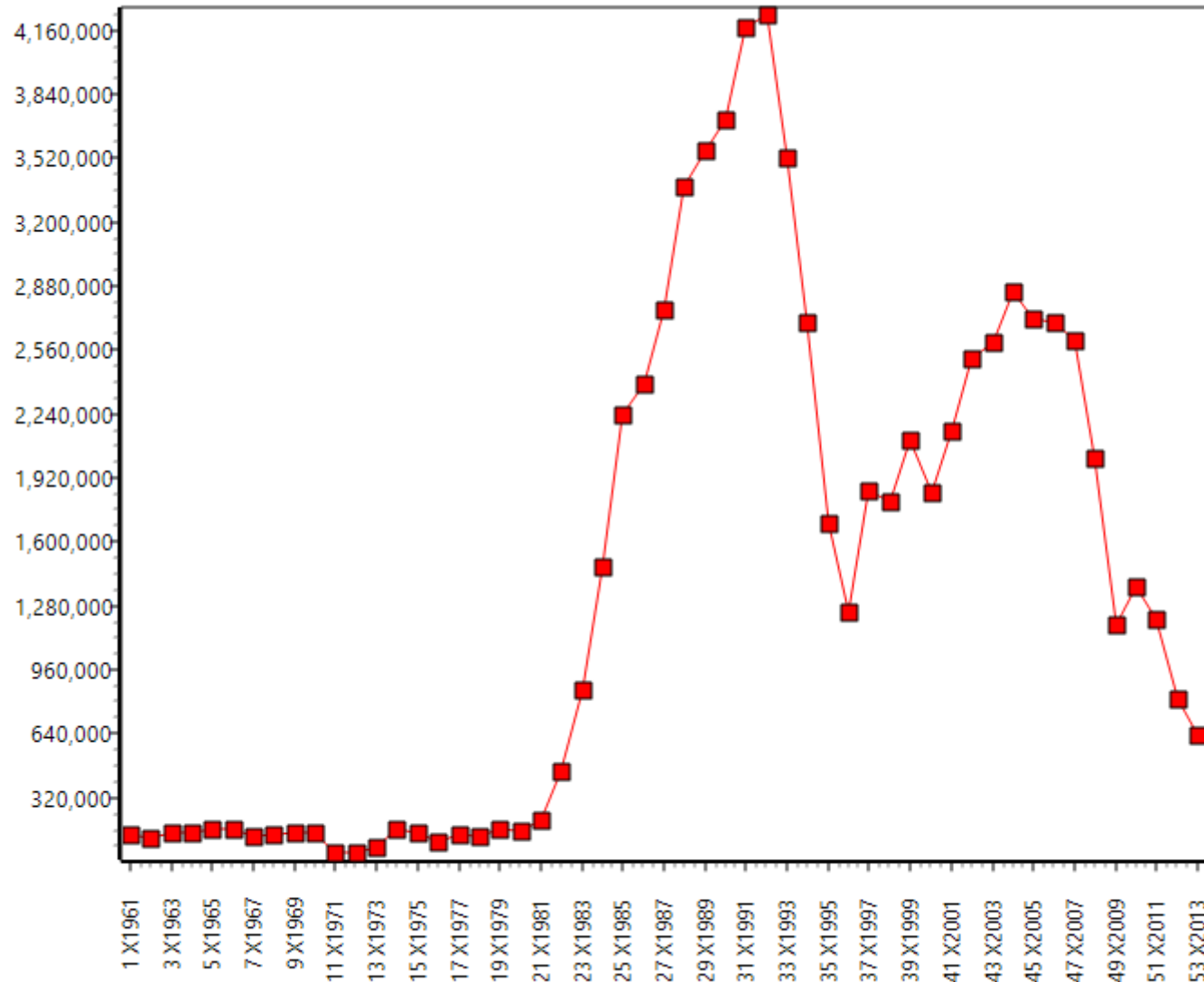


- We need to consider service exports & differences in entrepot treatment

What about comparing values in database in different years?

- The values for 2017 have deflated relative to 2014 using US GDP PI
- In Saudi Arabia, there is a disturbing *modelling* story for GTAP trends into the future. Saudi wheat production fell dramatically leading up to 2014.
Anyone using short- to medium-term trends to predict farm output increases in countries extracting groundwater unsustainably will be shown to be wrong within years, not decades.
- GTAP shows 70% contraction in wheat output in *sau* (2014 to 2017): on the right path – this sort of change is a challenge for database practitioners without specific information

Saudi Arabia wheat production



- FAOstat data: tonnes
- At US\$300t in 2013, output value about \$200m
- GTAP Saudi production \$2bn in 2014, \$619m in 2017
- By late 2030s, expect Australian coal to be the new Saudi wheat

Odd changes between 2014 and 2017 databases

- Dwellings output in Mexico shrank:
\$73bn in 2004, \$124bn in 2014, \$3.8bn in 2017
- Gas production in China: US Energy Information Administration indicates expansion of >10% from 2014 to 2017 – GTAP has shrinkage of 60%
- Other oddities detected with *Howler* in 2023 have been addressed in newest GTAP version: email trail suggests that I communicated with GTAP team in May 2023

What does this imply?

- Many analysts rely heavily on GTAP data
- Example: I wanted to work out the trade share of US wheat exports to nations with significant wheat sector of their own – *hypothetical wheat disease scenario/trade sanctions in single country model*
- It is possible in high income economies for GTAP data to carry errors: *Canada's net imports -5.2% of GDP in GTAP, -2.2% of GDP in UN* [not adjusted in 11c]
- More likely, we might anticipate problems to emerge in database for new entrants to the GTAP database
- *Howler* helps analysts undertake a typical task of assessing the data with which they are working
- Individual user could extend *Howler*: maybe systematic comparison with FAO for crops

Invaluable data & model development resource

www.copsmodels.com/archivep.htm



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CoPS Archive

TPMH0203 This download includes two programs to convert GTAP data from the old v6 format to the new v7 format, and vice versa. For more details see file ReadMe.TXT. Submitted JMH January 2023. [download](#) (150KB).

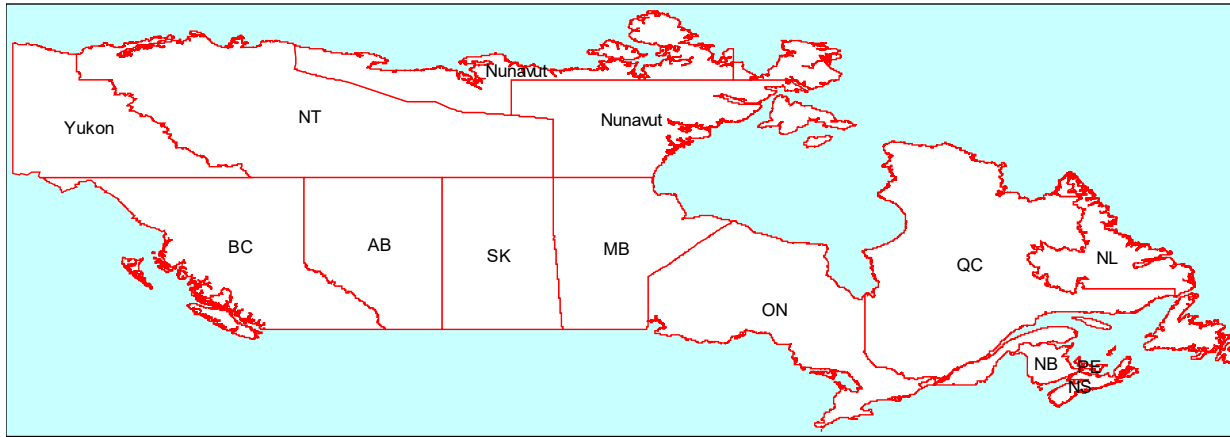
TPMH0186 Contains ORA2GTAP, a TABLO program used to convert a standard ORANI-G data file into the format needed to contribute data to GTAP. So, if you built a single-country ORANI-G model using IO data that was more recent than that used by GTAP, you could easily share your data with GTAP. See file ReadMe.txt. Submitted JMH December 2019. [download](#) (1.06MB).

TPMH0105 This archive contains SplitReg, a set of programs to add new regions to a standard GTAP database. Requires GEMPACK. See file SplitReg.doc. Submitted by Mark Horridge April 2011 (revised April 2016, August 2017). [download](#) (208KB).

TPMH0104 This archive contains GTAPAdjust, a program to adjust flows in (or remove imbalances from) a standard GTAP database. Requires GEMPACK. See file ReadMe.txt. Submitted by Mark Horridge March 2011. [download](#) (543KB).

A final word on Statistics Canada

IO/SUT database Olympics



Statistics Canada: 50 people working on IO



GOLD TO CANADA



ABS





O Canada!
Terre de nos aïeux,
Ton front est ceint de fleurons glorieux.
Car ton bras sait porter l'épée,
Il sait porter la croix.
Ton histoire est une épopée,
Des plus brillants exploits.
Et ta valeur, de foi trempée,
Protégera nos foyers et nos droits.
Protégera nos foyers et nos droits.

