Assessing the Impact of The CETA on Canada's Transportation Network

Mahyar Jahangiriesmaili, University of Toronto
Matthew Roorda, University of Toronto
Chris Bachmann, University of Waterloo

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Civil Engineering
UNIVERSITY OF TORONTO

UTTRI University of Toronto Transportation Research Institute

CETA

- Comprehensive Economic and Trade Agreement
- Between Canada and European Union
- Signed October 2016
- Ratified by European Parliament in February 2017
- Eliminates Tariff Barriers
- Better Access to EU Market

CETA

What are the impacts on the

Transportation System?

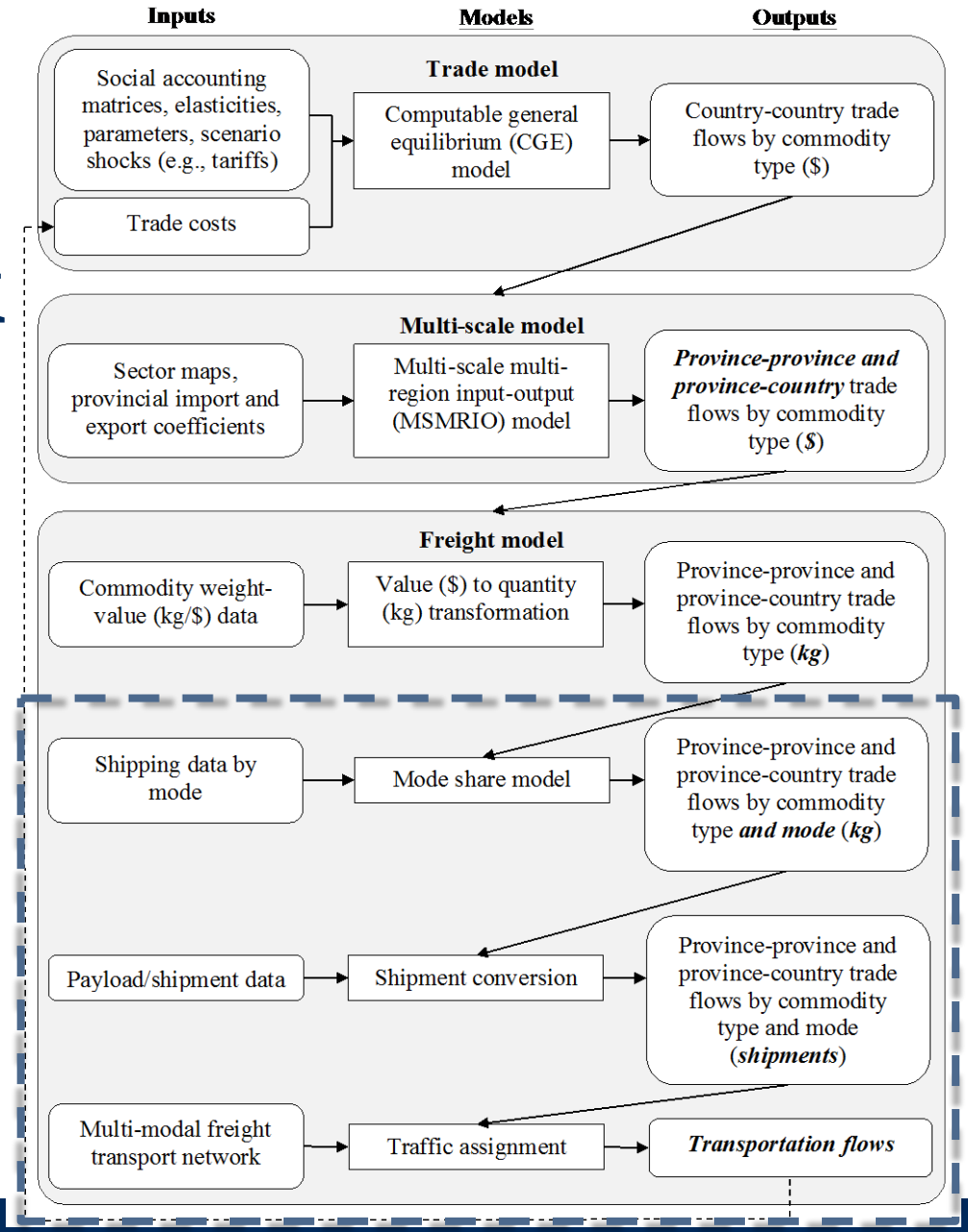
Objective

1. Model intercity freight flows before CETA on Canada's transportation system

2. Model intercity freight flows after CETA on Canada's transportation system

3. Compare the two scenarios

Model Framework

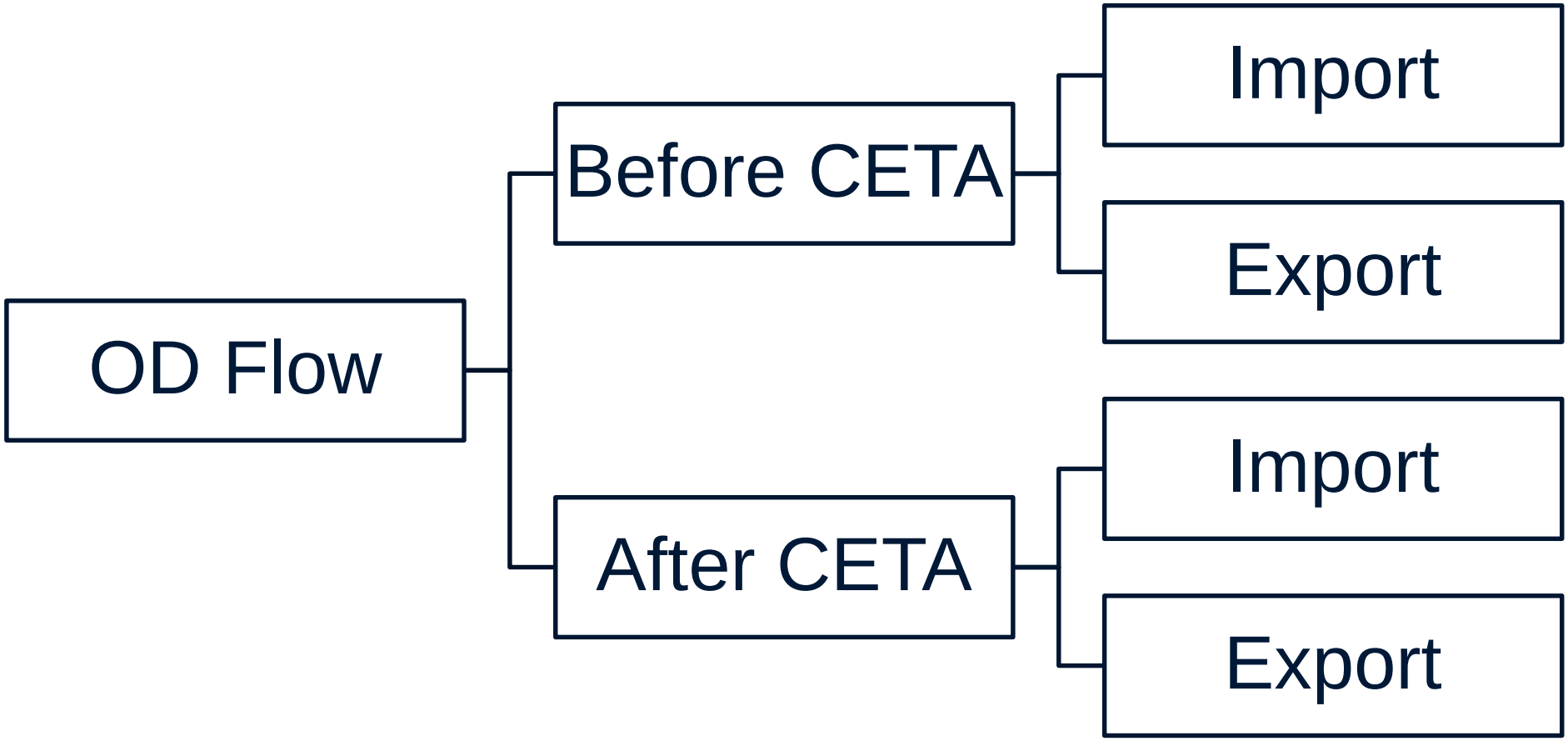


Acquired Data

- 2015 Commodity OD Flow (Bachmann, 2015, 2016)
- 2012 US Commodity Flow Survey Microdata
- Rail Network (MTO)
- Highway Network (ESRI)
- Intermodal Facilities (MTO)

Commodity OD Flow

Database Content



Commodity OD Flow

Database Format

Annual Weight & Value

- GSC-2 Commodity Group
- Province of Origin
- Province of Destination
- Trade Partner
- International Mode of Transport
- Port of Clearance

2012 CFS Microdata

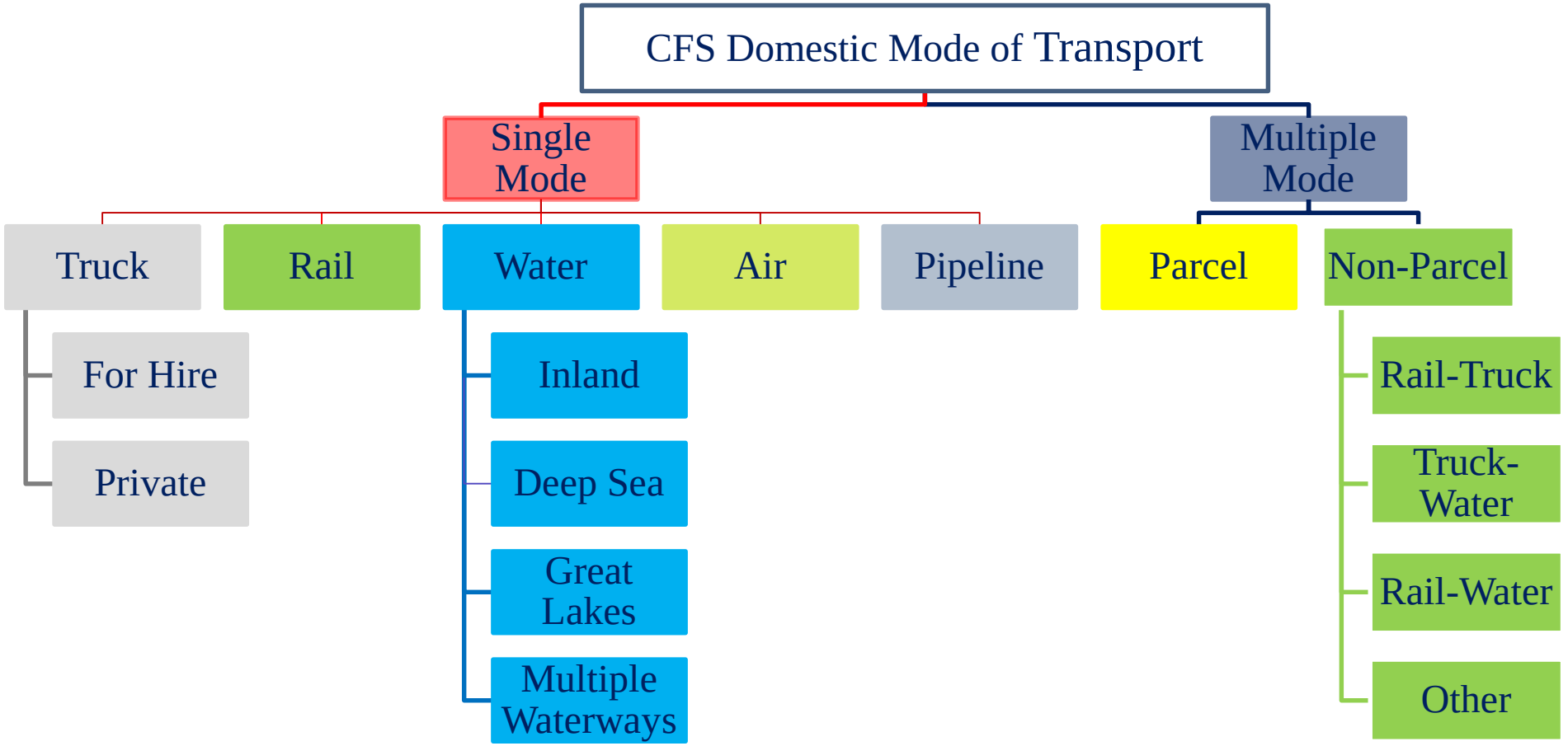
Database Content

OD area	NAICS industry Class	Quarter of the year	SCTG commodity group
Domestic mode of transport	Shipment value	Shipment Weight	Distance (GC and routed)
Hazard material	Local vs. Export	Country of destination	Temperature control commodity

4,547,661 Shipments

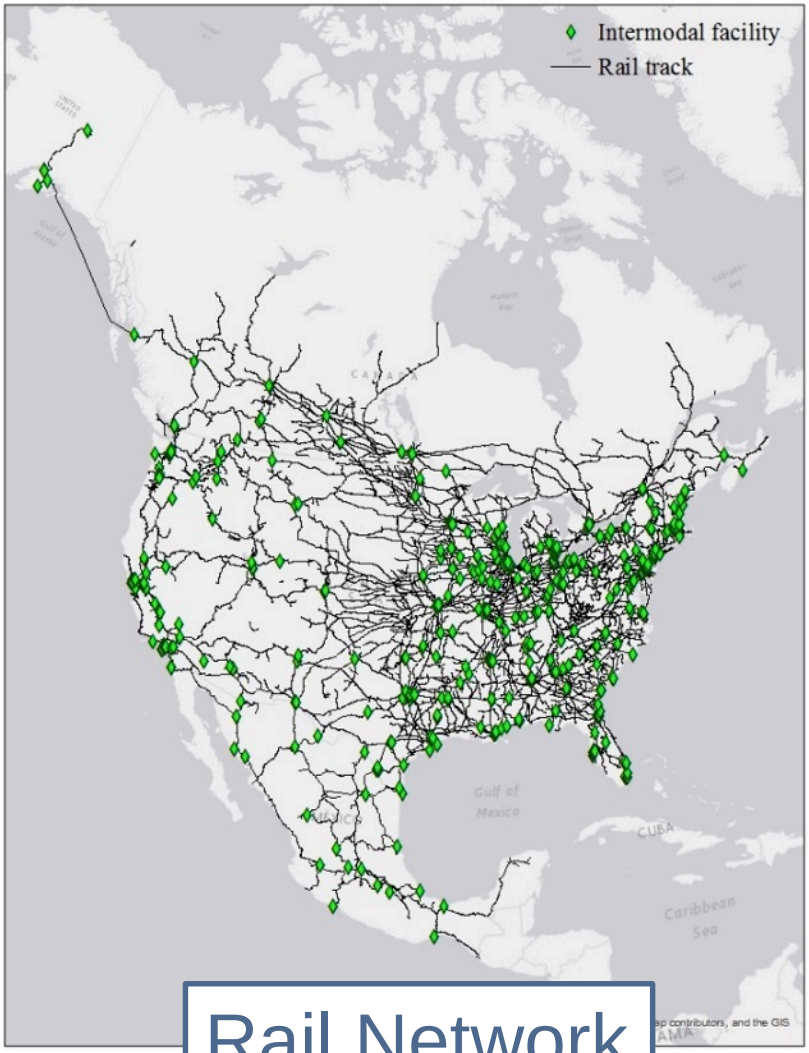
2012 CFS Microdata

Database Mode of Transport Structure

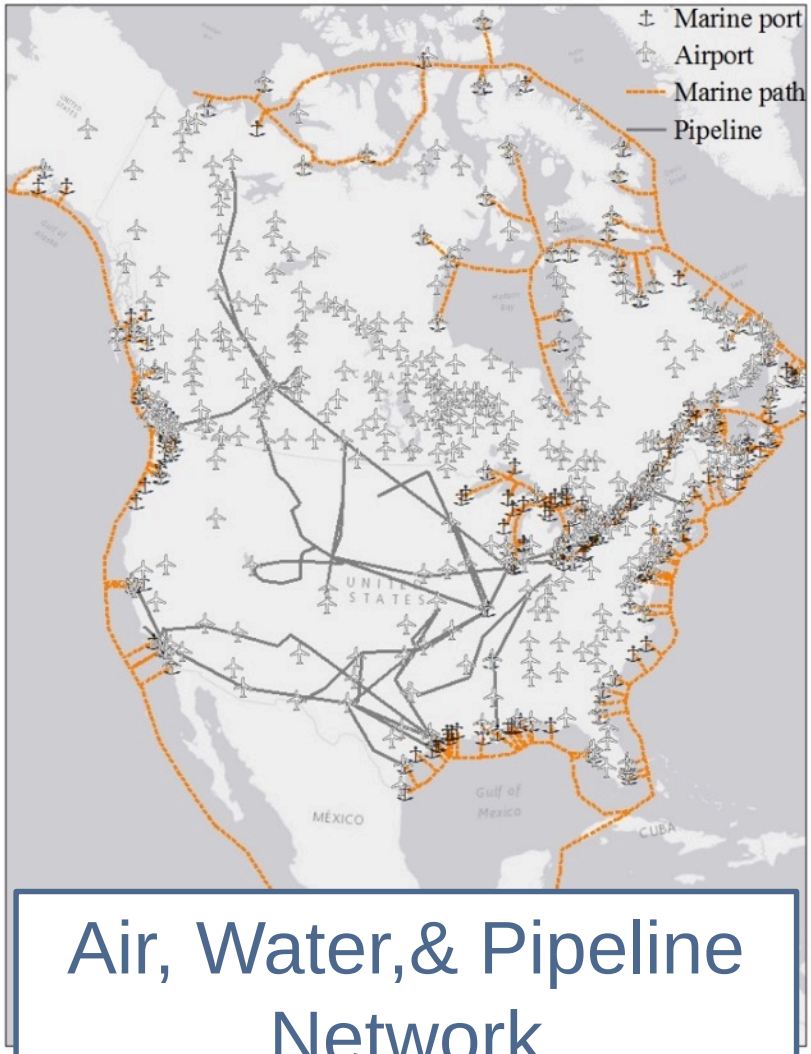


Transportation Network

Database Content



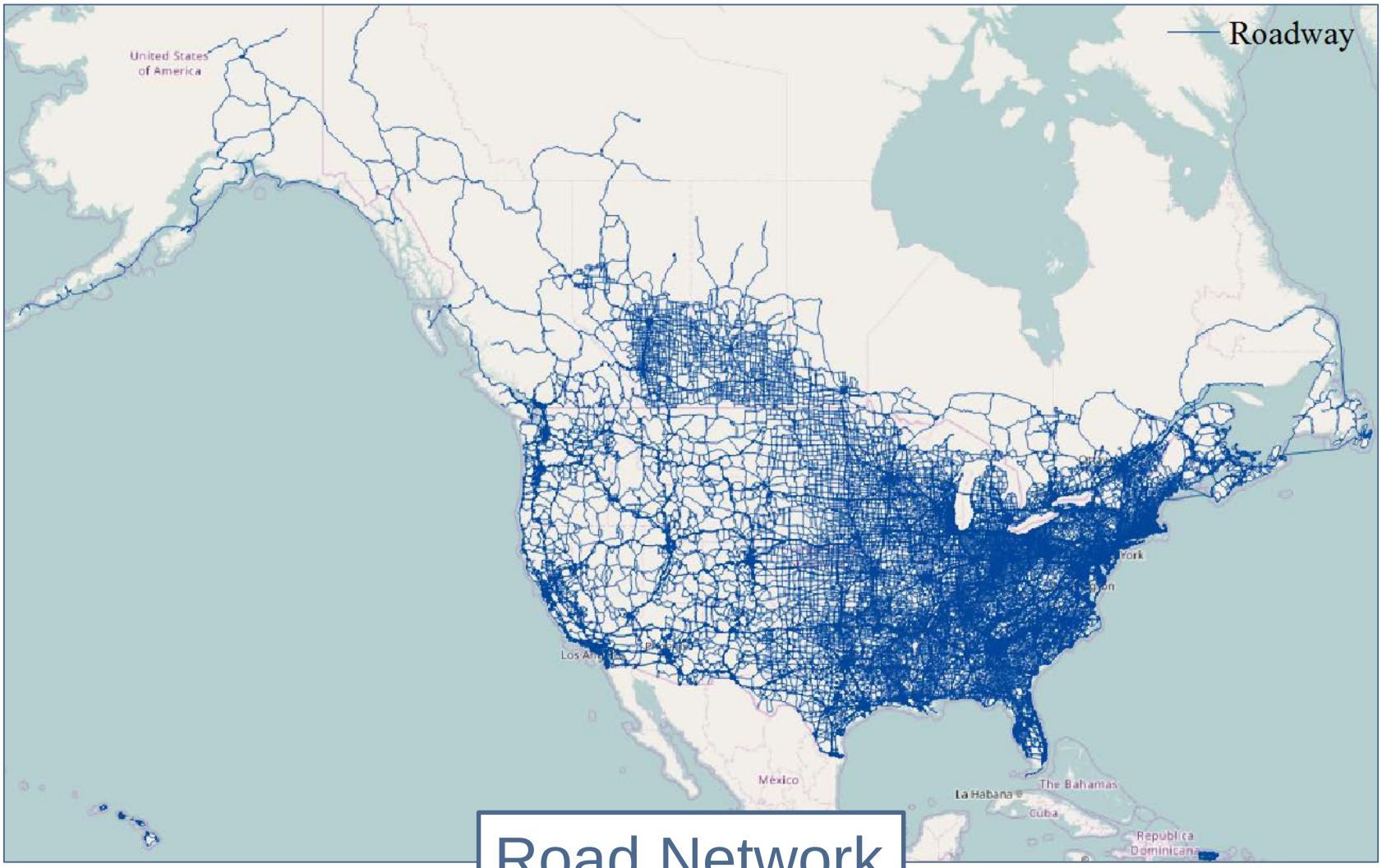
Rail Network



Air, Water,& Pipeline Network

Transportation Network

Database Content

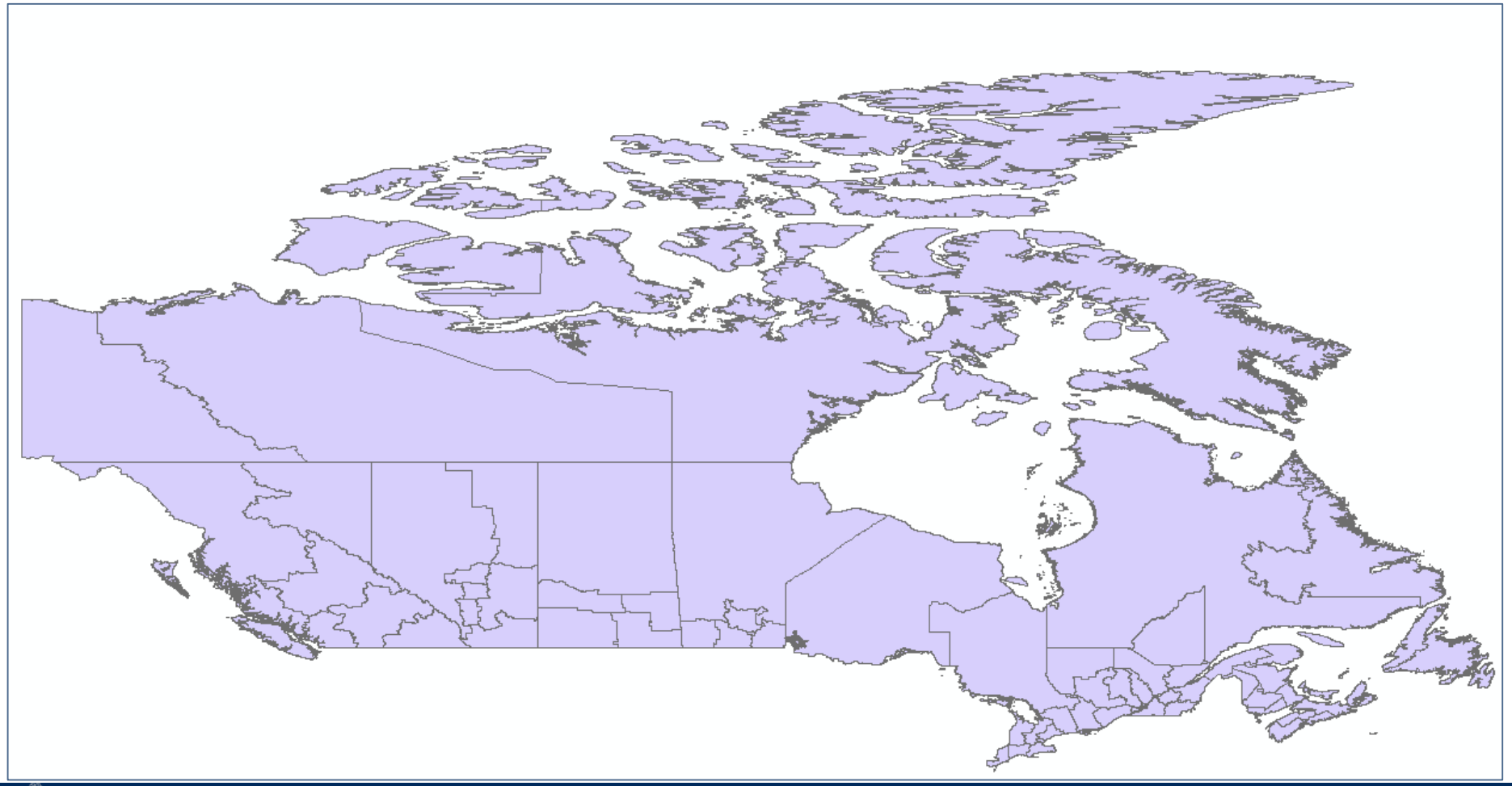


Road Network

Data Adjustment:

Commodity OD Flow

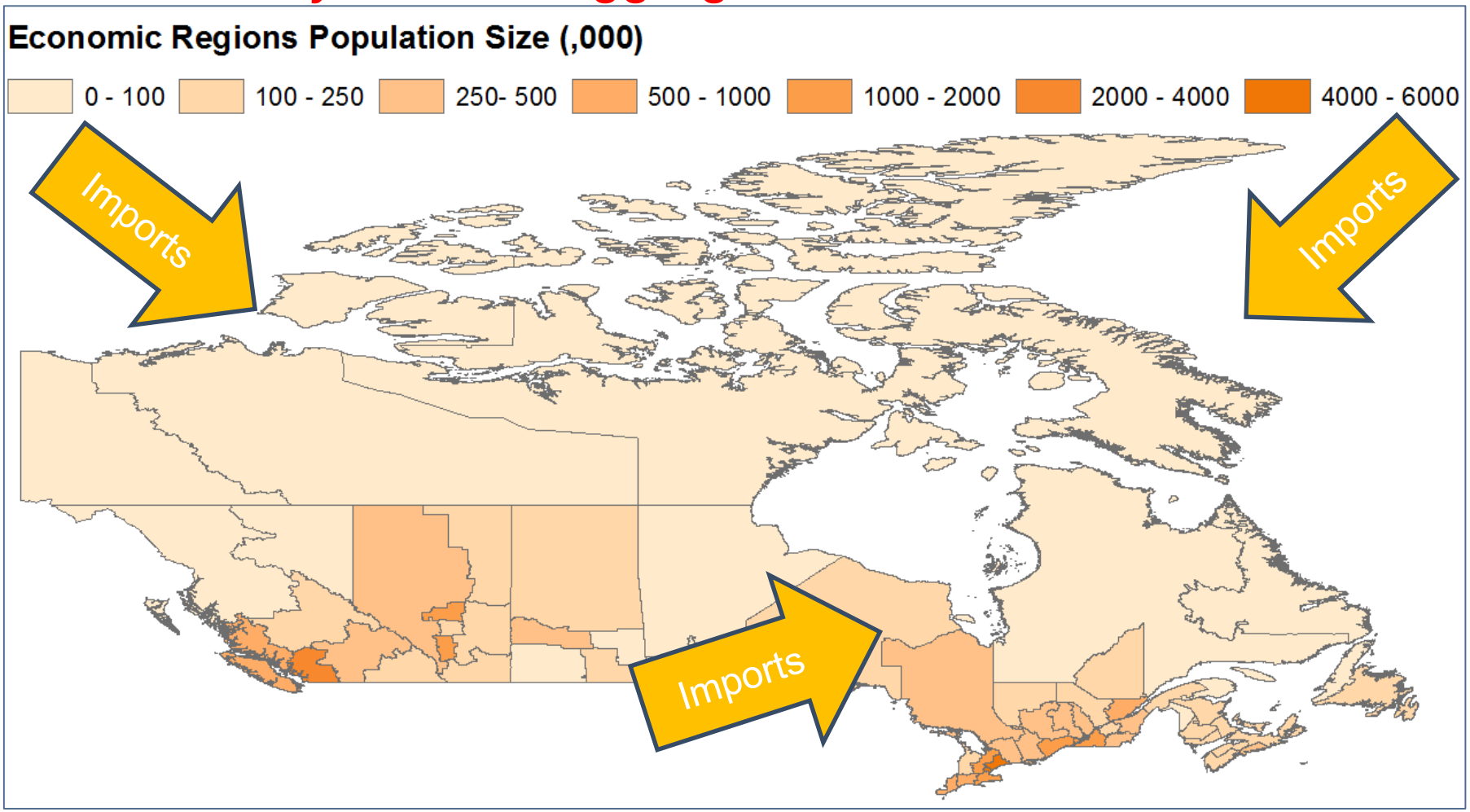
1. Province/Territories to 69 Economic Regions



Data Adjustment:

Commodity OD Flow

2. Commodity Flow Disaggregation



Data Adjustment:

Commodity OD Flow

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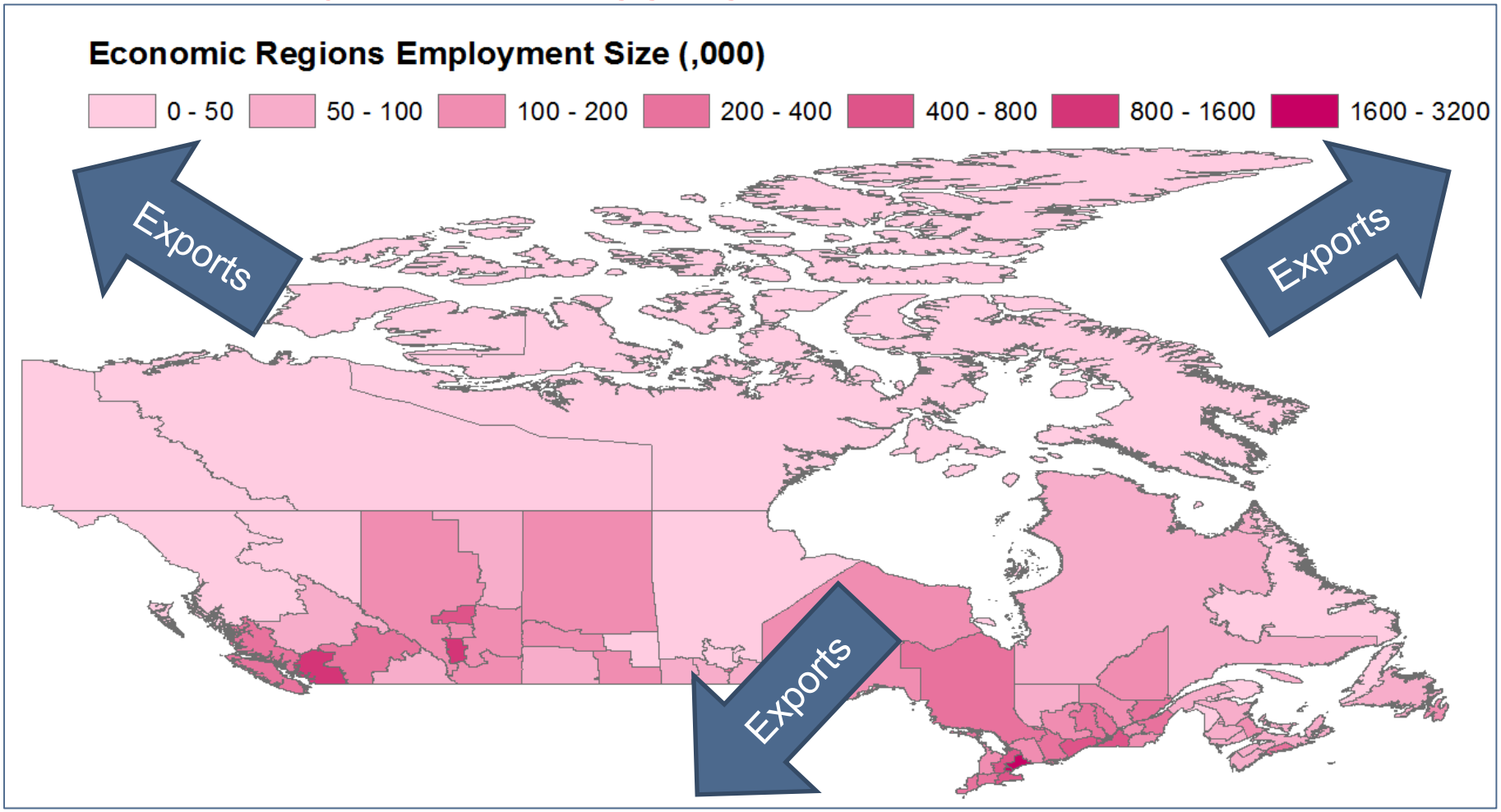
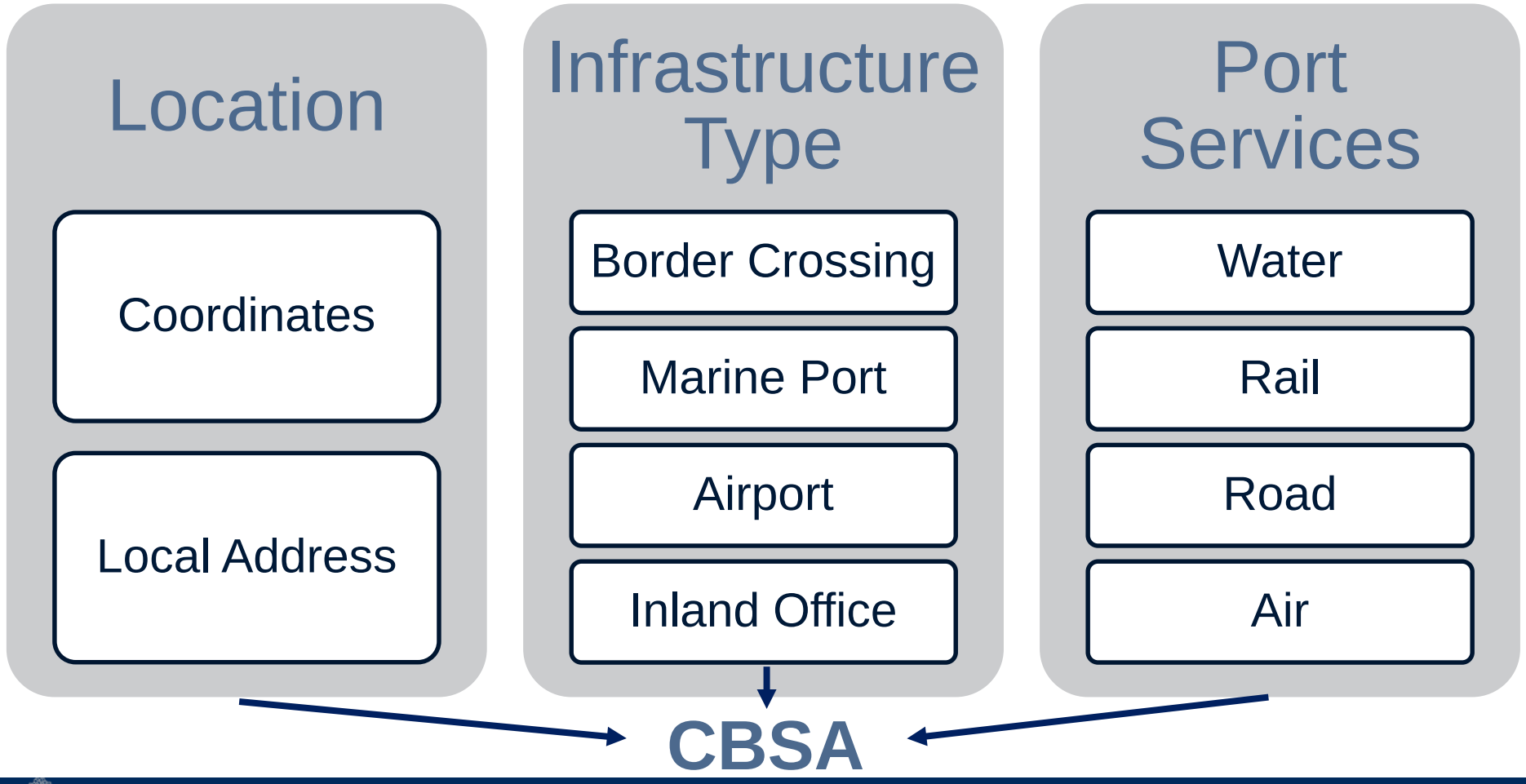


Data Adjustment:

Commodity OD Flow

3. Port of Clearance (PC) Specification



Data Adjustment:

Commodity OD Flow

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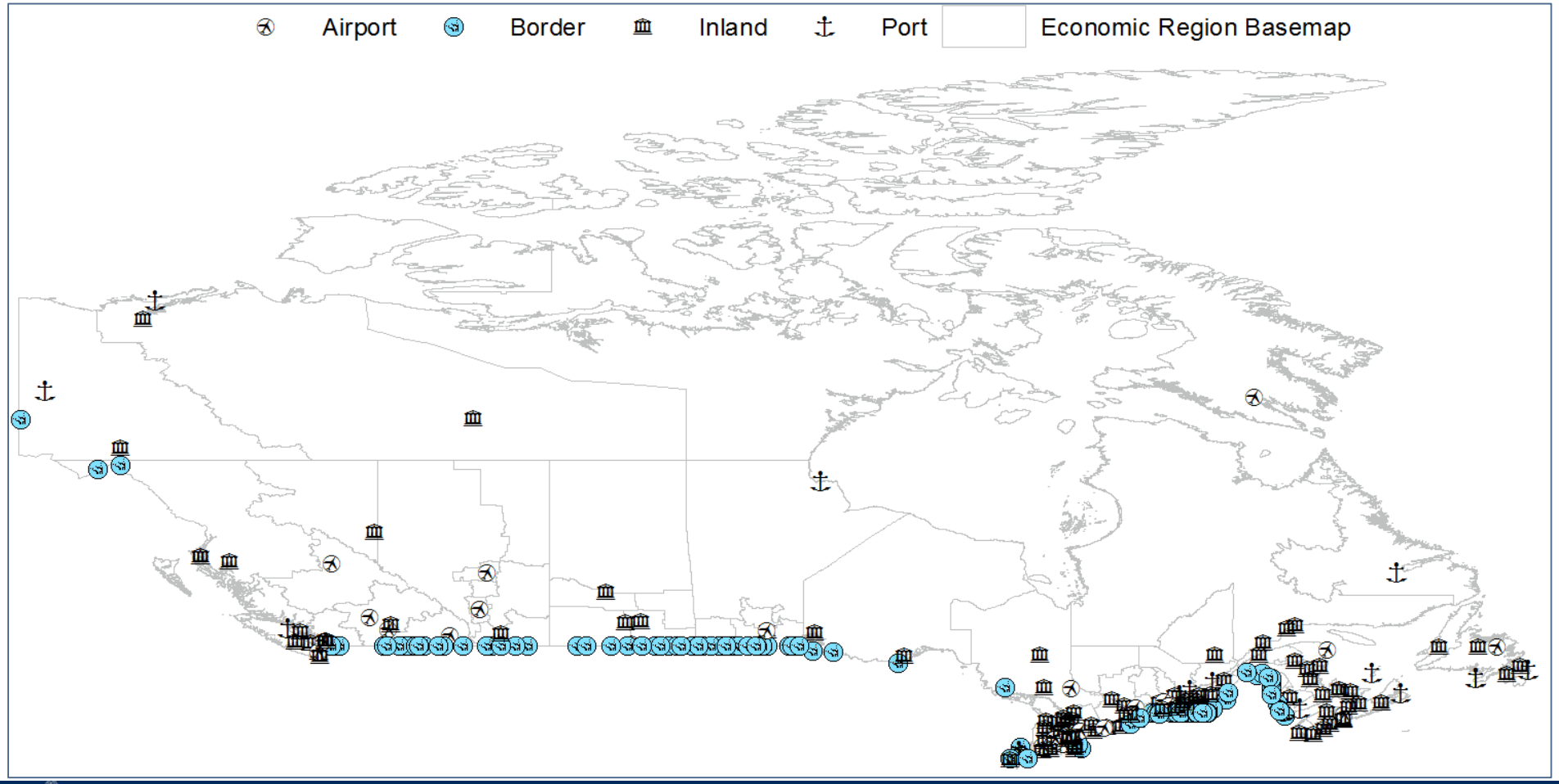


Data Adjustment:

Commodity OD Flow

4. Commodity Group Aggregation

SCTG Group	SCTG Group description	SCTG-2	GSC-2
A	Agricultural & fish products	1,2,3,4,5	1,2,3,4,5,6,7,8,9,10,12,14,19,20
B	Grains, alcohol, & tobacco products	6,7,8,9	11,21,22,23,24,25,26,45
C	Stone, nonmetallic minerals, & metallic ores	10,11,12,13,14	18
D	Coal & petroleum products	15,16,17,18,19	15,16,17,32,44
E	Basic chemicals, chemical & pharmaceutical products	20,21,22,23,24	33
F	Logs, wood products, textiles & leather	25,26,27,28,29 ,30	13,27,28,29,30,31
G	Base metals & machinery	31,32,33,34	34,35,36,37
H	Electronics, motorized vehicles, & precision instruments	35,36,37,38	38,39,40,41
I	Furniture, mixed freight, & manufactured products	39,40,41,43	42

Data Adjustment:

Transportation Network

i. Road Network

1. Extract Canada's road network

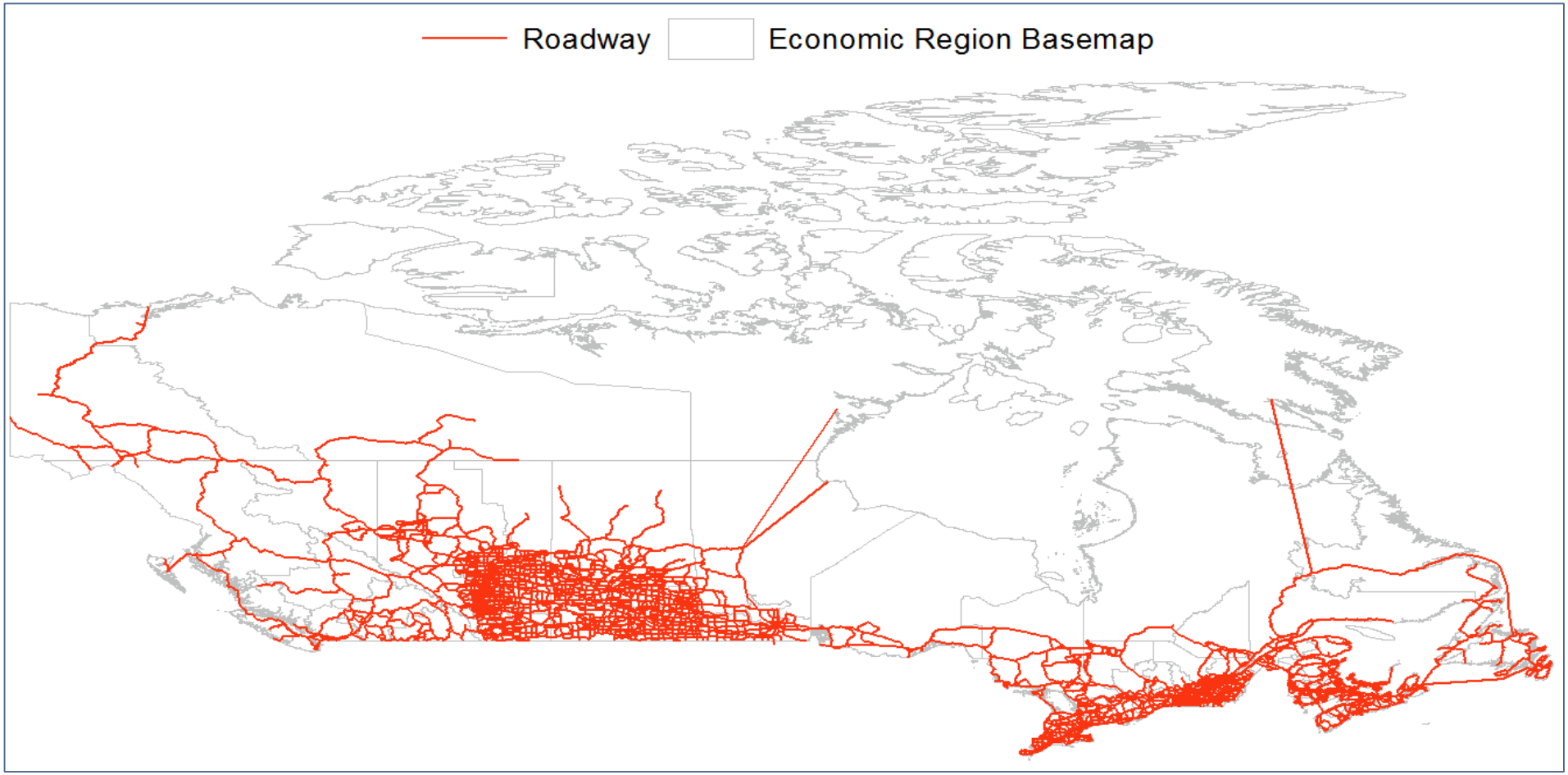
2. Connect production and consumption points to road network

3. Connect ports of clearance to road network

Data Adjustment:

Transportation Network

i. Road Network



Data Adjustment:

Transportation Network

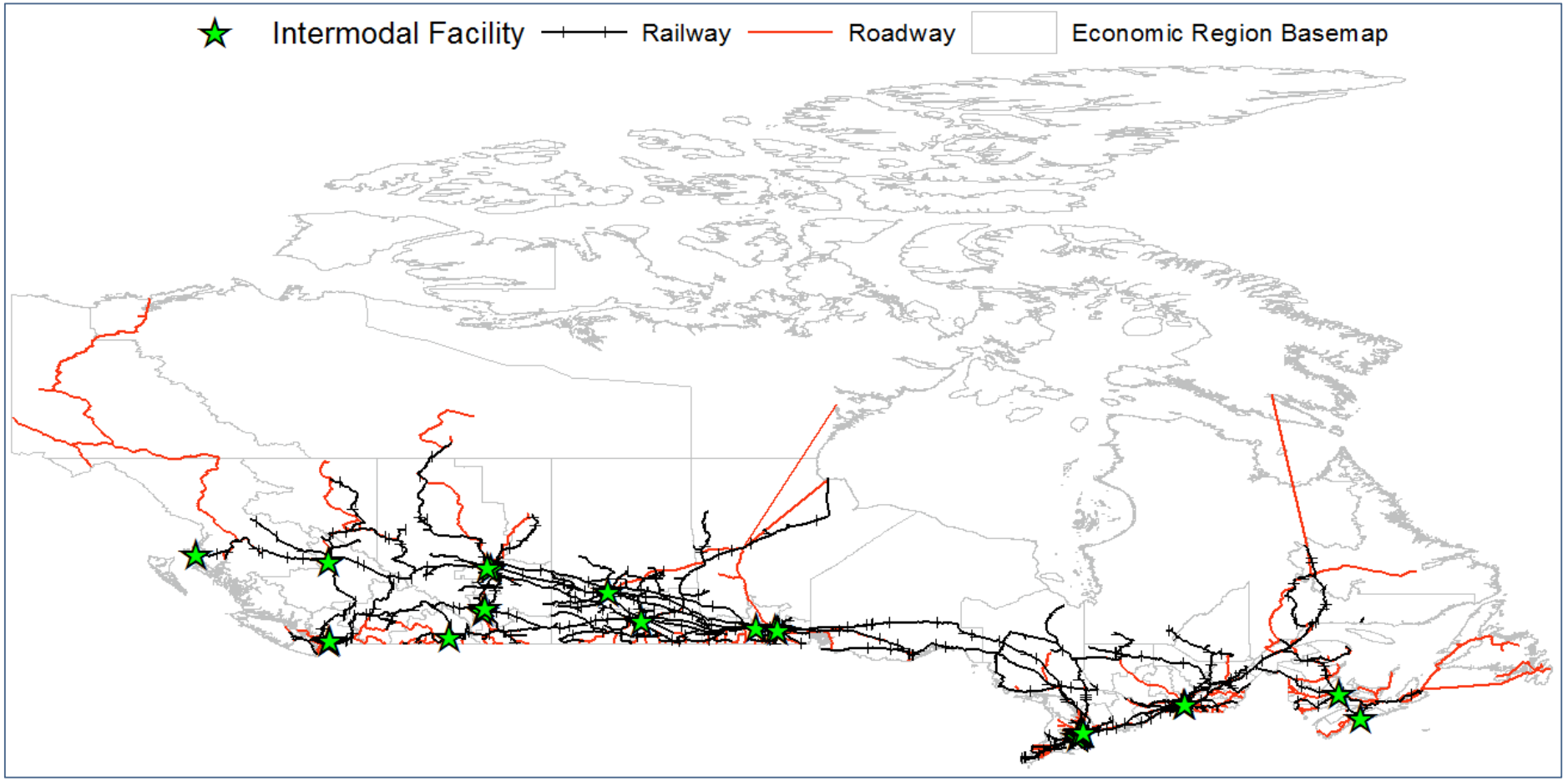
ii. Rail Network

1. Extract Canada's rail network
2. Connect production/consumption points to road network
3. Connect intermodal facilities to road & rail network
4. Connect ports of clearance to rail network

Data Adjustment:

Transportation Network

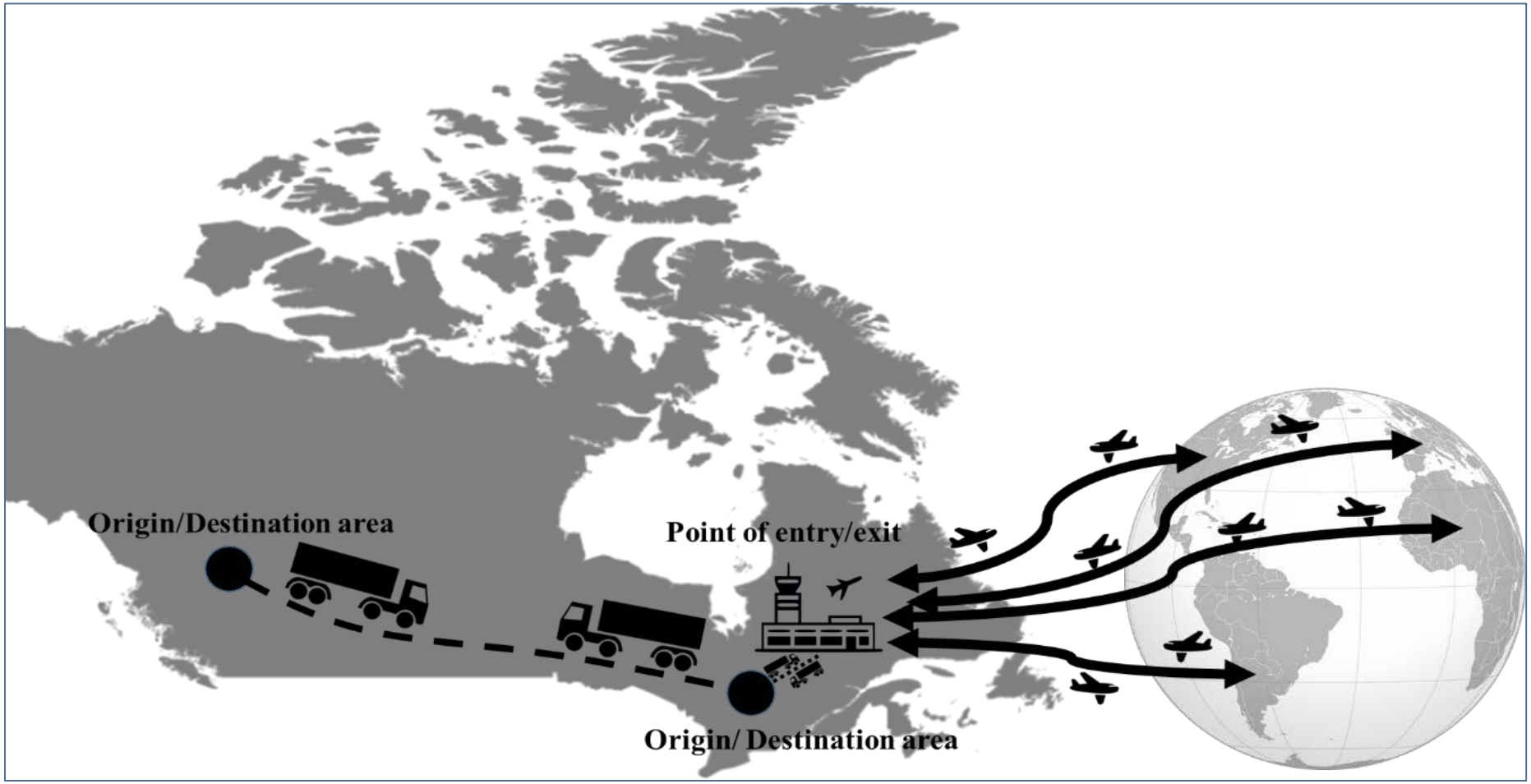
ii. Rail Network



Modeling Framework:

Mode Split

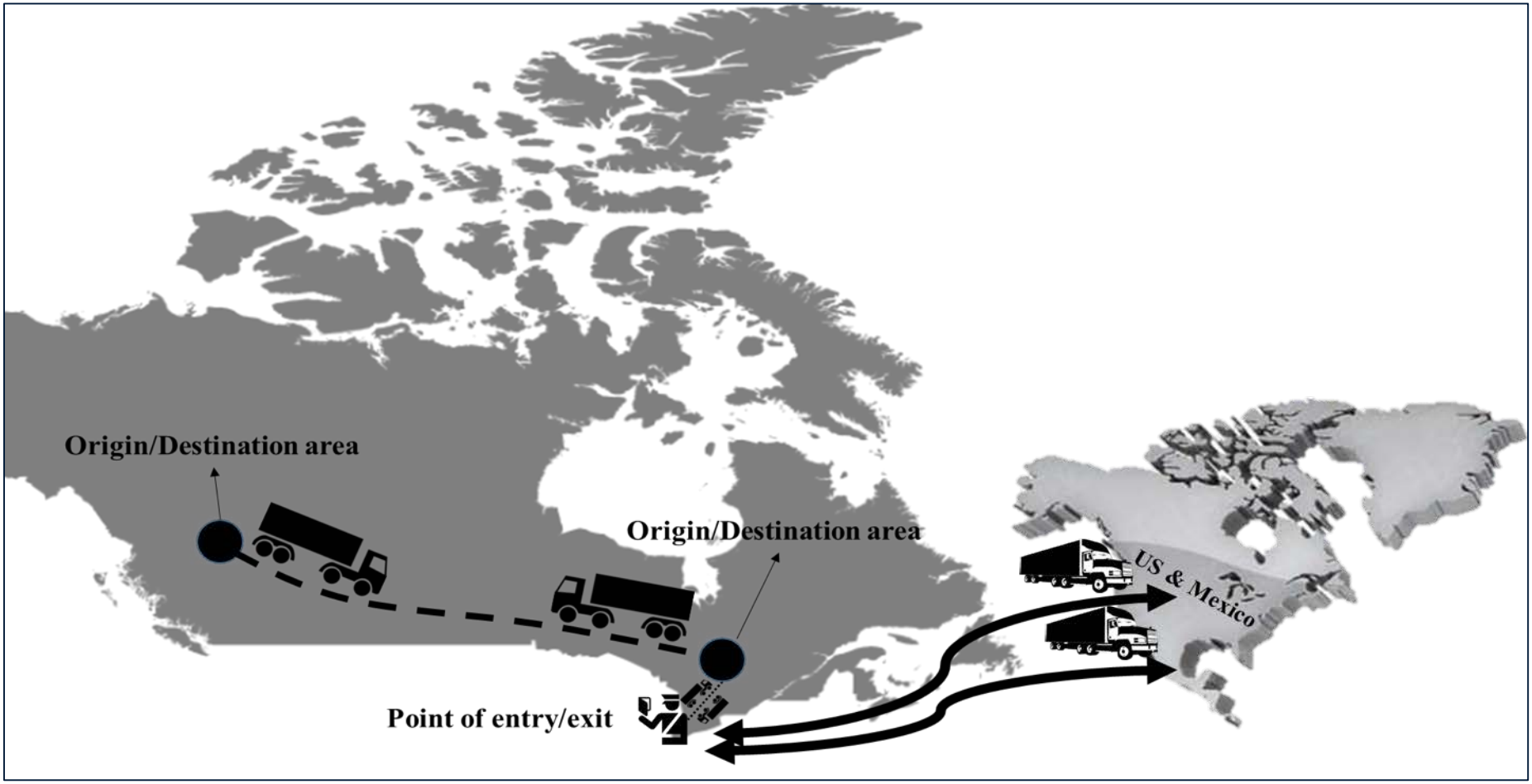
1. **Airports:** Domestic Mode of Transport is Truck



Modeling Framework:

Mode Split

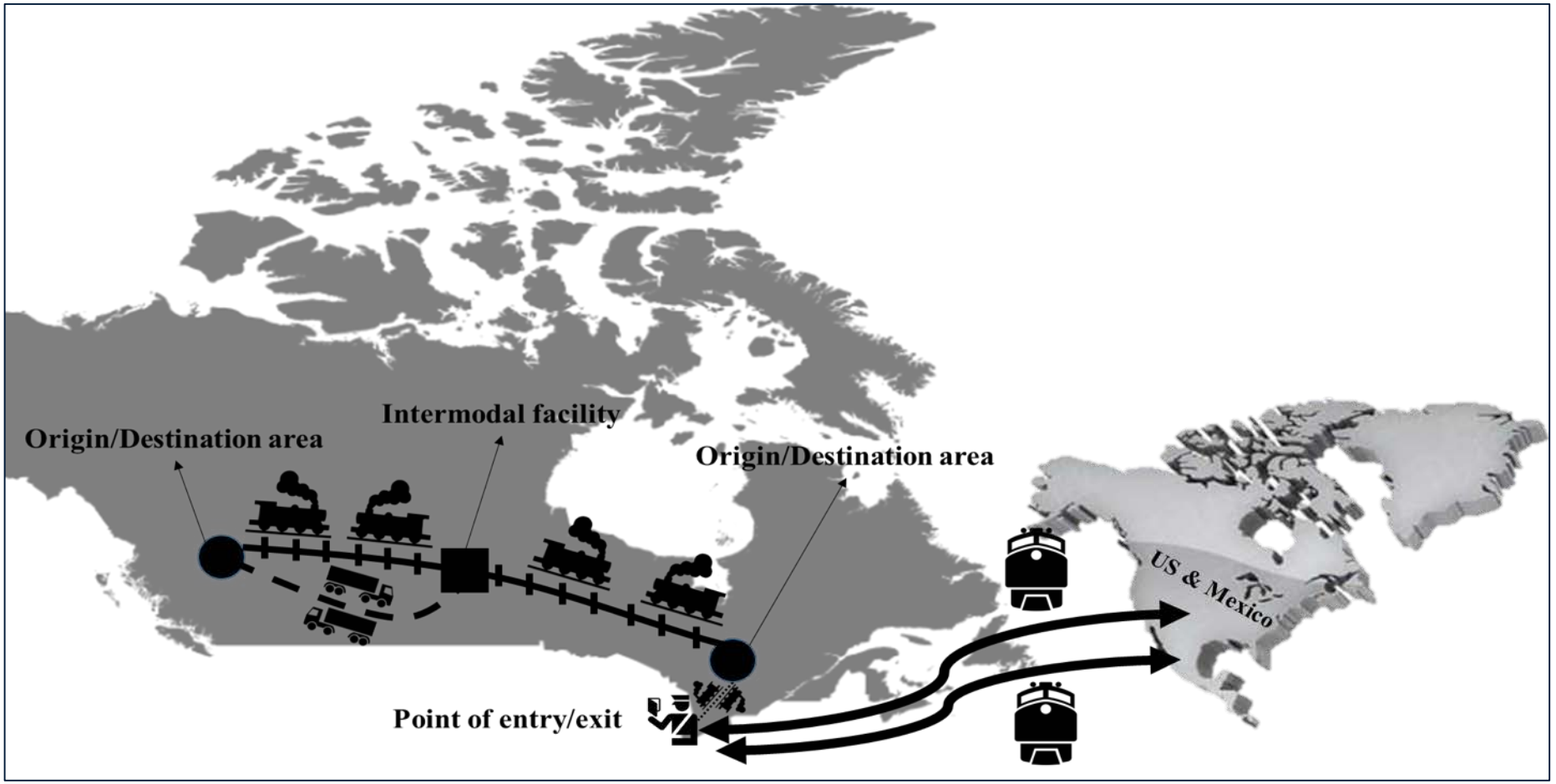
2. **Road Border Crossing:** Domestic Mode of Transport is Truck



Modeling Framework:

Mode Split

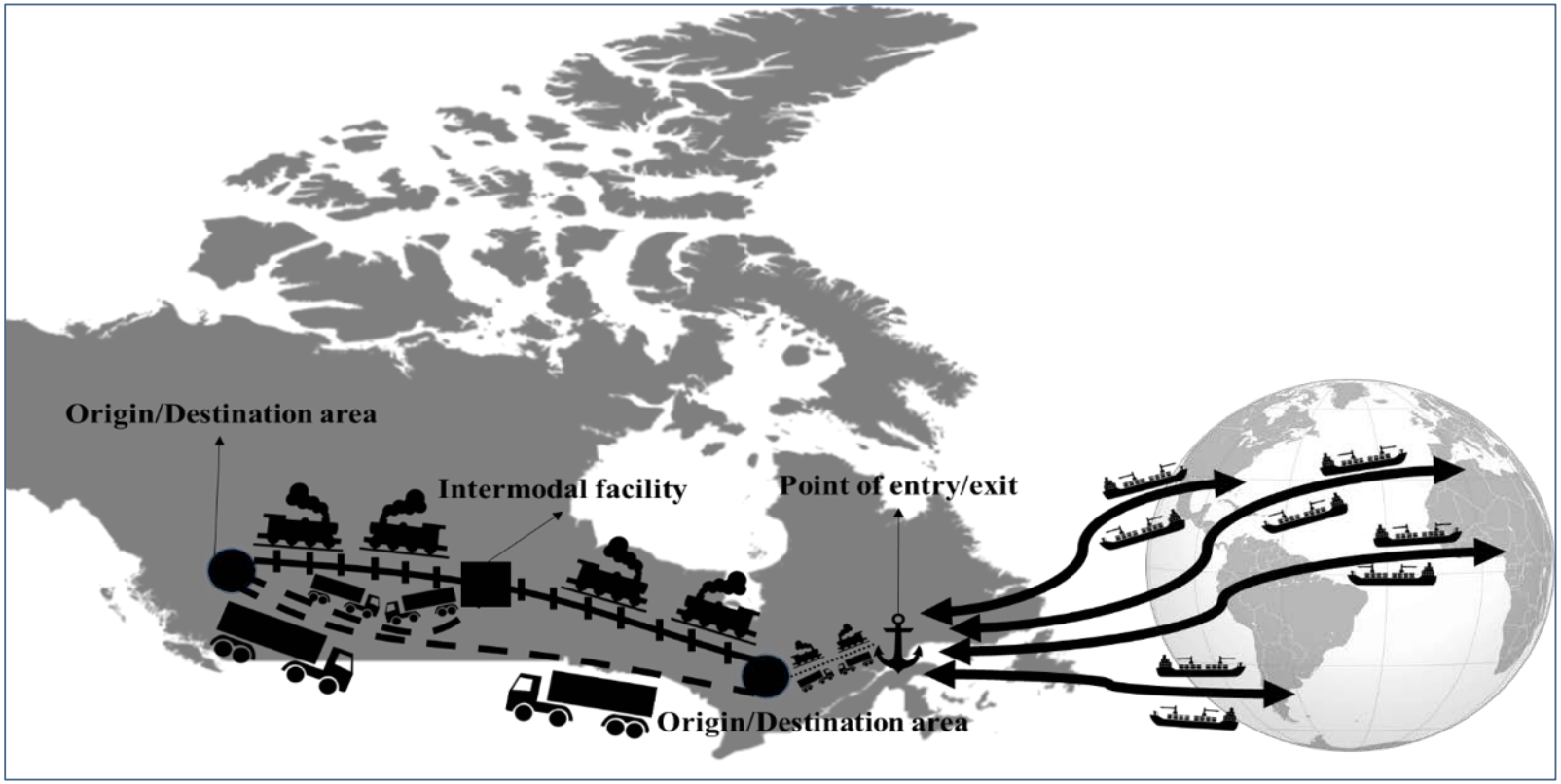
3. **Rail Border Crossing:** Domestic Mode of Transport is Truck-Rail



Modeling Framework:

Mode Split

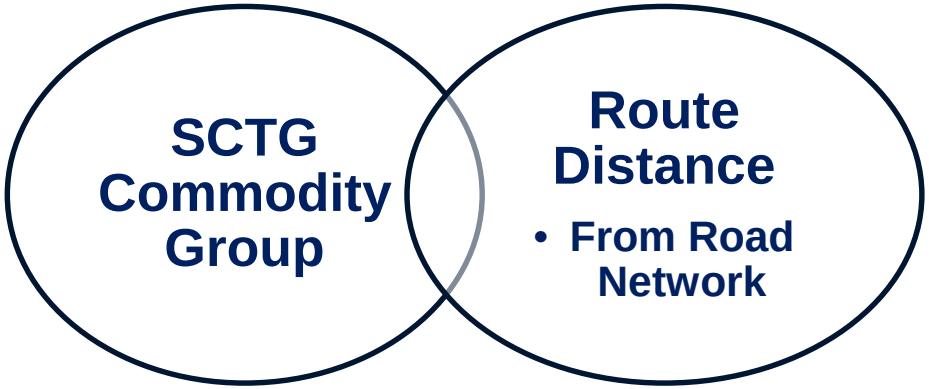
4. **Marine Border Crossing:** Domestic Mode of Transport is:
   a)Truck-Rail
   b)Truck



Modeling Framework:

Mode Split

4. **Marine Border Crossing:** Domestic Mode of Transport is:
   a)Truck-Rail
   b) Truck



Frequency: % Annual Tonnage	CFS-Routed Distance (Km)											
	0-250	0-250	250-500	250-500	500-750	500-750	750-1000	750-1000	1000-1750	1000-1750	>1750	>1750
SCTG Group	Rail	Truck	Rail	Truck	Rail	Truck	Rail	Truck	Rail	Truck	Rail	Truck
A	0.10%	99.90%	14.66%	85.34%	18.28%	81.72%	53.25%	46.75%	17.88%	82.12%	31.74%	68.26%
B	1.49%	98.51%	15.03%	84.97%	16.19%	83.81%	24.81%	75.19%	40.28%	59.72%	61.89%	38.11%
C	36.16%	63.84%	7.05%	92.95%	62.88%	37.12%	57.98%	42.02%	72.08%	27.92%	74.04%	25.96%
D	1.38%	98.62%	19.98%	80.02%	15.16%	84.84%	31.12%	68.88%	22.85%	77.15%	61.99%	38.01%
E	8.81%	91.19%	19.24%	80.76%	58.51%	41.49%	51.33%	48.67%	31.26%	68.74%	55.41%	44.59%
F	3.68%	96.32%	18.41%	81.59%	12.78%	87.22%	30.54%	69.46%	33.84%	66.16%	27.84%	72.16%
G	0.44%	99.56%	15.14%	84.86%	9.29%	90.71%	13.07%	86.93%	28.36%	71.64%	19.50%	80.50%
H	8.87%	91.13%	17.51%	82.49%	6.48%	93.52%	6.16%	93.84%	21.81%	78.19%	20.65%	79.35%
I	6.31%	93.69%	35.73%	64.27%	6.14%	93.86%	7.96%	92.04%	30.47%	69.53%	40.77%	59.23%

Modeling Framework:

Route Assignment

- Mode subset is reduced to Truck and Rail (Truck-Rail)
- Assign truck trips to road network
- Assign rail trips to rail network
- Assignment at Macroscopic Scope: All-or-Nothing

Results

Export (Province of Exit)		Difference (%)	
		Rail	Truck
Port of Clearance Province	Alberta	0.0%	-0.5%
	British Columbia	-1.0%	-0.9%
	Manitoba	16.3%	-0.6%
	New Brunswick	-0.7%	-0.5%
	Newfoundland/Lab	-0.7%	-0.5%
	Nova Scotia	-0.5%	-0.5%
	Ontario	-1.4%	-0.8%
	Prince Edward Is.	3.8%	-0.9%
	Quebec	-0.1%	1.2%
	Saskatchewan	-0.9%	-0.7%
	Yukon, North West Terr., Nunavut	-1.9%	-1.6%
Total		-0.7%	-0.6%

Results

Import (Province of Entry)		Difference (%)	
		Rail	Truck
Port of Clearance Province	Alberta	0.0%	-0.3%
	British Columbia	-0.5%	-0.1%
	Manitoba	3.6%	-1.3%
	New Brunswick	-0.2%	-0.7%
	Newfoundland/Lab	2.1%	2.4%
	Nova Scotia	6.5%	8.6%
	Ontario	-0.6%	-0.4%
	Prince Edward Is.	0.5%	0.7%
	Quebec	3.8%	5.4%
	Saskatchewan	-3.0%	-0.6%
	Yukon, North West Terr., Nunavut	-1.8%	-1.7%
Total		1.3%	1.0%

Results

Exports

Port of Clearance Type	Difference (%)
Airport	2.0%
Border	-0.9%
Inland	-0.4%
Port	-0.1%
Total	-0.6%

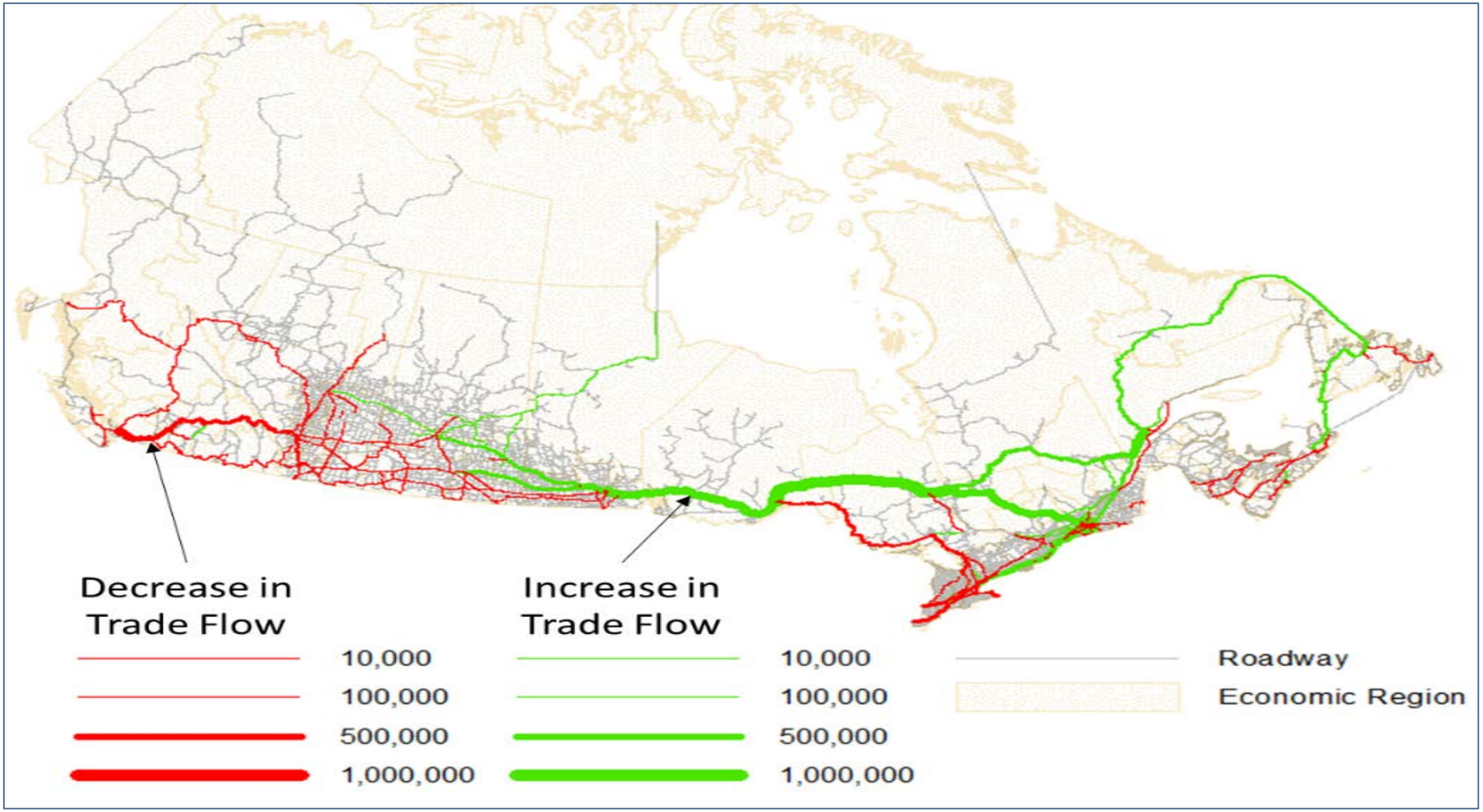
Imports

Port of Clearance Type	Difference (%)
Airport	3.3%
Border	-0.9%
Inland	4.0%
Port	0.8%
Total	1.1%

CETA diverts away the volume of commodities that are imported or exported from US

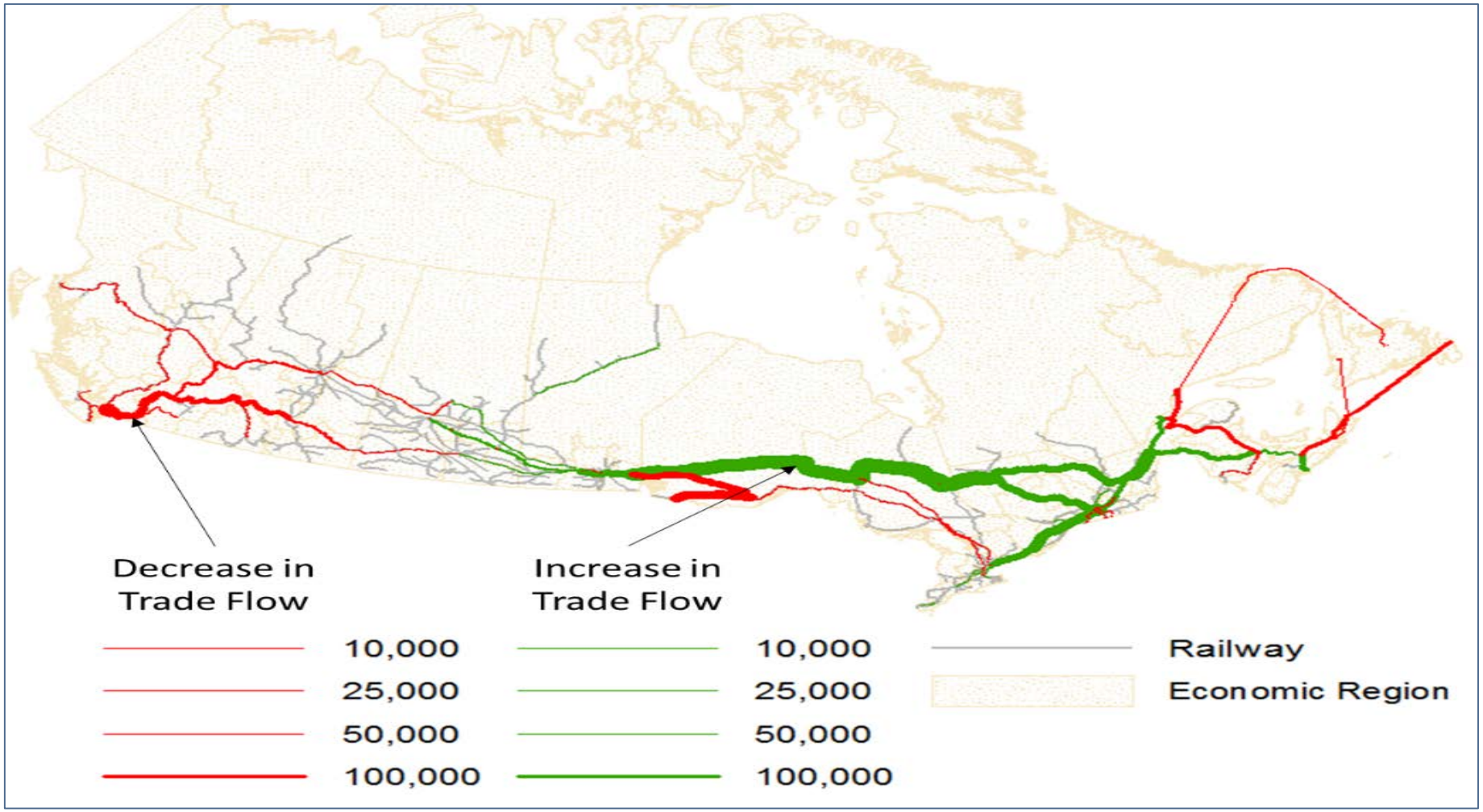
Results

Change in truck freight flow under CETA in total annual tonne



Results

Change in rail freight flow under CETA in total annual tonne



Findings

- Greatest percentage increases in demand on:
  - Imports at Ports of Clearance in Atlantic Region/ Quebec
  - Airports
- Decline in Canada US trans-border freight
- Decline in trade flows by road/rail accessing west cost ports
- Volume of freight movements expected to grow along Quebec City–Windsor Corridor

Contacts

Mahyar Jahangiriesmaili
M.A.Sc. Candidate
Department of Civil Engineering, University of Toronto
35 St. George Street, Toronto, ON M5S 1A4
Telephone: +1 647 716 9372
Email: mahyar.jahangiriesmaili@mail.utoronto.ca

Matthew J. Roorda
Professor
Department of Civil Engineering, University of Toronto
35 St. George Street, Toronto, ON M5S 1A4
Telephone: +1 416 978 5976
Email: roordam@ecf.utoronto.ca

Chris Bachmann
Assistant Professor
Department of Civil and Environmental Engineering, University of Waterloo
200 University Avenue West, Waterloo, ON N2L 3G1
Telephone : 519-888-4567 x31303
E-mail: chris.bachmann@uwaterloo.ca