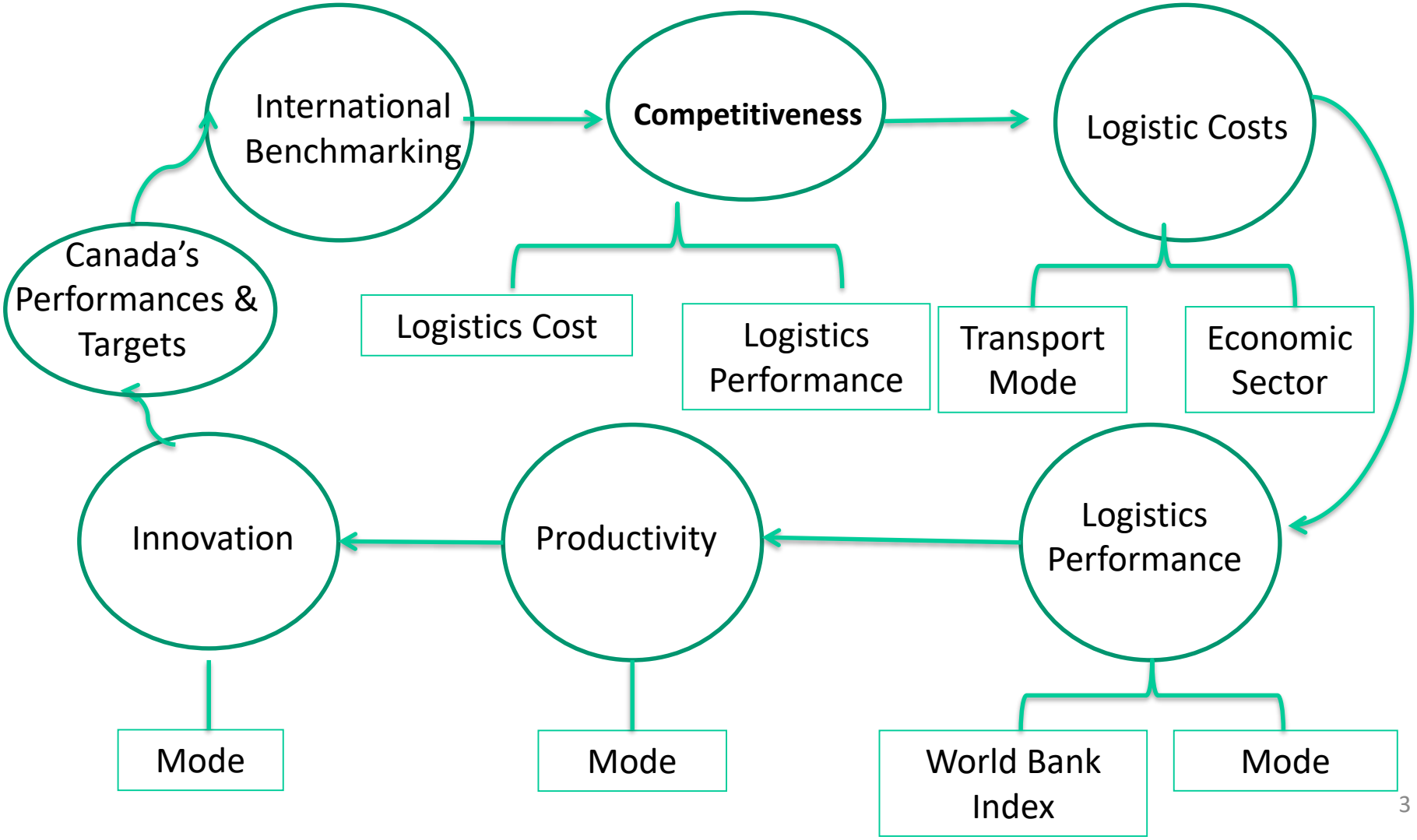
Canada's Competitiveness Position

Total Logistics Costs and Logistics Performance

OBJECTIVES

- Provide an international comparison of Canada's total logistics costs relative to GDP and Logistics Performance against those of selected countries.
- Provide a breakdown of the composition of Canada's Total Logistics Costs and the World Bank Logistics Performance Index for policy guidance.
- Look at the productivity in the sector.

Analysis Flow Chart

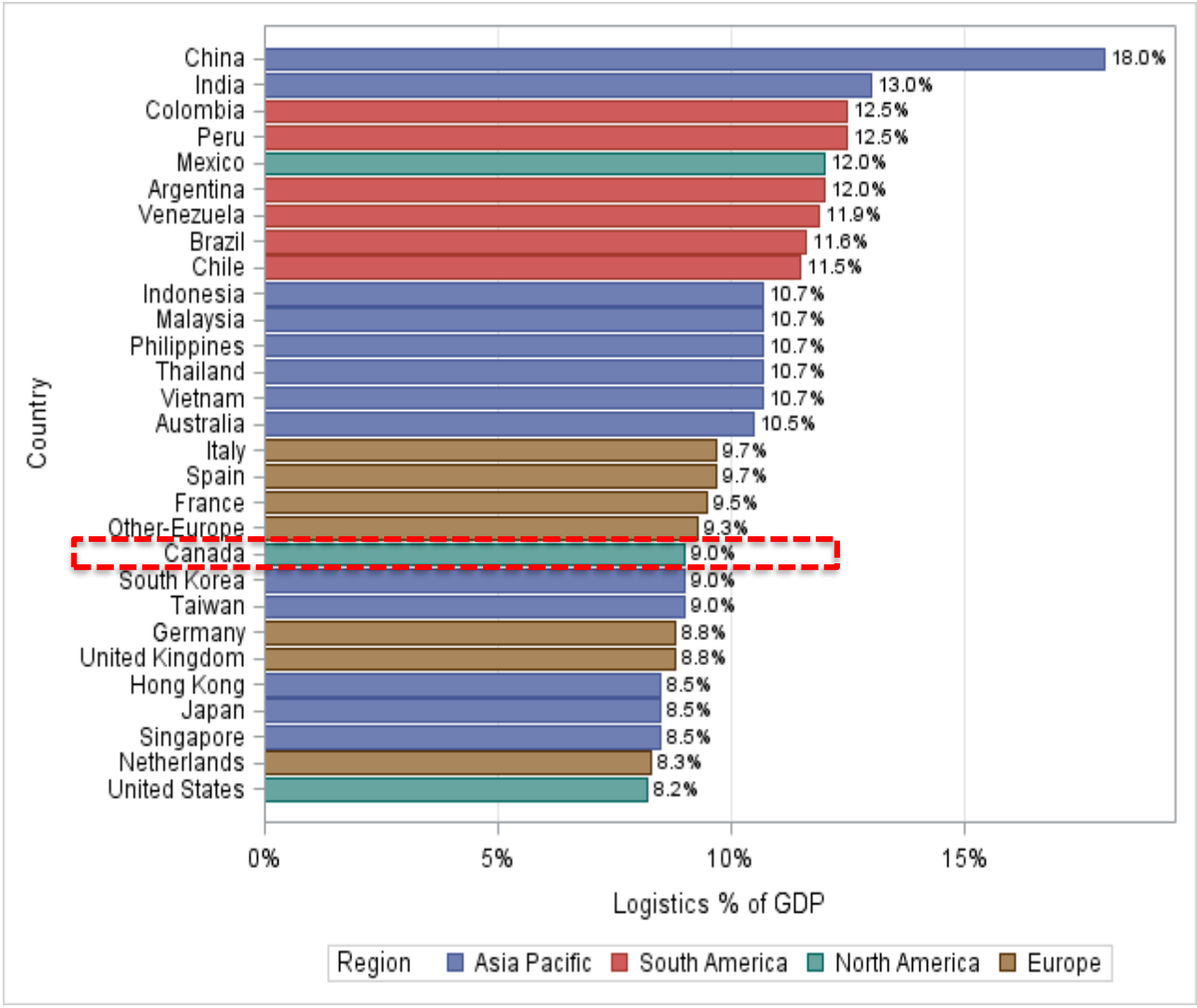


TOTAL LOGISTICS COSTS
INTERNATIONAL BENCHMARKING

Logistics Cost as a % of GDP for Selected Countries, 2015

- At a logistics cost to GDP ratio of 9%, Canada is comparable to South Korea and Taiwan.

- China's logistics cost relative to their GDP is the highest at 18%, while the United States has the smallest relative share at 8.2%.

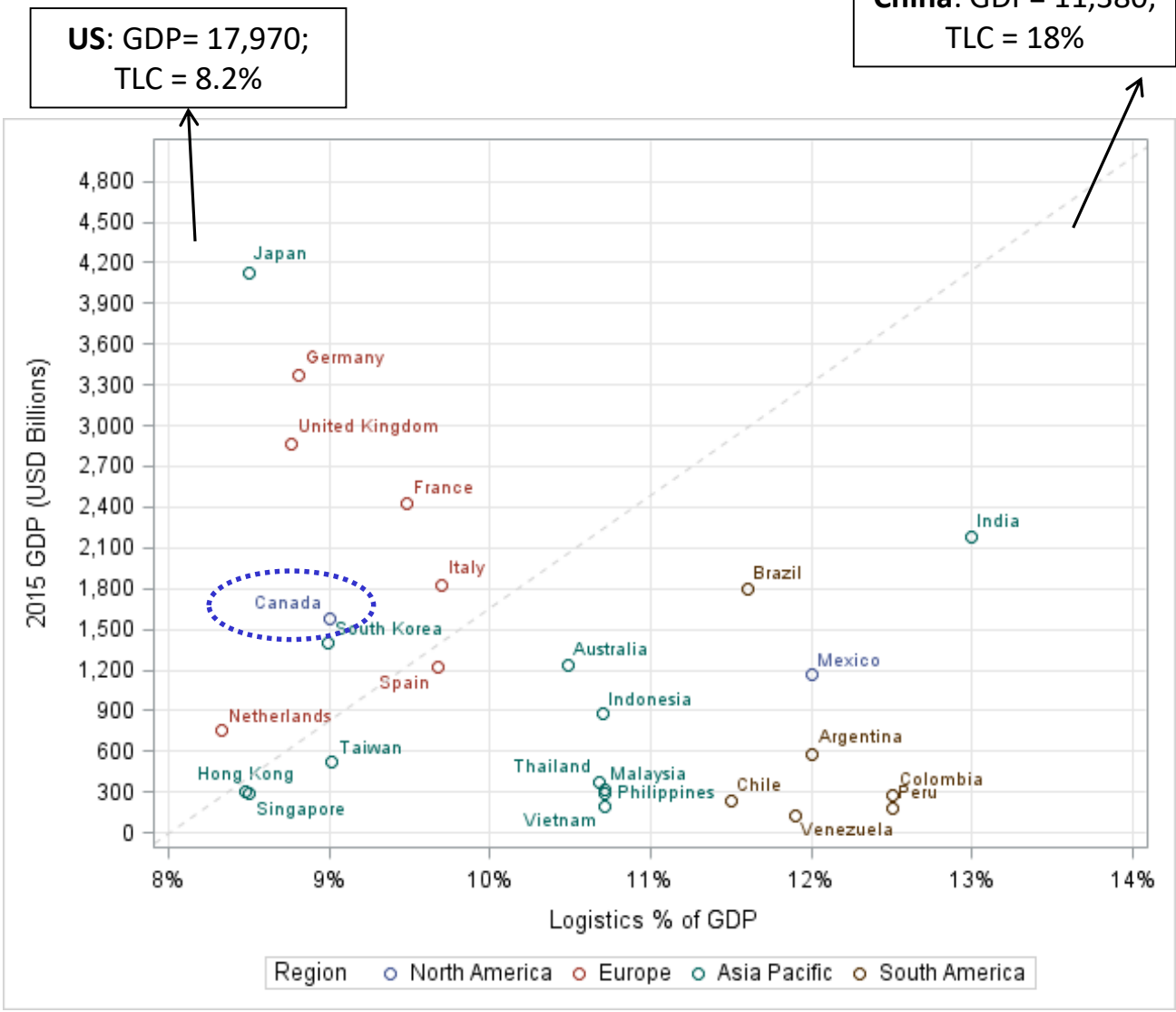


Source: Armstrong and Associates, Inc

2015 GDP vs. Logistics Cost Share

- Logistics costs relative to GDP seem to exhibit regional trends, as European countries tend to have lower relative percentages.

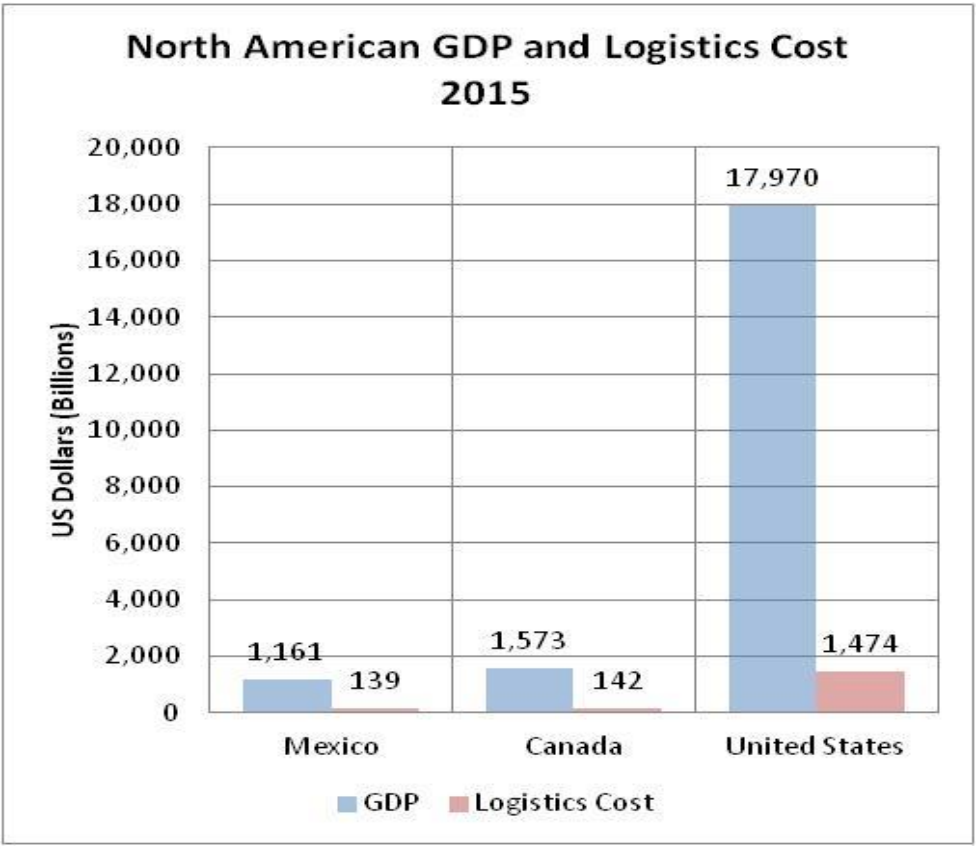
- The South American and some Asia-Pacific nations have higher relative percentages.



Source: Armstrong and Associates, Inc

Logistics as a share of GDP
North America, 2015

- On a North American basis, Canada is between Mexico and the United States in terms of logistics cost relative to GDP.



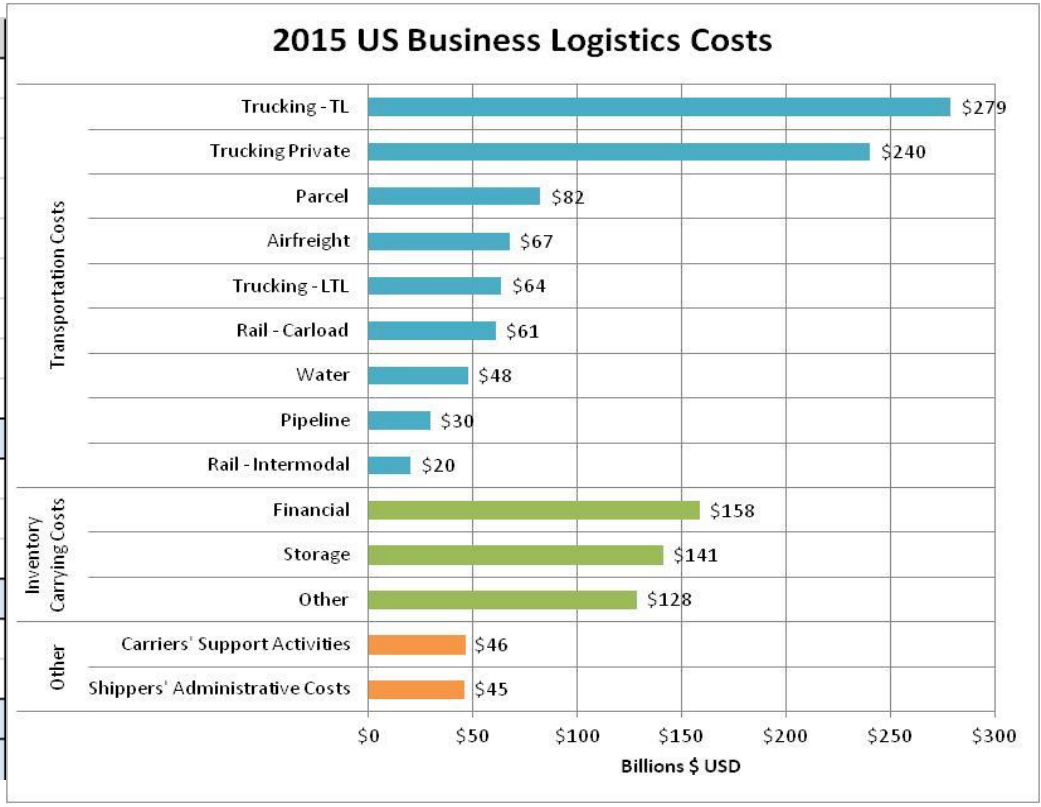
Source: Armstrong & Associates

TOTAL LOGISTICS COSTS BY MODE AND SECTOR

Composition of US Logistics Cost, 2015

- The U.S. is the benchmark, given their lowest cost relative to their GDP.
- Transportation costs represent about 63% of logistics costs, of which trucking and parcel delivery make up 80% of that cost.
- The road mode make up 40%, Rail and air freight make up 5% each.
- Carrying costs represent roughly 30% and other administrative costs about 6%.

Component	Sub-component	Billions	%
Transportation Costs	Trucking - TL	279	20%
	Trucking Private	240	17%
	Parcel	82	6%
	Airfreight	67	5%
	Trucking - LTL	64	5%
	Rail - Carload	61	4%
	Water	48	3%
	Pipeline	30	2%
	Rail - Intermodal	20	1%
Transportation Costs Total		**890**	**63%**
Inventory Carrying Costs	Financial	158	11%
	Storage	141	10%
	Other	128	9%
Inventory Carrying Costs Total		**427**	**30%**
Other	Carriers' Support Activities	46	3%
	Shippers' Administrative Costs	45	3%
Other Total		**91**	**6%**
Grand Total		**1,408**	**100%**



Source: U.S. Council of Supply Chain Management Professionals

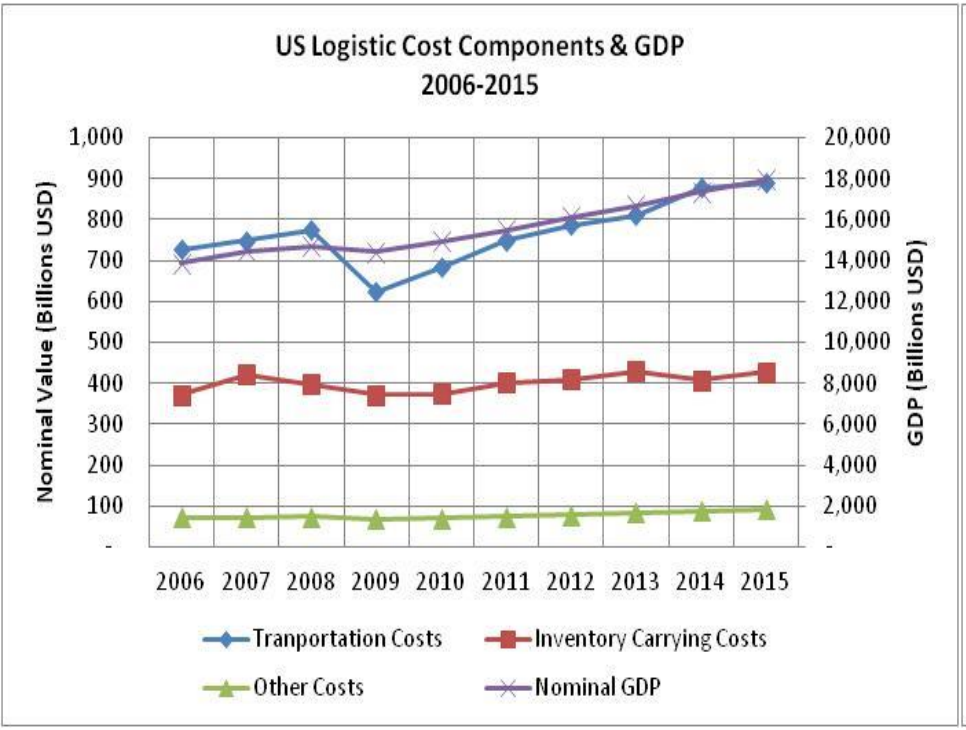
U.S. Drill Down

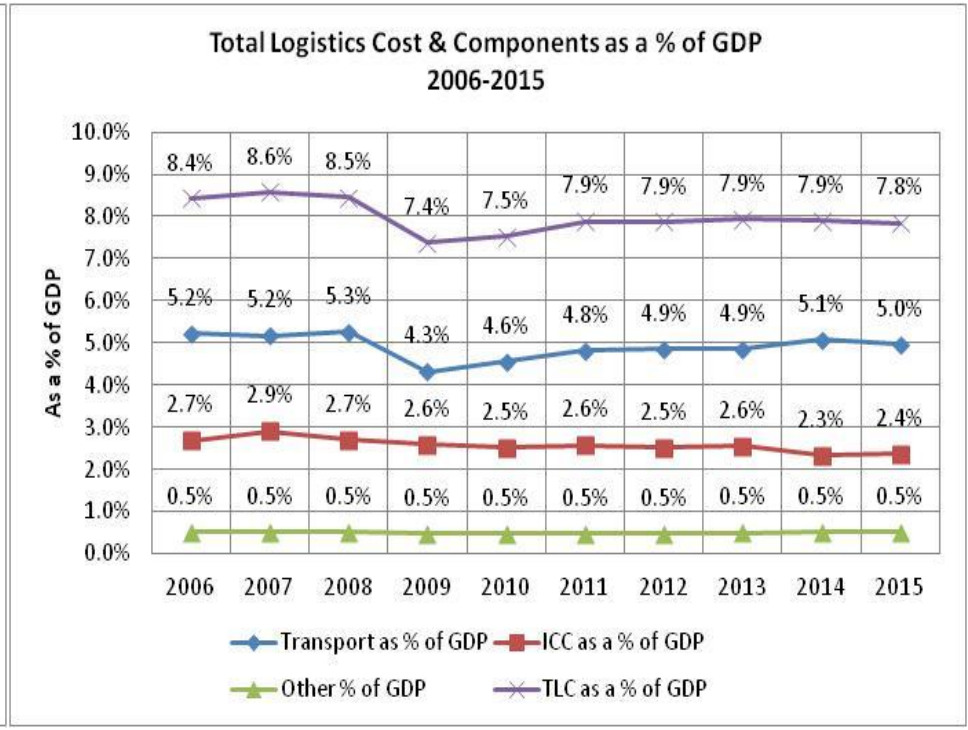
• According to the U.S. Council of Supply Chain Management Professionals, logistics costs relative to GDP have decreased from 8.4% to 7.8%* from 2006 to 2015.

•This is due to lower inventory carrying costs from lower interest rates, as well as a small decrease in relative transport cost.

•In nominal terms, logistics costs have increased as the US economy has recovered from the 2008/2009 recession.

•Spending on freight transportation generally increases as economic activity expands but as a share of GDP it has remained pretty stable at around 5%.





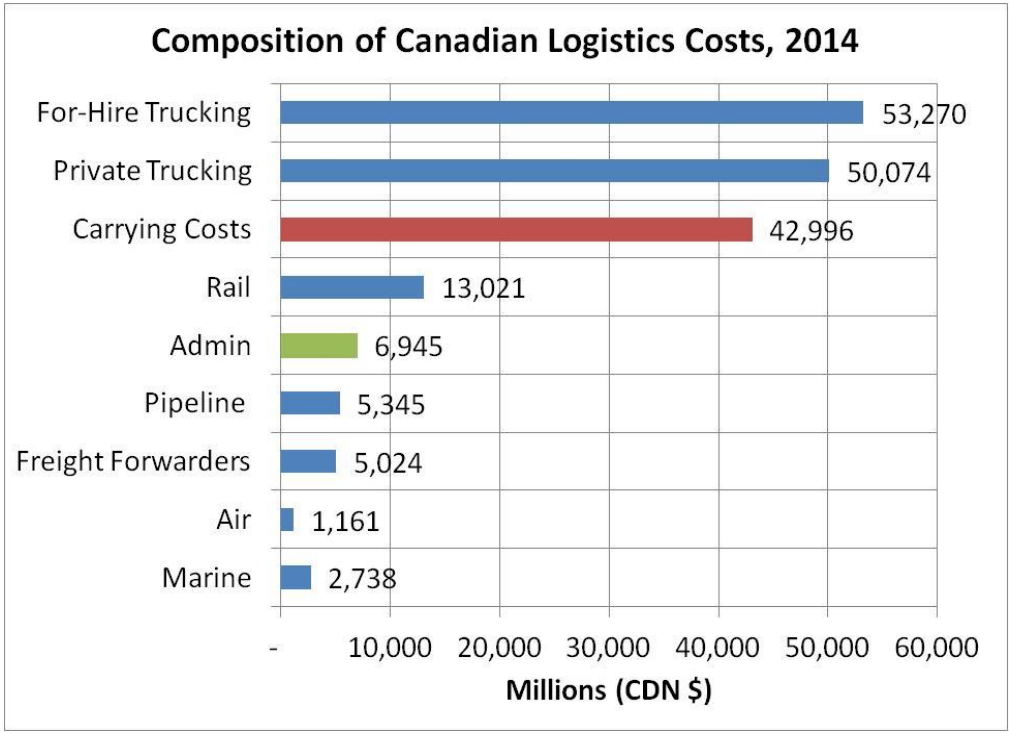
*Note: The percentage in this table (7.8%) differs from those on slides 5,6, & 7 (8.2%) due to different data sources. The source of variance is being investigated.

Source: U.S. Council of Supply Chain Management Professionals

Composition of Canadian Logistics Cost, 2014*

- Estimates for Canada have been derived in accordance with the Council of Supply Chain Management Professionals methodology.
- Trucking costs are by far the largest component of logistics costs, accounting for almost 60% of the total.
- Inventory carrying costs represent the second largest component at almost 25%.

Component	Sub-component	Millions (CDN)	%
Transport	For-Hire Trucking	53,270	29.5%
	Private Trucking	50,074	27.7%
	Rail	13,021	7.2%
	Pipeline	5,345	3.0%
	Freight Forwarders	5,024	2.8%
	Marine	2,738	1.5%
	Air	1,161	0.6%
Transport Total		**130,633**	**72%**
Carrying Cost		**42,996**	**24%**
Administrative		**6,945**	**4%**
Grand Total		**180,574**	**100%**



*Estimates for 2015 are not yet available due to latency of contingent data sources, i.e.) TCOD, retail Inventory).

Sources: Transport Canada international databases, Statistics Canada, Bank of Canada, Class 1 rail carriers.

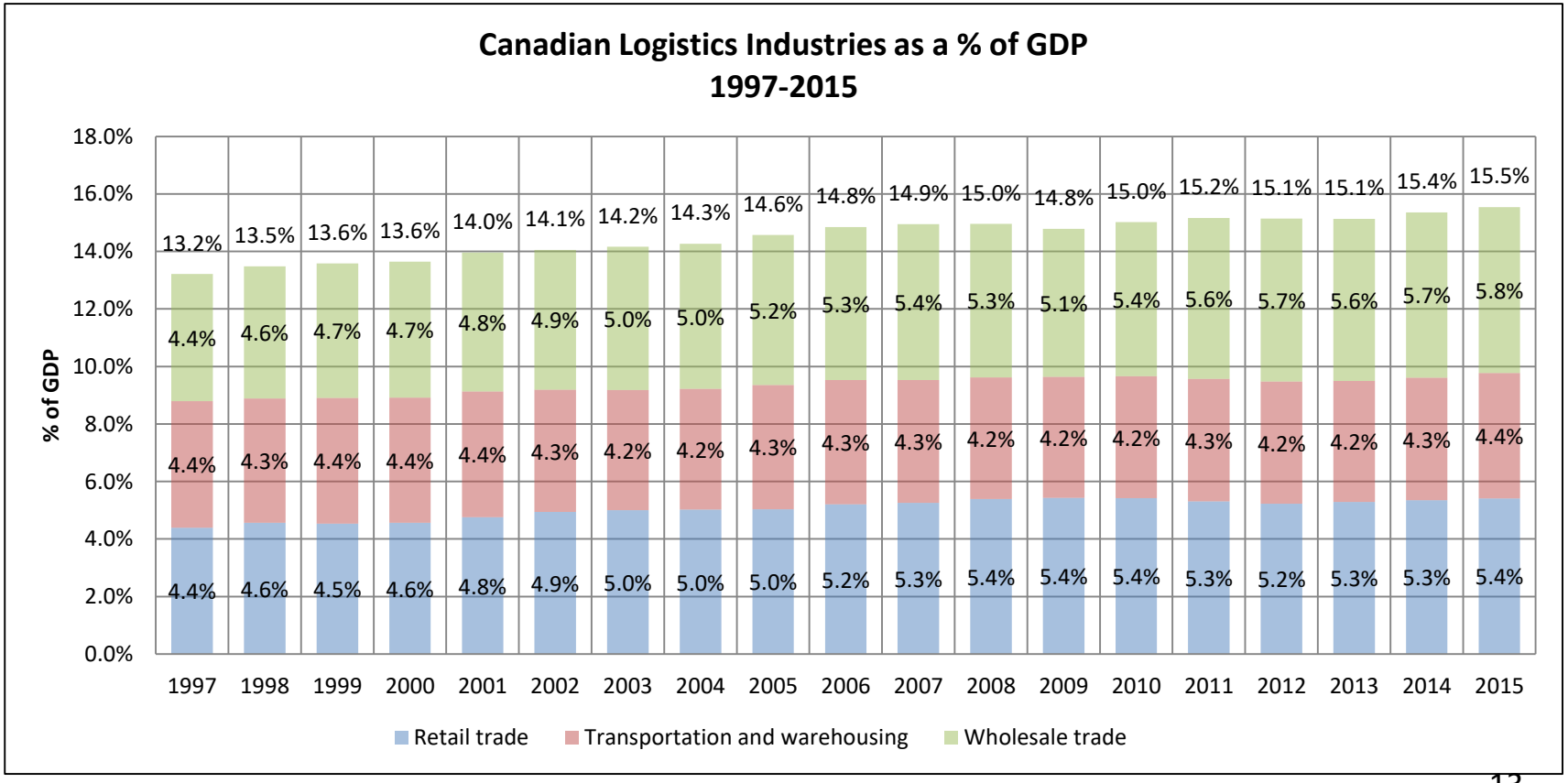
Total Logistics Cost Components: U.S. vs. Canada, 2014

- Given the geographic size and dispersion of urban areas for Canada transport costs as a component of Total Logistics costs are 10% higher than the United States.

- Conversely, Canadian carrying costs are relatively less than the United States.

Component	Sub-Component	US	Canada
Administrative Costs	Logistics Administration	3.9	
	Shipper Related Costs	0.7	
	Subtotal	4.6	3.8
Carrying Costs	Interest	0.1	
	Taxes, Obsolescence, Depreciation, Insurance	22.8	
	Warehousing	9.9	
	Subtotal	32.9	23.8
Transportation Costs	Air	1.9	0.6
	Forwarders	2.8	2.8
	Oil Pipelines	1.2	3.0
	Railroads	5.5	7.2
	Truck-Intercity	33.5	57.2
	Truck-Local	14.9	
	Water	2.8	1.5
	Subtotal	62.6	72.3
Total		100	100

- From a national accounts perspective the *Retail*, *Transportation and Warehousing* and *Wholesale trade* sectors are the sectors traditionally associated with logistics.
- As a share of GDP, *Retail* and *Wholesale trade* have increased 1.1% and 1.4% , over the last 20 years.
- The *Transportation and Warehousing* sector has remained stable at 4.4% of GDP.
- The net effect is a 2.5% increase in the share of these industries in the overall economy.



Source: Cansim table 379-0031

Modal Comparison: Truck vs. Rail

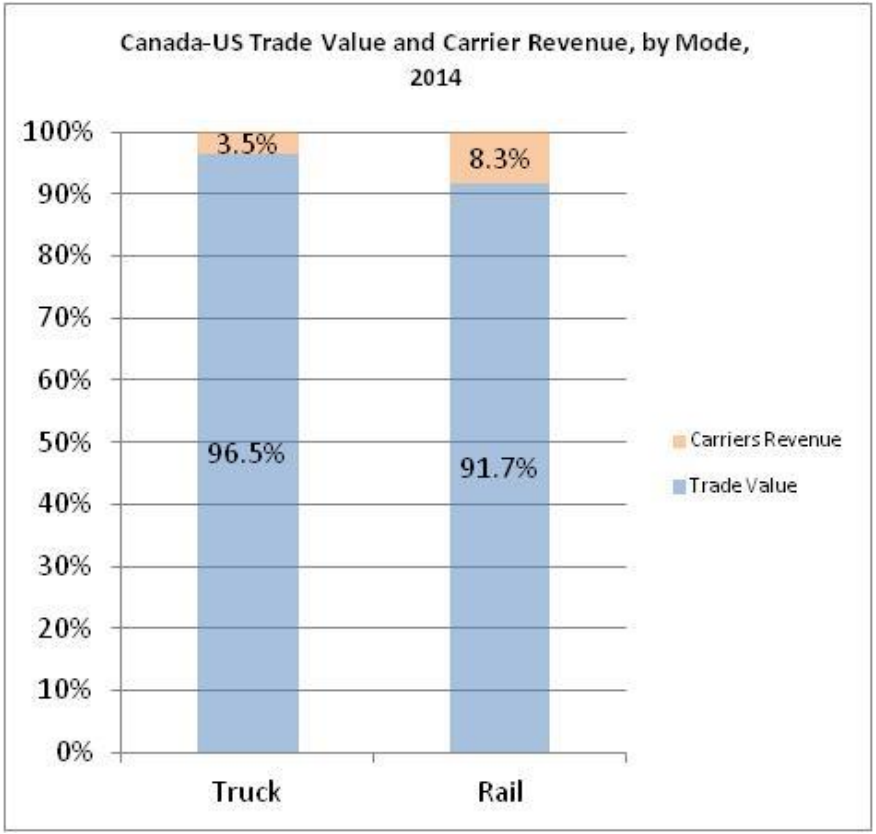
- Trucking generally favours higher value goods travelling shorter distances, while rail traditionally handles larger volumes and farther distances.
- This translates to a higher proportion of the final value of goods tied up in transport by rail rather than trucking.

2014 CAN-US Trade Value and Carrier Revenue, by Mode, (Billions CDN $)

Mode	Value of Trade[1]	Carrier Revenue[2]	%
Truck	$371	$13	3.5%
Rail	$115	$9	8.3%

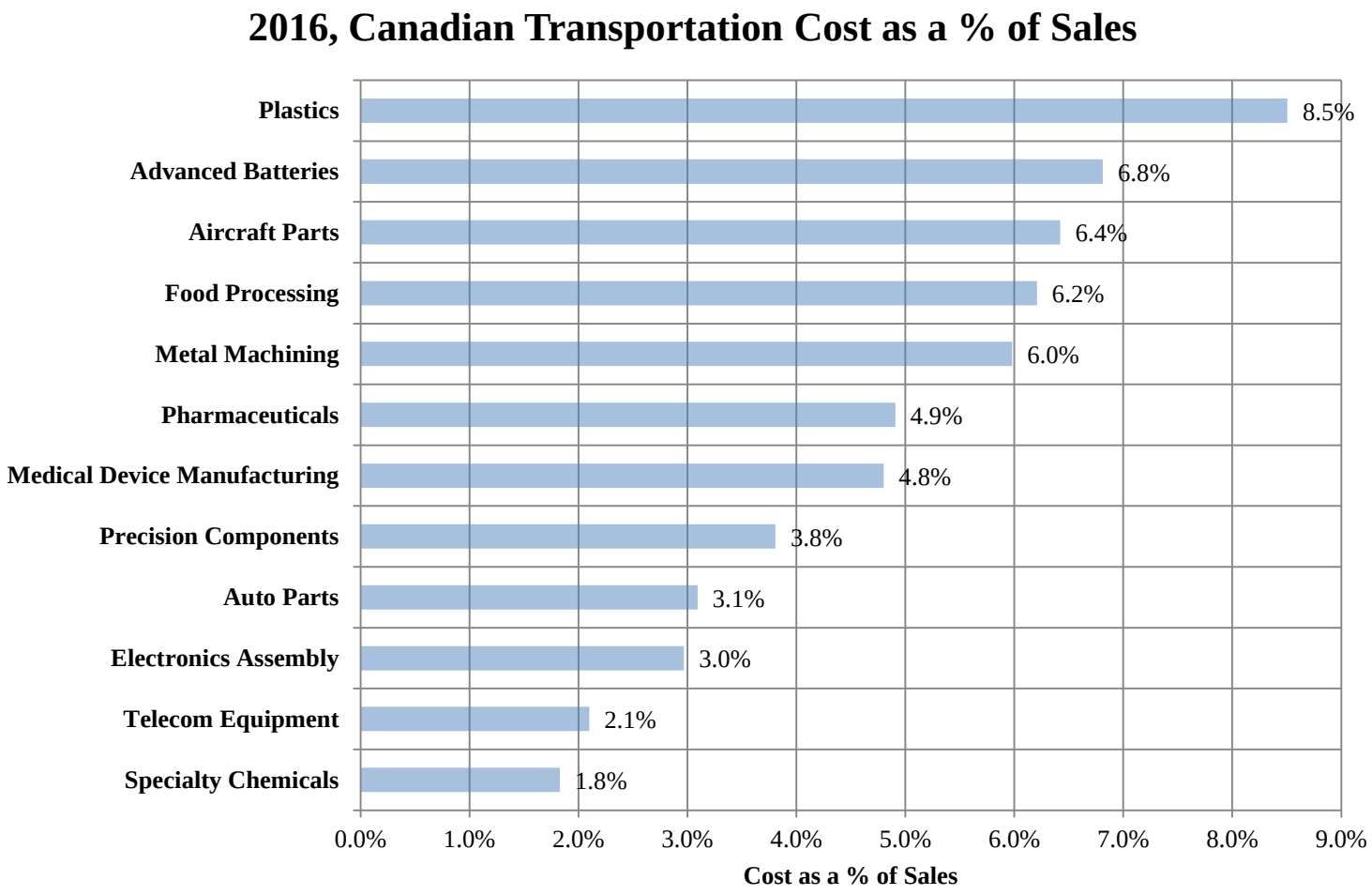
[1] Source: TC international Trade Database

[2] Source: TCOD, TC Rail Traffic Database



COMMODITY SPECIFIC TRANSPORT COSTS

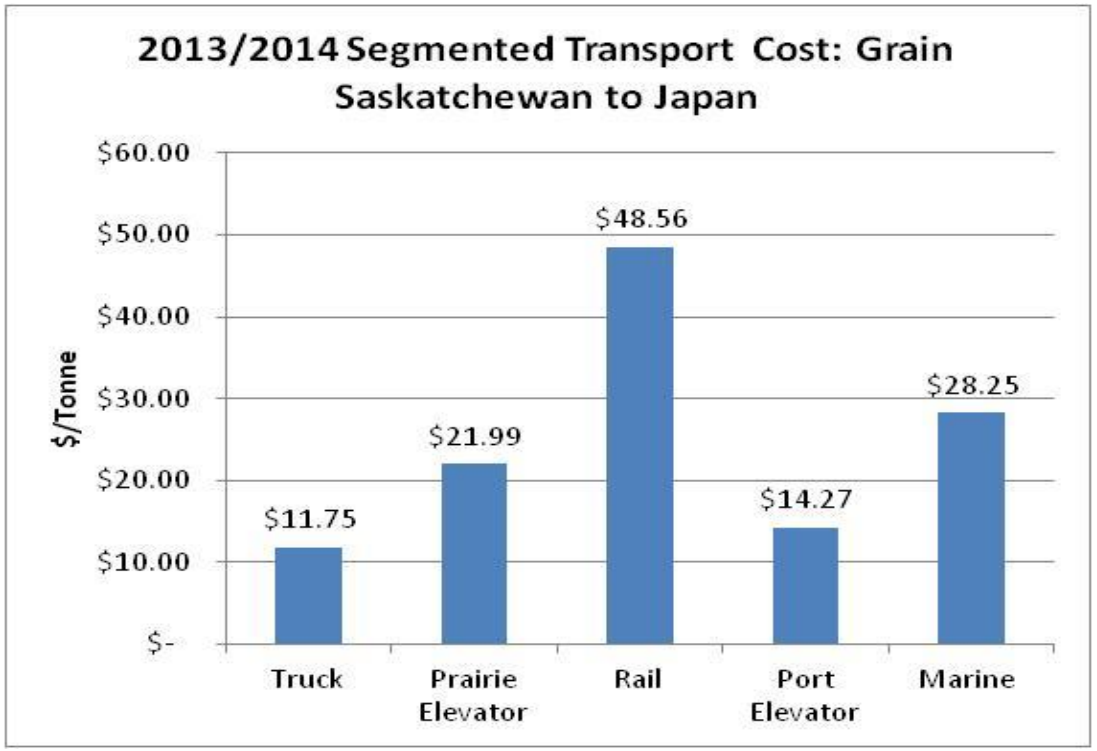
- The relative proportion of transport costs to sales varies across industries.
- Generally, transport costs make up a smaller proportion of higher value goods.

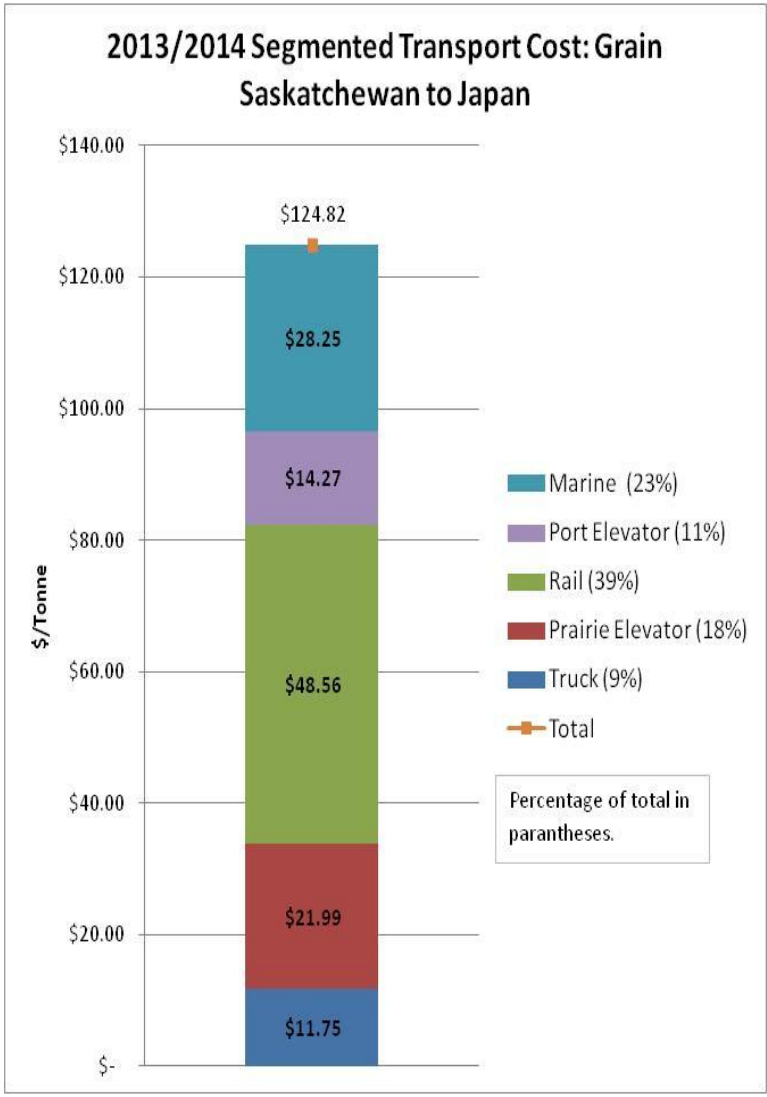


Source: KPMG 2016 Cost Competiveness Study

Segmented Transport Costs: Grain

-Almost 40% of the cost of transport for grain is attributed to rail.
-30% is attributed to the prairie and port terminal operations.
-Marine transport to destination represents around 23% of the total transport cost.



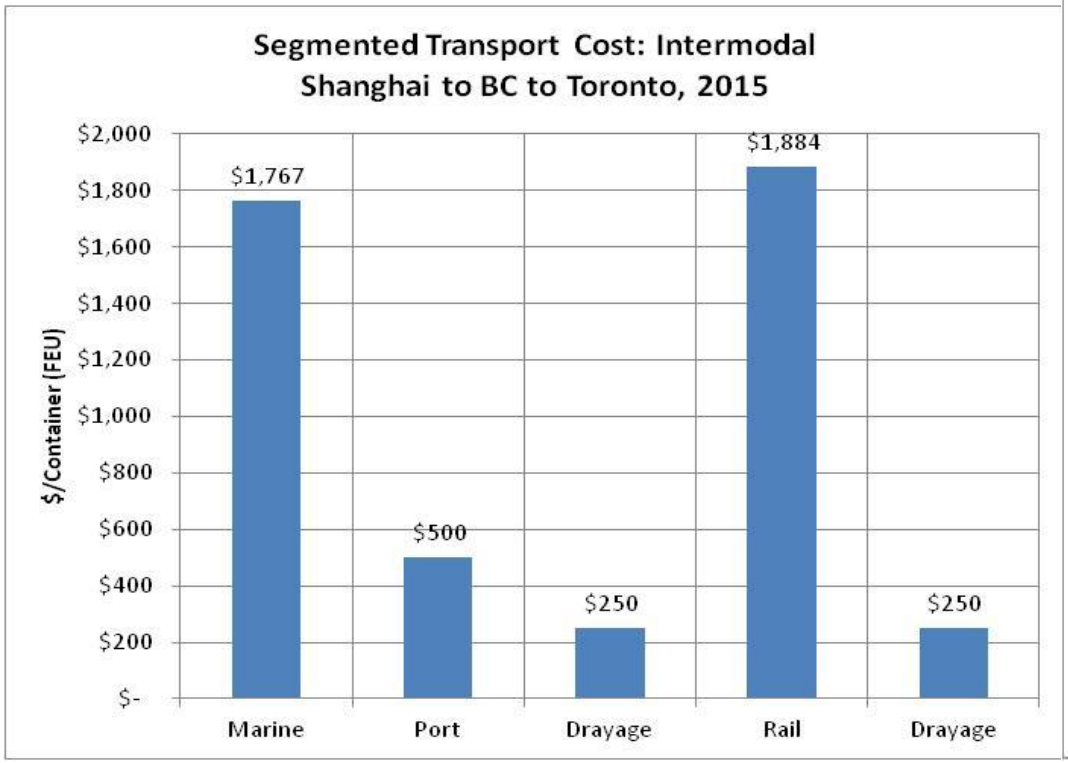


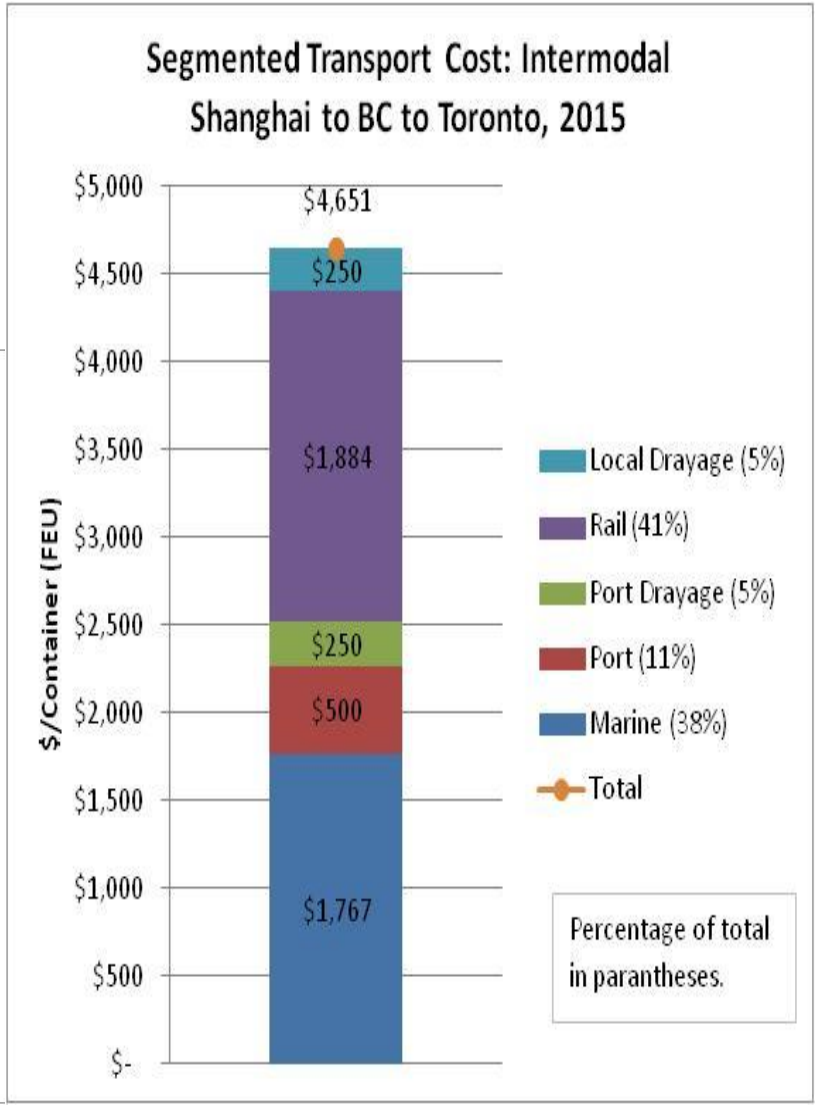
2013/2014 grain crop year defined as August 2013 to July 2014.

Source: Publically available information, Quorum Corporation; U.S. Wheat associates

Segmented Transport Costs: Intermodal

-Roughly 40% of the transport cost for an intermodal container is attributed to rail.
- Marine transit makes up 38% of the total transport cost.
- Port terminal and truck drayage make up the remaining 20% of total transport cost.





Source: Drewry, Port Metro Vancouver, Rail Traffic Database, CN Rail publically available quote

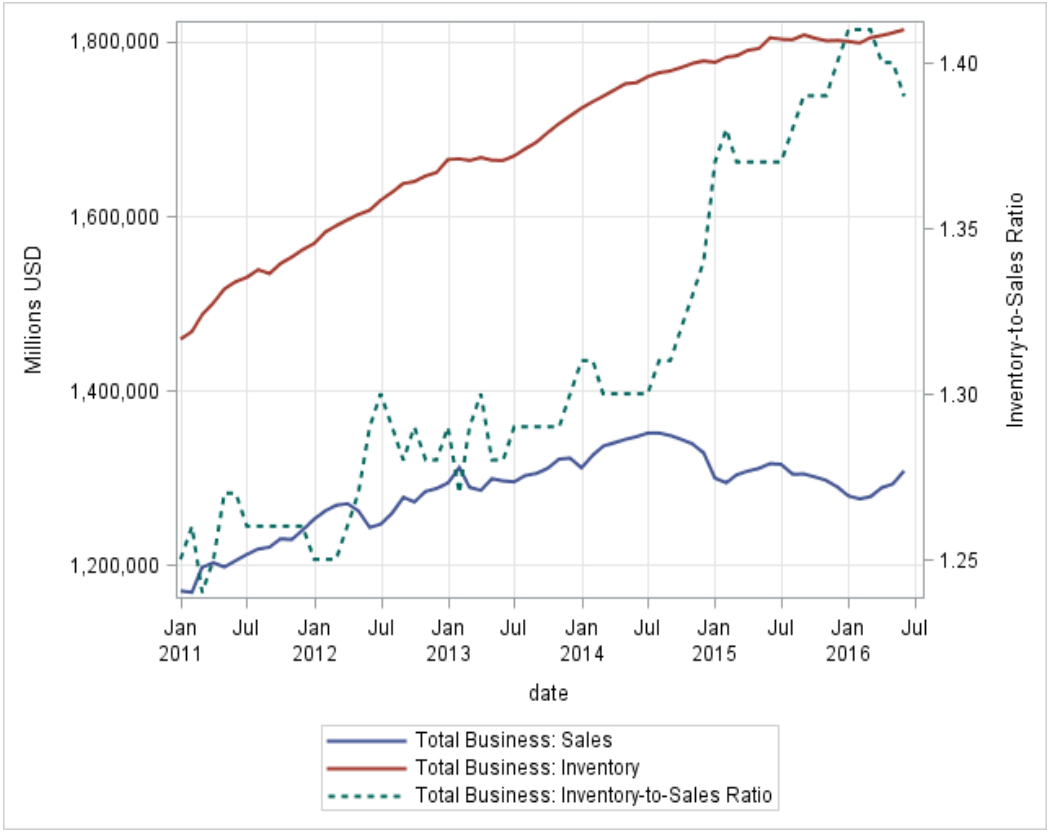
THE ROLE OF INVENTORY IN TOTAL LOGISTICS COSTS

Monthly U.S. Total Business Inventory and Sales
Jan 2011- Jun 2016

- Higher inventory levels impact logistics costs through higher costs in insurance, obsolescence and warehousing.

- Business sales in the U.S. business sector have been slowing and actually began decreasing mid-2014.

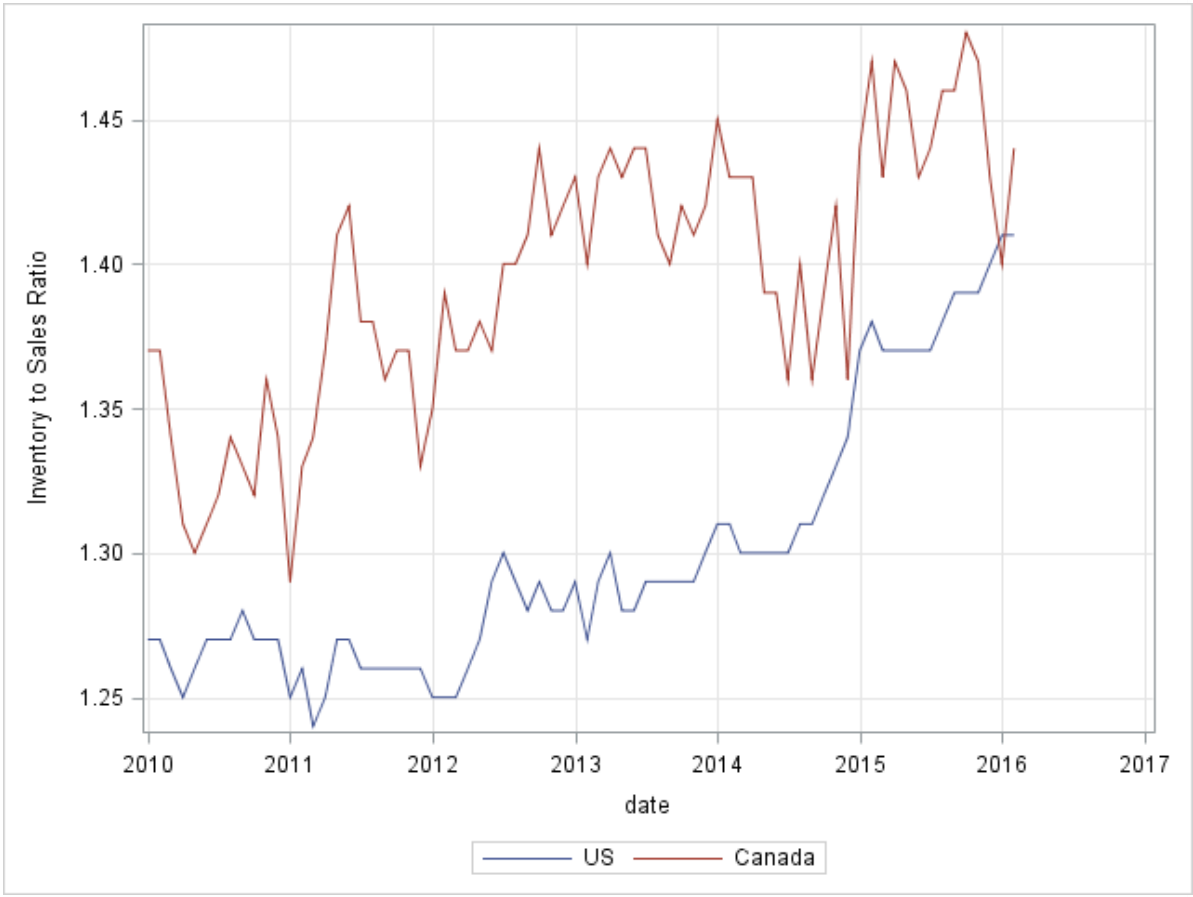
- Inventories were consistently rising during that time and have only recently begun to stabilize. This has resulted in a steadily rising inventory-to-sales ratio, typically a leading indicator for economic volatility.



Source: Federal Reserve Bank of St. Louis

Monthly Manufacturing Inventory to Sales Ratio

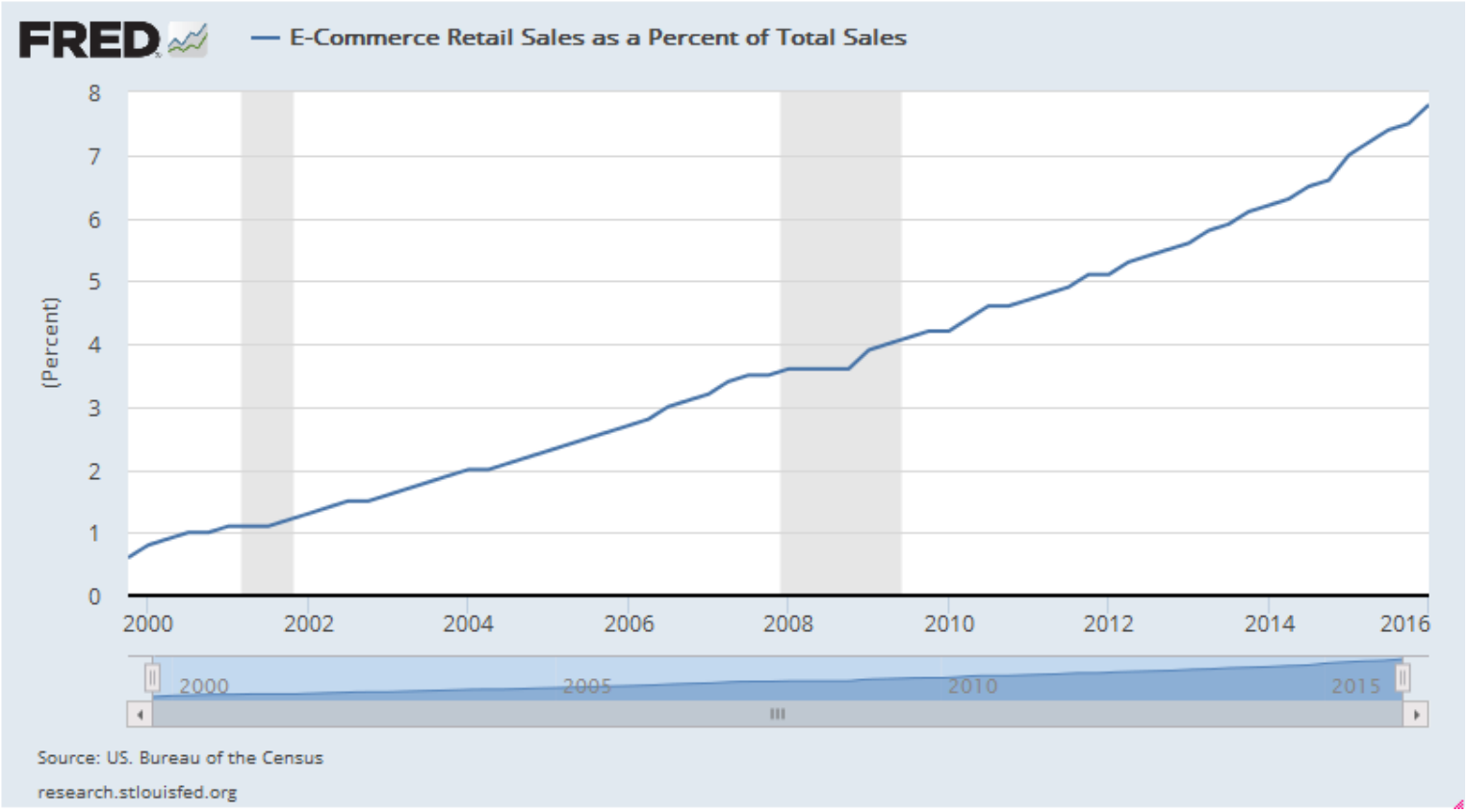
- The rising trend in the inventory-to-sales ratio is even more pronounced in Canada, relative to the United States.



Source: Federal Reserve Bank of St. Louis, Cansim Table 377-0009

Retail Supply Chains

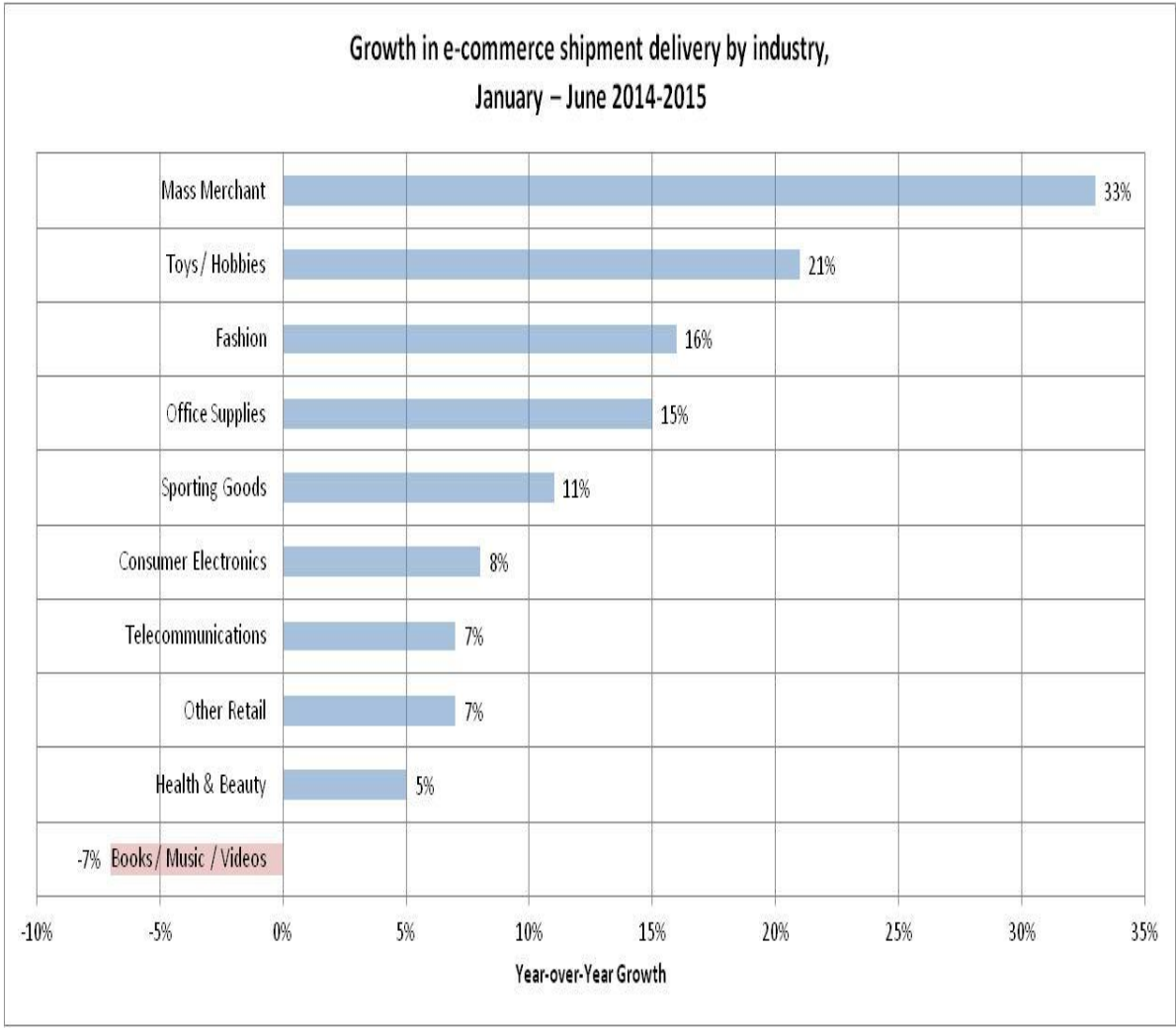
- The rising prominence of e-commerce is disrupting traditional retail supply chains.
- The advent of 2-day delivery service for online shopping necessitates a re-positioning of typical warehousing and “last-mile” logistics.
- This represents a potential structural driver for increasing inventory, and thus potentially higher logistics costs.



Retail Supply Chains

- Several retail segments are undergoing significant growth in e-commerce volume.

- Shipping to consumers directly from distribution centres or from retail outlets, represent “Omni-Channel” solutions, but increase complexity and cost for retailers.

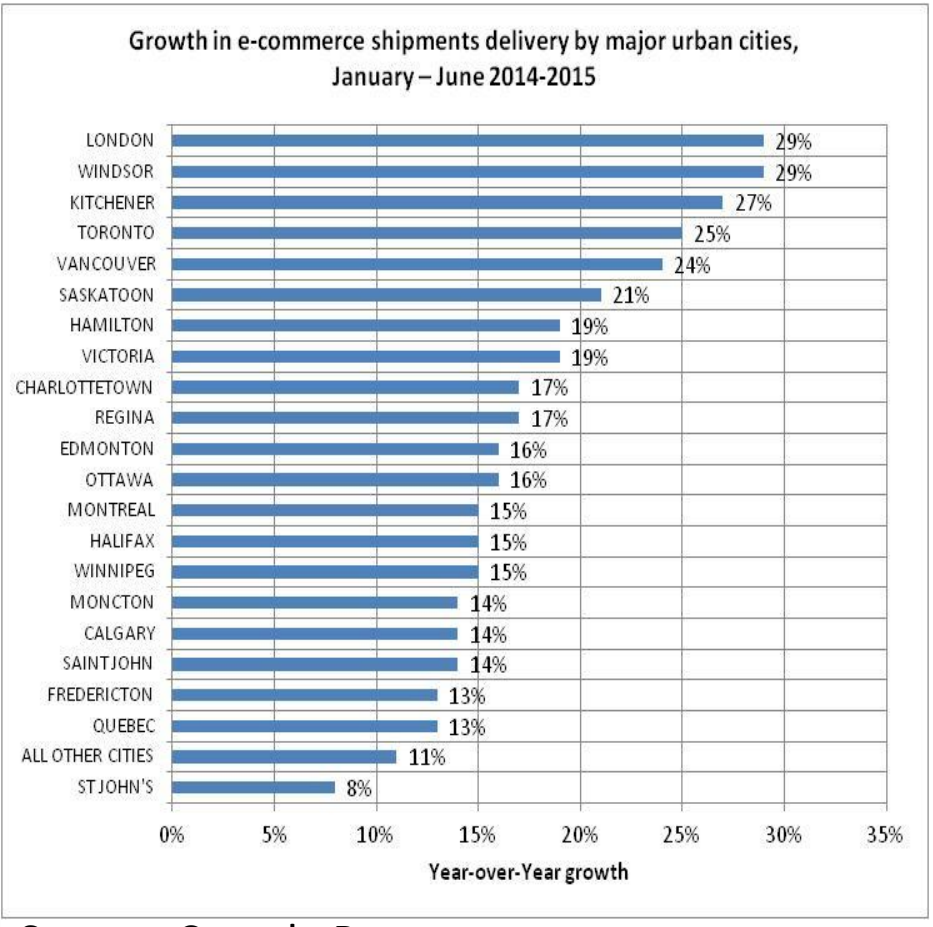


Source: Canada Post

Retail Supply Chains

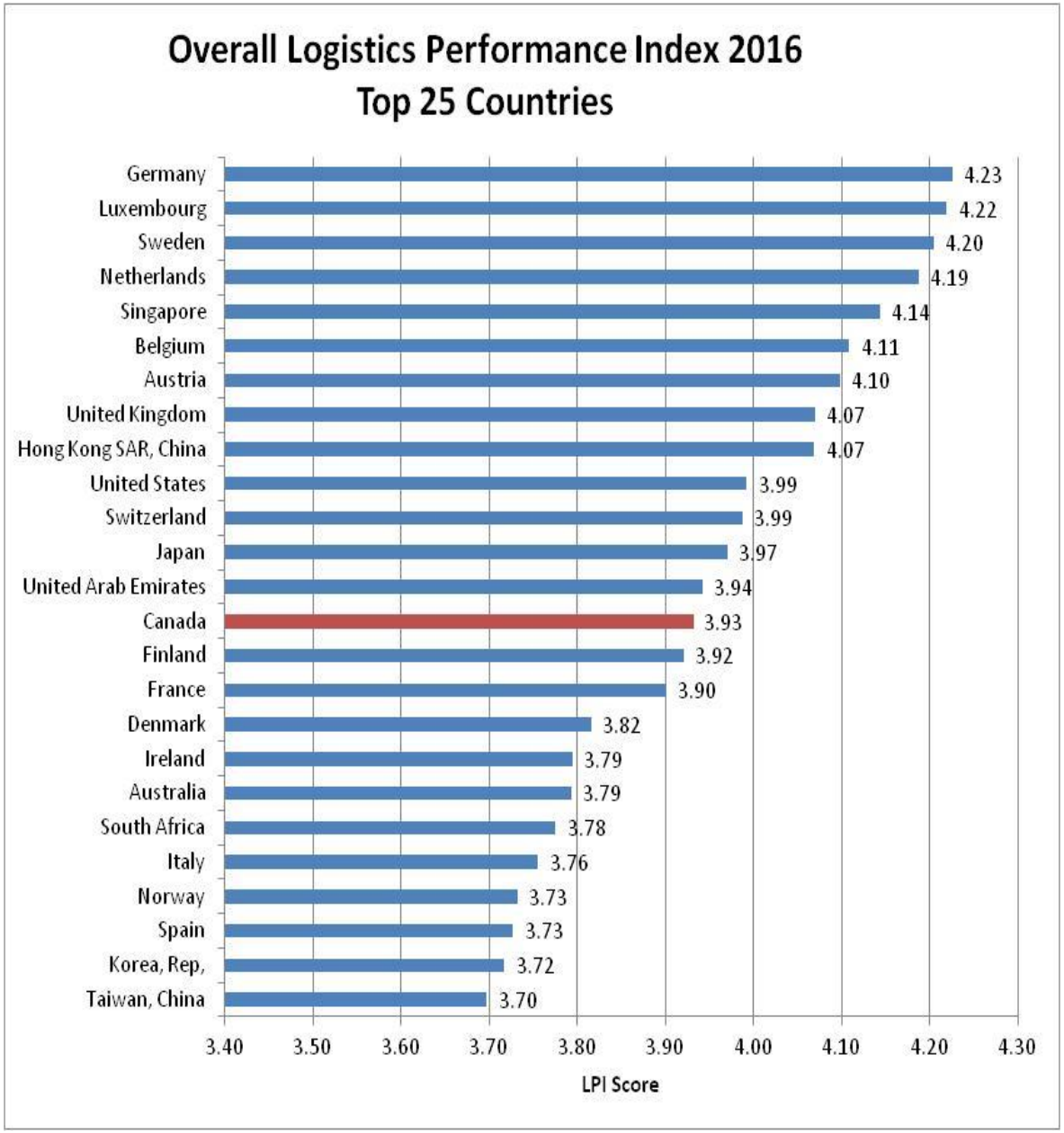
-The geographic dispersion of Canadian urban centres does not bode well for economies of scale to meet urban demand in a timely manner.

- E-commerce shipments in urban areas that are closer to traditional freight hubs seem to be growing at faster rates.

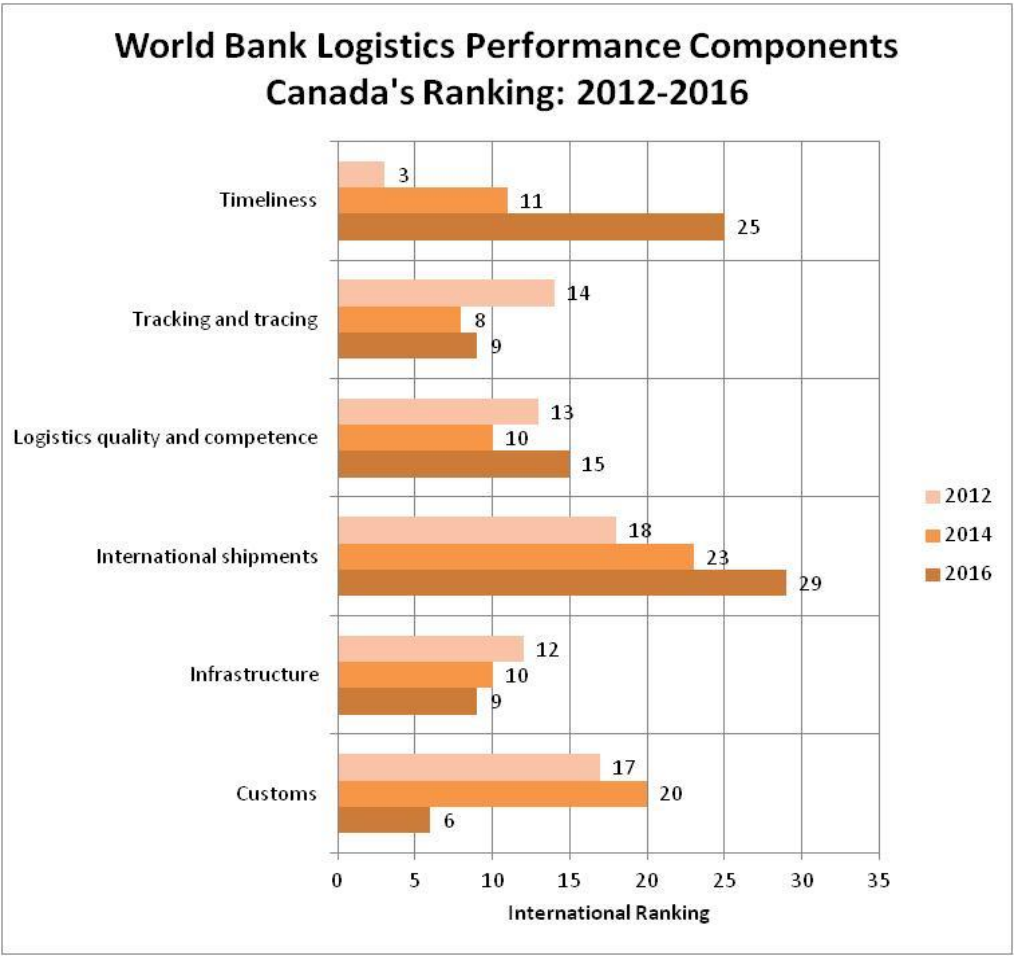


Source: Canada Post

LOGISTIC PERFORMANCE



- The World Bank's Logistics Performance Index is a benchmarking tool to help countries identify challenges and opportunities in trade logistics and performance.
- It represents a composite of six sub-components of logistics.
- As of 2016, the LPI compared 163 countries based on a worldwide survey of global freight forwarders and express carriers.
- Canada's overall LPI ranked 14th best in the world in 2016, down slightly from 12th in 2014.



-The World Bank has been tabulating these indices since 2007. The last three iterations are the most comparable among them.

- In 2016, Canada performed better in the *Customs* component, but worse in *Timeliness*, *Logistics quality and competence* and *International Shipments.*

	Annual Rank			
LPI Component	**2012**	**2014**	**2016**	**Top Country**
Timeliness[1]	3	11	25	Luxembourg
Tracking and tracing[2]	14	8	9	Sweden
Logistics quality and competence[3]	13	10	15	Germany
International shipments[4]	18	23	29	Luxembourg
Infrastructure[5]	12	10	9	Germany
Customs[6]	17	20	6	Singapore

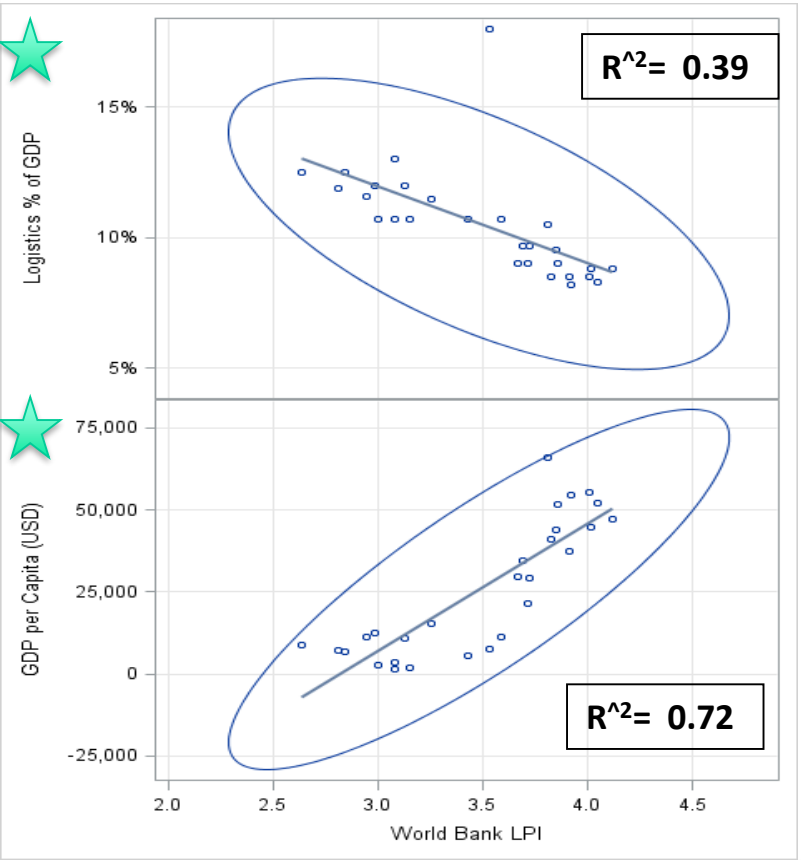
- Geography seems to be a factor for *International Shipments*, as the top three ranked countries are Luxembourg, Hong Kong and Belgium.

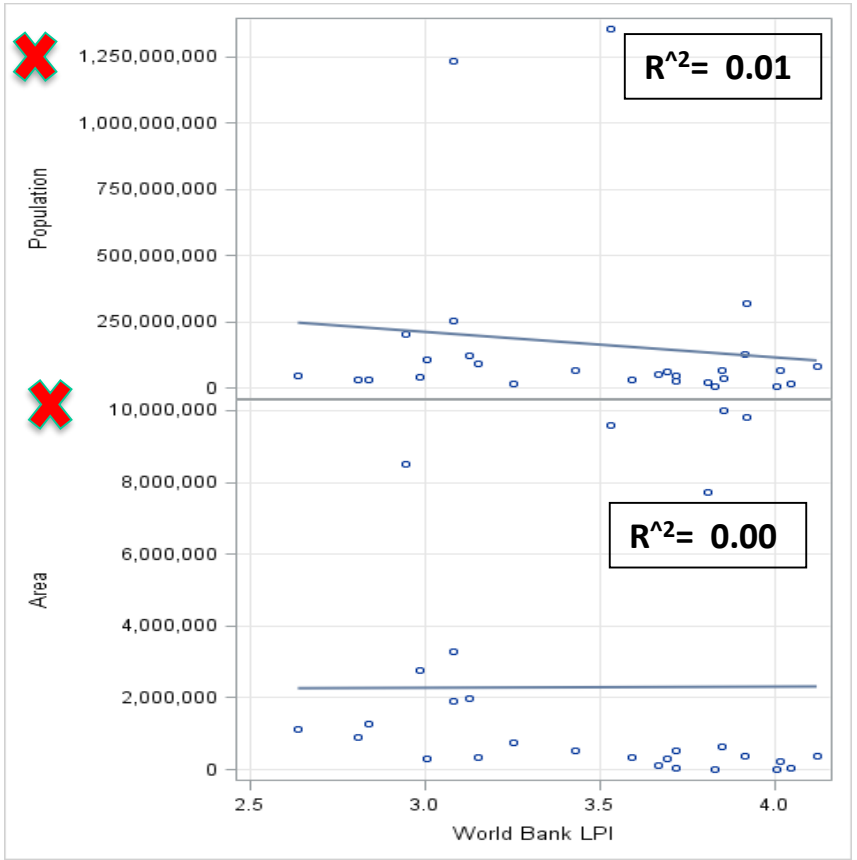
- This does not seem to be the case for *Timeliness* as Germany is ranked number 2.

1: The frequency with which shipments reach consignees within scheduled or expected delivery times
2: The ability to track and trace consignments
3: The competence and quality of logistics services
4: The ease of arranging competitively priced shipments
5: The quality of trade and transport infrastructure
6: The efficiency of customs and border clearance

Correlation Analysis:

- When looking at the determinants of logistics performance there is a negative relationship between higher logistics costs relative to GDP and performance in the World Bank Index.
- Also, there is a positive relationship between GDP per Capita and logistics performance.
- There does not seem to be a relationship with the size of a country in terms of people or area and logistics performance.

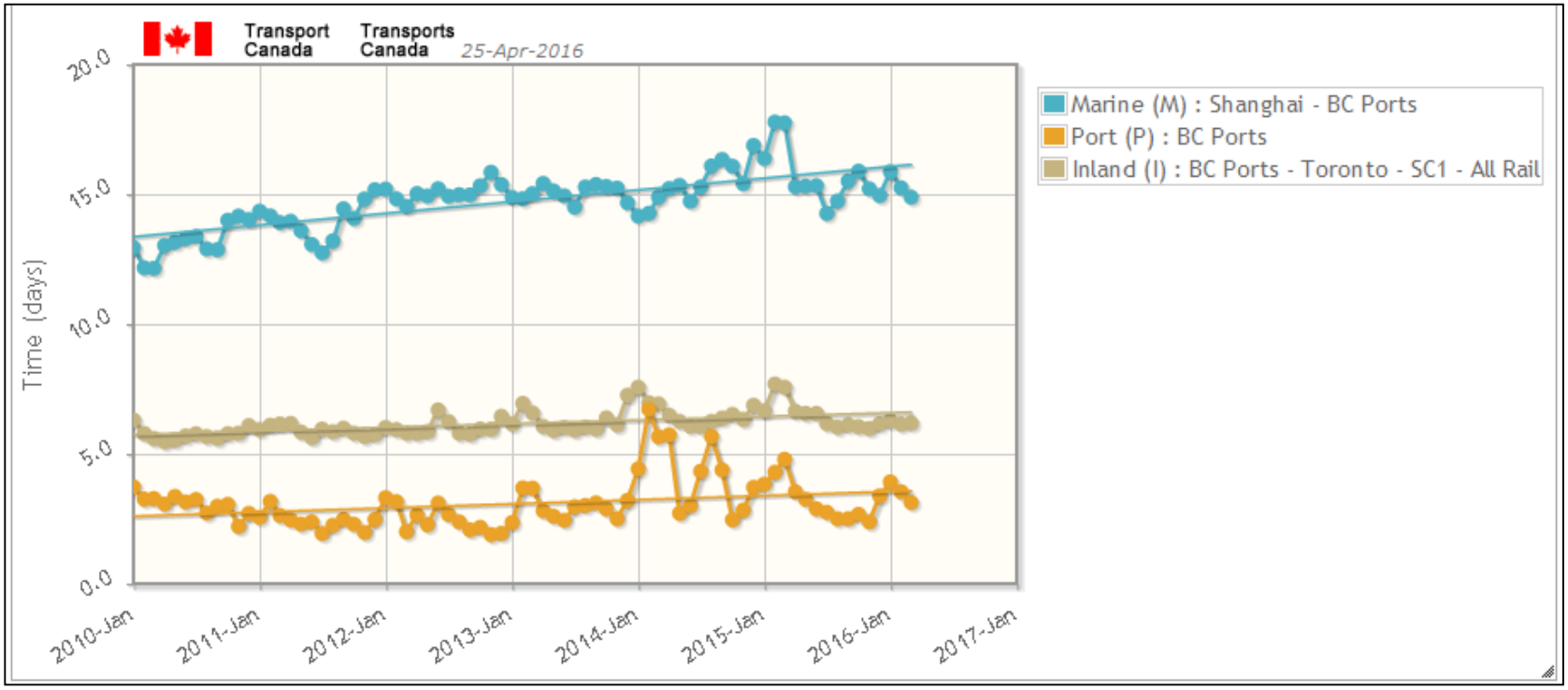




EXAMPLES OF SUPPLY CHAIN PERFORMANCE METRICS

West Coast Import Container Fluidity

Monthly average transit time for *Marine*, *Port* and *Inland Rail* segments.



GRAIN SUPPLY CHAIN PERFORMANCE METRICS: First Quarter 2016

Monthly updates as of June 9, 2016

Chart 1: Port of Vancouver Grain Vessel Waiting and Loading Time

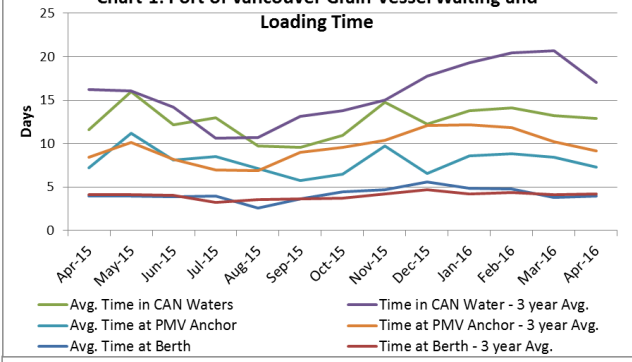
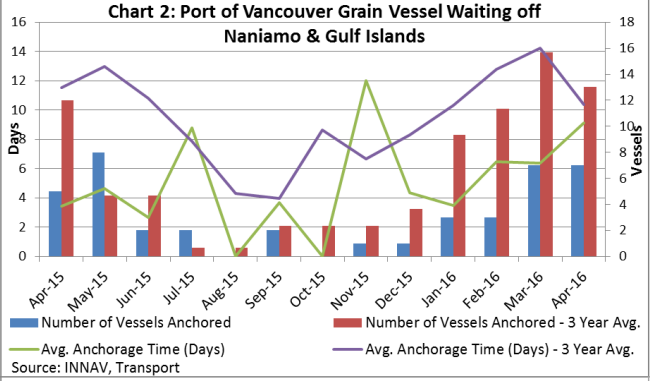


Chart 2: Port of Vancouver Grain Vessel Waiting off Naniamo & Gulf Islands



Source: INNAV, Transport

Chart 3: Port of Vancouver Grain Vessel Loading

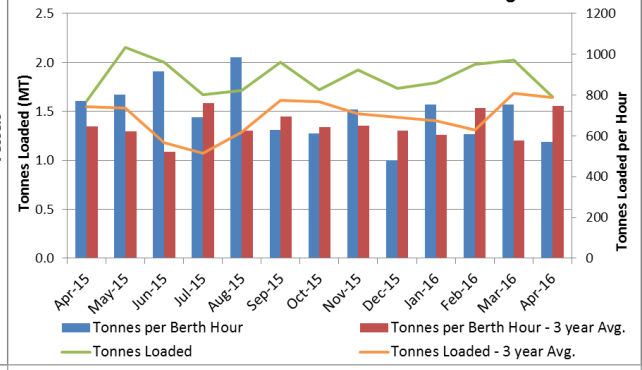
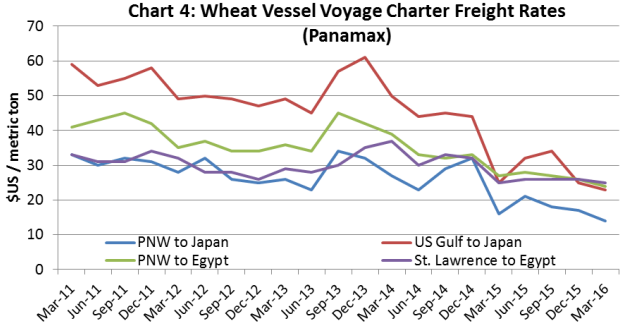
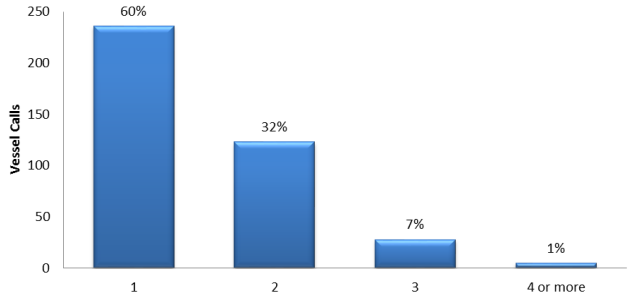


Chart 4: Wheat Vessel Voyage Charter Freight Rates (Panamax)



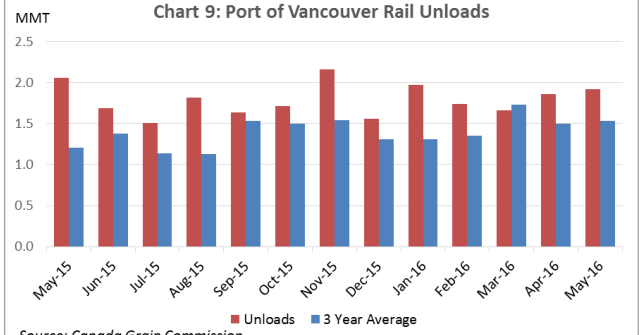
Source: U.S. Wheat Associates

Chart 5: PMV Grain Vessel Berth Visits 2015-2016 Crop Year



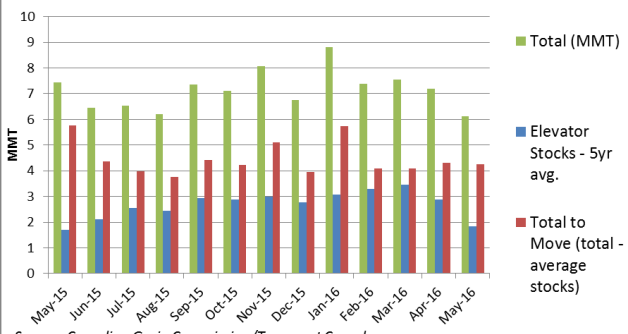
Source: Port of Vancouver

Chart 9: Port of Vancouver Rail Unloads



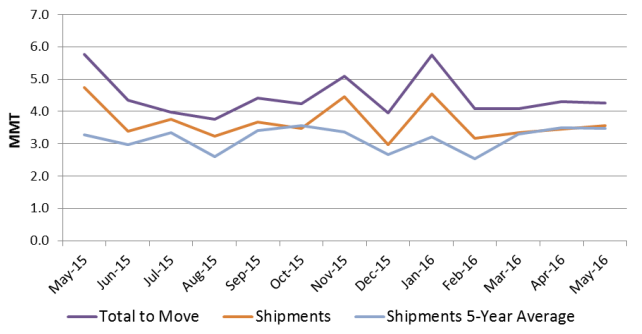
Source: Canada Grain Commission

Chart 7: Grain Stocks and Total to Move at Prairie Elevators



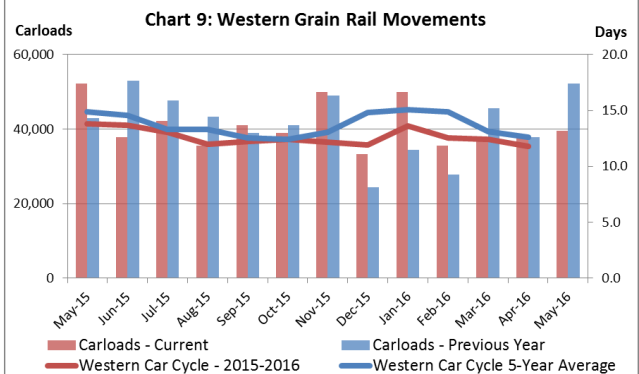
Source: Canadian Grain Commission/Transport Canada

Chart 8: Grain Shipments at Prairie Elevators



Source: Canadian Grain Commission/Transport Canada

Chart 9: Western Grain Rail Movements



Source: Canadian National/Canadian Pacific

Source: Chart 1,2 & 3 – Port of Vancouver; Transport Canada; INNAV

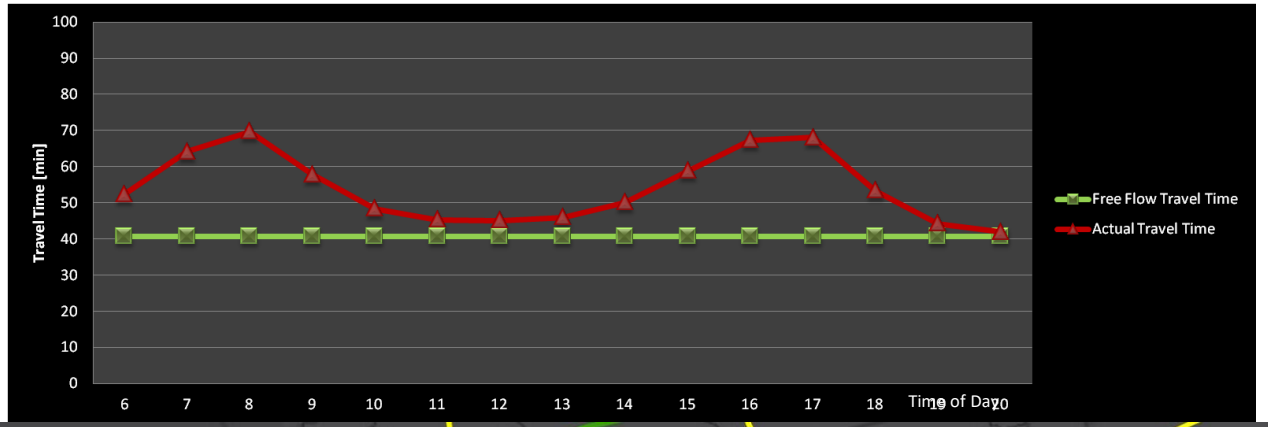
BORDER WAIT TIMES

Performance Metrics: Border Wait Times (2015 vs Historical Average)						
	Border Wait Time (minutes) - Median			Border Wait Time (minutes) - 95th Percentile		
Border Crossing	*2015 Q2*	*Year to Date*	*3 Year Avg*	*2015 Q2*	*Year to Date*	*3 Year Avg*
Pacific Highway	15.3	15.5	14.3	46.3	45.3	40.8
Huntingdon	15.6	14.1	13.7	35.7	34.5	32.5
Coutts	12.3	12.4	14.1	26.6	26.8	30.2
North Portal	13.4	13.5	12.6	27.6	27.6	27.3
Emerson	14.7	15.1	14.5	27.6	28.7	27.7
Sault Ste Marie	13.6	13.3	13.7	30.3	30.5	29.2
Windsor	15.5	15.3	16.0	43.7	43.3	44.6
Sarnia	14.8	15.1	15.0	30.3	33.6	36.3
Queenston	12.5	12.5	14.3	36.6	36.4	40.9
Fort Erie	12.4	12.0	13.9	51.0	48.0	43.9
Landsdowne	17.2	17.0	16.1	34.6	33.5	32.5
Lacolle	11.9	11.9	12.5	29.7	29.3	32.0
Rock Island	11.4	10.8	11.9	30.5	31.1	32.0
St. Stephen	7.1	6.9	7.5	16.5	17.7	19.1

Source: Transport Canada

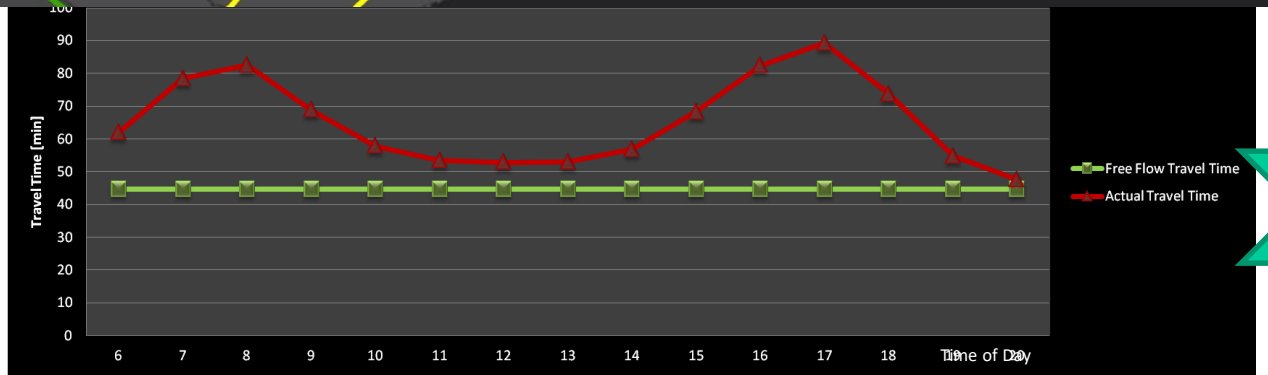
ROAD PERFORMANCE METRICS

HWY 401 DIRECTIONAL DAILY AVERAGE TRAVEL TIME



Actual Travel Time
Hwy401 WB
Pickering / HWY 427
Length = 65 km

WB



Actual Travel Time
Hwy401 EB
HWY 407 / Pickering
Length = 65 km

EB

PRODUCTIVITY OF THE SECTOR

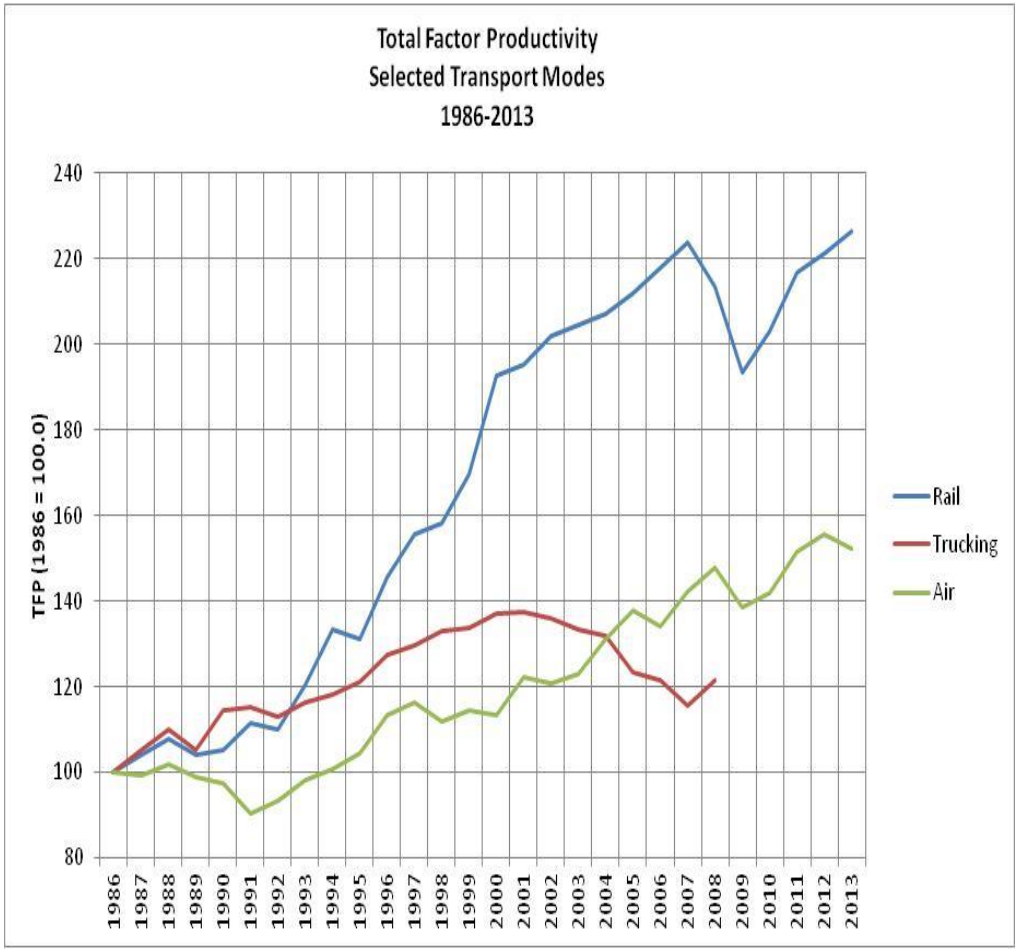
Competitiveness

• Productivity analysis measures quantity of production inputs relative to outputs. In this case we are measuring the year-to-year growth rates.

• Since the de-regulation of the transport sector in the late 1980's competition has provided the incentive to spur productivity improvements.

• The economic benefits of greater productivity can be internalized by carriers through retained earnings or passed on to freight shippers through better freight rates.

*The trucking time series ends in 2008 due to the termination of key input data by Statistics Canada.



Source: Transport Canada internal databases

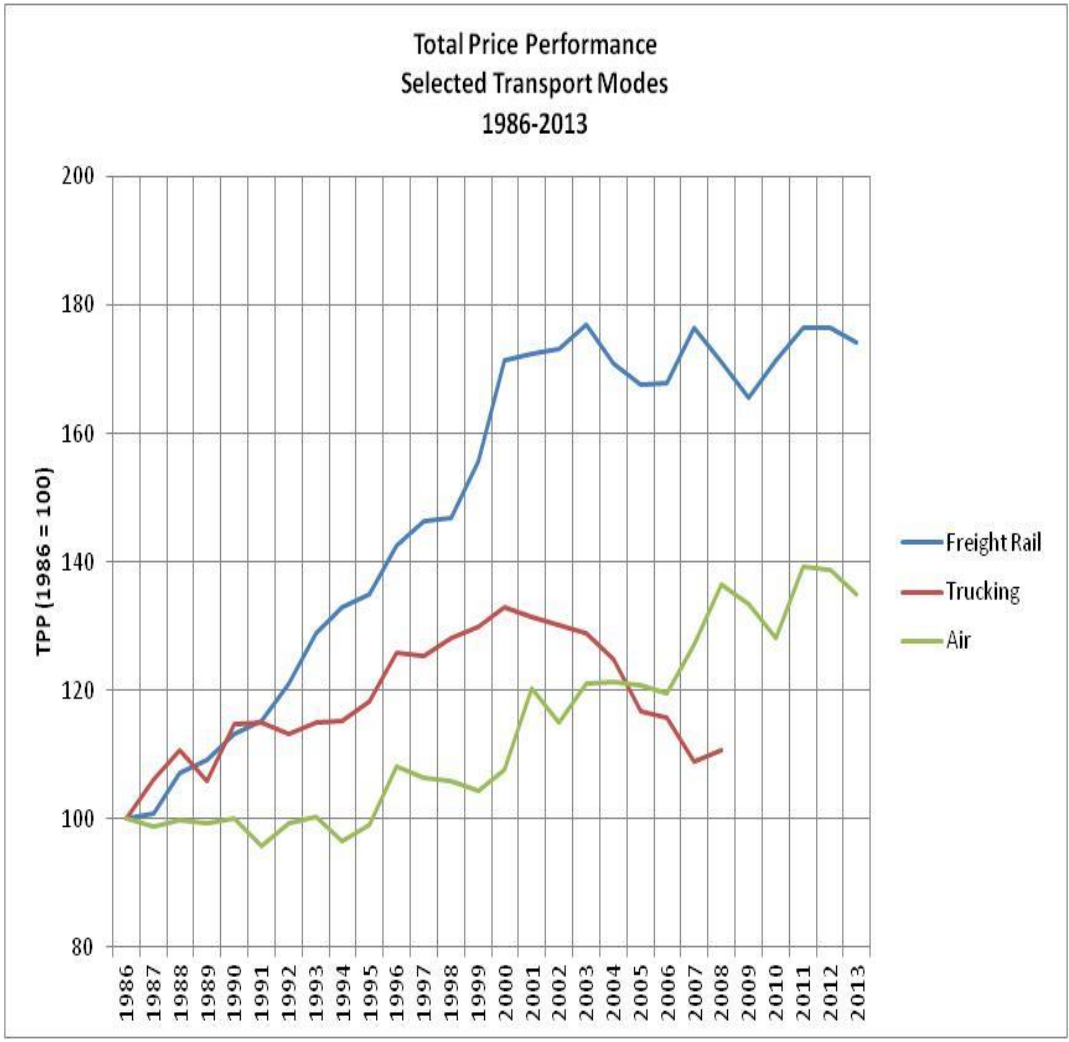
Competitiveness

• Freight rates can be measured as carriers' output prices.

•The ratio of input prices to output prices is a measure of price performance. Again, we are measuring the year-to-year growth rates.

• Previous productivity improvements have allowed carriers to pass on cost savings to shippers in the form of lower prices in the face of rising input prices.

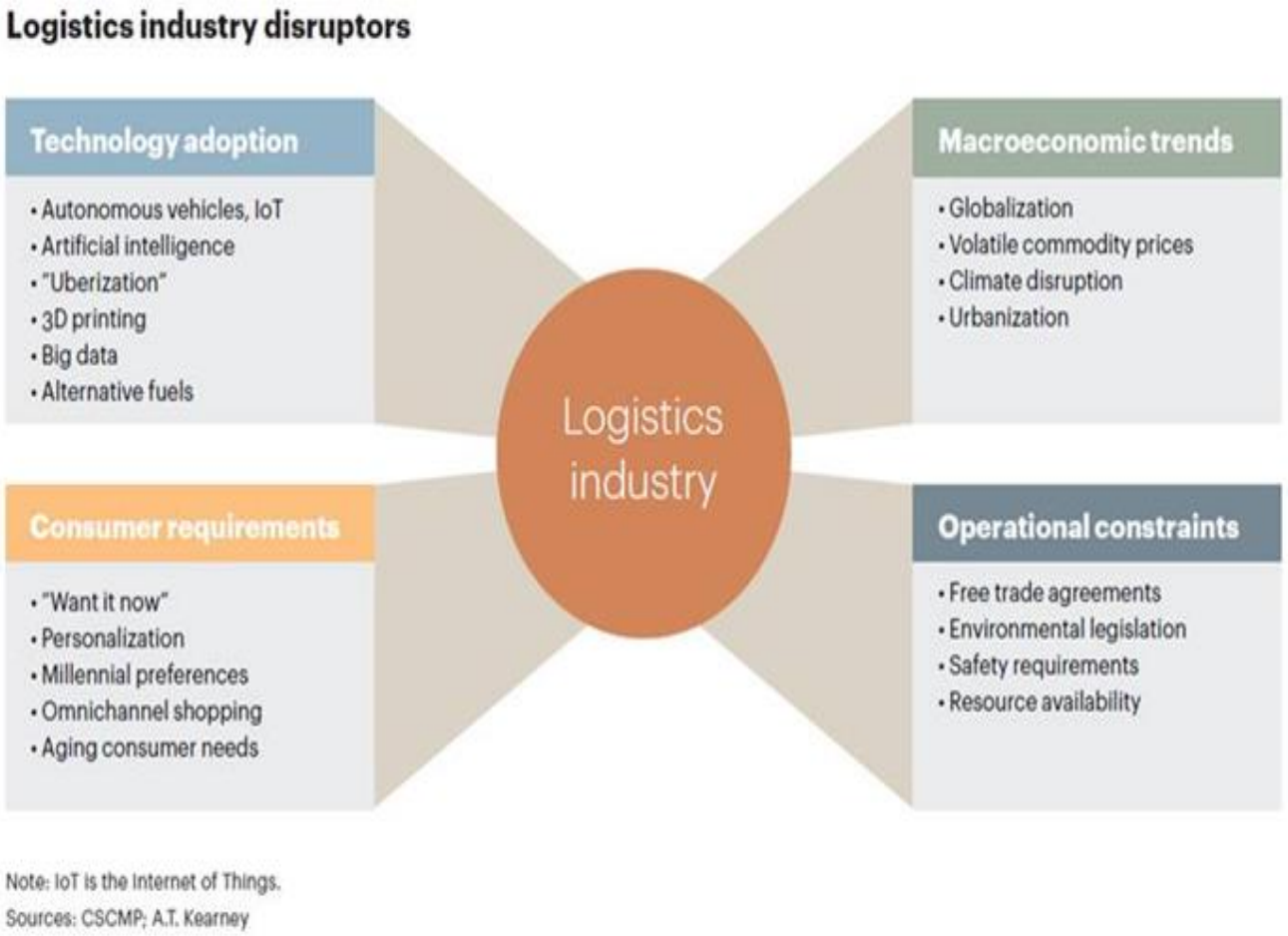
• Freight rail price performance grew steadily from 1986 to 2000, but has since levelled off. This implies that carriers are re-investing their gains from productivity through capital investments or distributing earnings to shareholders.



- An important source of productivity improvement is through investment in information, communication and technology (ICT) capital.

-New and potentially disruptive technologies are being tested within manufacturing and transportation sectors to improve the visibility of supply chains, better forecast demand and utilize assets.

-These technologies have the ability to drastically alter freight characteristics, supply chain structure, improve carrier performance and ultimately decrease the total logistics cost.



Source: CSCMP's 2016 State of Logistics Report