

Is Carrier Choice Different for 3PLs and other End-shippers? Some Preliminary Findings

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42nd Canadian Transportation Research Forum, 2007

Outline

- 1 Purpose and Context
- 2 Methodology
- 3 Modeling, Results & Conclusions

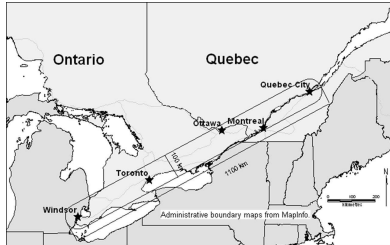
Acknowledgements

- Transport Canada
- Railway Association of Canada
- Transports Québec
- McGill University
- Le Fonds québécois de la recherche sur la nature et les technologies

Project Purpose

For the Quebec City - Windsor Corridor:

- Develop models of shipper choice of carrier;
- estimate the potential to divert freight traffic to rail; and
- estimate changes to CO₂ emissions in Canada.



Freight Transportation in Canada

- Overall freight traffic in Canada is increasing rapidly
- Truck traffic is growing much faster than rail
- Road freight mode split particularly high in the Quebec City - Windsor Corridor
- Road freight traffic is much more GHG intensive than rail
- Can traffic be shifted to rail?
- Quantifiable models of mode choice are needed

3PLs

- Companies that organize logistics on behalf of others
- Increased interest in 3PLs over the past few decades

Existing Literature:

- A lot of interest in the business and academic press
- Research has concentrated on:
 - 1 degree to which 3PLs are used
 - 2 reasons for the use of 3PLs

Conclusions about 3PLs

- Usage common and increasing:
 - In Canada 40% of companies use 3PLs sometimes
 - In 1991 38% of Fortune 500 companies used 3PLs
 - By 2003 83% used 3PLs
- Market Potential:
 - Large (US\$ 150 billion)
 - Room for growth (25% of market captured)

Why 3PLs Matter

- If 3PLs exhibit different carrier preferences than other end-shippers...
- ...and are contributing to more traffic...
- ...then understanding their behaviour is **important** for understanding **modal shift**
- However, little is known about 3PL carrier choice preferences

3PLs and Mode Choice

- A growing mode choice literature exists
- Using RP and SP methods
- No research looking at 3PLs
- This paper tests for differences between 3PLs and other shippers

Stated Choice Methodology

- Methods based on stated preference (SP) surveys
- SP surveys ask respondents choose between hypothetical (but realistic) alternatives.
- Results analyzed using discrete choice methods.

Discrete Choice Modeling

- Statistical methods applied to choice data.
- Dependent variable takes value of 0 or 1.
- Estimates effect of explanatory variables on choice.
 - e.g. % increase in using rail from decrease in cost
- Most common model - the multinomial logit (MNL).

$$P_{ni} = \frac{e^{\beta' x_{ni}}}{\sum_j e^{\beta' x_{nj}}}$$

QC - Windsor Corridor Shipper Survey

- A Stated Preference survey
- Goals:
 - 1 Identify and quantify the factors affecting carrier choice
 - 2 Establish the importance of mode in carrier choice

Intermodal Options Competitive with Trucks

- Shifting freight traffic to rail means:
 - Competing with trucks
- Premium-intermodal is the only competitive intermodal option
- It was the 'model' intermodal service used for the survey



Sampling Frame

Corridor shipping managers of 'end-shippers':

- manufacturers...
- wholesalers and retailers...
- ...with more than 50 employees
- Freight Arrangers (3PLs, etc.)
- Around 7,000 in total

Source: D&B MDDB

- Telephone marketing firm contracted to:
 - contact and pre-interview potential respondents
 - send respondents survey access information follow-up with non-respondents
- Raffle was offered as incentive
- Roughly 11,000 calls to entire sample
- 392 completed surveys

Sample Survey Question

Department of GEOGRAPHY McGill

It is the beginning of your work day. You are responsible for sending a **pallet of mason jars** from **Toronto to Montreal** that is supposed to arrive tomorrow before noon.

Given the characteristics of the carriers, please select which carrier you would choose for this shipment:

Company	Company A	Company C	Company B
Price	\$150	\$165	\$135
On-Time Reliability	98%	85%	92%
Damage Risk	0.75%	1.5%	3%
Security Risk	1%	0.5%	1.5%
How the shipment will be carried	Truck only	Truck only	By rail on a portion of the trip
	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Follow these links for more information on [carrier attributes](#), [by-appointment shipments](#),* or other [shipment attributes](#).

Next

Modeling Approach

- Conditional logit developed for all responses
- Test joint insignificance of 3PL interaction terms
- If test significant...
- ...estimation of separate models for 3PLs and other 'end-shippers'

Modeling Results

	All	End-shippers	3PLs
Price(ln)	-4.54	-3.724	-7.335
Dist*Price	-0.002	-0.002	
Ontime Reliability (OR)	0.093	0.086	0.100
By-appt.*OR	0.046	0.045	0.072
Damage Risk (DR)	-0.364	-0.378	
Fragile*DR	-0.191	-0.187	-0.511
Security Risk	-0.100	-0.094	
Intermodal	-0.774	-0.590	-1.189

Carrier choice is influenced by:

- carrier attributes in ways consistent with theory & previous findings
- **strong bias** against **intermodal** carriers

Difference between 3PLs and other end-shippers:

- More price sensitive
- more sensitive to on-time reliability
- almost as sensitive to damage for fragile goods
- even **stronger bias** against **intermodal** carriers

Implications:

- even greater **challenge** for **increasing** rail mode share
- 3PLs have shippers' best interests at heart