Data Need for Truck Trip Generation Analysis: Qualitative Analysis of the Survey of Retail Stores

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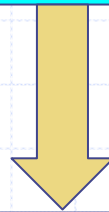June 3, 2005

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Outline of Presentation

1. Recent Trends

2. TTG Analysis & Problems

3. Goal, Premises & Framework

4. Data Collection Strategy

5. Preliminary Observation

6. Future Research

Recent Trends

Truck Dominance in Urban Areas

Adoption of sophisticated goods movement strategies

Need to study the impacts of increasing truck traffic in urban areas

Truck Trip Generation (TTG) Analysis

◆ The 1st step toward understanding the impacts of truck traffic

◆ Estimation of the number of trucks coming in and out of a study area

◆ Accurate estimation of TTG leads to better planning and policy decision

Problems for Current TTG Approach

1. Limited data collection efforts in the public sector

2. TTG at spatially aggregated level

3. Insensitivity to changes in goods movement behavior

4. No well-accepted practice in estimating TTG, especially for selecting independent variables
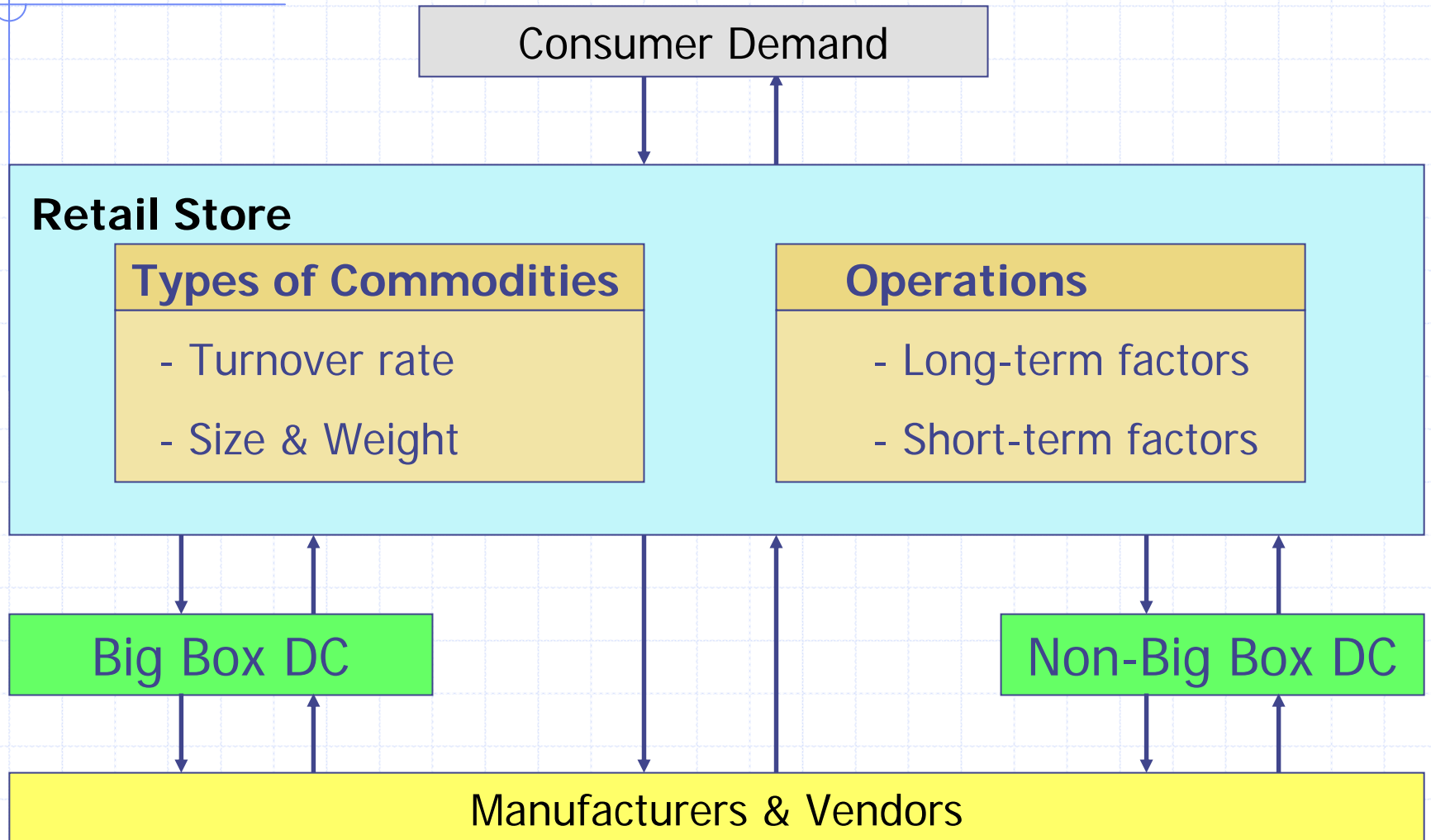
Goals

- ◆ Goal of the study as a whole:
  - To develop a robust methodology for estimating TTG that has appropriate independent variable(s)

- ◆ This presentation:
  - Suggest a new framework for TTG,
  - Discuss the data collection efforts, and
  - Discuss the preliminary observation

Premises

- TTG is measured and predicted better at the individual business (disaggregate) level and should be summed up to produce a spatially aggregated TTG → Bottom-up approach.

- Businesses in a similar sector (e.g. same SIC) may have similar TTG characteristics.

Framework

Consumer Demand

Retail Store

Types of Commodities
- Turnover rate
- Size & Weight

Operations
- Long-term factors
- Short-term factors

Big Box DC

Non-Big Box DC

Manufacturers & Vendors

Data Collection Strategy

1. Building the Knowledge Base
→ Conduct "Preliminary Discussions" with field experts

- To get a grasp on the relationships b/w TTG and business decisions at various levels

- To understand day-to-day activities of businesses and their terminology

- To understand freight truck issues from the perspectives of logistics and supply chain management

- To decide sectors of industry that would be rich sources of data and also cooperative → **Routing schedule between DCs and Retail Stores**

Data Collection Strategy

2. Creating Contact Information

- Obtain contacts from membership directories of professional organizations → the most efficient approach for building a contact list

Data Collection Strategy

3. Data Wish List

- To document the types of data and possible sources where the information could be found

- Flexible approach but time consuming
  - Follow-up phone calls or visit a site to go over the list
  - Terminology

Data Collection Strategy

4. Survey

Strategy	Chains	SIC*	Response Rate	Numer of Stores	Advantage	Disadvantage
Distributing Survey Questionnaire to Distribution	Furniture A	5712		76	* Detailed replenishment schedule with routing plan	* Extremely low response rate
	Shoe A	5661	4% (3/75)	259		* Time consuming
	Apparel A	5632		n/a		* No consistent information
	Subtotal			**335**		
Visiting Stores	Furniture B	2511	100% (4/4)	4	* Cooperative	* No detail information
	Furniture C	5719	100% (6/6)	6		* Time consuming
	Furniture D	2512	100% (6/6)	12		
	Subtotal		100% (16/16)	**22**		
Phone Survey (Individual Stores)	Furniture E	5719	44.4% (16/36)	16	* Somewhat responsive	* No detail information
	Shoe B	5661	67.5% (27/40)	27	* Low cost	
	Shoe C	5661	50% (10/20)	10		
	Shoe d	3149	79.2% (19/24)	19		
	Subtotal		60% (72/120)	**72**		
Total				**429**		

Findings

1. Highly standardized routing schedule

|	Chains	Number of Deliveries	Truck Types	Coverage per routing	SIC
Funiture	A	1 or 2	Semi	2-4 stores	5712
	B	1	Semi	n/a	2511
	C	5	UPS	n/a	5719
	D	1	Semi	n/a	2512
	E	1 or 2	Semi	n/a	5719
Shoe	A	1	Semi	3-5 stores	5611
	B	2	Semi	n/a	5611
	C	1	Semi	n/a	5611
	D	1	Semi	n/a	3149

Findings

2. Furniture Chains: direct delivery from DC to customers

3. No clear standard for business classification

4. Push to pull logistics
   - Change of delivery frequency and size

Findings

5. Seasonal variation of Shoe Chain A

Figure 4. Daily Variation of Cartons Delivered (N=233)
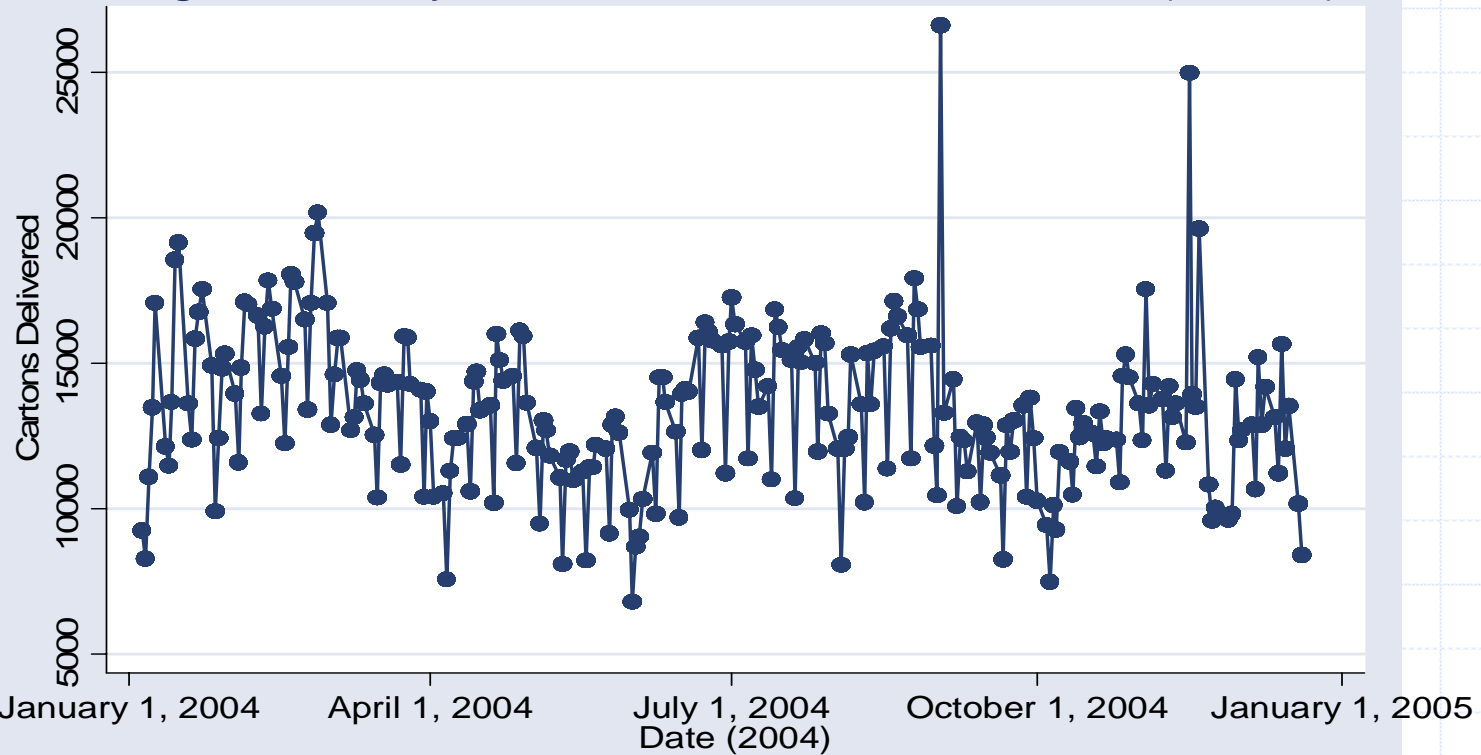
Findings

6. Location characteristics and store types (Furniture Chain A)

By Location Characteristics

Delivery/ Week	Mall			Off-mall			Outlet		
	N	Mean (pallets)	S.D.	N	Mean (pallets)	S.D.	N	Mean (pallets)	S.D.
1	28	8.71	1.96	15	9.47	2.64	8	11.88	2.7
2	6	8.33	1.86	10	7.2	3.8	2	9.5	0.71
Total	34	8.65	1.92	25	8.56	3.28	10	11.4	2.59

By Store Characteristics

Delivery/ Week	Combo			Conventional			Outlet		
	N	Mean (pallets)	S.D.	N	Mean (pallets)	S.D.	N	Mean (pallets)	S.D.
1	1	7	n/a	42	9.02	2.23	8	11.88	2.7
2	9	6	1.73	7	7.2	3.5	2	9.5	0.71
Total	10	6.1	1.63	49	9.12	2.41	10	11.4	2.59

Findings

7. Socio-economic influence (Furniture Chain A)

Figure 5. Weeky Delivery: IL and Other States
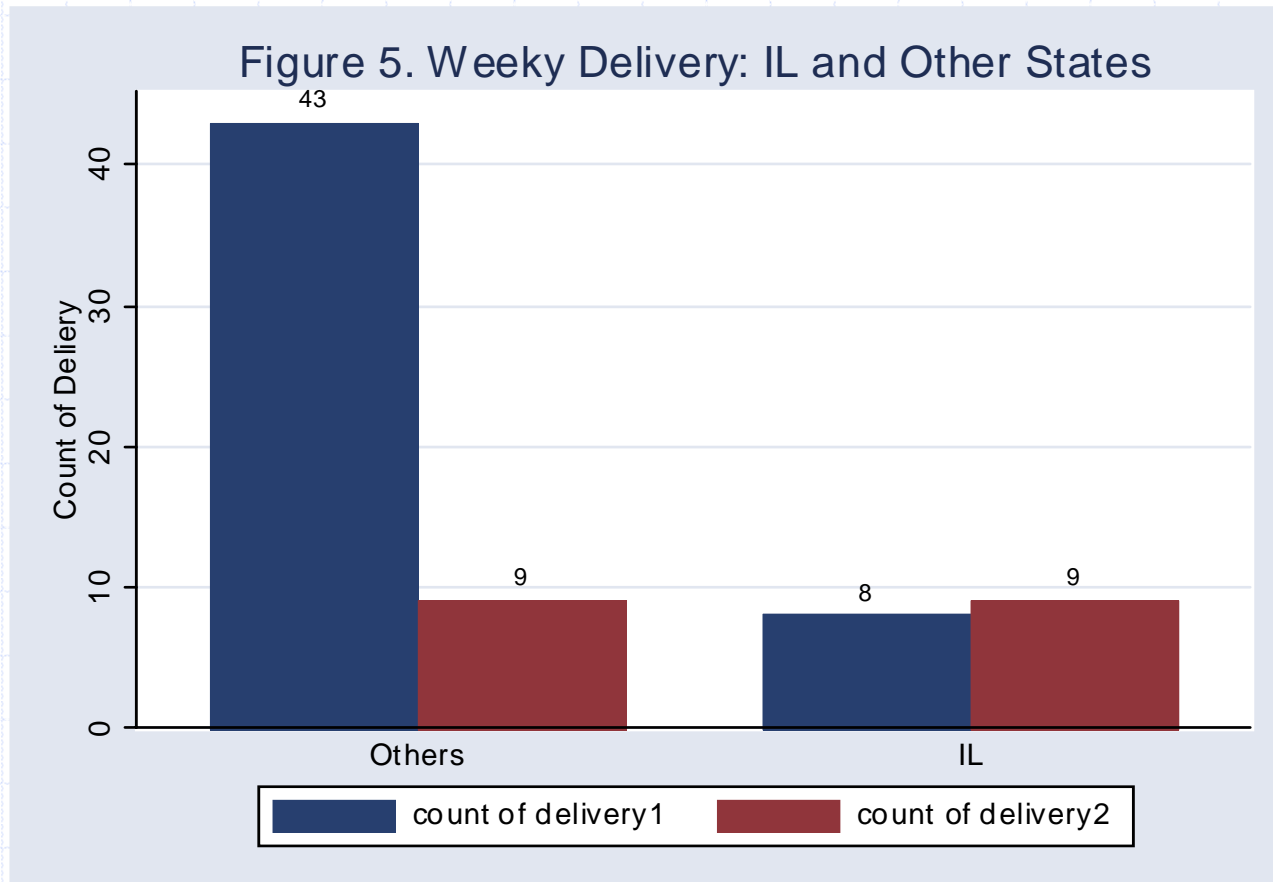
Future Research

◆ Store specific information, e.g. employment, store size, sales volume

◆ Socio-economic data of market area

◆ Quantitative Analysis
  ■ To identify the factor(s) that influence TTG
  ■ To identify whether the proxy variables used in the past study are still valid in the disaggregate level of TTG