

# Impacts of E-Commerce & Service Expectations on Transportation: Conceptual Possibilities and Selected Research Questions

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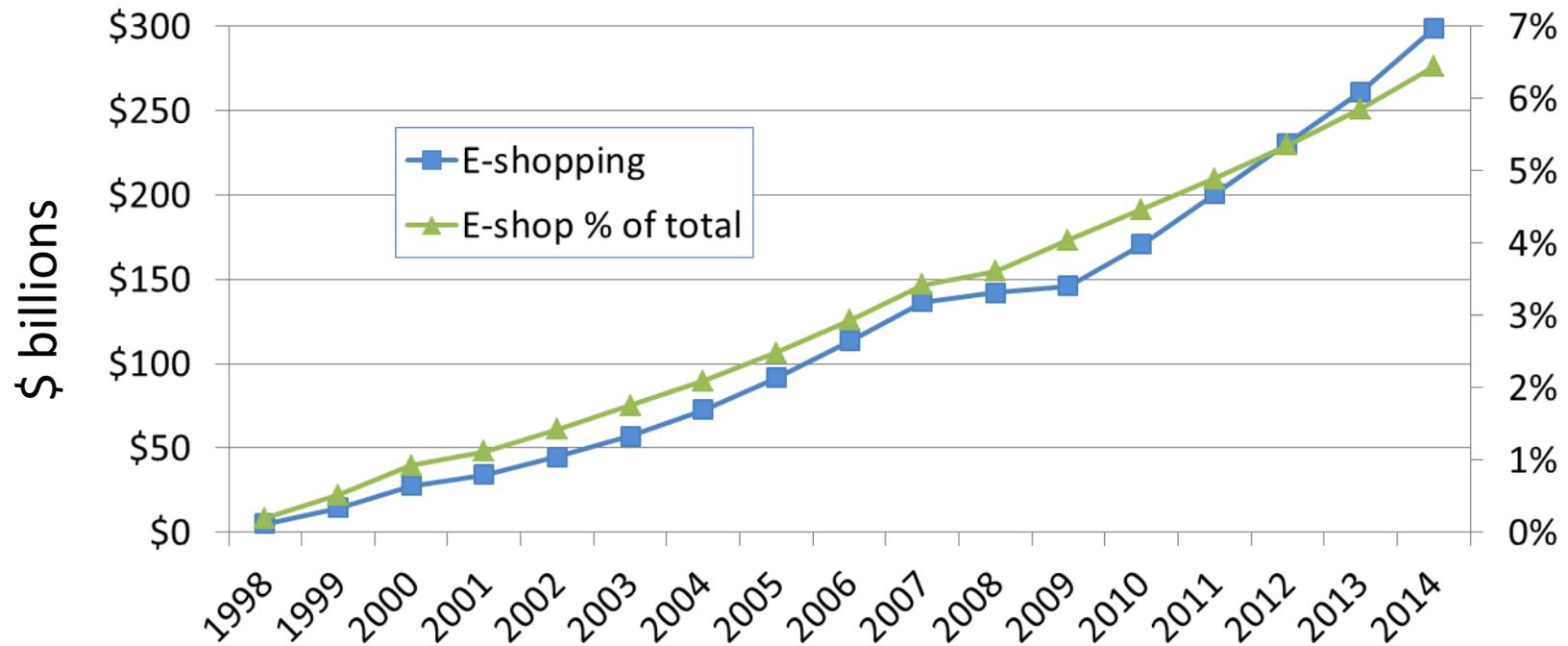
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# U.S. E-shopping Trends



[www2.census.gov/retail/releases/current/arts/ecommerce.xls](http://www2.census.gov/retail/releases/current/arts/ecommerce.xls), accessed October 19, 2016

# Motivation

- E-shopping continues to rise
  - In absolute terms
  - As a share of total retail sales
- What will be the transportation-related impacts?
  - Contribute to reductions in travel?
  - Impacts on bricks-and-mortar retail?
  - Implications for retail, warehouse locations?
- Primary focus: first-order consumer-based travel impacts
  - Conceptual framework(s) within which to view potential impacts

# Outline

- Comparative advantages of electronic v. store shopping
- Elements of the shopping process and their spatial/temporal reorganization
- **Potential transportation impacts of e-shopping**
- Research issues/approaches
- Conclusions

# (Theoretical) Advantages of E-Shopping

- Unlimited selection
- Lower prices/search costs
- Information
- Personalization
- Convenience

# GO NAKED

shopping.yahoo.com

# TO THE MALL

Too busy to hit your favorite stores? Shop on-line with Yahoo! Shopping.

With more choices of everything from flowers to jeans, stereos to jewelry.

It's fast. It's safe. It's a shopper's paradise.



Worldwide. Webwide. Visa® It's everywhere you want to be.®

Newsweek 11/23/98

www.visa.com

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When you're looking for the perfect digital TV, go to **BestBuy.com** first. Then, when you come to the store for a closer look, you'll feel, well, totally at home.



# (Theoretical) Advantages of E-Shopping

- Unlimited selection
- Lower prices/search costs
- Information
- Personalization
- Convenience
- Speed

(adapted from Underhill, 2000)

# **(Potential) Advantages of Store Shopping**

- Sensory information
- Tangibility
- Immediate possession

I JUST ORDERED US  
A PIZZA ON-LINE !...

HOW DO I  
DOWNLOAD IT ?

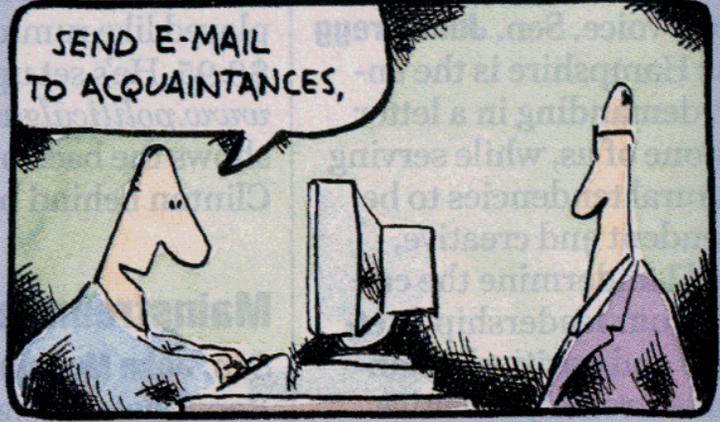
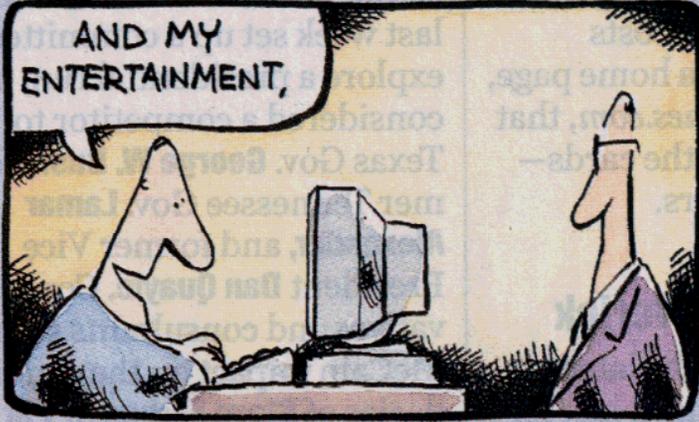
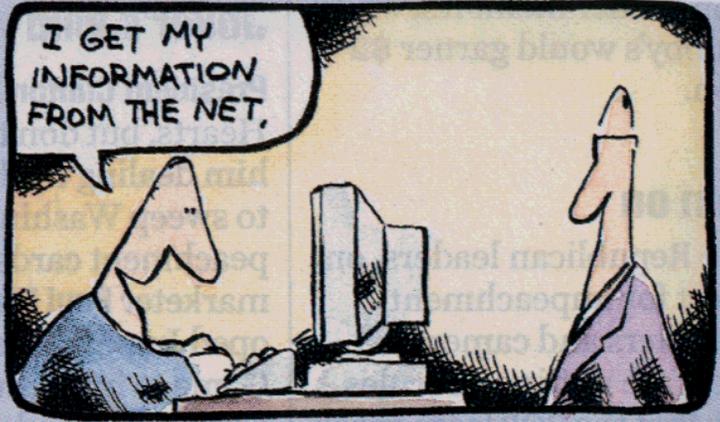


# **(Potential) Advantages of Store Shopping**

- **Sensory information**
- **Tangibility**
- **Immediate possession**
- **Social interaction**

Jan. 11, 1999 US News & World Report p. 12

TOM TOLES FOR USN&WR



TTLS

©1999. FOR US NEWS & WORLD REPORT

# (Potential) Advantages of Store Shopping

- Sensory information
- Tangibility
- Immediate possession
- Social interaction
- Entertainment
- Movement
- Trip chaining

(adapted from Underhill, 2000 and others)

# Implications for the Adoption of E-Shopping

- Several studies have collectively identified four segments of early adopters:
  - the mobility-limited
  - the time-limited
  - those who like technology
  - those who dislike shopping

# ICT has Enabled the Fragmentation/Recombination (in Time & Space) of Shopping Components

- Desire
- Information gathering/receiving
- Trial/experience
- Evaluation
- Selection
- Transaction
- Delivery/possession
- Display/use
- Return

# Future Shopping-Related Change in Transportation

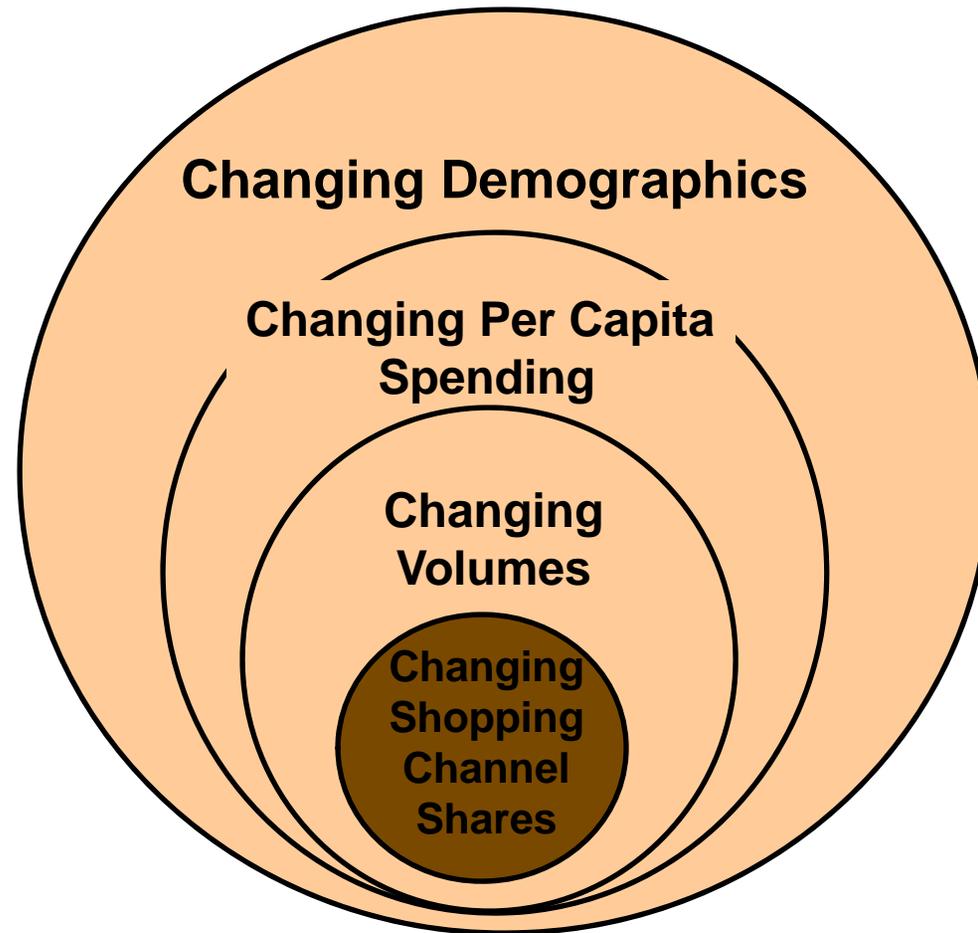
- Net outcome of 4 hierarchical factors
- Series of concentric circles, where moving outward represents successive relaxation of the constraints of holding remaining factors constant at previous stages
- Factors arranged in order of increasing indirectness (perhaps in increasing likelihood of being neglected)

# Potential Travel Impacts

Change can be decomposed into 4 components:

- Changing shares of shopping channel given other components fixed
- Changing volumes given fixed per capita spending and demographic characteristics
- Changing per capita spending
- Demographic changes

# Potential Travel Impacts



# 1. Changing Shopping Channel Share Given Fixed Purchase “Volume”

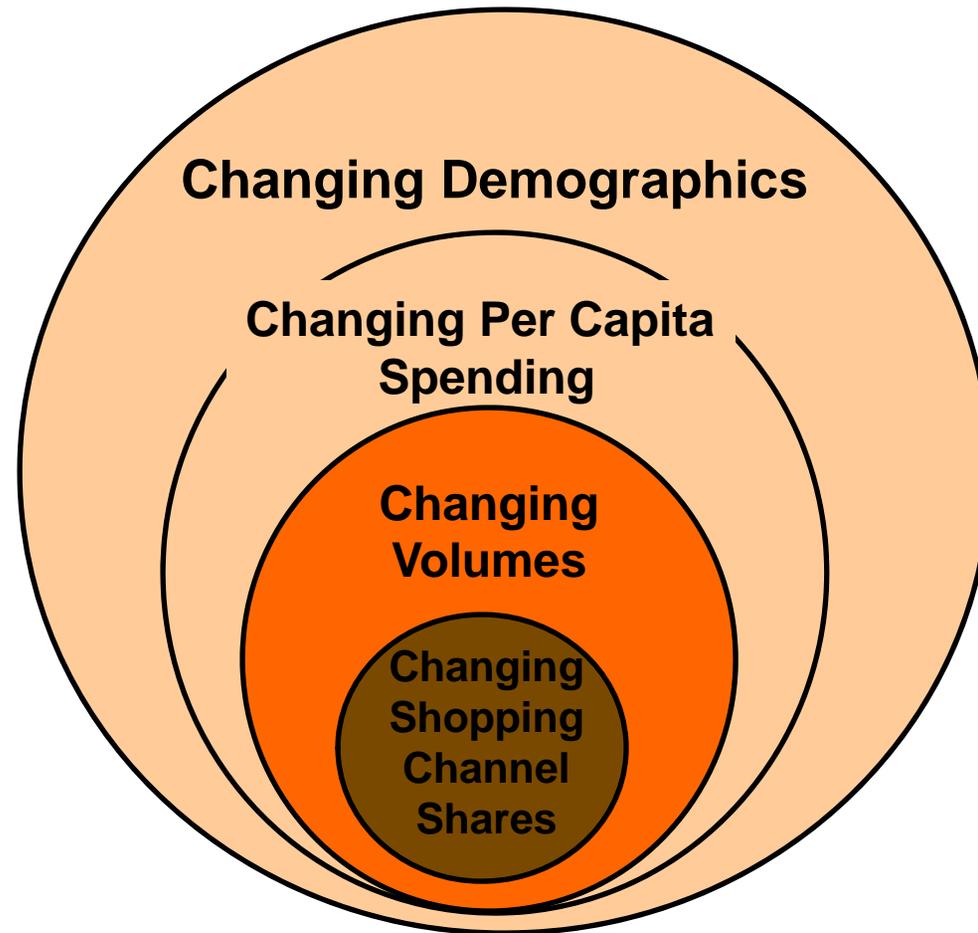
To the extent some store shopping is replaced:

- **Passenger side:** trip/activity chaining
  - Electronic purchase may replace some but not all items purchased in store
  - Store may be on the way to/from other activities conducted anyway
  - Reducing transit/bike/walk shopping trips won't help
- **Freight side:** efficiency/timeliness tradeoff
  - Greater demand for fast, time-constrained, deliveries...
  - ...Partly counteracted by greater goods movement efficiencies through info-sharing

# 1. Changing Channel Share Given Fixed Volume (cont'd)

- Frequency may increase
- “Destinations” may be more distant
- Better information about physical stores may prompt trips to more distant stores, or entirely new trips
- If electronic goods are “reconstituted”, must account for prior/later delivery of generic storage and display media (paper, disks)

# Potential Travel Impacts



## 2. Changing Volume Given Fixed Per Capita Spending

- Cost savings could lead to more goods being purchased for same amount of money
- *Travel* may be among those goods

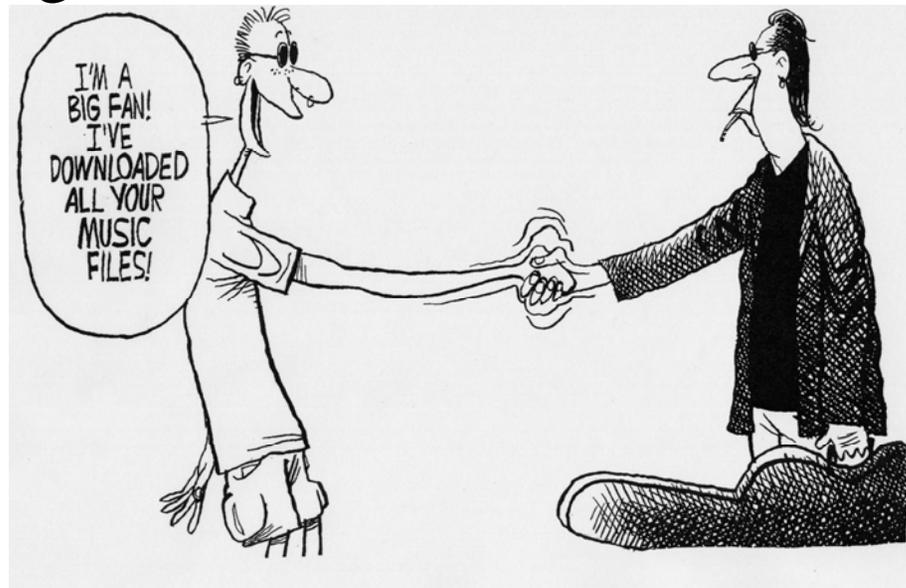
**Hotwire**

“By booking with Hotwire, I saved enough to swing *both* trips!”



## 2. Changing Volume Given Fixed Per Capita Spending

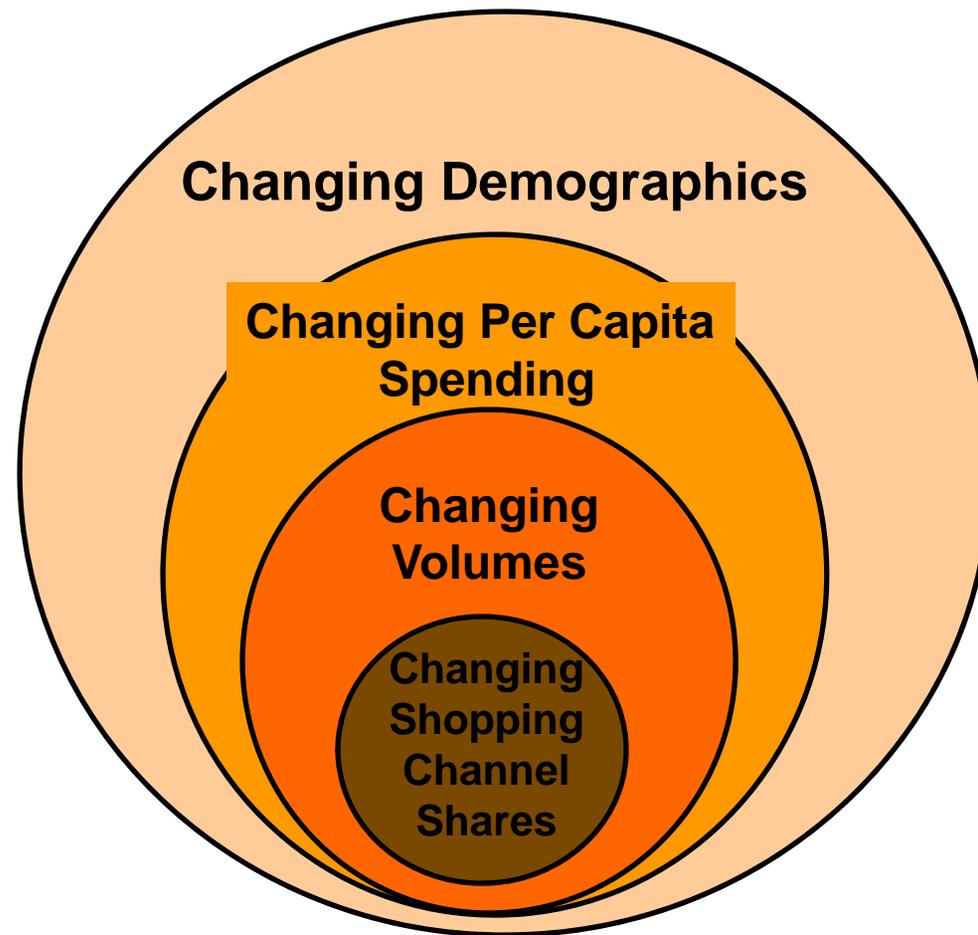
- Cost savings could lead to more goods being purchased for same amount of money
- *Travel* may be among those goods
- Digital goods reduce volume...



## 2. Changing Volume Given Fixed Per Capita Spending

- Cost savings could lead to more goods being purchased for same amount of money
- *Travel* may be among those goods
- Digital goods reduce volume...
- But if (1) quantity of digital goods demanded increases (due to cost savings) and (2) goods are then reconstituted, volume will increase
- Higher value added could lead to fewer goods purchased given fixed budget
- Shifts among material and immaterial goods

# Potential Travel Impacts



### 3. Will Per Capita Spending Remain Fixed?

- Targeted marketing, ease of purchase may increase volume of impulse purchases



### 3. Will Per Capita Spending Remain Fixed?

- Targeted marketing, ease of purchase may increase volume of impulse purchases
- Convenience, variety may stimulate deliberate new purchases
- Location-based marketing likely to increase both spending and travel
- Personalization may release latent demand
- Uniqueness of the internet

© 2002 Best Buy

HEY, if I took pictures of the baby and e-mailed them to the in-laws, maybe they wouldn't visit as often. WAIT. What if that just made them want to visit more?



...the most ...  
...best value ...  
...Turn On the Fun ...

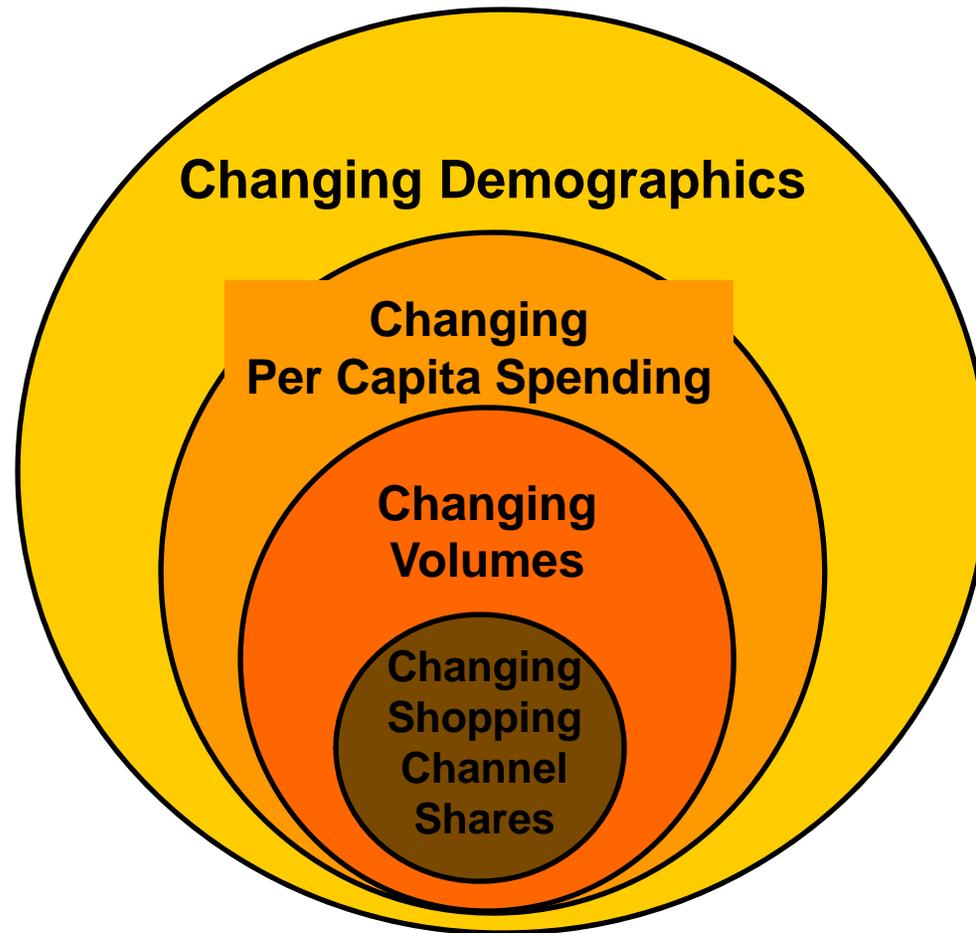


Online or in the store, find what you need to stay in touch. Turn On the Fun™  
BestBuy.com™

### 3. Will Per Capita Spending Remain Fixed? (cont'd)

- Transportation impacts of increased consumer spending:
  - For tangible goods purchased online, freight travel will increase
  - For goods purchased through location-based marketing, personal travel to stores likely to increase
  - The more money spent on travel as a good, the more travel will increase

# Potential Travel Impacts



## 4. Demographic Changes

- Changes in:
  - population
  - household size
  - employment rate
  - per capita incomesand so on will affect aggregate consumer spending
- Not due to the internet, but have direct implications for forecasting

# The Net Effect

- Effects described work in different directions, counteracting each other
- *Magnitude* of net impact is uncertain
- *Direction* of net impact is almost certainly toward increasing travel
- Systemwide effects probably small
- But localized impacts could be substantial

# Research Issues

- Hypothetical study:
  - Total (passenger and freight) travel impact of “shopping”, and
  - Short-term spatial, temporal redistributions of travel (segmented by passenger, freight)
- Need to segment the market based on purchase frequency/price, search area:
  - reg'l (cars), city (electronics), local (groceries)

# Research Issues: Data Collection

- Disaggregate measurement challenges -- collecting and combining online and travel data
- Freight impacts -- how far back up the chain must we go?
- Challenge to combine passenger and freight impacts -- obtaining data on same purchases from both sides
- Need something like a Life Cycle Analysis

# Research Issues: Analysis Methodologies

- Proper assessment of causality may require panel surveys of “complete” travel and communication activity
- No one study can provide the definitive answer; will require multiple studies of partial aspects
  - aggregate: offers the “big picture”
  - disaggregate: better insight into causality

# Interesting (to me) Research Questions

## *Are consumer expenditures increasing?*

- Are savings decreasing?
- Can any portion of the change be attributed to a stimulative effect of online (or ICT-enabled) shopping?
- What is the role of impulse buying (who does it, under what circumstances)?
- If expenditures are remaining constant, from what categories is the growth in online spending taken?

# Interesting (to me) Research Questions (cont'd)

## What impacts are changing demographics having?

- Delayed “nest flight” (or boomerangers), marriage, child-bearing
- Declining birth rate, retiring baby-boomers
- Immigration

all have effects on household formation, sizes, distribution of expenditures, ICT savviness

# Interesting (to me) Research Questions (cont'd)

## What are the spatial/urban form impacts?

- Optimal warehouse locations may differ for online-only vs. bricks-&-clicks merchants
- Fragmentation/recombination of manufacturing/distribution functions
- Closure of some retail outlets (videos, books, software, travel agencies)
- Added functionality of others (neighborhood pick-up/drop-off; deepening the shopping “experience”)
- Mobile commerce/location-based marketing more effective with *higher* densities of physical retail outlets

# Conclusions

- Not an “either/or” choice: both e-shopping and store shopping will coexist
- Substitution can occur at the margin, but both forms likely to expand overall
- Dominant impact likely to be interactive augmentation/modification of both forms
- Assessing transportation impacts is a formidable, but worthwhile, challenge

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