

# Innovation and Business Dynamics in U.S. Retail Trade

Prepared for:

RIETI Policy Symposium “Productivity Growth in the Global Economy: Innovation in the Service Sector and the Role of Intangible Assets”

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## Disclaimer:

The views expressed here don't necessarily reflect those of the Census Bureau. All econometric results have been screened to ensure the confidentiality of individual respondents is protected.

# Goals of the talk

- Review results on business dynamics and productivity
  - Discuss the role of innovation and new technology
- Argue that the role of business dynamics is more nuanced than Schumpeterian Creative Destruction
  - Differences in business dynamics across time, regions and countries can be due to a variety of policy, as well as, technology shocks
- Argue that the important role business dynamics play in the innovation process requires better statistics on business dynamics

# Motivation

Productivity growth is a function of not only technology and other shocks, but how firms and markets respond to these shocks.

Recent literature stresses the role of firm and establishment turnover in reallocating resources from less to more efficient producers – Foster et. al. (2006), Haskel and Sadun (2005) and Matsuura and Motohashi(2005)

## Motivation (cont.)

Thus, the ability of markets to reallocate resources is crucially important to the innovative process, productivity growth and improved living standards

# Why Retail?

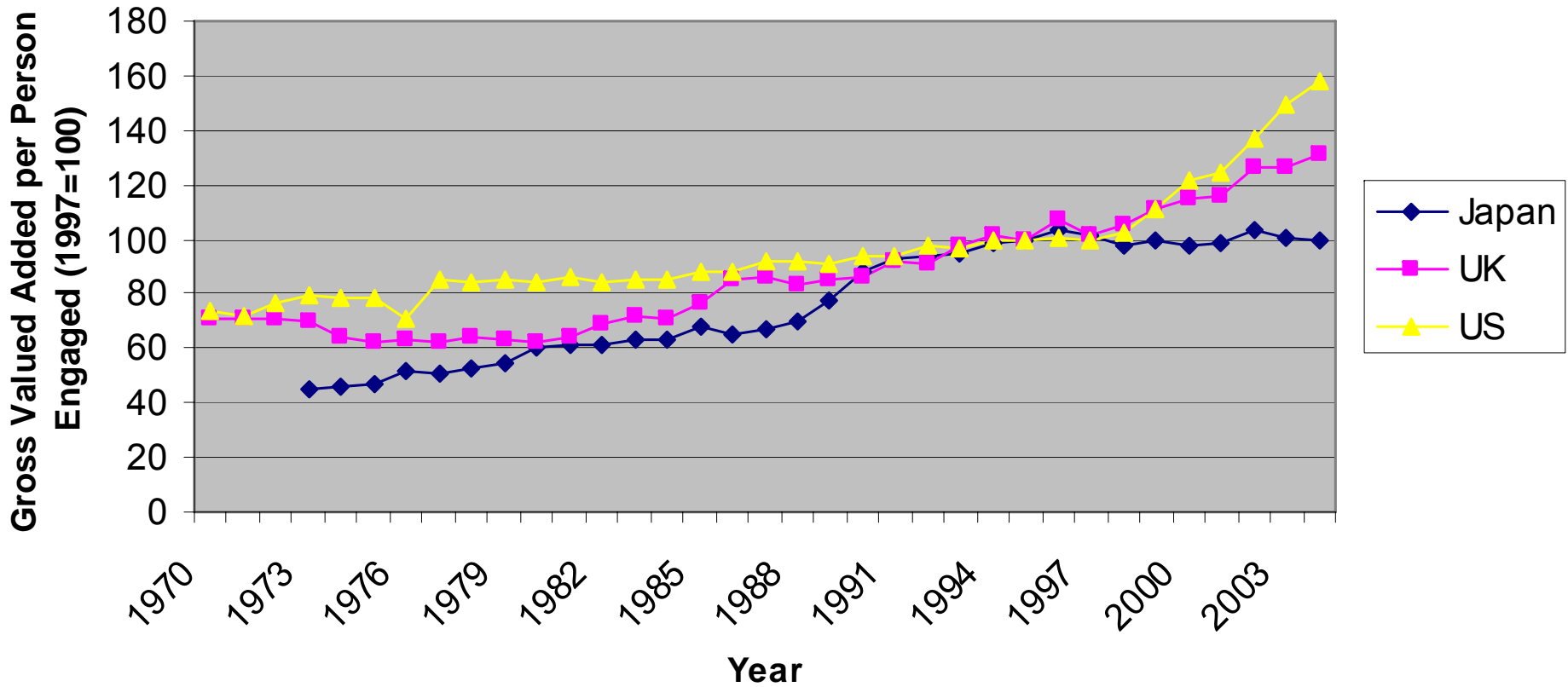
- Growing share of the economy
- Strong recent productivity growth
- Undergoing significant structural changes

# Background: Labour productivity in retail trade (GVA per person engaged)

|              | US  | UK  | JA   |
|--------------|-----|-----|------|
| Levels       |     |     |      |
| 1980         | 100 | 63  | 62   |
| 1995         | 100 | 61  | 70   |
| 2002         | 100 | 56  | 46   |
|              |     |     |      |
| Growth rates |     |     |      |
| 1980-95      | 2.2 | 2.0 | 3.0  |
| 1995-2002    | 5.4 | 4.3 | -0.7 |

Source: Timmer, M and Ypma, G., (2006), "Productivity Levels in Distributive Trades: A New ICOP Dataset for OECD Countries", Working paper GD83, [www.ggdc.net/workpap.html](http://www.ggdc.net/workpap.html), Table 12

## Labor Productivity Growth (Source: EUKLEMS)





# Productivity drivers in the Retail Sector

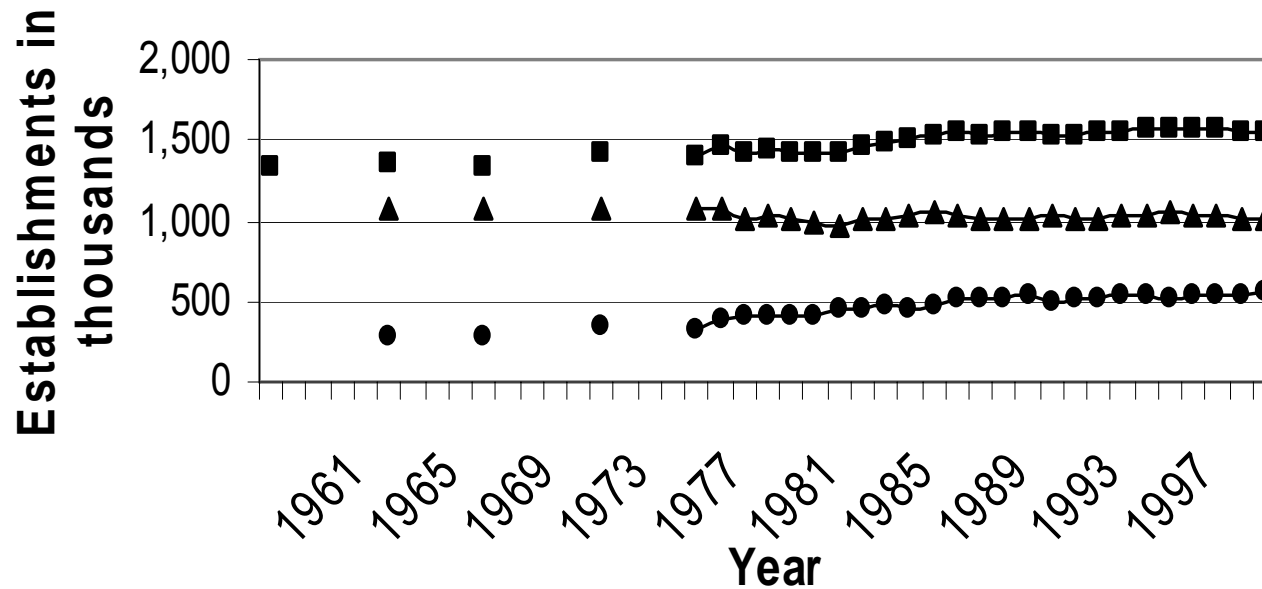
- Information Technology
  - Industry level (Jorgensen and others)
  - Firm level (Doms, Jarmin and Klimek, 2004)
    - Large chain retailers much more IT intensive and have much more productivity and employment growth

# Productivity Drivers (cont.)

- Firm and Establishment Dynamics
  - Foster, Haltiwanger and Krizan(2006)
    - Contribution of net entry more important than productivity growth at continuing establishments
    - Large national retail chains play an especially important role by opening more productive establishments
  - Jarmin, Klimek and Miranda (2005)
    - show that local retail markets are increasingly served by fewer, larger firms often associated with large national chains

# Modest Growth of Establishments

Figure 2.2 Number of Retail Establishments  
1958-2000

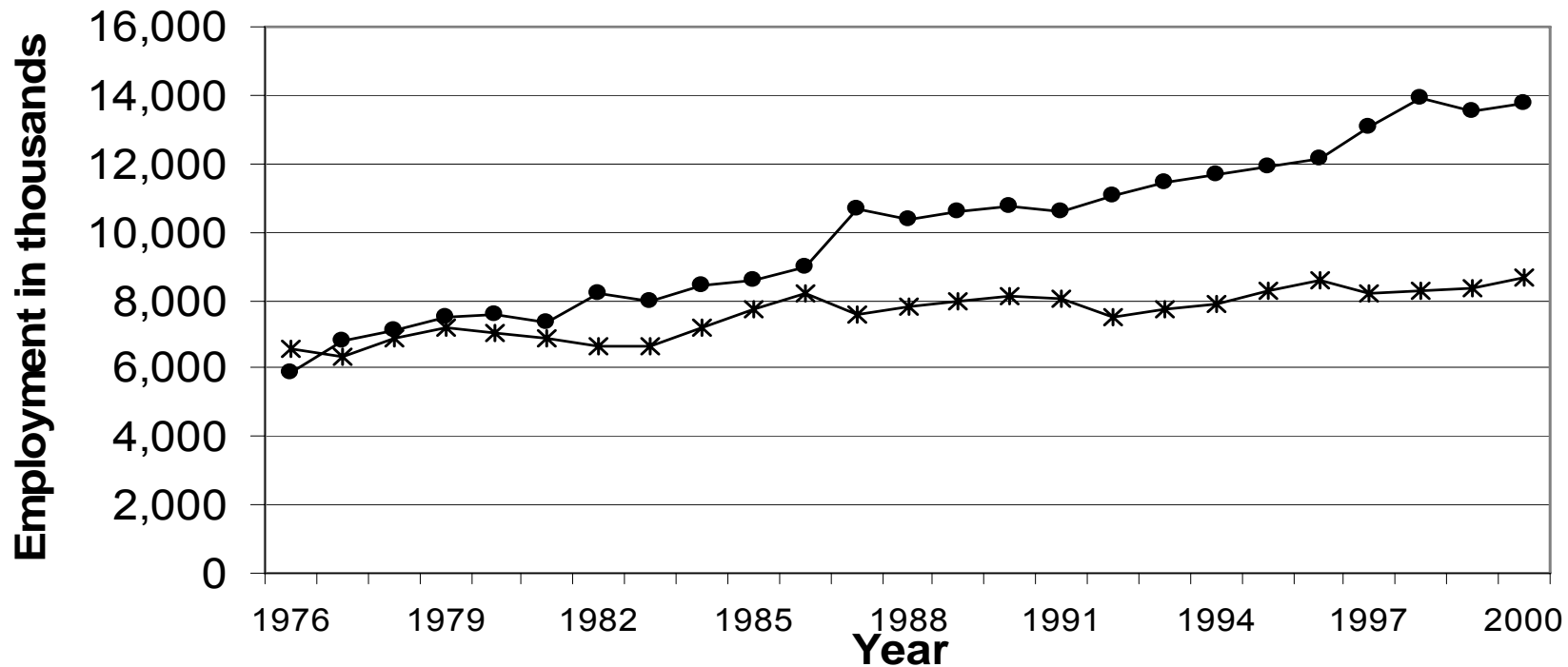


Sources: Statistical Abstract of the U.S. and own calculations  
from the LBD

■ Total Establishments    ▲ Single Location Establishments    ● Chain Establishments

# Growing Dominance of Chains

**Figure 2.3 Retail Employment at Single Location and Chain Stores**

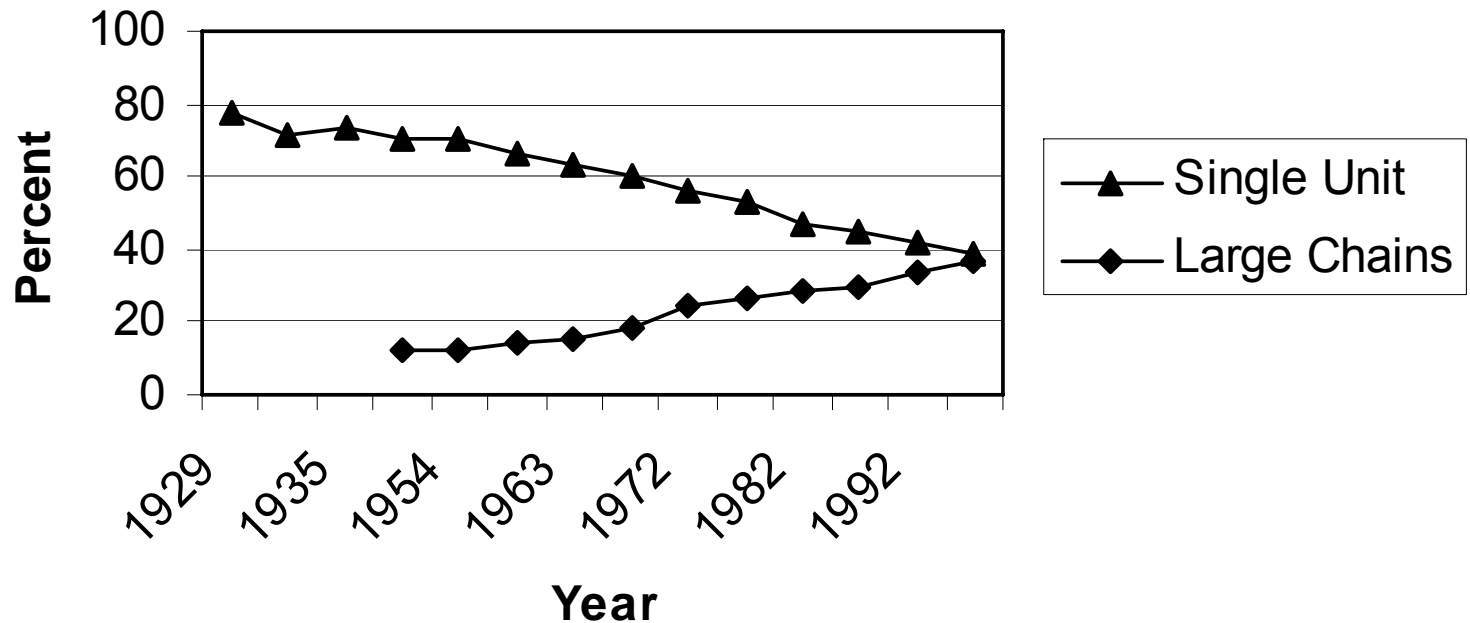


Source: Own calculations from the LBD

—\*— Single Location    —●— Chain Stores

# Long run trend in composition of retail sales

Share of Total Retail Sales for Single Units and Large Chains (>100 Stores)



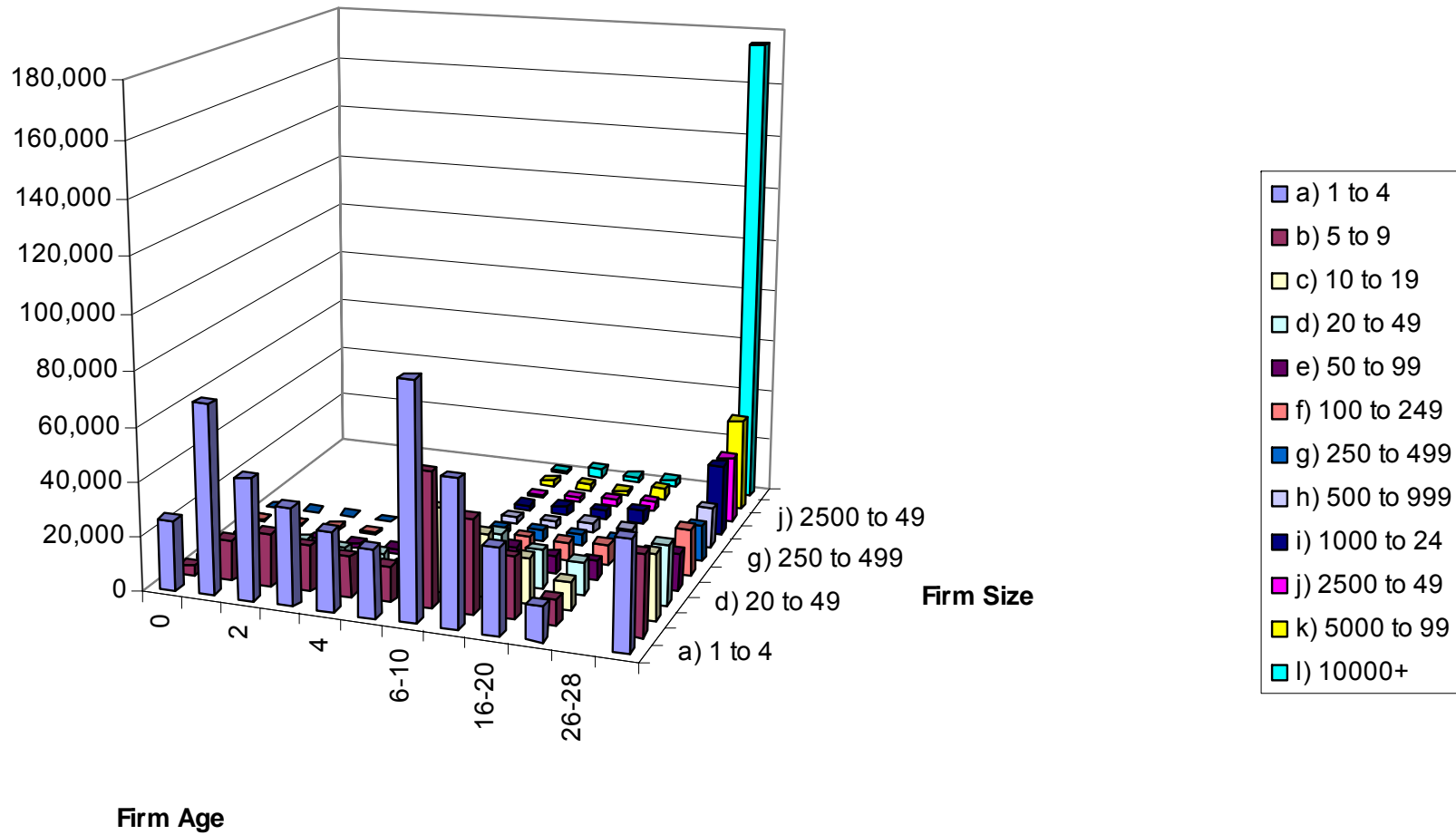
# Note on the Role of IT in Retail

- Prior slides show long run trend towards chain dominance pre-dates electronic computers and the Internet
  - Telephone and Telegraph helped “pre-IT” chains (need even older data)
  - IT and the Internet have led to a reshuffling of the top chains but have not substantially altered the long run changes in market structure

# What's so special about large retail chains?

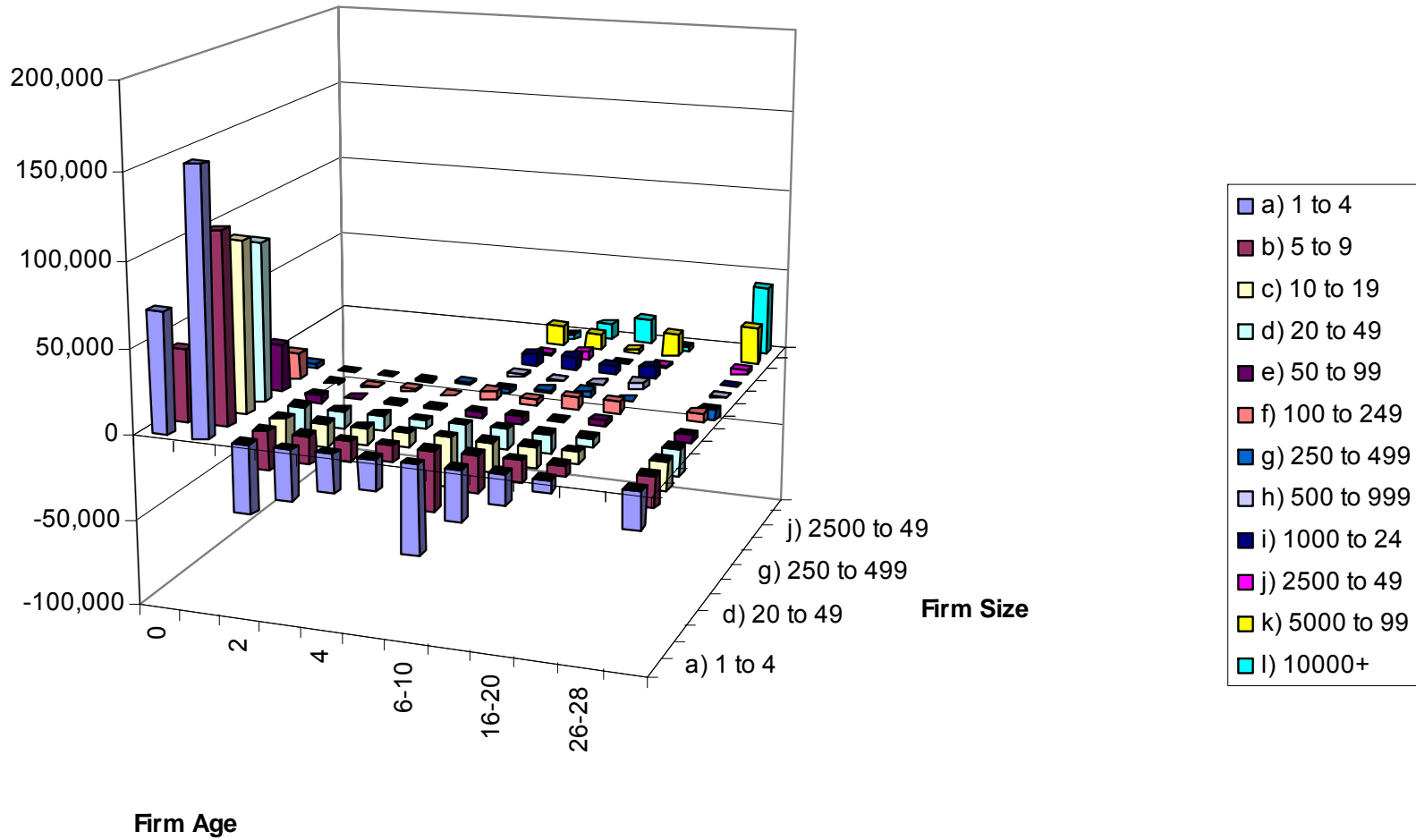
- They operate a very large number of stores
  - Just under 14% of all retail establishments
  - Just over 12% of all retail establishments are owned by firm born before 1976.
- Large and old firms account for a very significant amount of retail job creation.

### Estabs (including births): Retail, 1998





### Net Job Creation (including births): Retail, 1998



# Large Retail Firms Cont.

- More IT investment
- Higher return on IT investment
- IT more integrated into overall business plan (McKinsey, 2004)
- More investment in advertising / brand name
- Increasing returns on these investments captured by opening more stores (Starbucks)
- Other intangibles?

# Cross-Country Differences in Retail Market Structure and Dynamics

- U.S.
- Japan
- U.K.
- Coordinated research design using restricted access microdata for each country.

# Data

|                             | Japan                 | UK  | US  |
|-----------------------------|-----------------------|---|---|
| Data source                 | Retail Census         | Business Register   | Census of Retail Trade, Longitudinal Business Database                    |
| Primary data unit           | Store (establishment) | Store (establishment)   | Store (establishment)   |
| Other units                 |                       | Firm, Enterprise Group  | Firm  |
| Start year                  | 1997                  | 1998  | 1997  |
| End year                    | 2002                  | 2002  | 2002  |
| Longitudinal Linkage method |                       | Survey ID   | Longitudinal IDs, Survey IDs, Tax IDs                                     |
| Classification              | Industry, Region      | Industry, Region  | Industry, Region  |
| Key variables               | Sales, Employment     | Employment  | Sales, Employment   |
| Comments                    |                       | Bus Reg provides emp data. Survey gives sales and other inputs. 1997 data exists but noisy. | Employment and Sales data are from CRT and longitudinal linkages from LBD |

# Structure of the Retail Sector

Cross Section table for reference year = 2002

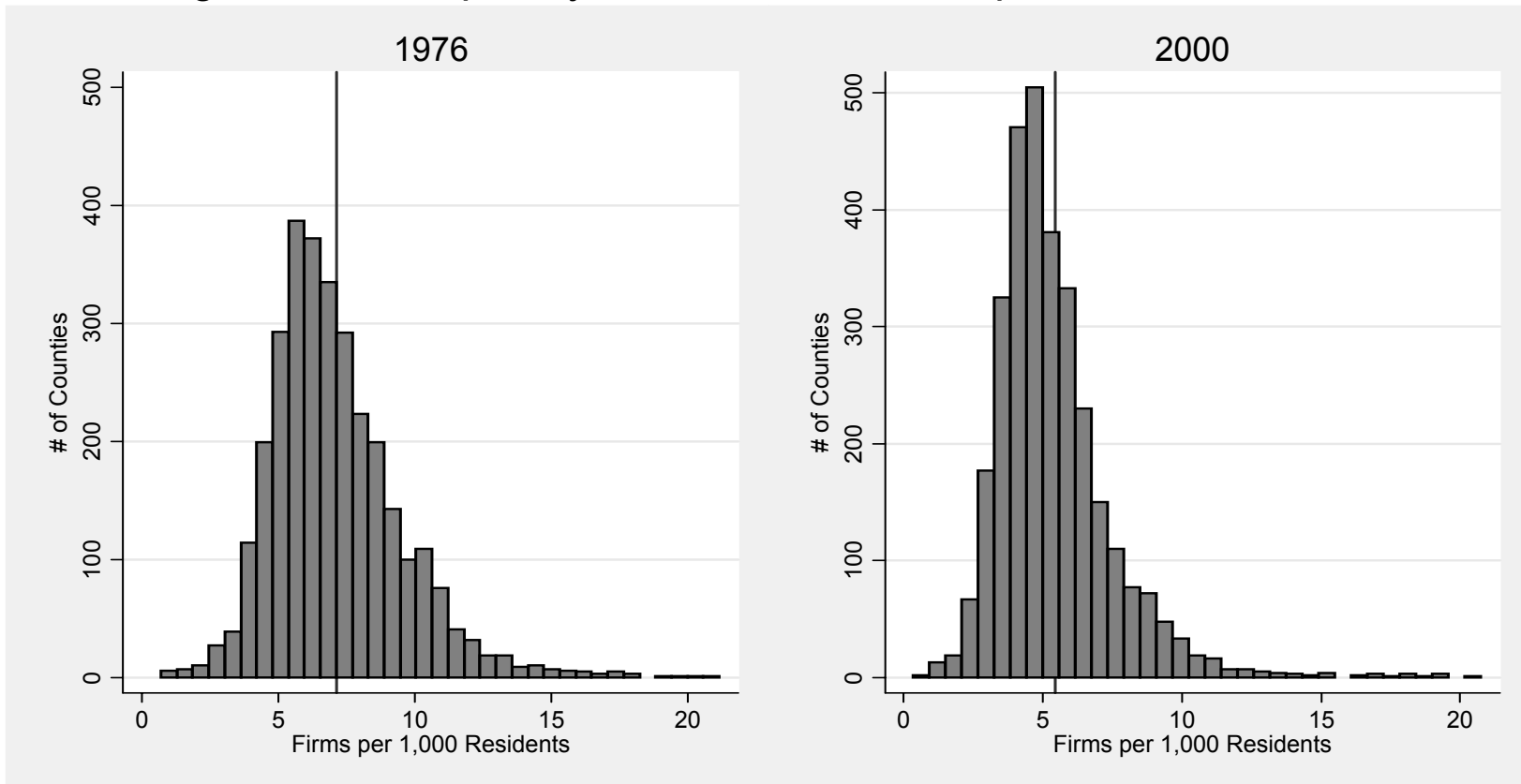
|                              | <b>Japan</b> | <b>U.S.</b> | <b>UK</b> |
|------------------------------|--------------|-------------|-----------|
| Number of Establishments     | 1,273,904    | 1,114,637   | 286,175   |
| Establishments per 1000 pop. | 10.03        | 3.94        | 4.78      |
| Number of Firms              |              | 717,553     | 214,930   |
| Single Unit Establishments   | 839,993      | 685,044     | 190,288   |
| Multi Unit Establishments    | 326,167      | 429,593     | 95,887    |
| Employment                   | 7,146,228    | 14,647,675  | 2,663,331 |
| average establishment emp.   | 6.13         | 13.14       | 9.31      |
| average firm employment      |              | 20.41       | 12.39     |

RSJ3      **Maybe add a row for 2002 population**  
Ron S. Jarmin, 2006/08/24

## Structure Cont.

| Establishments Per 1000 Population |       |      |      |
|------------------------------------|-------|------|------|
| Year                               | Japan | U.S. | UK   |
| 1997                               | 11.06 | 4.10 | 4.93 |
| 2002                               | 10.03 | 3.94 | 4.78 |

Figure 4.1. Frequency Distributions: Firms per 1000 Residents



Source: Own Calculations from LBD



# Establishment (Store) Size Distribution

Employment Size Distribution, reference year = 2002

|                 | Japan |    | US |    | U.K. |    |
|-----------------|-------|----|----|----|------|----|
|                 | SU    | MU | SU | MU | SU   | MU |
| 10th percentile | 1     | 1  | 0  | 3  | 1    | 2  |
| 25th percentile | 2     | 3  | 1  | 5  | 1    | 4  |
| median          | 2     | 6  | 3  | 9  | 2    | 7  |
| 75th percentile | 4     | 11 | 7  | 18 | 4    | 14 |
| 90th percentile | 7     | 22 | 14 | 54 | 7    | 32 |

# Basic results on Dynamics

## DHS Establishment birth and death rates

|            | <u>Japan</u>               | <u>US</u> | <u>UK</u> |
|------------|----------------------------|-----------|-----------|
|            | <i>% of Establishments</i> |           |           |
| Death Rate | 35%                        | 41%       | 38%       |
| Birth Rate | 17%                        | 40%       | 36%       |
|            | <i>Employment weighted</i> |           |           |
| Death Rate | 28%                        | 26%       | 32%       |
| Birth Rate | 25%                        | 28%       | 33%       |

# More on basic dynamics

| Average Employment Size                           | Japan | US    | UK   |
|---|-------|-------|------|
| emp of estabs year 1                              | 5.02  | 12.51 | 7.97 |
| emp of estabs in both years (continuers) year1    | 5.47  | 15.59 | 8.74 |
| emp of estabs in both years (continuers) year2    | 5.63  | 22.90 | 9.42 |
| emp of estabs in year 1 but not year 2 (deaths)   | 4.55  | 8.22  | 6.71 |
| emp of estabs in year 2 but not in year1 (births) | 8.26  | 8.94  | 8.19 |
| emp of estabs in year 2                           | 6.32  | 13.14 | 9.92 |

## More systematic approach to comparing the dynamics of the retail sector across the three countries

We compare the cross sectional dispersion (standard deviation) of establishment and firm growth rates.

We use the DHS growth rate measure which permits entry and exit:

$$\gamma_{it} = \frac{(x_{it} - x_{it-s})}{((x_{it} + x_{it-s}) / 2)}$$

# Cross Sectional Dispersion in firm and establishment growth rates

## Cell based approach

- Establishment and Firm micro data for the three countries are confidential and can't leave statistical offices
- We compute comparable statistics based on the micro data for pre-defined cells.
  - Mean and standard deviation of establishment and firm employment growth rates ( $\gamma$ )

Cross Sectional Dispersion Regression  
(Dependent Variable: std dev of employment growth)

|                       |                | Model                  |                         |                        |                        |
|-----------------------|----------------|------------------------|-------------------------|------------------------|------------------------|
|                       |                | <u>All</u>             |                         | <u>Continuing</u>      | <u>Continuing</u>      |
|                       |                | <u>Establishments</u>  | <u>All Firms</u>        | <u>Establishments</u>  | <u>firms</u>           |
| Intercept             |                | 1.257<br><i>0.063</i>  | 1.452<br><i>0.046</i>   | 0.488<br><i>0.032</i>  | 0.604<br><i>0.033</i>  |
| Multi-Unit            |                | 0.023<br><i>0.015</i>  | -0.179<br><i>0.019</i>  | -0.03<br><i>0.007</i>  | 0.049<br><i>0.014</i>  |
|                       | avgemp<2       | 0.38<br><i>0.039</i>   | 0.217<br><i>0.046</i>   | 0.007<br><i>0.024</i>  | -0.122<br><i>0.042</i> |
|                       | 2<=avgemp<5    | 0.203<br><i>0.026</i>  | 0.122<br><i>0.027</i>   | 0.02<br><i>0.014</i>   | 0.006<br><i>0.022</i>  |
|                       | 5<=avgemp<10   | 0.196<br><i>0.024</i>  | 0.049<br><i>0.025</i>   | 0.051<br><i>0.012</i>  | -0.025<br><i>0.019</i> |
|                       | 10<=avgemp<25  | 0.174<br><i>0.022</i>  | 0.037<br><i>0.022</i>   | 0.07<br><i>0.011</i>   | -0.056<br><i>0.016</i> |
| Size Class            | 25<=avgemp<50  | 0.133<br><i>0.024</i>  | 0.039<br><i>0.023</i>   | 0.067<br><i>0.012</i>  | -0.047<br><i>0.017</i> |
|                       | 50<=avgemp<75  | 0.082<br><i>0.027</i>  | -0.0002<br><i>0.028</i> | 0.048<br><i>0.013</i>  | -0.073<br><i>0.02</i>  |
|                       | 75<=avgemp<100 | 0.08<br><i>0.03</i>    | -0.002<br><i>0.033</i>  | 0.034<br><i>0.015</i>  | -0.075<br><i>0.024</i> |
|                       | 100<=avgemp    |                        |                         |                        |                        |
| Japan                 |                | -0.927<br><i>0.016</i> | NA<br><i>NA</i>         | -0.246<br><i>0.008</i> | NA<br><i>NA</i>        |
| UK                    |                | 0.044<br><i>0.018</i>  | -0.061<br><i>0.012</i>  | -0.047<br><i>0.011</i> | -0.078<br><i>0.009</i> |
| US                    |                |                        |                         |                        |                        |
| Observations          |                | 351                    | 279                     | 333                    | 260                    |
| 3 Digit ISIC Controls |                | yes                    | yes                     | yes                    | yes                    |

**How does this reallocation affect the composition and structure of the retail sector across different countries?**

Does churning result in changing market shares?

Or is it limited to only the smallest units?

# More firm entry in the US than in the UK but how do the entrants do?

To see this, we calculate the fraction all entrants ending up in the market share quintiles in 2002

| Fractions of entrants in mshare quintile in 2002 |     |     |     |     |     |      |
|--|-----|-----|-----|-----|-----|------|
|  | Q1  | Q2  | Q3  | Q4  | Q5  |      |
| UK   | 46% | 19% | 13% | 12% | 11% | 100% |
| US   | 27% | 22% | 20% | 17% | 14% | 100% |

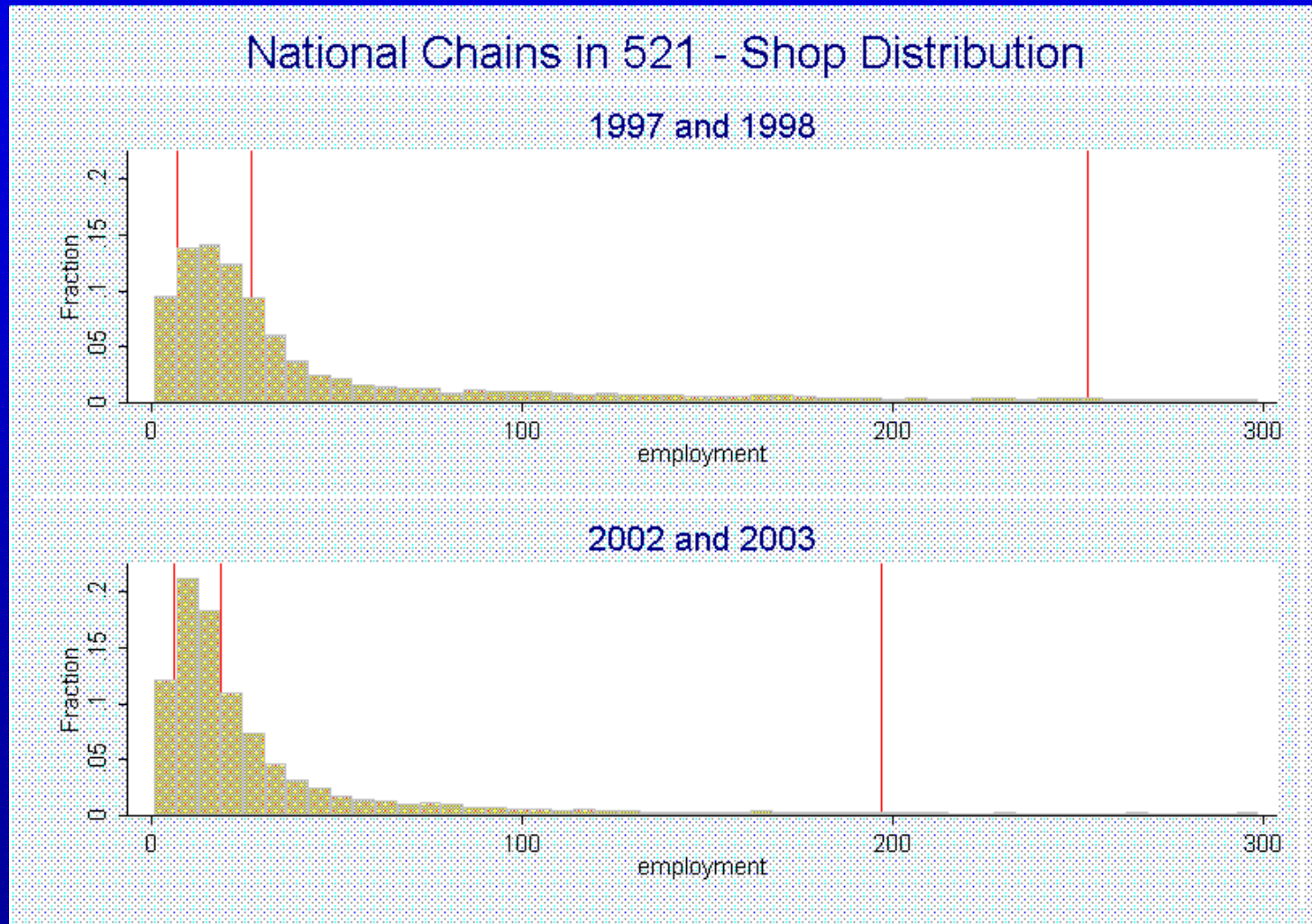
UK entrants more likely to remain at bottom



# Role of Policy

- Policies that affect business dynamics can affect the rate of innovation and productivity growth
  - Example from Haskel and Sadun (2007)
    - Land use restriction led UK retail chains to open smaller stores near the center of cities towns – reversing trend to larger stores outside of city centers.
    - Related to a slowing of TFP growth.
    - Preliminary evidence from U.S. shows trend to larger stores for U.S. chain continuing.

# Change in Chain Store Size in the U.K (Source: Haskel and Sadun)



# Conclusions

- Business Dynamics are an important part of the innovative process
- Policies that affect the ability of firms in market economies to optimally respond to technology shocks can slow innovation and productivity growth.

## Conclusions (cont.)

- However, official measures of business dynamics are relatively new and underdeveloped.
  - Recent report in U.S. by the CNSTAT
  - Upcoming official public release tables from the LBD
- Send additional questions and comments to [ron.s.jarmin@census.gov](mailto:ron.s.jarmin@census.gov)