Week 10: Commercial Markets

- Tracking markets with data: absorption, vacancy, rent, completions and construction.
- Office space: economic sectors, rental elasticity, technology and the workplace.
- Industrial space: inventories, manufacturing, R&D.
- Retail space: centers versus stand-alones, sales, income, obsolescence.
- Hotels: Is there more than GDP?
Some Market Accounting Fundamentals

\( v_t \): Vacancy Rate (vs “availability rate”)
\( S_t \): Stock of Space
\( C_t \): Construction starts of new space
\( \text{Ab}_t \): net absorption of space
\( L_t \): Average lease term
\( N_t \): Average Renewal rate

\( \text{Ab}_t = (1-v_t)S_t - (1-v_{t-1})S_{t-1} \)

\( S_t = S_{t-1} + C_{t-n} \)

Gross Abs = \( S_t \) \( (1-N_t)/L_t \)

Average Lease up time = \( v_t /[(1-N_t)/L_t] \)
A lease Rent index: Average, Repeat, Hedonic Rent
(CB Vouchers) (average annual $/sqft over lease term)

\[
\log(R) = \alpha_0 + \alpha_1 \text{SQFT} + \alpha_2 \text{GROSS1} + \alpha_3 \text{GROSS2} + \alpha_4 \text{TERM} + \alpha_5 \text{HIGH}
\]

\[+ \alpha_6 \text{NEW1} + \alpha_7 \text{NEW2} + \sum_{i=1979}^{1991} \beta_i \text{D}_i + \sum_{j=1}^{n} \delta_j \text{S}_j\]

\[\text{(1)}\]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Denver</th>
<th>Cincinnati</th>
<th>Houston</th>
<th>San Francisco</th>
<th>Washington</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>1.8153</td>
<td>2.0887</td>
<td>2.0700</td>
<td>2.4211</td>
<td>2.2169</td>
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<tr>
<td>Square Feet</td>
<td>1.08e-06</td>
<td>3.35e-07</td>
<td>8.42e-07</td>
<td>-5.7e-06</td>
<td>-1.03e-07</td>
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<tr>
<td>G1</td>
<td>0.0952</td>
<td>0.0993</td>
<td>0.0574</td>
<td>0.0172</td>
<td>0.1420</td>
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<td>G2</td>
<td>0.0728</td>
<td>0.0315</td>
<td>0.0316</td>
<td>0.0633</td>
<td>0.1177</td>
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<td>Term</td>
<td>0.0290</td>
<td>0.0196</td>
<td>0.0203</td>
<td>0.0260</td>
<td>0.0120</td>
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<td>High</td>
<td>0.1048</td>
<td>0.1293</td>
<td>0.0586</td>
<td>0.1119</td>
<td>0.0361</td>
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<tr>
<td>Dummy 1979</td>
<td>-0.0681</td>
<td>na</td>
<td>0.0082</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>Dummy 1980</td>
<td>0.2860</td>
<td>na</td>
<td>0.1290</td>
<td>0.0790</td>
<td>na</td>
</tr>
<tr>
<td>Dummy 1981</td>
<td>0.4775</td>
<td>na</td>
<td>0.3480</td>
<td>0.3664</td>
<td>0.0684</td>
</tr>
<tr>
<td>Dummy 1982</td>
<td>0.5992</td>
<td>0.0468</td>
<td>0.3925</td>
<td>0.4847</td>
<td>0.1872</td>
</tr>
<tr>
<td>Dummy 1983</td>
<td>0.5468</td>
<td>0.1305</td>
<td>0.3300</td>
<td>0.4193</td>
<td>0.2176</td>
</tr>
<tr>
<td>Dummy 1984</td>
<td>0.5394</td>
<td>0.1385</td>
<td>0.1995</td>
<td>0.4879</td>
<td>0.3996</td>
</tr>
<tr>
<td>Dummy 1985</td>
<td>0.5402</td>
<td>0.1128</td>
<td>0.1646</td>
<td>0.4525</td>
<td>0.4113</td>
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<tr>
<td>Dummy 1986</td>
<td>0.3556</td>
<td>0.1378</td>
<td>0.1314</td>
<td>0.3408</td>
<td>0.4422</td>
</tr>
</tbody>
</table>
Lease (Rent) Fundamentals:

• An Efficient forward market implies:
  \[ R_{t,n} = R_{t,n-m} + R_{t+n-m,m} \]
  [The first superscript designates the date for which occupancy begins, the second the lease term]
  or: the difference between a three year lease and a 5 year lease signed today equals a forward commitment (three years hence) for a 2 year lease.

• Hence if the market is expected to improve, longer lease terms command a higher average rent and vice-versa.

• How to test the efficiency theory?
For the last 25 years, on average lease rent is 2%+ higher for each year longer in Term. But yearly, this varies inversely with market vacancy. Why? (Minneapolis Data)
In Most Markets large blocks of space rent for less than small! Why isn’t the whole worth more than the sum of the parts?
Lease - versus – Own?

• Tax implication? Leases are deductions, as are debt payments.
• Accounting implications? Only ownership shows on the balance sheet (loophole).
• Corporate Prestige. But you can easily purchase the naming rights to a building.
• Firm Specific Capital. Facility has little other use, and so developer would charge higher lease payments since residual value is zero. Holdup issue.
• Expansion and other options.[see: Benjamin, et.al.]
• Correlation between firm’s business and local real estate market.
• If your corporate cost of capital is $I_c$, how is $I_c P >> R$?
Office and Industrial Space Usage in square feet by Tenure, 1991 (50 metro areas CBRE)
The North American Industry Classification System (NAICS) & Office Employment

11 Agriculture, Forestry, Fishing, and Hunting
21 Mining
22 Utilities
23 Construction
31-33 Manufacturing
42 Wholesale Trade
44-45 Retail Trade
48-49 Transportation and Warehousing
51 Information
52 Finance and Insurance
53 Real Estate and Rental and Leasing
54 Professional, Scientific and Technical Services
55 Management of Companies and Enterprises
56 Administrative and Support and Waste Management and Remediation Services
61 Educational Services
62 Health Care and Social Assistance
71 Arts, Entertainment and Recreation
72 Accommodation and Food Services
81 Other Services (except Public Administration)
92 Public Administration
### Office Space usage by SIC

<table>
<thead>
<tr>
<th>Standard Industrial Classification (SIC)</th>
<th>Dallas</th>
<th>Chicago</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total (thousands)</td>
<td>Office (thousands)</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>184.7</td>
<td>16.2</td>
</tr>
<tr>
<td>Mining</td>
<td>17.4</td>
<td>10.3</td>
</tr>
<tr>
<td>Construction</td>
<td>47.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Transportation, Communication, and Utilities (TCU)</td>
<td>92.4</td>
<td>7.1</td>
</tr>
<tr>
<td>Trade</td>
<td>287.9</td>
<td>28.1</td>
</tr>
<tr>
<td>Finance, Insurance, and Real Estate (FIRE)</td>
<td>122.9</td>
<td>122.9</td>
</tr>
<tr>
<td>Services</td>
<td>314.8</td>
<td>105.8**</td>
</tr>
<tr>
<td>Total Private</td>
<td>1067.6</td>
<td>291.0</td>
</tr>
</tbody>
</table>

adapted from DiPasquale and Wheaton (1996)

* Those employees occupying separate office space from on-site manufacturing

** includes advertising, computer and data processing, credit reporting, mailing and reproduction, legal and social services, membership organizations, engineering and management services.
Rental Elasticity of Office Space Demand
[see also: Hakfoort and Lie]

Office space per square foot and rent in US$
All sectors/All cities

Figure by MIT OpenCourseWare.
Square feet/worker. Changes in professional Occupation ratio: Rental cost of occupancy, technology?
**Impact of Technology: Breakdown of Workers at Home (x1000)**

<table>
<thead>
<tr>
<th></th>
<th>1991</th>
<th>1997</th>
<th>Growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total at Home</td>
<td>19,967</td>
<td>21,478</td>
<td>7.57</td>
</tr>
<tr>
<td>Paid</td>
<td>7,432</td>
<td>10,116</td>
<td>36.11</td>
</tr>
<tr>
<td>35 Hours or More</td>
<td>1,070</td>
<td>1,791</td>
<td>67.38</td>
</tr>
<tr>
<td>Full-time, not self-employed</td>
<td>94</td>
<td>583</td>
<td>520.21</td>
</tr>
</tbody>
</table>

Source: Bureau of Labor Statistics, Torto Wheaton Research
How to Explain the recent Absorption Deficit Across Markets
(1992 q1 to 1999 q4)
Across Markets, Deficit Explained by Numerous Factors
(dependent variable: office job growth – absorption)

Multiple R 0.73304
R Square 0.53735
Adjusted R Square 0.48814
Standard Error 0.00268
Observations 53

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficients</th>
<th>Standard Error</th>
<th>t Stat</th>
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</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.00532573</td>
<td>0.00255</td>
<td>2.09023</td>
</tr>
<tr>
<td>% of 1999 Single-Tenant Stock less % 1992 Single-Tenant Stock</td>
<td>0.05573823</td>
<td>0.02557</td>
<td>2.17969</td>
</tr>
<tr>
<td>% of New Office Using Service jobs from 92to99 that Were B&amp;P</td>
<td>0.01157904</td>
<td>0.00286</td>
<td>4.04977</td>
</tr>
<tr>
<td>1999.4 Multi-Tenant Office Stock</td>
<td>-0.00000001</td>
<td>0.00000</td>
<td>-1.38736</td>
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<tr>
<td>FIRE Employment as % of all Office Employment 1999.4</td>
<td>-0.01309827</td>
<td>0.00583</td>
<td>-2.24851</td>
</tr>
<tr>
<td>Average quarterly TW Rent growth (1999.4$) 1992.1 to 1999.4</td>
<td>0.27158579</td>
<td>0.06570</td>
<td>4.13370</td>
</tr>
</tbody>
</table>

Variable Observations
% of New Office Using Service jobs from 92to99 that Were B&P More B&P Employment, Bigger Deficit
1999.4 Multi-Tenant Office Stock Weak Evidence that Deficit is Smaller in Larger Markets
FIRE Employment as % of all Office Employment 1999.4 Smaller Deficit in Markets With FIRE Concentration
Average quarterly TW Rent growth (1999.4$) 1992.1 to 1999.4 The Demand for Space is Sensitive to Rental Growth
Office Tenant Base: Increasingly Smaller Service Companies, Less Large Financial Companies

Change in Jobs x 1,000

Financial Activities
Office-Services

TWR Office Outlook XL
# Industrial Space Occupancy by SIC and Building Use

*(CBRE, 1991)*

## Industrial Tenants, 1991

<table>
<thead>
<tr>
<th>Industry of Occupant (SIC)</th>
<th>Manufacturing</th>
<th>Distribution</th>
<th>R &amp; D</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing</td>
<td>2422.8</td>
<td>807.1</td>
<td>140.4</td>
<td>2.7</td>
<td>3,373.00</td>
</tr>
<tr>
<td>Transportation / Communication / Utilities (TCU)</td>
<td>50.8</td>
<td>474.3</td>
<td>12.4</td>
<td>0.7</td>
<td>538.3</td>
</tr>
<tr>
<td>Wholesale Trade</td>
<td>260.1</td>
<td>1047.0</td>
<td>43.8</td>
<td>2.5</td>
<td>1,353.40</td>
</tr>
<tr>
<td>Retail Trade</td>
<td>19.4</td>
<td>175.1</td>
<td>5.8</td>
<td>0.2</td>
<td>200.5</td>
</tr>
<tr>
<td>Services</td>
<td>90.6</td>
<td>202.2</td>
<td>129.8</td>
<td>1.8</td>
<td>424.4</td>
</tr>
<tr>
<td>Other</td>
<td>73.0</td>
<td>190.4</td>
<td>21.6</td>
<td>31.1</td>
<td>316.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2916.7</strong></td>
<td><strong>2896.1</strong></td>
<td><strong>353.8</strong></td>
<td><strong>39.0</strong></td>
<td><strong>6,205.60</strong></td>
</tr>
</tbody>
</table>

*adapted from DiPasquale and Wheaton (1996)*
Velocity (J.I.T. technology) = Shipments (sales) / Inventories

Index 1980 = 100
(Billions $, seasonally adjusted)
Warehouse Demand: \( \Delta \text{Space/worker (+10\%)} = \Delta \text{space/\$inventory (-60\%)} + \Delta \text{\$ inventory/worker (+70\%)} \)
Industrial demand: $\Delta$space/worker (+40%) = $\Delta$production/worker (+70%) + $\Delta$space/production (-30%)
Logistics (S.C.M.): what enters the country at one place does not stay there!
Logistics (S.C.M.): what determines which port is used by whom, for what, from where?

[U.S./Canada/Mexico Container Traffic (TEUs)]
Trade Flows and Warehouse Demand. Why do:
Exports need more space than imports?
Ports often need none?
Retail sales closely follow personal income, but grow at only 80% of the rate! (times series studies have difficulty identifying additional demographic effects)
Retail Sales across 52 cities: more than just personal income: labor force participation and climate matter as well.

Clothing (logs):
\[
sales/pop = 0.41 \text{ inc/pop} + 0.37 \text{ emp/pop} \\
+ 0.45 \text{ Jan Temp} - 0.03 \text{ pop} \quad [R^2 : 0.53]
\]

Food/Beverage eaten in (logs):
\[
sales/pop = 0.89 \text{ inc/pop} - 0.26 \text{ emp/pop} \\
+ 0.09 \text{ Jan Temp} - 0.06 \text{ pop} \quad [R^2 : 0.58]
\]

MIT CRE Thesis: 2008
Some contend that housing wealth impacts retail demand, but Housing Wealth has had only Small Impact on Consumption! Much of recent housing Wealth Gains Went Back into Housing!
Hence going forward Housing Related Sales are going to Suffer the most

Source: BOC.
1967-1993 growth of: Retail store Sales (from establishments), and alternative measures of retail square feet. Is the US over supplied with retail space or is demolition widespread?

- Restaurant and Entertainment: 102%
- Furniture: 79%
- Building Materials: 78%
- Other Hard goods (Appliance…): 68%
- GM: 46%
- Clothing: 31%
- Food at home 26%
- Personal Income: 83%
- Neighborhood Centers (NRB): 143% (net)
- Regional Malls (NRB): 238% (net)
- All retail space (FW Dodge) 117% (gross)
But is Construction Moving Beyond the Shopping Center Format? Walmart?
The small E-Commerce Share doubles every 3-4 years: Will clicks cannibalize Bricks next decade?

### Diagram Description

- **Y-Axis:** Retail sales, % change year ago (L) - E-commerce, % change year ago (L) - E-commerce, % of total (R)
- **X-Axis:** 99Q4 to 05Q4

- **Retail sales, % change year ago (L):** depicted with blue bars.
- **E-commerce, % change year ago (L):** depicted with purple bars.
- **E-commerce, % of total (R):** depicted with green line.

The graph illustrates the growth in retail sales and e-commerce over time, showing the percentage change year over year and the e-commerce share of total sales. The small e-commerce share is observed to double approximately every 3-4 years, highlighting the potential cannibalization of brick-and-mortar retail by online sales in the next decade.
The Lodging Industry (Smith Travel Research)
[200 national hotel chains]

- Rooms available (potential nights) = “supply”
- Change in Rooms available = “net additions”
- Rooms sold = “demand”
- Change in Rooms Sold = “absorption”
- Rooms Sold/Available = “occupancy”
- ADR = Total room revenue/rooms sold
- REVPAR = ADR x occupancy
National Hotel Market
Rooms Sold vs. Real GDP: GDP and room rates are all that matter!
Can you detect the “rental elasticity of hotel demand?"
Full Service Hotels at 9/11: Learning from the first Iraq war!
National Model Forecasts from 2002 (1st Quarter)
Just as Forecast: A Remarkable Post 9/11 Turnaround: Occupancy first then ADR = Mean Reversion