Products, Pricing and Pass-through

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and NBER

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Federal Reserve  
Bank of Dallas

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Background & Company Information

IKEA is a major international presence in retail home furnishings:

- Over 300 stores in 38 countries.
- Among the top-ten furniture retailers in the US.
- 3rd largest wood-products purchaser after Home Depot and Lowe’s.
- Over 21 billion Euros in annual sales.
Background & Company Information

**IKEA sales by country:**
- Germany: 16%
- US: 11%
- France: 10%
- UK: 7%
- Italy: 7%

**IKEA sales by regions:**
- Europe: 80%
- North America: 15%
- Asia/Australia: 5%
# Background & Company Information

## IKEA sales by country:

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>16%</td>
</tr>
<tr>
<td>US</td>
<td>11%</td>
</tr>
<tr>
<td>France</td>
<td>10%</td>
</tr>
<tr>
<td>UK</td>
<td>7%</td>
</tr>
<tr>
<td>Italy</td>
<td>7%</td>
</tr>
</tbody>
</table>

## IKEA sales by regions:

<table>
<thead>
<tr>
<th>Region</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>80%</td>
</tr>
<tr>
<td>North America</td>
<td>15%</td>
</tr>
<tr>
<td>Asia/Australia</td>
<td>5%</td>
</tr>
</tbody>
</table>

## Countries in our sample:

- Germany
- US
- France
- UK
- Canada
- Italy (in progress)

## Years:

- 1994-2010
- Over 100,000 Observations
The IKEA Catalog
A great laboratory for studying international pricing by a single multinational

3 Reasons to focus on the IKEA catalog:

1. **Size of the market**
   - 200 million copies of the 2010 IKEA catalogs.

2. **Timing**
   - IKEA publishes a catalog of its products in July of every year, e.g.,
     - 2011 catalog was released in July/August 2010
   - Prices remain unchanged over the course of the catalog year.
   - The catalog prices are excellent measures of transactions prices.

3. **Detailed descriptions**
   - The catalog specifies each good in detail.
# The IKEA Catalog

The catalog specifies the good in detail:

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Dimensions (cm or inches)</th>
<th>Units</th>
<th>Price in local-currency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BILLY</strong> bookcase</td>
<td>$69.99/ea</td>
<td>RA. W31 1/2 x D11 x H79 1/2”</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The IKEA Catalog

The catalog specifies the good in detail:

- Name
- Description
- Dimensions (cm or inches)
- Units
- Price in local-currency

**BILLY bookcase** $69.99/ea

RA. W31½ x D11 x H79½”
The IKEA Catalog

The catalog specifies the good in detail:

- Name
- Description
- **Dimensions (cm or inches)**
- Units
- Price in local-currency

**BILLY bookcase $69.99/ea**

RA: W31½ x D11 x H79½”
The IKEA Catalog

The catalog specifies the good in detail:

- Name
- Description
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BILLY bookcase **$69.99/ea**
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The IKEA Catalog

The catalog specifies the good in detail:

- Name
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**Billy bookcase** $69.99/ea
RA. W31 1/2 x D11 x H79 1/2”

Local-currency pricing means that IKEA should consider the exchange rate when setting prices 1 year in advance.
Number of Observations in IKEA catalogs

The number of observations in a typical catalog has risen
But the number of distinct goods has fallen
The Law of One Price (LOP) states that the exchange-rate adjusted price of a good will be the same across countries.

LOP holds if transportation and non-traded costs are identical, and pricing is competitive.

Empirically, this law fails miserably.
Law of One Price

- Some notation:
  - $p_{ijt}$: local-currency price of good $i$ in country $j$ at date $t$.
  - $e_{jt}$: exchange rate between Sweden and country $j$, expressed as local-currency units per Swedish krona.
  - $\bar{p}_{it}$: mean price of good $i$ at date $t$ across all countries, $j$.

- The LOP deviation is $(p_{ijt} \times e_{jt}) - \bar{p}_{it}$
  - mean-zero for every good at a particular date $t$.
  - won’t necessarily be mean-zero for a particular country.
Law of One Price

Wide dispersion in LOP deviations across country

<table>
<thead>
<tr>
<th>Goods</th>
<th>Canada</th>
<th>Germany</th>
<th>France</th>
<th>Sweden</th>
<th>UK</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>8.4%</td>
<td>-3.4%</td>
<td>-2.5%</td>
<td>-7.6%</td>
<td>3.1%</td>
<td>5.0%</td>
</tr>
</tbody>
</table>
Law of One Price

Wide dispersion in LOP deviations across country

Percent Deviations from Law of One Price
Means

<table>
<thead>
<tr>
<th>Goods</th>
<th>Canada</th>
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<th>US</th>
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</thead>
<tbody>
<tr>
<td>All</td>
<td>8.4%</td>
<td>-3.4%</td>
<td>-2.5%</td>
<td>-7.6%</td>
<td>3.1%</td>
<td>5.0%</td>
</tr>
<tr>
<td>New</td>
<td>7.4%</td>
<td>-2.9%</td>
<td>-2.2%</td>
<td>-6.7%</td>
<td>2.8%</td>
<td>5.0%</td>
</tr>
<tr>
<td>Cont.</td>
<td>9.7%</td>
<td>-4.0%</td>
<td>-2.8%</td>
<td>-8.5%</td>
<td>3.4%</td>
<td>5.0%</td>
</tr>
</tbody>
</table>
Law of One Price

Similar standard deviations across high- and low-average-deviation countries

### Percent Deviations from Law of One Price

<table>
<thead>
<tr>
<th>Goods</th>
<th>Canada</th>
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<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>16.6%</td>
<td>14.6%</td>
<td>13.2%</td>
<td>13.3%</td>
<td>14.7%</td>
<td>15.8%</td>
</tr>
</tbody>
</table>
Law of One Price

Similar standard deviations across high- and low-average-deviation countries

Percent Deviations from Law of One Price
Standard Deviations

<table>
<thead>
<tr>
<th>Goods</th>
<th>Canada</th>
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<th>UK</th>
<th>US</th>
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</thead>
<tbody>
<tr>
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<td>15.8%</td>
</tr>
<tr>
<td>New</td>
<td>16.3%</td>
<td>13.8%</td>
<td>13.0%</td>
<td>12.5%</td>
<td>14.2%</td>
<td>15.4%</td>
</tr>
<tr>
<td>Cont.</td>
<td>16.8%</td>
<td>15.3%</td>
<td>13.5%</td>
<td>13.9%</td>
<td>15.1%</td>
<td>16.1%</td>
</tr>
</tbody>
</table>
Law of One Price

Autoregressive parameters imply half-life deviations from LOP of 3-4 years

Autoregressions for Deviations from the Law of One Price

<table>
<thead>
<tr>
<th>Ind. variable</th>
<th>Canada</th>
<th>Germany</th>
<th>France</th>
<th>Sweden</th>
<th>UK</th>
<th>US</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR(1)</td>
<td>0.67</td>
<td>0.67</td>
<td>0.66</td>
<td>0.62</td>
<td>0.72</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Observations</td>
<td>4240</td>
<td>5817</td>
<td>5691</td>
<td>5807</td>
<td>5490</td>
<td>3850</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.46</td>
<td>0.43</td>
<td>0.46</td>
<td>0.39</td>
<td>0.49</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
Exchange Rate Pass-Through
Are exchange-rates "passed through" to prices?

- Usual regression:

\[ p_{ijt} = \beta c_{it} + \gamma e_{jt} + \mu_{ijt}, \]

where the price \( p_{ijt} \) depends on
- Cost \( c_{it} \)
- Exchange rate \( e_{jt} \)
- Other perturbations \( \mu_{ijt} \)
  (e.g., markup, transportation, and non-traded costs)

- Usual results: pass-through coefficient, \( \gamma \), is less than 1.
Exchange Rate Pass-Through
Pass-through regressions

- Cost measures are frequently not available. Wages and output are used as proxies for cost measures.

- We can "proxy" for the cost term by including the Swedish price as a control for the common, unobservable, cost

\[ p_{ijt} = \alpha_j + \beta_j p_{i,SE,t} + \gamma_j e_{jt} + \left( \mu_{ijt} - \mu_{i,SE,t} \right). \]

\$ sek $/sek other perturbations

- The pass-through regression takes the form:

\[ \Delta p_{ijt} = \alpha_j + \beta_j \Delta p_{i,SE,t} + \gamma_j \Delta e_{jt} + \mu_{ijt}. \]
Exchange Rate Pass-Through

Cost matter; Exchange rate does not

\[ \Delta p_{ijt} = \alpha_j + \beta_j \Delta p_{i,SE,t} + \gamma_j \Delta e_{jt} + \mu_{ijt} \]

<table>
<thead>
<tr>
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<th>UK</th>
<th>US</th>
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</thead>
<tbody>
<tr>
<td>Swedish price</td>
<td>0.25</td>
<td>0.34</td>
<td>0.31</td>
<td>0.41</td>
<td>0.27</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Exchange rate</td>
<td>-0.01</td>
<td>0.05</td>
<td>0.13</td>
<td>0.07</td>
<td>0.13</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.04)</td>
<td>(0.03)</td>
<td>(0.02)</td>
<td>(0.02)</td>
</tr>
<tr>
<td>Observations</td>
<td>2,759</td>
<td>4,438</td>
<td>4,295</td>
<td>4,410</td>
<td>2,466</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.05</td>
<td>0.08</td>
<td>0.08</td>
<td>0.14</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
Do IKEA prices predict exchange-rates?
Cumby (1997)

- If US price is higher than Swedish price, then the US dollar is expected to depreciate.

- Expected devaluation:

\[
E_t \Delta e_{jt} = E_t (e_{j,t+1} - e_{jt}) = (p_{ijt} - e_{jt} - p_{i,SE,t}).
\]

- Actual devaluation:

\[
\Delta e_{jt} = (e_{j,t+1} - e_{jt}).
\]

- To test the theory that ex-ante price differential should predict price changes, we estimate the following regression:

\[
\Delta e_{jt} = \alpha_j + \beta_j E_t \Delta e_{jt} + u_{t+1}.
\]
Do IKEA prices predict exchange-rates?
Cumby (1997)

\[ \Delta e_{jt} = \alpha_j + \beta_j E_t \Delta e_{jt} + u_{t+1}. \]

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</tr>
</thead>
<tbody>
<tr>
<td>(E_t \Delta e_{jt})</td>
<td>0.04</td>
<td>0.03</td>
<td>0.02</td>
<td>0.01</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.00)</td>
<td>(0.00)</td>
<td>(0.01)</td>
<td>(0.01)</td>
</tr>
<tr>
<td>Observations</td>
<td>3,955</td>
<td>5,921</td>
<td>5,761</td>
<td>5,710</td>
<td>3,577</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.01</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Standard errors in parentheses
Conclusion

- We examine international pricing behavior using every items of six countries IKEA catalogs from 1994 to 2010.

- Within the context of these data, we provided evidence on:
  1. **LOP**: Wide dispersion in LOP deviations across countries.
  2. **Exchange-rate pass-through**: Costs seem to be an important determinant in IKEA's pricing decision; Exchange rate is not.
Let’s turn the floor over to...
...the designated complaint department for this paper
LOP Deviations:
Goods available in every country's catalog

US
LOP Deviations:
Goods available in every country's catalog

Canada  Germany  France  Sweden  United Kingdom  United States

LOP Deviations:
Goods available in every country's catalog

Swedish is the low price country