Income-Induced Expenditure Switching

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CREI and CEPR

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Motivation

- Revisit external sector adjustment and the role of relative prices
- Focus on expenditure switching from foreign to domestic goods
- **Conventional Macro models**: Expenditure switching is
  - Central ingredient of external sector rebalancing
  - Driven solely by changes in the relative price of foreign/domestic goods
- **Needed**: Empirical evidence
This Paper

- Examines 2008–09 crisis in Latvia with a novel supermarket scanner dataset with home/imported goods
  - Classic boom-bust episode with a sudden stop
  - Limited role for nominal exchange rate in adjustment due to EUR peg

- Measures the role of expenditure switching

- Measures relative price changes

- Asks whether relative price changes can explain the observed expenditure switching through the lens of standard models
Preview of Results

- Expenditure switching accounted for 1/3 of the fall in imports
- No corresponding change in relative prices
- Fall in income induced consumers to switch towards cheaper domestic substitutes $\implies$ Expenditure switching driven by *income effect*, not changes in relative prices
Related Literature

- Expenditure switching and crisis: Burstein et al. (2005); Diaz Alejandro (1965); Kehoe & Ruhl (2008); Mendoza (2005); Obstfeld & Rogoff (2005). Also Engel (2003) for general review on models


- Micro/scanner data: Broda & Weinstein (2010); Coibion et al. (2012); Handbury (2012)
Outline

1. Data
2. Empirical findings
3. Theoretical framework
4. Estimation strategy and results
5. Conclusion
Data

Supermarket transaction data for food & beverages (F&B) from one of largest retailers in Latvia

- Cover May 2006 – May 2011
- Monthly expenditure on and quantity sold for each item
- Identify domestic/foreign origin of each item
- Aggregated by type of store in Latvia
- 2-, 3- and 4-digit classification of items (Example: Food $\rightarrow$ Hot drinks $\rightarrow$ Tea $\rightarrow$ Herbal tea $\rightarrow$ UPC items)
Representative of household expenditures on food:

- Add up to 15% of aggregate household expenditures on food in NIA
- Stable grocery retail market share of around 20%
- Broadly match: (i) official CPI for F&B; (ii) aggregate F&B imports

Food accounts for 30% of household expenditures
Advantages of scanner data

- Consistent measurement of expenditures on domestic/imported goods within a large dataset
- Not only domestic/imported breakdown of final consumer prices, but also of quantities

Limitations of scanner data

- Demand for food only
- No matching supply side or export data
Three Empirical Findings about the Crisis

1. Expenditure switching
   - Took place between goods *within* product groups
Three Empirical Findings about the Crisis

1. Expenditure switching
   - Took place between goods *within* product groups

2. Relative price adjustment
   - Took place *across* product groups
Three Empirical Findings about the Crisis

1. Expenditure switching
   - Took place between goods *within* product groups

2. Relative price adjustment
   - Took place *across* product groups

3. Within-group item mix
   - Shifted towards *cheaper domestic* substitutes
Finding 1. Expenditure Switching

- Crisis year: Q4:09/Q4:08 (largest y-o-y fall in food consumption)

- Did expenditure switching contribute to the fall in consumption of imported food?

\[
\Delta x_{\text{crisis}}^F = \Delta x_{\text{crisis}} + \left( \Delta x_{\text{crisis}}^F - \Delta x_{\text{crisis}} \right)
\]

Imported food: $-26\%$  
All food: $-18\%$

\[
\text{Expenditure switching: $-8\%$}
\]

⇒ YES!
Finding 1. Expenditure Switching

or... 3% of expenditures reallocated (imports $\rightarrow$ domestic)
Finding 1. Expenditure Switching

Two sources of expenditure switching: (i) within product groups and (ii) across product groups

Notation:

- \( g \in \{1, \ldots, G\} \): 4-digit product group
- \( s_{gt} \): product group’s expenditure share
- \( s^F_{gt} \): product group’s imports to total expenditures
- \( \varphi^F_{gt} \): share of imports in a product group \( (= s^F_{gt} / s_{gt}) \)
- \( s^F_t \equiv \sum_g s_{gt} \varphi^F_{gt} \): total import share
Finding 1. Expenditure Switching

Decompose expenditure switching as:

$$\Delta s_t^F = s_t^F - s_k^F$$

$$= \sum_g s_{gt} \varphi_{gt}^F - \sum_g s_{gk} \varphi_{gk}^F$$

$$= \sum_g s_{gk} \Delta \varphi_{gt}^F + \sum_g \varphi_{gk}^F \Delta s_{gt} + \sum_g \Delta \varphi_{gt}^F \Delta s_{gt}$$

Within

Across

$\approx 0$
Finding 1. Within and Across Components

Driven by reallocation of expenditures within narrow (4-digit) product groups.
Finding 1. Intensive or Extensive Adjustment?

1. Decompose sales growth into two margins (di Giovanni et al., 2013):

\[ \tilde{\gamma}_t \equiv \ln \sum_{i \in I_t} x_{igt} - \ln \sum_{i \in I_t} x_{igt-1} \]

\[ = \ln \frac{\sum_{i \in I_{t/t-1}} x_{igt}}{\sum_{i \in I_{t/t-1}} x_{igt-1}} - \left( \ln \frac{\sum_{i \in I_{t/t-1}} x_{igt}}{\sum_{i \in I_{t}} x_{igt}} - \ln \frac{\sum_{i \in I_{t/t-1}} x_{igt-1}}{\sum_{i \in I_{t-1}} x_{igt-1}} \right) \]

\[ = \tilde{\gamma}_t - \ln \frac{\pi_{t,t}}{\pi_{t,t-1}} \]

Intensive margin  Extensive margin
Finding 1. Intensive or Extensive Adjustment?

1. Decompose sales growth into two margins (di Giovanni et al., 2013):

\[ \tilde{\gamma}_t \equiv \ln \sum_{i \in I_t} x_{igt} - \ln \sum_{i \in I_t} x_{igt-1} \]

\[ = \ln \frac{\sum_{i \in I_{t/t-1}} x_{igt}}{\sum_{i \in I_{t/t-1}} x_{igt-1}} - \left( \ln \frac{\sum_{i \in I_{t/t-1}} x_{igt}}{\sum_{i \in I_t} x_{igt}} - \ln \frac{\sum_{i \in I_{t/t-1}} x_{igt-1}}{\sum_{i \in I_{t-1}} x_{igt-1}} \right) \]

\[ = \gamma_t \quad \text{Intensive margin} \quad \text{Extensive margin} \]

2. Apply to foreign and total sales:

\[ \ln s_t^F - \ln s_{t-1}^F = \ln \frac{\sum_{i \in I_t^F} x_{igt}^F}{\sum_{i \in I_t} x_{igt}} - \ln \frac{\sum_{i \in I_{t-1}^F} x_{igt-1}^F}{\sum_{i \in I_{t-1}} x_{igt-1}} \]

\[ = \tilde{\gamma}_t^F - \tilde{\gamma}_t \]
Finding 1. Intensive and Extensive Margins

Expenditure switching driven by the **intensive margin**
Finding 2. Relative Price Adjustment

Did relative prices adjust?

Notation:

- \( p_{igt} \): unit value of item \( i \) in group \( g \)
- \( P_{gt}^F \): price indexes for (F)oreign food in group \( g \)
- \( P_t^F \): aggregate price indexes for food imports
- \( P_t \): aggregate price indexes for food

Construct aggregate prices with a discrete Divisia (Tornqvist) price index:

\[
\Delta \ln P_t = \sum_g \sum_j \sum_{i \in I_{gt}^j} w_{igt} \Delta \ln p_{igt}, \quad j = \{ D, F \},
\]

and \( w_{igt} = 0.5(s_{igt} + s_{igt-1}) \)
Finding 2. Relative Price Adjustment

Relative price of imports, defined as $P^F_t/P_t$, increased during the crisis: 4.5% y-o-y (2009Q4–2008Q4) and 6% trough-to-peak
Finding 2. Relative Price Adjustment

Again, decompose changes into *within* and *across* components:

\[
\Delta \ln \frac{P^F_t}{P_t} \equiv \ln \frac{P^F_t}{P_t} - \ln \frac{P^F_k}{P_k}
\]

\[
= \sum_g w^F_g \left( \ln \frac{P^F_g}{P_{gt}} + \ln \frac{P_{gt}}{P_t} \right) - \sum_g w^F_g \left( \ln \frac{P^F_g}{P_{gk}} + \ln \frac{P_{gk}}{P_k} \right)
\]

\[
= \sum_g \frac{w^F_g}{w^F_k} \Delta \ln \frac{P^F_{gt}}{P_{gt}} + \sum_g \frac{w^F_g}{w^F_k} \Delta \ln \frac{P_{gt}}{P_t}
\]

\[
\approx 0
\]

**Within**

**Across**
Finding 2. Within and Across Components

No systematic change in relative price **within** product groups
Findings 1 and 2. A Puzzle?

The findings presented thus far show

1. Expenditure switching occurs within product groups

2. Relative price changes occurs across product groups

Puzzle:
Why are consumers buying more domestic varieties even though they are not becoming less expensive than their foreign counterparts?

Potential Explanation
25% fall in income induced switching towards cheaper substitutes within product groups
Finding 3. Unit Values

- Compare price **levels** within 4-digit product groups

**Notation:**

- $p_{igt}$: unit value of item $i$ in group $g$
- $q_{igt}$: units (e.g., kg) sold for item $i$ in group $g$
- $V^j_{gt} = \sum_{i \in I^j_{gt}} \phi_{igt} p_{igt}$, where $\phi_{igt} = q_{igt} / \sum_{i \in I^j_{gt}} q_{igt}$

- Unit values exhibit:
  - Large dispersion across items: $p_{igt}^{75%} / p_{igt}^{25%} = 1.70$
  - Larger values for imports on average: $V^F_{gt} / V^D_{gt} = 1.33$
Finding 3. Within-group Unit Value Dispersion

Unit values exhibit large dispersion for median $g$
Finding 3. Foreign/Domestic Unit Value Dispersion

Unit values exhibit larger values for imports on average.
Finding 3. Flight Towards Cheaper Substitutes

- Did consumers switch towards cheaper items during the crisis?
- For group $g$ compare changes in average unit value and price index:

$$\Delta \ln W_{gt} = \Delta \ln V_{gt} - \Delta \ln P_{gt},$$

where differences are due to

- Changes in quantities consumed (item mix)
- Entry/exit of items

$\Delta \ln W_{gt}$ is an index of changes in consumed item mix within product groups (Boorstein and Feenstra, 1987)
Finding 3. Unit Value and Price Decomposition

- **Average unit value:**

\[
\Delta \ln V_{gt} = \ln \sum_{i \in I_{gt/t-1}} \phi_{igt} p_{igt} - \ln \sum_{i \in I_{gt/t-1}} \phi_{igt-1} p_{igt-1},
\]

- **Price index:**

\[
\Delta \ln P_{gt} = \frac{1}{w_{gt}} \sum_{i \in I^j_{gt/t-1}} w_{igt} (\ln p_{igt} - \ln p_{igt-1})
\]
Finding 3. Unit Value and Price Decomposition

The decomposition has the following implications

- $\Delta \ln P_{gt}$ is calculated keeping weights fixed
  - Shift in item mix, $\phi_{igt} - \phi_{igt-1} \geq 0$, is not captured
  - If item mix shifts systematically towards lower unit values, then $\Delta \ln V_{gt} < 0$, but $\Delta \ln P_{gt} = 0$
    - $\Delta W_{gt} < 0$
**Finding 3. Flight Towards Cheaper Substitutes**

Consumer switched to **cheaper substitute** items

![Graph showing the y-o-y change in ln(V_{gt}) − ln(P_{gt}) from 2007.5 to 2011. The y-axis represents the change in log values, ranging from -0.03 to 0.03. The x-axis represents the years from 2007.5 to 2011. The line graph shows a decrease in the change from 2007.5 to 2008, then a sharp drop from 2008 to 2009, followed by a recovery in 2009.5 and 2010, and a slight increase in 2010.5.](#)
Finding 3. Implications for Expenditure Switching

- Did the shift in item mix induce expenditure switching?

- Consider a partial price index that imposes homogeneity within Foreign/Domestic items in each product group:

\[
\Delta \ln P_{gt}^{F/D} = \sum_j w_{gt}^j \Delta \ln V_{gt}^j
\]

and a unit value for each \( D \) and \( F \), respectively:

\[
\ln V_{gt}^j = \ln \sum_{i \in I_{gt}^j} \left( \phi_{igt} p_{igt} - \phi_{igt-1} p_{igt-1} \right)
\]
Finding 3. Implications for Expenditure Switching

The decomposition has the following implications

- $\Delta \ln V_{gt} - \Delta \ln P_{gt}^{F/D} = 0$ if
  - $w_{gt}^j = \{0, 1\}$ or
  - $V_{gt}^F = V_{gt}^D$

- $\Delta \ln V_{gt} - \Delta \ln P_{gt}^{F/D} < 0$ if
  - $V_{gt}^F > V_{gt}^D$ and
  - $\phi_{gt}^F - \phi_{gt-1}^F < 0$, where $\phi_{gt}^F = \sum_{i \in I_{gt}^F} \phi_{igt}$
Finding 3. Flight Towards Cheaper Domestic Substitutes

Consumer switched to cheaper domestic substitute items
Summary of Empirical Findings

- **Across:**
  - Prices adjusted, but very little expenditure switching
  - Likely more important when $\Delta NEER \gg 0$

- **Within:**
  - Expenditure switching, but no relative price adjustment
  - A puzzle for conventional macro
  - Consumers switched to cheaper domestic substitutes
Theoretical Framework: Demand System

- **Goal:** quantify the role of prices and income in expenditure switching

- **Expenditure allocation problem** of a representative consumer
  - Given $C_t$ and $p_{igt}$, allocate expenditures across and within product groups
  - Focus on *within* product groups
  - Changes in income induce substitution between high and low unit value items
Theoretical Framework: Demand System

- Preferences:

\[ U_t = \left( \sum_{g=1}^{G} \omega^\rho_{gt} c^\rho_{gt} \right)^{\frac{\rho}{\rho-1}} \]

ACROSS:

\[ c_{gt} = \left( \left( \frac{1}{N^\sigma_{gt}} \right) \frac{1}{\sigma^\sigma_g} \sum_{i \in I^\sigma_{gt}} \widehat{c}^\sigma_{igt} \right)^{\frac{\sigma_g}{\sigma_g-1}} \]

where \( \widehat{c}^\sigma_{igt} = \theta^\lambda_{ig}(C_t) c^\sigma_{igt} \), and \( \sum_g \sum_i p^\sigma_{igt} c^\sigma_{igt} = C_t \)

- \( c^\sigma_{igt} \): quantity of item \( i \)

- \( \theta^\lambda_{ig} \): quality of item \( i \), which depends on income \( \lambda^\lambda_g(C_t) \) 
  (Hallak, 2006)
Theoretical Framework: Demand System

Solving the demand system subject to a consumer’s budget constraint yields the across and within expenditure shares:

\[ s_{gt} \equiv \frac{p_{gt} c_{gt}}{P_t C_t} = \omega_{gt} p_{gt}^{(1-\rho)} \]  \hspace{1cm} \text{(Across)}

\[ \varphi_{igt} \equiv \frac{p_{igt} c_{igt}}{p_{gt} c_{gt}} = \frac{1}{N_{gt}} \left( \frac{p_{igt}}{\theta_{igt}^{\gamma_g(C_t)}} \right)^{1-\sigma_g} \]  \hspace{1cm} \text{(Within)}
Estimation Strategy

1. Model yields an estimable equation of an item’s *within* share as a function of (i) relative prices, and (ii) income

2. Aggregate predicted item expenditure shares to predict switching between foreign/domestic goods

3. Do steps (1) and (2) for a standard homothetic model (CES) and the non-homothetic model (NH) and compare predictions with data
Estimation Strategy

- Take first differences of log of Within share:

\[
\Delta \ln \varphi_{igt} = \Delta \ln N_{gt} + (1 - \sigma_g)\Delta \ln \left(\frac{p_{igt}}{P_{gt}}\right) + (\sigma_g - 1)\Delta \lambda_g(C_t) \ln \theta_{ig}
\]

- Assume that \(\lambda_g(C_t) = \eta_g + \mu_g \ln C_t\) (Hallak, 2006):

\[
\Delta \ln \varphi_{igt} = \Delta \ln N_{gt} + (1 - \sigma_g)\Delta \ln \left(\frac{p_{igt}}{P_{gt}}\right) + (\sigma_g - 1)\mu_g \ln \theta_{ig} \Delta \ln C_t
\]
Estimation Strategy

- Estimation equation

\[ \Delta \ln \varphi_{igt} = \alpha_{gt} + \beta_{1g} \ln \Delta \left( \frac{p_{igt}}{p_{gt}} \right) + \beta_{2g} \ln \bar{p}_{ig} \Delta \ln C_t + \varepsilon_{igt} \]

- \( \alpha_{gt} \): 4-digit product group \times time fixed effect
- \( \bar{p}_{ig} \): item’s median relative unit value, \( p_{igt}/V_{gt} \) (quality)
- \( C_t \): total real per capita household spending
- \( \varepsilon_{igt} \): random disturbance term

- Homothetic (CES) model restricts \( \beta_{2g} = 0 \)
Estimation Strategy

- Calculate the predicted expenditure switching between $\tau$ and $\tau - 1$ as follows:
  1. Given $\hat{\beta}$s, calculate $\Delta \ln \varphi_{ig\tau}$, excluding fixed effects
  2. Calculate $\hat{\varphi}_{ig\tau} = \exp(\Delta \ln \varphi_{ig\tau}) \varphi_{ig\tau-1}$
  3. Calculate $\hat{\varphi}^F_{g\tau} = \sum_{i \in I^F_{g\tau}} \hat{\varphi}_{ig\tau}$
  4. Calculate $(s^F_{t} - s^F_{k})_{\text{Within}} = \sum_{\tau=k}^{t} \sum_{g} s_{g\tau-1}(\hat{\varphi}^F_{g\tau} - \varphi^F_{g\tau-1})$, for $k = t - 3$ (y-on-y change)
Expenditure Switching (Within): Data, CES, and NH
NH Model Within: Total, Price and Income Effects

![Graph showing the changes in import expenditure share from 2007.5 to 2011. The graph includes lines for Total, Price effect, and Income effect.](image-url)
Conclusion

- Expenditure switching driven by income effect, not changes in relative prices

- A more general phenomenon across countries during the crisis?
  - Fall in quality of European exports (Berthou & Emlinger, 2010)
  - Beginning a project with Bems and Shambaugh to investigate potential for asymmetries across countries in adjustment

- Policy implications
  - ‘Successful internal devaluation?’ We find no impact of an internal devaluation in the relative retail price of foreign/domestic goods
  - External sector adjustment without rebalancing? As income increases, expenditure switching is reversed
Note: Time 0 is 2008Q3
## Two-Digit Product Group Summary Statistics

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Share</th>
<th>Foreign Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Meat, fresh and frozen</td>
<td>0.0100</td>
<td>0.0109</td>
</tr>
<tr>
<td>11</td>
<td>Fish</td>
<td>0.0200</td>
<td>0.1188</td>
</tr>
<tr>
<td>12</td>
<td>Processed meat</td>
<td>0.0428</td>
<td>0.0320</td>
</tr>
<tr>
<td>13</td>
<td>Prepared food</td>
<td>0.0111</td>
<td>0.0331</td>
</tr>
<tr>
<td>14</td>
<td>Fresh bread</td>
<td>0.0766</td>
<td>0.0180</td>
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<tr>
<td>21</td>
<td>Dairy products</td>
<td>0.0852</td>
<td>0.0159</td>
</tr>
<tr>
<td>20</td>
<td>Eggs and eggs preparations</td>
<td>0.0198</td>
<td>0.0000</td>
</tr>
<tr>
<td>22</td>
<td>Yogurts &amp; dairy snacks</td>
<td>0.0491</td>
<td>0.1246</td>
</tr>
<tr>
<td>23</td>
<td>Edible fats</td>
<td>0.0157</td>
<td>0.1782</td>
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<tr>
<td>24</td>
<td>Cheese</td>
<td>0.0464</td>
<td>0.1526</td>
</tr>
<tr>
<td>25</td>
<td>Frozen foods</td>
<td>0.0182</td>
<td>0.4035</td>
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<td>26</td>
<td>Ice cream</td>
<td>0.0139</td>
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<td>30</td>
<td>Grain products</td>
<td>0.0264</td>
<td>0.3617</td>
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<tr>
<td>31</td>
<td>Biscuits and wafers</td>
<td>0.0163</td>
<td>0.1711</td>
</tr>
<tr>
<td>32</td>
<td>Canned (jarred) foods</td>
<td>0.0231</td>
<td>0.3393</td>
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<tr>
<td>33</td>
<td>Juices</td>
<td>0.0228</td>
<td>0.2136</td>
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<td>34</td>
<td>Hot drinks</td>
<td>0.0439</td>
<td>0.8580</td>
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<tr>
<td>35</td>
<td>Baby foods and drinks</td>
<td>0.0089</td>
<td>0.9993</td>
</tr>
<tr>
<td>36</td>
<td>Baby care products</td>
<td>0.0145</td>
<td>0.9059</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Code</th>
<th>Name</th>
<th>Share</th>
<th>Foreign Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>37</td>
<td>Pet foods</td>
<td>0.0134</td>
<td>0.8581</td>
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<tr>
<td>38</td>
<td>Pet accessories</td>
<td>0.0018</td>
<td>0.8455</td>
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<tr>
<td>40</td>
<td>Dry ingredients</td>
<td>0.0059</td>
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</tr>
<tr>
<td>41</td>
<td>Seasoning &amp; preserve</td>
<td>0.0455</td>
<td>0.4278</td>
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<tr>
<td>42</td>
<td>Sweets</td>
<td>0.0467</td>
<td>0.6632</td>
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<tr>
<td>43</td>
<td>Snacks</td>
<td>0.0085</td>
<td>0.4524</td>
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<tr>
<td>44</td>
<td>Dried fruit and nuts</td>
<td>0.0091</td>
<td>0.1788</td>
</tr>
<tr>
<td>45</td>
<td>Natural &amp; pharm. prods.</td>
<td>0.0020</td>
<td>0.7623</td>
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<tr>
<td>48</td>
<td>Brewery + mild alc. bevs.</td>
<td>0.0532</td>
<td>0.1595</td>
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<tr>
<td>49</td>
<td>Alcoholic products</td>
<td>0.1497</td>
<td>0.6481</td>
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<tr>
<td>50</td>
<td>Soft drinks</td>
<td>0.0372</td>
<td>0.4710</td>
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<tr>
<td>60</td>
<td>Tissues</td>
<td>0.0133</td>
<td>0.7304</td>
</tr>
<tr>
<td>62</td>
<td>Disposable tableware, etc.</td>
<td>0.0074</td>
<td>0.7129</td>
</tr>
<tr>
<td>63</td>
<td>Intimate hygiene</td>
<td>0.0065</td>
<td>0.9836</td>
</tr>
<tr>
<td>64</td>
<td>Body wash and care</td>
<td>0.0265</td>
<td>0.9771</td>
</tr>
<tr>
<td>65</td>
<td>Cosmetics</td>
<td>0.0064</td>
<td>0.8908</td>
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<tr>
<td>66</td>
<td>Jewelry &amp; optical prods.</td>
<td>0.0015</td>
<td>0.8145</td>
</tr>
<tr>
<td>68</td>
<td>Detergents</td>
<td>0.0006</td>
<td>0.5648</td>
</tr>
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### Aggregate:

<table>
<thead>
<tr>
<th></th>
<th>Share</th>
<th>Foreign Share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aggregate</td>
<td>1.0000</td>
<td>0.3683</td>
</tr>
</tbody>
</table>

Notes: This table presents summary statistics for two-digit product groups, aggregated across stores over the sample period May 2006–May 2011. The ‘Share’ column presents a product group’s share of total sales over the sample period. The ‘Foreign Share’ column presents the share of foreign sales within a product group over the sample period. The ‘Aggregate’ foreign share is a ‘Share’-weighted average of product groups’ foreign shares.
<table>
<thead>
<tr>
<th></th>
<th>CES Model</th>
<th>NH Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>( \beta_{1g} )</td>
<td></td>
<td>( \beta_{1g} )</td>
</tr>
<tr>
<td>10th pctile</td>
<td>-3.595</td>
<td>-3.588</td>
</tr>
<tr>
<td>25th pctile</td>
<td>-2.814</td>
<td>-2.837</td>
</tr>
<tr>
<td>50th pctile</td>
<td>-1.925</td>
<td>-1.955</td>
</tr>
<tr>
<td>75th pctile</td>
<td>-1.115</td>
<td>-1.102</td>
</tr>
<tr>
<td>90th pctile</td>
<td>-0.067</td>
<td>-0.092</td>
</tr>
<tr>
<td>Observations</td>
<td>236,595</td>
<td>236,595</td>
</tr>
<tr>
<td>Group × time pairs</td>
<td>7,294</td>
<td>7,294</td>
</tr>
<tr>
<td>Groups</td>
<td>384</td>
<td>384</td>
</tr>
<tr>
<td>( R^2 )</td>
<td>0.099</td>
<td>0.103</td>
</tr>
</tbody>
</table>

Notes: The number of coefficients significant at the 10% level or lower. In Column (1), 270 coefs are significant at the 10% level or lower; in Column (2), 273 coefs are significant at the 10% level or lower; in Column (3), 101 coefs are significant at the 10% level or lower.