The Household Consumption system in DANTE: A PADS for Italy
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XX° Inforum Conference
Florence, 3-7 sept. 2012
Main features of DANTE

Task: Analysis of structural changes + Policy analysis

In order to do this we decided to build a model:
1) multi-regional (3 regions);
2) multi-sectoral (30 industries; 59 commodities);
3) structural
4) econometric
5) micro-macro (households microsimulation model)
Resident Household Consumption in DANTE

Aggregate consumption equation → Total consumption

Relative prices → PADS → Expenditures by product

population
The INFORUM approach to Demand System estimation

Main features of PADS:
1) A two stage approach (cross-section + time-series);

2) A functional form easy to estimate (a sparing specification);

3) Many important features:
   a) It is able to consider both complementarity and substitution effects;
   b) It is able to consider the effects of relative prices on marginal propensity to consume;
   c) It is able to consider a significant growth in real income;

Shortcomings in PADS for DANTE:
1) I worked with one population (cross-section + time-series);

2) I worked at the national level;
Some features:
1) I introduced dummy var. to control for specific events (sales incentive 97-98);
2) For some durables I used the lagged value of the stock;
3) For some other durables I used the real interest rate:

Regression period:
I worked with time series starting in 1980. The last year is 2007

Categories of consumption:
41 consumption categories (non dur + dur + services)
Categories of consumption

Group 1°
- Alcoholic Beverages
- Tobacco

Group 2°
- Rents
- Tenant Occupied Rent
- House maintenance

Group 3°; 2 sub-gr.
- Water and other household services
- Electricity, gas, and other fuels
- Other NonDurables
- Drug Preparation, Sundries and orthopedic equipment
- Physicians, Dentists, Other Medical professionals
- Hospitals, Nursing Homes

Group 4°; 2 sub-gr.
- Postal services
- Education
- Social services

Group 5°
- Other Services n.e.c.

Group 6°
- Group 7°; 2 sub-gr.
- Group 8°
- Group 9°
- Group 10°

No group

Food
- Non alc beverages, Coffee, Tea and Cocoa

Clothing

Footwear and Repair

TV, Radio, Photo, Computers

Furniture

Kitchen and Household appliances

Public Transportation

Vehicles

Operation of Motor Vehicles

Household Linen

China, Glassware and Tableware

Household and garden utensils

Telephone and communication equipment

Telephone and communication services

Other recreational durables

Recreational equipment, flowers, plants, pets

Recreational and cultural Services

Books, newspaper

All inclusive holidays

Bar and Restaurants

Hotels & motels

Personal Care equipment

Personal care items n.e.c.

Insurance

Financial Services
Food

Income elasticity: 0.07
Price elasticity: -0.33
Error: 0.8%
Clothing

Income elasticity: 0.67 (0.88)
Price elasticity: -0.53 (-0.53)
Error: 2.8%
Furniture

Income elasticity: 1.82 (1.57)
Price elasticity: -0.55 (-0.67)
Stock elasticity: -0.01
Error: 2.1%
Income elasticity: 1.52 (1.27)
Price elasticity: -0.79 (-1.17)
Stock elasticity: -0.09
Error: 4.6%
TV, Radio and personal computer

Income elasticity: 1.67 (1.87)
Price elasticity: -0.91 (-014)
Error: 5.9%
Bar and Restaurants

Income elasticity: 1.45 (1.03)
Price elasticity: -1.29 (-0.15)
Error: 3.0%
Aggregate Consumption Equation

Life Cycle Hypothesis:
1) Income;
2) Real interest rate;
3) Net financial wealth;

Error Correction Model:
1) Long Run equation: \( \log(C) = f(\log(W); \log(YD); \log(pop) ) \)
2) Short Run equation: \( D \log(C) = f( D\log(Y); D(r); \log(\text{residual}_{LR}) ) \)
Aggregate Consumption – step 1: Long Run eq.

Variables are in natural log

<table>
<thead>
<tr>
<th></th>
<th>North-Center</th>
<th>Tuscany</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2) Disposable_income/Price</td>
<td>0.591021</td>
<td>0.498445</td>
<td>0.801311</td>
</tr>
<tr>
<td>(3) Net_financial_Wealth/Price</td>
<td>0.422187</td>
<td>0.501555</td>
<td>0.211576</td>
</tr>
<tr>
<td>(4) Population</td>
<td>1.200335</td>
<td>2.319865</td>
<td>1.812648</td>
</tr>
</tbody>
</table>

R-squared

<table>
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<tr>
<td>R-squared</td>
<td>0.979046</td>
<td>0.94757</td>
<td>0.981099</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.975903</td>
<td>0.942576</td>
<td>0.978264</td>
</tr>
</tbody>
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According to the theory the sum of the parameters (2 + 3) should be equal to one.

Problem with population.

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<tbody>
<tr>
<td>Constant</td>
<td>-0.605</td>
<td>-0.651</td>
<td>-0.227</td>
</tr>
<tr>
<td>Disposable_income/Price</td>
<td>0.691</td>
<td>0.624</td>
<td>0.818</td>
</tr>
<tr>
<td>Net_financial_Wealth/Price</td>
<td>0.308</td>
<td>0.375</td>
<td>0.181</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.9484</td>
<td>0.9173</td>
<td>0.9757</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.9464</td>
<td>0.9142</td>
<td>0.9748</td>
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Aggregate Consumption – step 1: Long Run eq.

North - Center

Tuscany

South
## Aggregate Consumption – step 2: Short Run eq.

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</tr>
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<tbody>
<tr>
<td>Constant</td>
<td>0.013</td>
<td>0.013</td>
<td>0.010</td>
</tr>
<tr>
<td>Delta log (Disposable Income/Price)</td>
<td>0.611</td>
<td>0.350</td>
<td>0.456</td>
</tr>
<tr>
<td>Delta (nominal interest rate - inflation )&lt;sub&gt;(t-1)&lt;/sub&gt;</td>
<td>-0.004</td>
<td>-0.005</td>
<td>-0.006</td>
</tr>
<tr>
<td>Log (residual_LR)&lt;sub&gt;(t-1)&lt;/sub&gt;</td>
<td>-0.109</td>
<td>-0.135</td>
<td>-0.367</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.937</td>
<td>0.900</td>
<td>0.948</td>
</tr>
<tr>
<td>Adjusted R-squared</td>
<td>0.909</td>
<td>0.864</td>
<td>0.926</td>
</tr>
</tbody>
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There are some dummy variables used to control specific events:
1) Introduction of Euro (I used a dummy for 2001-2004)
2) “Rottamazione” (dummy for 1998)
Aggregate Consumption – step 2: Short Run eq.
Resident Household Consumption.
Nominal term. % change

**North - Center**

- Actual Value
- Fitted Value

**Tuscany**

- Actual Value
- Fitted Value

**South**

- Actual Value
- Fitted Value
Thanks ...
Time-series specification for PADS

\[ x_i(t) = \left[ a_i(t) + b_i \left( \frac{y}{P} \right) \right] \cdot \left( \frac{p_i}{P} \right)^{-\lambda_0} \cdot \prod_{k=1}^{n} \left( \frac{p_i}{p_k} \right)^{-\lambda_k \cdot s_k} \cdot \left( \frac{p_i}{P_G} \right)^{-\mu_G} \]

Income term

Price term
Problem with Population

% Growth rate (yoy)

Tuscany