Fuel Poverty and Energy Benefits: The Case of Italy

R. Miniacci - Università di Brescia
C. Scarpa – Università di Brescia
P. Valbonesi – Università di Padova

IEFE Seminar Series
Milan, March 4, 2014

Outline

- Fuel poverty:
  - alternative definitions
  - Italy 1998 – 2011
- Energy benefits: Italy
  - Gas and electricity benefits
  - The eligible households: are they poor / fuel poor?
  - The benefits: effective against poverty / fuel poverty?
Fuel poverty ~ Affordability

“The ability to pay for necessary level of consumption within normal spending patterns” (Public Utilities Access Forum, 2004)

The necessary level of consumption and the normal spending patterns can depend on:

- Family size and income
- Endowment (Housing conditions, …)
- Environment (Climatic conditions, …)
- Accessibility (Resources and infrastructures)
- Non linear tariffs

Bill-to-income ratio approach

Total expenditure: \( x_h = x_h^c + x_h^p \)

Actual bill-to-income ratio: \( r_h = x_h^c / x_h \)

\[ r_h > r^* \Leftrightarrow x_h < x_h^c / r^* \]

\[ q^c \geq \frac{r^u}{1 - r^u} \frac{p_c}{p_u} q^e \]
Bill-to-income ratio approach

- Lacks specific consideration of consumers’ ability to pay
- Critical threshold $r^*$ (Fankhauser and Tepic, 2007 EnPol)

Residual income and affordability

- “…housing is not affordable for a household if it excessively crowds out other expenditure…” (Thalmann, 2003 JHousEc)
- Behavioral definition of affordability (Bandorf and Pauly, 2006 JEalhEc)
- The household faces an affordability problem if:
  \[ x_h - x^n_h < x^{sp} \]
- Public utility induced poverty
Residual income approach: refinements

\[ q^u = p_d q^u + p_u q^p \]

\[ \begin{align*}
q^p &= \frac{x_h - x^u}{x_{cp}} \\
A &= \frac{q^p}{x_{cp}} \quad A + F + E \\
B &= \frac{x_h - x^u < x_{cp}}{x_h > x_{cp}} \quad D + C
\end{align*} \]

Residual income approach

It allows to recognize that the affordability problem can stem from different reasons:

- The absolutely poor: they cannot afford the minimum quantities and income support may be advisable
- The “over-consumers” (tastes or non-monetary constraints?)
- The “under-consumers” (tastes or non-monetary constraints?)
Fuel poverty in Italy: data & parameter settings

- Data
  - Survey on Family Budgets 1998 – 2011 (ICF – ISTAT)
  - Survey on Income and Living Conditions 2011 (SILC – ISTAT)
- Setting $x^p$ and $x^e$
  - ISTAT poverty line
    - $x^p$: minimum set of appliances and dwelling standard, conditional on household composition and climatic area
    - $x^e$: sum of items, limited reference to relative position
    - Regional CPI updated values
  - Setting threshold ratio $r^e$
    - Standard 5% - 10% + $x^p/x^e$

Household energy expenditure 98-11

Euro 2010

- Gas: cooking
- Gas: cooking & heating
- Electricity
- Total expenditure
Price index dynamics 1998 - 2012

Setting $x^{hp}$

Electrical & Gas, Euro per month, 2011

<table>
<thead>
<tr>
<th>Household members</th>
<th>Electricity</th>
<th>Warm</th>
<th>Mild</th>
<th>Cool</th>
<th>Cold</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>12.01</td>
<td>5.33</td>
<td>36.49</td>
<td>36.51</td>
<td>53.36</td>
</tr>
<tr>
<td>2</td>
<td>16.34</td>
<td>20.27</td>
<td>47.76</td>
<td>52.12</td>
<td>68.27</td>
</tr>
<tr>
<td>3</td>
<td>22.33</td>
<td>27.17</td>
<td>53.79</td>
<td>59.17</td>
<td>75.12</td>
</tr>
<tr>
<td>4</td>
<td>25.13</td>
<td>40.94</td>
<td>61.98</td>
<td>68.05</td>
<td>87.79</td>
</tr>
<tr>
<td>5+</td>
<td>27.29</td>
<td>55.90</td>
<td>73.82</td>
<td>82.38</td>
<td><strong>102.72</strong></td>
</tr>
</tbody>
</table>
### Setting $x^{df}$ - Other goods, Euro per month, 2011

<table>
<thead>
<tr>
<th>Household members</th>
<th>Warm</th>
<th>Mild</th>
<th>Cool</th>
<th>Cold</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>563.96</td>
<td>614.81</td>
<td>647.80</td>
<td>739.93</td>
</tr>
<tr>
<td>2</td>
<td>801.03</td>
<td>870.63</td>
<td>889.19</td>
<td>1025.34</td>
</tr>
<tr>
<td>3</td>
<td>1035.76</td>
<td>1106.69</td>
<td>1139.85</td>
<td>1301.22</td>
</tr>
<tr>
<td>4</td>
<td>1260.45</td>
<td>1349.52</td>
<td>1331.91</td>
<td>1566.30</td>
</tr>
<tr>
<td>5+</td>
<td>1456.33</td>
<td>1531.08</td>
<td>1506.09</td>
<td>1774.63</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Household members</th>
<th>Warm</th>
<th>Mild</th>
<th>Cool</th>
<th>Cold</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>556.05</td>
<td>634.19</td>
<td>624.12</td>
<td>682.33</td>
</tr>
<tr>
<td>2</td>
<td>779.45</td>
<td>868.71</td>
<td>858.70</td>
<td>953.41</td>
</tr>
<tr>
<td>3</td>
<td>1006.74</td>
<td>1106.82</td>
<td>1091.55</td>
<td>1220.38</td>
</tr>
<tr>
<td>4</td>
<td>1222.44</td>
<td>1311.79</td>
<td>1302.77</td>
<td>1471.95</td>
</tr>
<tr>
<td>5+</td>
<td>1430.94</td>
<td>1501.59</td>
<td>1468.43</td>
<td>1718.28</td>
</tr>
</tbody>
</table>

### Setting the budget share threshold $r^d$

- 5% electricity – 10% gas
- $r^d = x^{df} / x^d$
  - Electricity: from 1.5% (5+, cold) to 2% (1, warm)
  - Gas: from 0.9% (1, warm) to 7.2% (1, cold)
- Median $\alpha_{b}^{d}/\alpha_{b}^{d}$ for relative poor households
  - Electricity: from 2.3% (5+, cold) to 5.3% (1, warm)
  - Gas: from 1.9% (5+, warm) to 7.5% (1, cold)
Actual bill-to-income ratio, $r > r^p$
(Headcount index)

Electricity
Gas

Actual bill-to-income ratio, $r > 5\%, 10\%$
(Headcount index)

Electricity
Gas
Residual income poor, electricity + gas
(Headcount index 2011)

Residual income poor, electricity + gas
(Headcount index 1998 - 2011)
Residual income poor, electricity + gas
Poverty gap index

\[
P_{G I}^{R I} = \frac{1}{N_{G I}^{R I}} \sum_{h} I_{h}^{u} \times (p_{c} q_{c}^{p} - p_{c} q_{h}^{c})^{2} + I_{h}^{c} \times (p_{a} q_{a}^{p} - p_{a} q_{h}^{u})^{2}\]

A

B

C

D

E

F

Residual income poor, electricity + gas
Poverty gap index 1998 – 2011, Euro per month 2010
Fuel poverty in Italy 2011: summary

- 6.9% spend more than 5% of their budget for electricity
- 6.5% spend more than 10% of their budget for gas
- 8.4% do not have enough money after having paid their gas and electricity bills: they need 200 Euro a month on average
- 24.9% consume “too little” gas or electricity: they need 25 Euro a month on average

Energy benefits in Italy: Electricity and gas

- (Natural) Gas benefit: 11/2008
- Aim: to support energy consumption of vulnerable households
- Vulnerable:
  - Income (equivalent income < 7,500 Euro)
  - Health
  - At least 4 dependent children (and income < 20,000 Euro)
  - NO REFERENCE TO ACTUAL CONSUMPTION LEVEL OR HOUSING CONDITIONS
Energy benefits in Italy: Electricity and gas

- Application procedure:
  - Equivalent income & wealth certification (ISEE)
  - Municipality (or delegated, CAF), contract details needed
  - Must be renewed
- Eligibility: if the household of the contract holder satisfies the requirements
  - Direct client
  - Indirect client

<table>
<thead>
<tr>
<th>Household members</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2</td>
<td>60</td>
<td>58</td>
<td>56</td>
<td>56</td>
<td>63</td>
<td>71</td>
</tr>
<tr>
<td>3-4</td>
<td>78</td>
<td>75</td>
<td>72</td>
<td>72</td>
<td>81</td>
<td>91</td>
</tr>
<tr>
<td>5+</td>
<td>135</td>
<td>130</td>
<td>124</td>
<td>124</td>
<td>139</td>
<td>155</td>
</tr>
</tbody>
</table>
**Energy benefits in Italy: Gas**

**Euro per year**

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>A/B</td>
<td>60</td>
<td>85</td>
<td>87</td>
<td>70</td>
</tr>
<tr>
<td>5+</td>
<td>C</td>
<td>75</td>
<td>78</td>
<td>87</td>
<td>127</td>
</tr>
<tr>
<td>1-4</td>
<td>D</td>
<td>100</td>
<td>103</td>
<td>113</td>
<td>127</td>
</tr>
<tr>
<td>5+</td>
<td>E</td>
<td>75</td>
<td>78</td>
<td>87</td>
<td>139</td>
</tr>
<tr>
<td>1-4</td>
<td>F</td>
<td>100</td>
<td>103</td>
<td>113</td>
<td>202</td>
</tr>
<tr>
<td>5+</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Benefit / expenditure: 14.4% - 16.6%
Benefit / Income: 0.2% - 0.3%

**# members 5+, Area F, 2011**

Electricity 124 + Gas 264 = 388 Euro per year

**Income poverty and benefit eligibility**

SILC 2011: at risk 19.5%, eligible 11.5% - 9.2%
Poverty, fuel poverty and eligibility

Percentage of eligible by poverty status

<table>
<thead>
<tr>
<th>At risk of poverty</th>
<th>Total</th>
<th>Poor</th>
<th>( x^*/inc &gt; r )</th>
<th>( x^*/inc &gt; r )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>11.50%</td>
<td>43.20%</td>
<td>87.40%</td>
<td>22.90%</td>
</tr>
<tr>
<td>Gas</td>
<td>10.60%</td>
<td>42.50%</td>
<td>87.50%</td>
<td>28.60%</td>
</tr>
</tbody>
</table>

- ~12.5% of the (absolute) poor are not eligible: 170,000 households
- ~57% of households at risk of poverty are not eligible: 2,8 mil. hh
- Non eligibility high among the poor:
  - without children
  - living in the North
  - home owners

---

Poverty and eligibility

Percentage of eligible among the poor
Fuel poverty and eligibility

Percentage of eligible among $x^e/inc > 5\%, 10\%$

Benefits & exit poverty/fuel poverty
(Preliminary, assuming all eligible claim the benefit)

- Average electricity benefit 68 euro (max 124 euro) $\rightarrow$ 196.2 mil Euro
- Average gas benefit 92 euro (max 240 euro) $\rightarrow$ 213.7 mil. Euro
- Electricity + gas benefits
  - Overall poverty rate: 5,33$\% \rightarrow$ 5,28$\%$
  - Poverty rate among eligible: 40,7$\% \rightarrow$ 40,2$\%$
- Electricity benefit
  - Overall $x^e/inc > 5\%$: unchanged
  - $x^e/inc > 5\%$ among eligible: 31,4$\% \rightarrow$ 26,5$\%$
- Gas benefit
  - Overall $x^e/inc > 10\%$: unchanged
  - $x^e/inc > 10\%$ among eligible: 14,2$\% \rightarrow$ 12,1$\%$
Conclusions

- Alternative approaches to fuel poverty
- Increasing fuel poverty in Italy …
- … mainly due to increasing income poverty
- Energy benefits in Italy
  - Targeting problems → new “ISEE” + consumption test
  - Effectiveness → more money needed (0.026% PIL)
  - (Financing, no LPG & heating oil, housing & appliances)

Thank you!

miniaci@eco.unibs.it
cescarpa@eco.unibs.it
paola.valbonesi@unipd.it