Impact of staple food price changes on households

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Outline

- How do price changes affect households?
- How can we measure the welfare impact?
- What is the net benefit ratio (NBR)?
- How can we use the NBR to understand the welfare impact of price changes?
- What are the characteristics of net buyers and net sellers in sub-Saharan Africa?
- Exercises
How do price changes affect households?

- Common sense tells us:
  - Higher prices of consumer goods hurt households
  - Higher prices of crops they sell benefit households
  - But
    - What about households that are mostly self-sufficient?
    - How about households that buy and sell the same good?
    - And how much do they gain or lose?

- Economics helps us measure the size of the benefit or loss in income
How do price changes affect households?

Y=income, P=price, Qd=demand, Qs=supply

\[ \Delta y \cong \Delta P \cdot Qs - \Delta P \cdot Qd \]

\[ = \Delta P \cdot (Qs - Qd) \]

\[ = \Delta P \cdot \frac{(PQs - PQd)}{P} \]

\[ \Delta y \cong \frac{\Delta P}{P} \cdot (PQs - PQd) \]

How do price changes affect households?

Case of producers
- Orange + yellow area represents benefit to producers
- Yellow area is approximation and easier to measure
- Welfare effect \( \cong \Delta \text{price} \times \text{quantity produced} \)
- Amount of additional income that producer would get if there was no change in output
What is the net benefit ratio?

The percentage change in real income is approximately equal to the percentage change in price multiplied by the value of net sales of a crop divided by income.

\[ \Delta Y \approx \Delta P \times \frac{(PQs - PQd)}{Y} \]

Net benefit ratio (NBR)

The NBR is usually calculated for a crop or a crop category (e.g. cereals).

How can we use the NBR to understand the welfare impact of price changes?

### Example

<table>
<thead>
<tr>
<th>Example</th>
<th>NBR</th>
<th>Effect of 50% increase in price on income</th>
</tr>
</thead>
<tbody>
<tr>
<td>A farmer sells 4 tons of maize at $200/ton and the household income is $2000. So his NBR for maize = ((4 \times 200)/(2000 = 800)/2000 =)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A farmer produces 500 kg of maize and consumes 900 kg. The price is $200/ton and his income is $1600. The maize NBR is (200 \times (0.5 - 0.9)/1600 = -80/1600 =)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>An urban household spends 30% of its budget on rice. His rice NBR =</td>
<td></td>
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How can we use the NBR to understand the welfare impact of price changes?

Example

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<th>NBR</th>
<th>Effect of 50% increase in price on income</th>
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<tr>
<td>0.40</td>
<td>+20%</td>
</tr>
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</table>

A farmer sells 4 tons of maize at $200/ton and the household income is $2000. So his NBR for maize = (4x200)/2000 = 800/2000 = 0.40

A farmer produces 500 kg of maize and consumes 900 kg. The price is $200/ton and his income is $1600. The maize NBR is 200x(0.5-0.9)/1600 = -80/1600 = -0.05

An urban household spends 30% of its budget on rice. His rice NBR = -0.30

What are the characteristics of net buyers and net sellers?

<table>
<thead>
<tr>
<th>Type of household</th>
<th>Zambia maize</th>
<th>Mozambique maize</th>
<th>Kenya maize</th>
<th>Ethiopia cereals</th>
<th>Madagascar rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only seller</td>
<td>19</td>
<td>13</td>
<td>18</td>
<td>44</td>
<td>26</td>
</tr>
<tr>
<td>Net seller</td>
<td>5</td>
<td>*</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No trade</td>
<td>39</td>
<td>24</td>
<td>8</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Net buyer</td>
<td>3</td>
<td>*</td>
<td>7</td>
<td>54</td>
<td>61</td>
</tr>
<tr>
<td>Only buyer</td>
<td>33</td>
<td>51</td>
<td>55</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

* Net sellers and net buyers together are 12%
What are the characteristics of net buyers and net sellers?

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<th>Type of household</th>
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<th>Role in staple grain markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net sellers</td>
<td>Medium and large farmers</td>
<td>Small percentage of net sellers account for bulk of sales</td>
</tr>
<tr>
<td>No trade</td>
<td>Farmers in remote areas or farmers growing other staple crops</td>
<td>No role</td>
</tr>
<tr>
<td>Net buyers</td>
<td>Urban households, cash crop farmers, rural agricultural laborers, very small farmers</td>
<td>Rural demand exceeds urban demand in some cases</td>
</tr>
</tbody>
</table>

Benefit, overall: $bw = 0.9$

Generally, NBR rises with income, that is, net sellers are richer than net buyers.

Source: Tefara and Seyoum, 2008
Conclusions

- NBR is a useful tool for understanding effect of food price changes on households
- High grain prices usually generate benefits for rural area overall …
- … but benefits are concentrated among small number of net sellers, particularly large farmers
- Many (most) rural households are net buyer of the main staple crop
- Virtually all urban households are net buyers of staple crops
- Poor urban households have largest negative NBR for staples and are hardest hit by food price increases

Exercises

1. If a farmer produces $800 of maize and consumes $300 and household income is $1000, what is the maize NBR for this household?
2. If maize prices fall 20%, what is the approximate percentage fall in this farmer’s income?
3. Suppose a farmer produces cassava for own consumption, but does not buy or sell it. What is the cassava NBR?
4. If cassava prices rise 20%, what is the change in income for this household?
Exercises (2)

5. Open the file “AAMP Household impact.xls”
6. Calculate the NBR for maize for each household as \[(\text{sales-purchases})/\text{total expenditure}\]:
   - MaizeP – value of purchases
   - MaizeS – value of sales
   - Hhtotexpdr – total expenditure
7. Calculate the % impact on each household of a 80% increase in maize price as \[\text{NBR} \times (\% \text{ change in price})\]
8. Calculate the new expenditure per adult equivalent as \[(\text{adqexpdr}) \times (1+\% \text{ impact})\]

Exercises (3)

8. Calculate a dummy variable indicating households that were poor before the price change using poverty line of 17,000 Ksh/adult equivalent using =if(adqexpdr<17000,1,0)
9. Calculate a dummy variable indicating households that were poor after the price change using poverty line of 17,000 Ksh/adult equivalent using =if(newadqexpdr<17000,1,0)
10. Calculate average poverty rate before and after the price change