Public Stockholding in a Liberalized Grain Trade:
Recent Country Experiences and Emerging Evidences

Mulat Demeke, Areej Jafari, Eugenia Steanelli, and Stefania Croce

Selected Paper prepared for presentation at the International Agricultural Trade Research Consortium’s (IATRC’s) 2014 Annual Meeting: Food, Resources and Conflict, December 7-9, 2014, San Diego, CA.

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Recent Country Experiences and Emerging Evidences

M. Demeke, A. Jafari, N. Tefera, E. Stefanelli, and S. Croce

2014 IATRC Annual Meeting
"Food, Resources and Conflict“
December 7-9, 2014
San Diego, CA
Outline

I. Background
II. Socio-economic and political considerations
III. Factors influencing public stock decisions
IV. Conclusions
I. Background

• Different types of stocks – public vs. private
• Public stocks
  – Buffer stocks
  – Emergency reserve
  – Safety net stocks
  – Security stocks
  – Strategic reserve
• Two contrasting trends
  – Declining importance in d/ed countries
  – Renewed interest in d/ing countries, despite reforms
    • High fiscal costs
    • Crowding out private stocks
I. Background ...

• Objectives of the study
  – Examine the different aims of grain stocks, taking into account the various objectives and the drive to liberalize markets and trade
    • Explore the motivations for establishing public stocks
    • Identify factors influencing decisions to invest in stocks
II. Socio-economic and political considerations

- In theory, markets create incentives for the private sector to store grain
  - Adequate to meet current and future consumption needs
- However, several concerns why governments find reliance on private storage alone is not enough
  - Public stocks needed to
    - Address price variability,
    - Respond to food security needs
    - Accommodate political concerns
    - Overcome cost of imports
II. Socio-economic and political considerations...

1. As an instrument for addressing price volatility
   - Nominal prices of ag commodities more volatile
     • Disruptions in production – extreme weather
     • Inelastic supply and demand
     • Market failures
     • Underdeveloped infrastructure and institutions
   - Volatile and unpredictable prices reduce investment
   - Hence, buffer stocks to stabilize prices
     • Release or procure grain to stabilize prices
   - Several countries use buffer stocks
     • Evidence is mixed – some mention Kenya and Zambia as a success but others do not agree
       • Some have failed completely – Malawi and Sudan – poor governance
     • Nonetheless, many African governments continue to support stockholding
II. Socio-economic and political considerations ...

2. As a response to food security concerns
   - Two main reasons for food security concerns
     • Region highly vulnerable to food insecurity
       – 39 of the 59 most at risk of food insecurity are African countries
     • A high proportion of income is spent on food in Africa
       – Estimated at 42%
   - Stockholding a preferred option
     • The Ethiopian Emergency Food Security Reserve Admin. – successful
       – Small quantity (180,000 MT)
       – Food aid targeted – not displacing markets
   - Challenges if agencies undertake additional tasks
     • Zambia’s Food Reserve Agency – support producers and also urban consumers
   - But both can be done if managed well
     • Brazil and WFP use stocks to link support to small producers with safety net programs
II. Socio-economic and political considerations ...

3. As a response to political concerns
   – Political considerations important in establishing public stocks
     • Gain the support of the powerful urban populace
       – Food riots a common problem – 14 countries across Africa in 2007/08
         » Release of public stock a major policy response
           • Burkina Faso in Feb 2008
     • Food security concerns due to national security fears
       – Threat that navigation waters may be blocked
       – Exporting countries may impost export ban – major concern for heavily import dependent countries
   – Mineral or oil rich countries may prefer large reserves as part of their national security strategy
II. Socio-economic and political considerations ...

4. As an option to high cost of food imports
   – Food imports can be costly
     • Divert foreign exchange and create shortage of foreign exchange
     • Imported food staples more expensive than locally produced staples
       – imports involve expensive access costs
         » Maritime transport, port transfers, customs clearance and inspection, etc.
       – Add 30 to 100 % onto the price of imported food in LAC – more in Africa
         » Maize prices in Africa are relatively cheaper than rice or wheat
   – Landlocked countries face higher average costs
     • 15 countries are landlocked in Africa
       – landlocked countries pay 50 % more in transport costs than coastal countries
     • Inland transport costs can be prohibitive for landlocked countries
       – Numerous checkpoints
         » E.g. 32 checkpoints along the corridor Abidjan-Bamako road
   – Some countries have plans to expand their stock levels
     • Ethiopia – 1.5 million tons
     • Malawi also almost to double its reserve
       – Both landlocked countries
III. Factors influencing public stock decisions

1. Methodology
   • Binary choice of either participation or non-participation in public stock
     – Both logit and probit models can be fitted but both ignore the stock level decision
     – Levels of stock important for effective management
   • DH model estimated by the following log-likelihood function:
     
     \[
     LL = \sum_0 ln \left[ 1 - \Phi(x_{1i}^\gamma)\Phi\left(\frac{x_{2i}^\beta}{\sigma}\right) \right] \\
     + \sum_1 ln \left[ \Phi(x_{1i}^\gamma) + \frac{1}{\sigma} \varphi\left(\frac{R_i - x_{2i}^\beta}{\sigma}\right) \right]
     \]

     Where:
     • LL is log-likelihood function, \( R_i \) is national reserves for country \( i \), \( \Phi(.) \) and \( \varphi(.) \) are the standard normal distribution and density functions (cdf and pdf), respectively, \( x_{1i} \) and \( x_{2i} \) are vectors of explanatory variables that affects the two-stage decisions
     • Two hurdles: participation and level of expenditure
III. Factors influencing public stock decisions

2. Variables and descriptive results
   - Public stocks
     - 27 African countries covered, 18 countries (67 percent) had public stock.
     - Average ending stock varied widely across Africa from 117 kg per capita to less than 1 kg. The average is 35.5 kg per capita.
   - Production variability
     - The mean of production CV is 22% (2006 – 13), (Lesotho 47%)
   - Cereal import dependence
     - Huge variation, from 85% in Liberia and Lesotho to 6% in Mali and Malawi.
     - Average 33.9%
   - Share of food expenditure in hh income
     - Average 51.6%, varying from 72 percent (Rwanda) to 19.2 percent (South Africa)
   - Urban population growth rate: average 3.5%
   - Landlocked countries: 37 percent of the countries covered
   - Food subsidies: almost 63% of the countries
   - Export restrictions: Half of the countries (56%) have applied the measure (2007 – 12)
   - GDP per capita: average US$ 1578.4, varying from US$ 7314 in South Africa to US$ 267 in Malawi
### III. Factors influencing public stock decisions

**Variables and descriptive results**

- **Public stocks by access to ports**

<table>
<thead>
<tr>
<th>AFRICA</th>
<th>Public stock</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Landlocked</td>
<td>80% (8 countries)</td>
<td>20% (2)</td>
</tr>
<tr>
<td>Not land-locked</td>
<td>58.8% (10)</td>
<td>41.2% (7)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>All regions</th>
<th>Public stock</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>Landlocked</td>
<td>84.2% (16)</td>
<td>15.8% (3)</td>
</tr>
<tr>
<td>Not land-locked</td>
<td>62.7% (32)</td>
<td>37.3% (29)</td>
</tr>
</tbody>
</table>
III. Factors influencing public stock decisions

3. Results

• Tables 2 and 3 present results from the two-stage process (Double-Hurdle) model using data from:
  – A smaller group of 27 African countries
  – A larger group of 70 African, Asian and LAC countries, respectively

• The findings reveal that a few factors influence:
  – The probability of policy decision to have public stocks, and Levels of stock
## III. Factors influencing public stock decisions

### Results

Table (2): DH model of factor influencing stockholding: Africa countries

<table>
<thead>
<tr>
<th></th>
<th>DH1 Probit reg. of holding stocks</th>
<th>DH2 Level of stockholding</th>
<th>DH1 Probit reg. of holding stocks</th>
<th>DH2 Level of stockholding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foodsubsidy</td>
<td>1.669** (2.50)</td>
<td></td>
<td>1.783*** (2.59)</td>
<td></td>
</tr>
<tr>
<td>Cimpotdep</td>
<td>-0.026 (1.44)</td>
<td>0.014 (1.11)</td>
<td>-0.031* (1.74)</td>
<td>0.009 (0.97)</td>
</tr>
<tr>
<td>Prodcv</td>
<td>2.580 (0.60)</td>
<td>-1.088 (0.49)</td>
<td>1.785 (0.55)</td>
<td>3.010* (1.73)</td>
</tr>
<tr>
<td>Urpogrowth</td>
<td>0.011 (0.03)</td>
<td>-0.473*** (2.67)</td>
<td>0.071 (0.23)</td>
<td>-0.393** (2.48)</td>
</tr>
<tr>
<td>Landlocked</td>
<td>-0.108 (0.11)</td>
<td>0.963* (1.67)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exportrestr</td>
<td></td>
<td></td>
<td>-0.641 (0.83)</td>
<td>0.905** (2.21)</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.332 (0.19)</td>
<td>4.567*** (5.54)</td>
<td>0.098 (0.06)</td>
<td>3.393*** (3.64)</td>
</tr>
<tr>
<td>Sigma</td>
<td>0.590*** (5.83)</td>
<td></td>
<td>0.561*** (5.83)</td>
<td></td>
</tr>
<tr>
<td>Wald Chi2</td>
<td>7.64</td>
<td></td>
<td>8.02</td>
<td></td>
</tr>
</tbody>
</table>

* * p<0.1; ** p<0.05; *** p<0.01

Note: Robust standard errors in brackets
## III. Factors influencing public stock decisions

### Results

Table (3): DH model of factor influencing stockholding: All countries

<table>
<thead>
<tr>
<th></th>
<th>DH1 (Probit reg. of holding stocks)</th>
<th>DH2 (Level of stockholding)</th>
<th>DH1 (Probit reg. of holding stocks)</th>
<th>DH2 (Level of stockholding)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foodsubsidy</td>
<td>1.157*** (3.06)</td>
<td>1.087*** (2.95)</td>
<td>4.678** (2.09)</td>
<td>0.709 (0.60)</td>
</tr>
<tr>
<td>Lngdppc</td>
<td>4.932** (2.16)</td>
<td>1.387 (1.12)</td>
<td>-0.286** (2.03)</td>
<td>-0.030 (0.40)</td>
</tr>
<tr>
<td>Lngdppc2</td>
<td>-0.297** (2.07)</td>
<td>-0.070 (0.90)</td>
<td>-0.008 (1.17)</td>
<td>-0.005 (1.28)</td>
</tr>
<tr>
<td>Cimpotdep</td>
<td>-0.006 (0.86)</td>
<td>-0.003 (0.74)</td>
<td>-0.008 (1.17)</td>
<td>-0.005 (1.28)</td>
</tr>
<tr>
<td>Landlocked</td>
<td>0.519 (1.10)</td>
<td>0.387 (1.54)</td>
<td>-18.271** (2.09)</td>
<td>0.254 (0.05)</td>
</tr>
<tr>
<td>Constant</td>
<td>-19.792** (2.20)</td>
<td>-2.746 (0.55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sigma</td>
<td>0.671*** (10.20)</td>
<td>0.686*** (10.20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wald Chi2</td>
<td>12.86</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* * p<0.1; ** p<0.05; *** p<0.01

Note: Robust standard errors in brackets
IV. Conclusions

• Renewed interest in stocks because of:
  – Recent increases in price levels and volatility
  – A growing trend to install ‘safety nets’
  – Increasing emergencies due to extreme weather events;
  – Reducing dependence on high cost of imported staples;
  – Ensuring the right to adequate food and making social protection and food security ‘rights-based’ rather than ‘discretionary’

• Attempts to model the factors influencing public stocks have provided additional insights.
  – Cereal import dependence negatively associated with probability of policy decision to have public stocks
  – Production variability not related to probability of having strategic reserve but is significantly correlated with levels of public stock.
IV. Conclusions ...

– The presence of a food subsidy program by far the most significant factor associated with public stocks
  • Food subsidies politically more acceptable than many other social protection programmes
  • Food subsidies are important tools to gain political support.

– A quadratic relationship between GDP per capita and probability of holding stocks
  • At lower per capita level, interest in public stock increases with GDP per capita but the relationship reverses at relatively higher levels.

• In short, a combination of socio-economic and political considerations drive government decisions regarding public stocks
  – Stocks also attracting global attention: the 9th WTO Ministerial conference in Bali.
Thank you