Rice Stock Measurement

The Indonesian Experience
Conducting Rice Stocks Surveys

International Seminar on Approaches and Methodologies for Private Food Grain Stock Measurement
New Delhi, 9-11 November 2016
Introduction
Introduction

• How does the National stock usually calculated?
  – National Stock \( S \) generally regarded as residual between production \( P* \), consumption \( C \), and net export \( S = P* - C - \text{net export} \).

  Note:
  • \( P* \) is production left for food use after usage for feed, seedd, industrial, and losses are extracted,
  • \( P* = (1-f)P; \) \( P* \) is a fraction of \( P \).

Aside from those identity function, stock assumed to be negatively correlated with price.
In 2014:

• Indonesia has surplus of rice. Production >> Consumption, but the price continue to rise along the year.

• Do we really have surplus? Where are the stock lies? Who hold the stock?

• If we are firm with the consumption data, then the **real stock data are needed** to make adjustment of production data.
Question to be answered

• How much the stock of rice?
• Will the stock sufficient for national consumption?
• Who holds the rice stock?
• How does the pattern of change in stock over time?
• If the stock <> Production - Consumption – net eksport; Actually, how much national rice production is?
Survey Information
• Because rice is a fast moving commodity, then the surveys must be conducted on various groups of rice holders at the same time references.
• Surveys conducted 3 times in 2015, to obtain information of stock on 31 March, 30 June and 30 September.
• Enumeration was conducted at the beginning of April, July, and October.
• The goal is to obtain information about stock in the harvesting season, the dry season, and the planting season.
Rice Harvesting and Planting Patterns, 2012-2014

Harvesting season

Dry season

Planting season

<table>
<thead>
<tr>
<th>Month</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td>Jan</td>
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</tbody>
</table>
There are six respondent groups, each of them enumerated using different questionnaires.

1. Non-agricultural (rice farmer) household
2. Agricultural (rice farmer) household
3. Trader
4. Miller
5. Industry, hotel, restaurant, catering, etc.
6. BULOG (Indonesian Bureau of Logistics)
<table>
<thead>
<tr>
<th>Respondent Group</th>
<th>Sampling Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-agricultural household</td>
<td>2010 Population Census</td>
</tr>
<tr>
<td>Agricultural household</td>
<td>2013 Agricultural Census</td>
</tr>
<tr>
<td>Trader</td>
<td>1996 Economic Census, Business Directory</td>
</tr>
<tr>
<td>Miller</td>
<td>Miller Directory</td>
</tr>
<tr>
<td>Industry, hotel, restaurant, catering, etc.</td>
<td>1996 Economic Census, Business Directory</td>
</tr>
<tr>
<td>BULOG</td>
<td>-</td>
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</tbody>
</table>
### Stratification

<table>
<thead>
<tr>
<th>Respondent Group</th>
<th>Stratification</th>
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</thead>
<tbody>
<tr>
<td>Non-agricultural household</td>
<td>Number of household members</td>
</tr>
<tr>
<td>Agricultural household</td>
<td>Amount of cultivating area</td>
</tr>
<tr>
<td>Trader</td>
<td>Sales volume</td>
</tr>
<tr>
<td>Miller</td>
<td>Milling capacity</td>
</tr>
<tr>
<td>Industry, hotel, restaurant, catering, etc.</td>
<td>amount of labors</td>
</tr>
<tr>
<td>BULOG</td>
<td>-</td>
</tr>
<tr>
<td>Respondent Group</td>
<td>Sampling Method</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Non-agricultural household</td>
<td>Multistage sampling</td>
</tr>
<tr>
<td>Agricultural household</td>
<td>Multistage sampling</td>
</tr>
<tr>
<td>Trader</td>
<td>Complete count, and Multistage sampling</td>
</tr>
<tr>
<td>Miller</td>
<td>Complete count, and Multistage sampling</td>
</tr>
<tr>
<td>Industry, hotel, restaurant, catering, etc.</td>
<td>Complete count, and Multistage sampling</td>
</tr>
<tr>
<td>BULOG</td>
<td>-</td>
</tr>
</tbody>
</table>
Variable (1)

Non-agricultural Households

• **Main Variables:**
  – Rice stock
  – Rice purchases
  – Rice consumption

• **Explanatory Variables:**
  – Number of family member
  – Occupation
  – Income

• **Stock asked in form of rice and flour**
Agricultural Households

• **Main variables:**
  – Rice stock
  – Rice production
  – Rice trades and consumption

• **Explanatory variables:**
  – Cultivating Areas
  – Storage

• Stock asked in form of paddy, rice, and flour
Rice trader

• **Main variables:**
  – Rice stock
  – Rice purchases (volume and value)
  – Rice sales (volume and value)

• **Explanatory variables:**
  – traders category
  – Storage capacity

• **Stock asked in form of paddy, rice and flour**
Rice miller

- **Main variables:**
  - Rice stock
  - Paddy milled (volume)
  - Rice production (volume)

- **Explanatory variables:**
  - Milling capacity

- **Stock asked in form of paddy and rice**
Variable (5)

Industry, Hotel, Restaurant, catering, etc.

• **Main variables:**
  – Rice stock
  – Rice purchases (volume and value)
  – Rice consumption (volume and value)

• **Explanatory variables:**
  – Main activities

• **Stock asked in form of rice and flour**
**Result (1)**

How much the stock of rice?

<table>
<thead>
<tr>
<th>Period</th>
<th>Rice stock (million ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 March 2015</td>
<td>7.97</td>
</tr>
<tr>
<td>30 June 2015</td>
<td>10.02</td>
</tr>
<tr>
<td>30 October 2015</td>
<td>8.85</td>
</tr>
</tbody>
</table>

![Bar chart showing rice stock by month](chart.png)
Result (2)

Will the stock sufficient for national consumption?

![Graph showing surplus and deficit](image)

- **Surplus (Feb-Sept)**
- **Deficit (Oct-Jan)**
Result (3)

• On March 31st, 2015, agricultural households, traders, and BULOG are the biggest holder of rice stocks.
Result (4)

- On June 30, 2015, agricultural households, traders, and BULOG are the biggest holder of rice stocks.
- Traders and BULOG share are bigger than before.
- Millers also have some significant amount of stock in this period.
Result (5)

- On September 30, 2015, agricultural households, BULOG, and traders are the biggest holder of rice stocks.
- BULOG share are bigger than traders.
- Millers share are smaller than before.
Result (6)

How does the pattern of change in stock over time?

- Agricultural household stock change over time following the production pattern
Result (7)

How does the pattern of change in stock over time?

- Non-agricultural household stock relatively not changing overtime
How does the pattern of change in stock over time?

- Rice stocks held by traders, millers, industries, etc are following the production pattern with lag 1 period.
Another Finding

• Number of household members has a positive correlation with the number of stocks hold by households.
• Incomes has a positive correlation with the number of stocks hold by households.
• the frequency of rice purchasing has a negative correlation with the number of stocks hold by households.
• Cultivated area has a positive correlation with the number of stocks hold by agricultural households.
• Miller capacity has a positive correlation with the number of stocks hold by miller.
• Storage capacity has a positive correlation with the number of stocks hold by trader.
During March-June period, production>>>consumption, the stock >
During July-September period, production>consumption, the stock <
There’s a hint that the production figure were probably overestimate or stock data might be underestimate.
Currently, BPS - Statistics Indonesia, were trying to work this problem out.
We want to improve the calculation methods on rice production to obtain more accurate data.
Conclusion
Conclusion

• Rice stocks during the period March-September 2015 was at around 7-10 million tons. The stock is largely hold by the agricultural household.

• Many agricultural households in Indonesia are subsistent. As a consequence, the stock that they hold will be prioritized to meet their consumption needs, and not to be traded.

• Rice stocks in the market mostly come from stocks held by traders, milling, and BULOG. The amount of this stocks about 30 percent of the entire stock.

• Rice distribution chain needs to be improved, so that rice stocks could be used to meet the needs of society and to stabilize prices.

• There is a possibility that the figure of rice production has overestimate. This needs to be studied further, and the government must be wise when dealing with this issue.
Further Recommendation
Further Recommendation

• Survey of stock hold by household could be integrated with the national economic survey, because the stock is relatively same overtime.

• If the number of agricultural household is relatively large, it should be considered to conduct seasonal survey for this entity.

• Stock in trader, miller, industry, etc are mainly contributed by “the big player”. It’s recommended to develop a monthly reporting system initiated by Trade Association, and Ministry of Trade.

• It’s also important to be noted that stock reported by trader, miller, industry, etc were probably underreported. But even if the data reported is correct, result from this survey are suffering a large relative standard error.

• We need to built a better methodology to collecting data and estimate the true value from stock hold by trader, miller, industry, etc.
Thank You For Your Attention

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