The Role of Agriculture in the Development Process

OMR Conference, 4 September 2013
Maputo, Mozambique
Overview

- Perspectives from the development literature
- International experiences: the last 25-30 years
- Current global context: three crises
- Mozambique – experiences over the past decade
- Concluding remarks
Traditional views (from theory and empirics)

- Ricardo and colleagues
- The Lewis two-sector model
- The linkage literature
- Falling relative share of agriculture
- All this tended to suggest a passive and at best a supportive role
The basis for a positive role

• Classical paradigm of positive role of ag in development (1960s)
• Agricultural growth in support of industrialization through the agricultural transformation
• How the structural transformation works:
  – Agricultural growth induces urban-industrial growth through capital, labor, foreign exchange, and market contributions
• Industry (starting with agribusiness) grows faster than agriculture
• As a consequence, the shares of agriculture in aggregate employment and GDP decline due to success in triggering GDP growth, not due to failure to grow.
A powerful cross-country regularity (1990-2005 average) (de Janvry and Sadoulet 2008)

The share of agriculture in GDP can be 30-50% in poor countries; the share in employment 60-90%
Successful transformation in Asia
... except in a few countries that retained labor in agriculture.
But Africa experienced many challenges

• Many implementation failures (1970s)
• Import Substitution Industrialization failed
• Many failures in agriculture-based projects
• Too complex, insufficient support
• Integrated rural development to meet broadened development objectives (McNamara 1973) ineffective:
  – Underestimate emerging private sector roles
  – Overestimate state capacity to coordinate
  – Undermine cooperative producer organizations
And we also saw

- 20 years of neglect under structural adjustment and Washington Consensus (1985-2005)
- Adjust the macro-fundamentals but no sectoral policy
- Industrialize through open economy not agriculture
- Plus for example:
  - Descale the role of the state in agriculture, despite pervasive market failures
  - Reduce rural poverty through transfers instead of autonomous incomes
  - Investment in agriculture discouraged by low international commodity prices (OECD) & adverse environmental effects
  - Sharp decline in public expenditures on agriculture
  - Sharp decline in overseas development assistance to agriculture
- So what was the outcome?
So failed transformation in Africa in general: Labour displaced from agriculture without associated growth in GDP per capita
Plus another type of failed transformation: Growth without transformation

... except in a few countries that experienced growth.
In effect there are (at least) three types of economies (with associated roles of agriculture in development)

Y-axis: ag contribution to growth: 1990-2005

Role of agriculture fundamental but it differs …

- **Agriculture based economies:** *growth*
  - Agriculture essential for growth: large
  - Importance for food security and poverty

- **Transforming countries:** *equality*
  - Rapidly growing non-ag
  - Agriculture key to reduce imbalance + marginalization

- **Urbanized economies:** *inclusion*
  - Sub-sectors with comparative advantage
  - Include small holders as suppliers
Losses due to global trade policies

- Real international commodity prices have been suppressed by current global trade policies (% of price)
  - Cotton: -21%
  - Oilseed: -15%
  - Dairy products: -12%
  - Other grains: -7%
  - Wheat: -5%
  - Processed meat: -4%
  - Rice: -4%

- Trade share losses to developing countries due to current global trade policies (% point loss to developing country trade shares)
  - Cotton: -27%
  - Oilseed: -34%
  - Dairy products: -7%
  - Course grains: -5%
  - Wheat: -21%
  - Processed meat: -18%
  - Rice: -2%
Agriculture exports highly taxed
Low public spending

Transforming countries in 1980 had a much higher share of public spending on agriculture as a share of Ag GDP (10%) than the agriculture-based countries do today (4%) even though they had similar shares of agriculture in GDP.
Subsidies and public investment in Indian agriculture
Disaggregated project aid, 2002-2009

Project Aid to Africa, 2002-2009

- **SOCIAL INFRASTRUCTURE & SERVICES**
- **ECONOMIC INFRASTRUCTURE AND SERVICES**
- **PRODUCTION SECTORS**
- **MULTISECTOR / CROSS-CUTTING**

**Billions (Constant 2008 USD)**

Foreign aid and poverty
Ag growth and the link to poverty

GDP growth originating in agriculture benefits the poorest half of the population substantially more.

![Graph showing expenditure gains induced by 1% GDP growth, %]

- **Agriculture**
- **Nonagriculture**

**Source:** Ligon and Sadoulet 2007.
**Note:** Based on data from 42 countries during the period 1981–2003. Gains are significantly different for the lower half of expenditure deciles.
Examples of impressive successes

Headcount index and average farm yields
Rural India 1959-1994

Headcount index and average farm yields
Rural China 1980-2001
Agricultural productivity: two types of farming

(1) Highly efficient agriculture of developed countries and high output per worker

(2) Inefficient and low-productivity agriculture of developing countries

• Between the extremes: developing regions e.g. regions in India, Brazil, export-oriented sectors in Latin-America and Asia: reach higher agricultural productivity levels and growth!

• Agricultural productivity and productivity growth low especially in Sub-Saharan Africa
## Productivity examples

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<th></th>
<th>labour productivity</th>
<th>Cereal production Yields (in kilo per hectare)</th>
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<td></td>
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<td>Denmark</td>
<td>22,260</td>
<td>6,088</td>
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</table>

The risk averse peasant and technology choice

Is resistance to technological innovation due to lack of rationality or incompetence?

Not necessarily: uncertainties (e.g. weather, price), imperfect information, transactions costs, lack of access to credit and insurance

The peasant tries to maximise not income but the chance of the family’s survival => rational

- Technology A: Low yield, little variation
- Technology B: High yield, big variation

Is resistance to technological innovation due to lack of rationality or incompetence?
What else causes low output growth in low-productivity subsistence farming

1) Large amounts of land sometimes available, only small parts can be cultivated: traditional tools (e.g. hoe, ax, knife, ...). Use of animals sometimes impossible because of tsetse fly, lack of fodder in dry season => agriculture depends on applying human labour only to small plots of land.

2) Due to limited amount of land cultivated and tools used, small areas tend to be cultivated intensely => rapidly diminishing returns to labour. Best farming method is shifting cultivation (i.e. once minerals drawn from soil, new land cleared and cultivated while old land can recover and be used again later). If fallow time long enough, manure and chemical fertiliser would be unnecessary.

3) Seasonality: scarcity of labour in busy parts of the season (planting, weeding) while underemployed at other times.

Net result: constant level of agricultural output and labour productivity...as long as population size stable ...
The global context: three crises

• Finance
• Food
• Climate change
CRISIS 1: FINANCE
Present economic downturn deepest in 60 years, and no region untouched + a lot speculation as to recovery
World trade has experienced its sharpest decline in decades + uncertain future
Net private capital flows to the South have fallen dramatically.
CRISIS 2: FOOD
Cereal Prices in Indices of Market Prices (1957-2008)

Source: IMF Primary Commodity Price Data Base
Note: Rice: Thailand (Bangkok); Wheat: US Gulf; Maize: US; Soybeans: US

Food prices soared in 2007-2008 and then fell back: prospects?
Underlying factors

• Food price developments reflect:
  – Low priority to agriculture/food production
  – Shifting demand patterns
  – Biofuels (+ lack of research in alternative energy sources)

• Underlying structural drivers behind 2007-2008 spike remain in place – if growth resumes food prices likely to increase again

• Global food architecture not geared to deal with supply shortages – governments may intensify protection to try to satisfy domestic consumers
Responses

• National responses to food crisis have varied
• Africa: Macro-policies main tool to limit impact of world price shocks
• Elsewhere: Greater focus on social protection
• But too much social protection ad hoc, stop-go, high cost – needs to be systematic
• A double bind:
  – If recovery stalls: new trade and financial shocks
  – If recovery is sustained: food and energy prices will climb and hit energy and food importers
• Need for public action – but fiscal space limited in the smaller and poorer economies
CRISIS 3: CLIMATE
Climate change (1)

• Present global growth model clearly unsustainable – the challenges are unprecedented
• To respond, the world must transform existing energy systems (mitigation) and simultaneously adapt to the climate change that is already built into global climate (adaptation)
• Failure in shifting from fossil-fuel dependence evident in run-up in oil price prior to the financial crisis (due to lack of investment in energy research)
Huge run-up, then a fall as recession set in – but ...?
Climate change (2)

• If growth resumes energy prices will move back up
• Places huge burdens on poor countries – a range of fiscal effects, which make states more aid-dependent, not less
• Costs far exceed current level of aid:
  – Per annum mitigation in developing countries by 2030: USD 140-175 billion
  – Per annum adaptation costs by 2050: USD 30-109 billion
  – Aid is presently around USD 100 billion in total
• Climate change finance is as fragmented as traditional aid, will funding be additional, and who takes control of supply (how much voice for the South?)
• Climate change financing seen as compensation – but aid processes remain conditional
BACK TO MOZAMBIQUE
The Role of Agriculture in Mozambique

Sectoral Contributions to GDP

- The contribution of agriculture to GDP decreased significantly from 1997 to 2001, before immediately increasing again. Since recovery from the 2000 floods, the contribution of all sectors has stayed quite stable.
Public expenditure in agriculture

- State support to agriculture has not achieved the 10% Maputo Declaration target – the average empirical value attained by ‘transforming’ economies over the last 30 years.
- Actual expenditure of budget increases have tended to remain unfulfilled.
- The large budgets in 2003 and 2004 can be attributed to the rehabilitation of the Massingir Dam, and the Chokwe Irrigation Scheme in 2006 and 2007 – accounting for a large part of the budget.

Source: MozSAKSS (2011)
Levels of staple crop production

- Maize continues to be most produced staple crop
- Production levels have shown no signs of increase over the last 10 years
- Rainfall and weather patterns continue to heavily influence staple crop production (2005 and 2006)

Source: TIA/IAI
- Maize productivity levels still fluctuating and much below potential
- Rice productivity stagnation
- Sorghum and millet productivity levels fluctuate with no trend of improvement
- *Southern African/Zim maize yield comparison??*
Input use

- Extremely low utilisation of agricultural inputs
- No evidence of improvement
- Not uniformly distributed throughout the country...

Source: TIA/IAI
### Who uses inputs (%)?

<table>
<thead>
<tr>
<th></th>
<th>IMPROVED SEEDS</th>
<th></th>
<th>FERTILISER</th>
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<th>PESTICIDE</th>
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</table>

- Large use of improved seeds, fertilisers, pesticides and animal traction in Tete
- Evidence of increased national adoption of improved seeds varieties, particularly in Tete, Manica, Sofala and Cabo Delgado
- Fertiliser, pesticide and animal traction has generally not changed much
- Extremely low use of animal traction above the Zambezi River

**BOLD** values show above 10% usage

[Increase > 5 %]
[Increase 3 - 5%]
[Decrease 3 - 5 %]
[Decrease > 5 %]
Land use

- Average farm size falling in the South – labour shortages, rural to urban migration
- Increasing average farm size in Zambézia and Nampula
- Low levels of land registration nationally. Improved vastly in Maputo Province (25% in 2012) time, greater competition over land?
## Services (%)

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<th>Extension Advice</th>
<th>Received Price Info</th>
<th>Association Member</th>
<th>Received Credit</th>
<th>Emergency Seeds</th>
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</table>

- Large fall in farmers receiving extension advice throughout the country
- Farmers receiving price information decreased in the north, but rose in the centre and south
- Association membership increased slightly nationally, yet fell drastically in Maputo province
- Emergency seed reception fell in the centre and south, and was already initially very low in all other areas of the country

Source: TIA/IAI

### Notes:
- **Increase > 5 %**
- **Increase 3 - 5 %**
- **Decrease 3 - 5 %**
- **Decrease > 5 %**
- **BOLD** values show usage above national average
Cash crop producers

- Overall fall in farmers cultivating tobacco, whilst soybean is emerging as a viable cash crop
- No major identifiable trends
- National level statistics disguise important provincial level trends...
### Cash crop producers (%)

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<td><strong>0.9</strong></td>
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</tbody>
</table>

- Increase in cotton farmers in Niassa and Cabo Delgado, large fall in Nampula
- Tobacco slightly falling throughout the country

Source: TIA/IAI
Cash crop production

- **Soybean** growth enormous between 2002 and 2012 ( >700%); 59% of the total production was in Tete in 2012, 24% in Zambézia
- **Sesame** production has more than doubled; 25% of production in Sofala in 2012, 23% in Nampula
- Large fall in **tobacco** production from 2006 peak; 49% of production in Tete in 2012, 38% in Niassa
- **Cotton** has remained relatively stable; 27% of production in both Tete and Nampula in 2012

Source: TIA/IAI
Characteristics of productive maize farmers (2002-12)

<table>
<thead>
<tr>
<th>Maize Productivity Quintiles</th>
<th>Maize Yield (Kg/Ha)</th>
<th>Maize Area (Ha)</th>
<th>Total Cultivated Area (Ha)</th>
<th>Fertiliser Use (%)</th>
<th>Pesticide Use (%)</th>
<th>Hire Worker? (%)</th>
<th>Cultivate Cash Crop? (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – Lowest Yield</td>
<td>73</td>
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<td>51.4</td>
</tr>
<tr>
<td>5 – Highest Yield</td>
<td>2981</td>
<td>0.4</td>
<td>1.4</td>
<td>7.5</td>
<td>7.9</td>
<td>30.3</td>
<td>57.9</td>
</tr>
</tbody>
</table>

Source: TIA/IAI

- The top 20% productive maize farmers are much more productive than other maize farmers
- Inverse relationship between maize productivity and the area cultivated (maize area and total area)
- Farmers who use fertiliser and pesticides are more productive
- Hired workers and cash crops are associated with higher maize productivity
Looking closer at the most productive 20%

- The most productive farmers have generally become less concentrated in Niassa and Nampula, with Tete and Manica possessing a higher proportion. The share in Maputo province has increased dramatically.
- The most productive farmers in Tete and Manica use more improved seeds and sell increasing amounts of maize.
- The total area farmed by the most productive farmers decreased significantly nationwide, except in Nampula, Zambézia and Sofala.
- The percentage of the most productive farmers selling maize has fallen in most parts of the country – significantly in Manica, yet increased in Nampula and Inhambane. This implies that those who do sell maize are selling much more of it.

### PROVINCIAL DISTRIBUTION OF TOP 20% MAIZE FARMERS (%)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Niassa</td>
<td>32</td>
<td>24</td>
<td>11</td>
<td>7</td>
<td>1.70</td>
<td>1.61</td>
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<td>34</td>
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<tr>
<td>Cabo Delgado</td>
<td>19</td>
<td>17</td>
<td>3</td>
<td>8</td>
<td>1.51</td>
<td>1.26</td>
<td>32</td>
<td>30</td>
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<tr>
<td>Nampula</td>
<td>25</td>
<td>17</td>
<td>10</td>
<td>10</td>
<td>1.17</td>
<td>1.33</td>
<td>34</td>
<td>40</td>
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<tr>
<td>Zambézia</td>
<td>20</td>
<td>22</td>
<td>11</td>
<td>11</td>
<td>1.39</td>
<td>1.43</td>
<td>52</td>
<td>49</td>
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<tr>
<td>Tete</td>
<td>22</td>
<td>27</td>
<td>22</td>
<td>26</td>
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<td>1.64</td>
<td>27</td>
<td>21</td>
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<tr>
<td>Manica</td>
<td>25</td>
<td>26</td>
<td>19</td>
<td>26</td>
<td>1.68</td>
<td>1.46</td>
<td>59</td>
<td>36</td>
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<tr>
<td>Sofala</td>
<td>20</td>
<td>19</td>
<td>11</td>
<td>11</td>
<td>1.54</td>
<td>1.67</td>
<td>39</td>
<td>33</td>
</tr>
<tr>
<td>Inhambane</td>
<td>5</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>1.02</td>
<td>0.92</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>Gaza</td>
<td>9</td>
<td>13</td>
<td>12</td>
<td>16</td>
<td>1.17</td>
<td>0.93</td>
<td>13</td>
<td>5</td>
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<tr>
<td>Maputo</td>
<td>14</td>
<td>25</td>
<td>25</td>
<td>14</td>
<td>0.80</td>
<td>0.42</td>
<td>16</td>
<td>11</td>
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<tr>
<td><strong>Total</strong></td>
<td>20</td>
<td>20</td>
<td>13</td>
<td>15</td>
<td>1.48</td>
<td>1.39</td>
<td>38</td>
<td>33</td>
</tr>
</tbody>
</table>

### IMPROVED SEEDS (%)

- Increase > 5 %
- Increase 3 - 5%
- Decrease 3 - 5 %
- Decrease > 5 %

**BOLD** values show above average

Source: TIA/IAI
Comparing the top 20% with the rest

### Differences between the Top 20% Productive Maize Farmers and the Bottom 80%, Over Time

<table>
<thead>
<tr>
<th></th>
<th>Average Maize Production (Kgs) 2002-06</th>
<th>Average Maize Production (Kgs) 2007-12</th>
<th>Average Maize Sold (Kgs) 2002-06</th>
<th>Average Maize Sold (Kgs) 2007-12</th>
<th>Farmer Sold Maize (%) 2002-06</th>
<th>Farmer Sold Maize (%) 2007-12</th>
<th>Sells Cash Crop (%) 2002-06</th>
<th>Sells Cash Crop (%) 2007-12</th>
<th>Use Fertiliser (%) 2002-06</th>
<th>Use Fertiliser (%) 2007-12</th>
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<tbody>
<tr>
<td>Niassa</td>
<td>+1233</td>
<td>+828</td>
<td>+73</td>
<td>+238</td>
<td>+11</td>
<td>+14</td>
<td>+6</td>
<td>+7</td>
<td>+4</td>
<td>+3</td>
</tr>
<tr>
<td>Cabo Delgado</td>
<td>+489</td>
<td>+479</td>
<td>+104</td>
<td>+124</td>
<td>+12</td>
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<td>+1</td>
<td>+11</td>
<td>0</td>
<td>+1</td>
</tr>
<tr>
<td>Nampula</td>
<td>+327</td>
<td>+421</td>
<td>+85</td>
<td>+316</td>
<td>+12</td>
<td>+20</td>
<td>+6</td>
<td>+5</td>
<td>+1</td>
<td>+4</td>
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<tr>
<td>Zambézia</td>
<td>+511</td>
<td>+515</td>
<td>+136</td>
<td>+278</td>
<td>+17</td>
<td>+15</td>
<td>+9</td>
<td>+4</td>
<td>+2</td>
<td>+1</td>
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<tr>
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<td>+385</td>
<td>+730</td>
<td>+12</td>
<td>+13</td>
<td>+14</td>
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<tr>
<td>Manica</td>
<td>+1154</td>
<td>+1195</td>
<td>+299</td>
<td>+851</td>
<td>+32</td>
<td>+19</td>
<td>+7</td>
<td>+5</td>
<td>+1</td>
<td>-1</td>
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<tr>
<td>Sofala</td>
<td>+704</td>
<td>+813</td>
<td>+221</td>
<td>+327</td>
<td>+21</td>
<td>+18</td>
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<tr>
<td>Inhambane</td>
<td>+255</td>
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<td>+43</td>
<td>+227</td>
<td>+6</td>
<td>+12</td>
<td>+2</td>
<td>+1</td>
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<tr>
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<td>+73</td>
<td>+16</td>
<td>+9</td>
<td>+2</td>
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<td>+1</td>
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<td>+6</td>
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<tr>
<td>Maputo</td>
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<td>+8</td>
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<tr>
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<td>+16</td>
<td>+9</td>
<td>+7</td>
<td>+3</td>
<td>+4</td>
</tr>
</tbody>
</table>

- In general, the most productive maize farmers produce and sell significantly more maize, using less land.
- This is particularly apparent in Tete (where higher levels of fertiliser use is found) and in Manica.
- The difference in the quantity of maize produced did not change much over time, yet the quantity of maize sold more than doubled, especially in Tete and Manica.
- More farmers with higher maize yields sell their produce and cash crops than others.

Source: TIA/IAI
CONCLUDING REMARKS