Agriculture and Africa’s Structural Transformation

Presented to the Wilson Center and USAID Alumni Association panel discussion on

*Africa: Agriculture, Structural Change and the Urban Imperative*

by

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Michigan State University
May 22, 2013
Outline

1. Structural transformation
2. Agriculture’s role
3. Spatial implications
4. Household transitions
1. Structural transformation

<table>
<thead>
<tr>
<th>Country</th>
<th>Income ($/person)</th>
<th>Agriculture (% of GDP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>46,000</td>
<td>1</td>
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<tr>
<td>Korea</td>
<td>25,000</td>
<td>3</td>
</tr>
<tr>
<td>Brazil</td>
<td>9,400</td>
<td>5</td>
</tr>
<tr>
<td>China</td>
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<td>12</td>
</tr>
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</tr>
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</tr>
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1. Structural transformation

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Structural transformation
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Engel’s Law

[Graph showing the relationship between GNP per capita and agricultural share of GDP]

[Graph showing the relationship between expenditure per capita and food share of consumption]
Structural transformation

Engel’s Law

1. Graph showing the agricultural share of GDP decreases as GNP per capita increases.
2. Graph showing the food share of consumption decreases as expenditure per capita increases.
Structural transformation

Engel’s Law

Graph 1: Agricultural share of GDP decreases as GNP per capita increases.

Graph 2: Food share of consumption decreases as expenditure per capita increases.

1

2

3
1. Structural transformation

- *Productivity gains* drive structural transformation.

- Two-thirds of Africans work in agriculture.

- *Agricultural productivity gains* offer the most powerful lever for:
  - raising productivity of African workers
  - driving structural transformation
  - and economic growth.
Outline

1. Structural transformation
2. **Agricultural productivity drivers**
3. Spatial transitions
4. How do households navigate these transitions?
5. Policy implications
Farm productivity
Farm productivity drivers

• R&D
• Extension
• Improved agronomic practices
• Worker health and nutrition
• Input markets
Farm productivity without markets?
Requirements for agricultural growth

On-farm productivity + Market access
Zambia Maize Value Chain, 2006

Channel 1: Subsistence Production
- Subsistence Producers: Q = 500

Channel 2: Small Commercial
- Hammer Mills: Q = 600
- Small traders

Channel 3: Large
- Millers: Q = 500
- Large Traders
- Commercial farms: Qty = 250 TMT

Channel 4: Animal Feed
- Feed companies: Q = 50-100

Channel 5: Brewing
- Brewers: Q = 30-60
- Beer: Q = 30-60

Channel 6: Retailing
- Consumers: Mugaiwa: Q = 600
- Mealie Meal: Q = 500
- Livestock: Q = 50-100
- Retailers

Channel 7: Wholesaling
- FRA: Q = 110

Channel 8: Maize retailing
- Small traders
- Hammer Mills: Q = 600

Channel 9: Processing
- Small traders

Channel 10: Farming
- Subsistence Production
- Small Farms: Qty = 150
- Commercial farms: Qty = 50-100
- Brewers: Q = 30-60
- Beer: Q = 30-60
Zambia Maize Value Chain, 2006

Consumption

Subsistence Producers
Q = 500

Retailing

Hammer Mills
Q = 600

Processing

Mealie Meal Consumers
Q = 500

Farming

Live-stock
Q = 50-100

Maize retailing

Retailers

Wholesaling

Beer
Q = 30-60

FRA
Q = 110

Large Traders

Small traders

Small Farms
Qty = 150

Commercial farms
Qty = 250 TMT

Channel 1
Subsistence Production

Channel 2
Small Commercial

Channel 3
Large

Channel 4
Animal Feed

Channel 5
Brewing

Subsistence
Producers
Q = 500

Mugaiwa Consumers
Q = 600

Mealie Meal Consumers
Q = 500

Live-stock
Q = 50-100

Hammer Mills
Q = 600

Millers
Q = 500

Feed companies
Q = 50-100

Brewers
Q = 30-60
Nigeria Cassava Value Chain, 2000

Final markets
- Gari Volume = 25% of total harvest

Distribution
- Fresh cassava Volume = 17%
- Gari Volume = 42%
- Feed 10%
- Other* 6%

Processing
- Fresh Cassava Retailers
- Gari Retailers
- Feed Retailers
- Industrial Processors
- 5,000

Farming
- Fresh Cassava
- Gari
- Feed
- Other*

Channel 1
- Subsistence Farms
- Commercial Fresh Production
- Small-scale gari plants

Channel 2
- Mobile Graters
- Commercial Fresh Production
- 800

Channel 3
- Small-scale gari

Channel 4
- Medium-scale gari processors

Channel 5
- Feed Mftrs
- Feed Markets

Channel 6
- Industrial markets

Subsistence Farms
- Channel 1
- Subsistence Farming
- Channel 2
- Fresh Marketing
Nigeria Cassava Value Chain, 2000

- **Final markets**
  - Gari Volume = 25% of total harvest

- **Distribution**
  - Fresh Cassava Retailers

- **Processing**
  - Mobile Graters
  - Small-scale gari plants
  - Medium-scale gari processors (800)
  - Feed Retailers
  - Feed Mftrs
  - Industrial Processors (5,000)

- **Farming**
  - Channel 1: Subsistence Farming
  - Channel 2: Fresh Marketing
  - Channel 3: Small-scale Gari
  - Channel 4: Medium-scale Gari
  - Channel 5: Feed Markets
  - Channel 6: Industrial markets

- **Gari**
  - Volume = 42%

- **Feed**
  - 10%

- **Other***
  - 6%
Nigeria Cassava Value Chain, 2000

Final markets
- Gari Volume = 25% of total harvest

Distribution

Processing
- Fresh cassava Volume = 17%
- Gari Volume = 42%
- Feed 10%
- Other* 6%

Farming
- Subsistence Farms
- Fresh Cassava Retailers
- Mobile Graters
- Commercial Fresh Production
- Small-scale gari plants
- Medium-scale gari processors
- Feed Retailers
- Feed Mfrs
- Industrial Proc
- Industrial Mkt

Channels:
1. Subsistence Farming
2. Fresh Marketing
3. Small-scale Gari
4. Medium-scale Gari
5. Feed Markets
6. Industrial Markets

Notes:
- Volume figures
- Other categories
Nigeria Cassava Value Chain, 2000

Final markets
- Gari Volume = 17%
- Gari Volume = 42%
- Feed 10%
- Other 6%

Distribution
- Fresh Cassava Retailers
- Gari Retailers
- Feed Retailers
- Industrial Processors

Processing
- Mobile Graters
- Small-scale gari processors
- Medium-scale gari processors

Farming
- Subsistence Farms
- Commercial Fresh Production
- Commercial Cassava Production

Channels
1. Subsistence Farming
2. Fresh Marketing
3. Small-scale Gari
4. Medium-scale Gari
5. Feed Markets
6. Industrial markets

Volume:
- Fresh Cassava = 17% of total harvest
- Gari = 42%
- Feed = 10%
- Other = 6%
- Total: 100%

Numbers:
- 800 small-scale gari processors
- 5,000 industrial processors
- 10 mobile graters

Notes:
- Gari Volume = 25% of total harvest
- Subsistence Farms
- Fresh Cassava Retailers
- Gari Retailers
- Feed Retailers
- Industrial Processors
- Mobile Graters
- Small-scale gari processors
- Medium-scale gari processors
- Commercial Fresh Production
- Commercial Cassava Production
- Subsistence Farming
- Fresh Marketing
- Small-scale Gari
- Medium-scale Gari
- Feed Markets
- Industrial markets
Marketing efficiency

Source: Jayne et al. (2010)
Poor roads, low volumes, high marketing cost
Marketing productivity drivers

- Rural towns
- Assembly and wholesale markets
- Rural electrification
- Roads
- Telecommunications
- Competition
Marketing productivity drivers

• Rural towns
• Assembly and wholesale markets
• Rural electrification
• Roads
• Telecommunications
• Competition
• Open borders
Maize Market Sheds in ESA
African borders
Cross-border trade
Requirements for agricultural growth

- On-farm productivity
- Market access

Diagram:

- Intersection of on-farm productivity and market access
Technology spills over across AEZ’s
Outline

1. Structural transformation
2. Agricultural productivity drivers
3. Spatial transitions
4. How do households navigate these transitions?
5. Policy implications
Trends in LDC Population Distribution
African population trends

Source: UN Urban Projections (http://esa.un.org/unup/)
## Spatial Distribution of Population, 2005

<table>
<thead>
<tr>
<th>Region</th>
<th>Rural</th>
<th>Urban</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>small</td>
<td>large*</td>
<td></td>
</tr>
<tr>
<td>World</td>
<td>51%</td>
<td>25%</td>
<td>24%</td>
</tr>
<tr>
<td>Developed countries</td>
<td>26%</td>
<td>40%</td>
<td>35%</td>
</tr>
<tr>
<td>Developing countries</td>
<td>57%</td>
<td>22%</td>
<td>21%</td>
</tr>
<tr>
<td>Least developed</td>
<td>73%</td>
<td>16%</td>
<td>11%</td>
</tr>
<tr>
<td>Latin American</td>
<td>23%</td>
<td>37%</td>
<td>40%</td>
</tr>
<tr>
<td>South-Eastern Asia</td>
<td>56%</td>
<td>29%</td>
<td>15%</td>
</tr>
<tr>
<td><strong>Sub-Saharan Africa</strong></td>
<td><strong>65%</strong></td>
<td><strong>20%</strong></td>
<td><strong>15%</strong></td>
</tr>
</tbody>
</table>

* Large cities include those with population over 500,000.

## Employment Share, by Locality Size

<table>
<thead>
<tr>
<th>Country (year)</th>
<th>Country (year)</th>
<th>Total Labor</th>
<th>Total Agriculture</th>
<th>Total Nonfarm</th>
<th>Mftr.</th>
<th>Commerce &amp; Transport</th>
<th>Personal &amp; Financial Services</th>
<th>Construction, Utilities and Mining</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh, 2000</td>
<td>Rural</td>
<td>100</td>
<td>58</td>
<td>42</td>
<td>10</td>
<td>17</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Small urban</td>
<td>100</td>
<td>16</td>
<td>84</td>
<td>27</td>
<td>28</td>
<td>23</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Dhaka &amp; Chitt.</td>
<td>100</td>
<td>8</td>
<td>92</td>
<td>26</td>
<td>29</td>
<td>32</td>
<td>5</td>
</tr>
<tr>
<td>Chile, 1984</td>
<td>Rural</td>
<td>100</td>
<td>65</td>
<td>35</td>
<td>5</td>
<td>9</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Small urban</td>
<td>100</td>
<td>7</td>
<td>93</td>
<td>14</td>
<td>29</td>
<td>41</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Santiago</td>
<td>100</td>
<td>1</td>
<td>99</td>
<td>20</td>
<td>26</td>
<td>46</td>
<td>7</td>
</tr>
<tr>
<td>Zambia, 2000</td>
<td>Rural</td>
<td>100</td>
<td>90</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>7</td>
<td>1</td>
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<tr>
<td></td>
<td>Small urban</td>
<td>100</td>
<td>22</td>
<td>78</td>
<td>7</td>
<td>31</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Lusaka</td>
<td>100</td>
<td>0</td>
<td>100</td>
<td>14</td>
<td>22</td>
<td>54</td>
<td>10</td>
</tr>
</tbody>
</table>

## Household transitions in Tanzania

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Percent per hh</td>
<td>Share of total</td>
</tr>
<tr>
<td>Farm → farm</td>
<td>1,369</td>
<td>61</td>
<td>0.18</td>
</tr>
<tr>
<td>Farm → middle</td>
<td>1,106</td>
<td>134</td>
<td><strong>0.42</strong></td>
</tr>
<tr>
<td>Farm → city</td>
<td>219</td>
<td>233</td>
<td>0.17</td>
</tr>
<tr>
<td>Middle → farm</td>
<td>210</td>
<td>48</td>
<td>0.04</td>
</tr>
<tr>
<td>Middle → middle</td>
<td>306</td>
<td>99</td>
<td>0.11</td>
</tr>
<tr>
<td>Middle → city</td>
<td>91</td>
<td>234</td>
<td>0.08</td>
</tr>
<tr>
<td>Total</td>
<td>3301</td>
<td>104</td>
<td><strong>1.00</strong></td>
</tr>
</tbody>
</table>

Source: Christiansen et al. (2013)
Outline

1. Structural transformation
2. Agricultural productivity drivers
3. Spatial transitions
4. How do households navigate these transitions?
5. Policy implications
Group 1
Group 2
Group 1
Group 2
Distinguishing the two groups

- **Group 1.** Successful commercial smallholder farmers
- **Group 2.** Subsistence farmers → children transition out of agriculture
### How many make the transition?

Zambia 2008

<table>
<thead>
<tr>
<th>Farm category</th>
<th>Percent of Small and Medium Farms</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maize</td>
</tr>
<tr>
<td>Top half of sales</td>
<td>3</td>
</tr>
<tr>
<td>Bottom half of sales</td>
<td>36</td>
</tr>
<tr>
<td>Growers with no sales</td>
<td>62</td>
</tr>
<tr>
<td>Total growers</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Chapoto et al. (2013)
Both groups require agricultural productivity gains to succeed!

- Group 1. Competes with Brazil
- Group 2. Transition children out of agriculture
  - lower land and labor requirements
  - release child labor for schooling
  - enable parents to pay school fees
How long does the transition take?

<table>
<thead>
<tr>
<th>Year</th>
<th>Nonfarm share of farm household income (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>22</td>
</tr>
<tr>
<td>1960</td>
<td>42</td>
</tr>
<tr>
<td>1970</td>
<td>63</td>
</tr>
<tr>
<td>1980</td>
<td>80</td>
</tr>
<tr>
<td>1987</td>
<td>87</td>
</tr>
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Source: Haggblade, Hazell and Reardon (2007)
Outline

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2. Agricultural productivity drivers
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5. Policy implications
Causal relationships

+ Productivity per capita (agriculture, nonfarm)
→ Changing sectoral demand
→ Shifting sectoral composition of economy
   (+ Agriculture, ++ Industry, +++ Services)
→ Spatial transition (+ rural towns, + cities)
→ Shift in household livelihood strategies
4. Policy requirements

- **Productivity gains** (agricultural R&D, extension, input markets, rural towns)
- **Markets** (rural towns, assembly & wholesale markets, rural roads, electrification)
- **Open borders** (technology transfer, markets)
- **Rural education**
4. Investment requirements

- Agricultural R&D
- Rural towns
- Open borders
- Rural education
Thank You