FSE
STANFORD

CENTER ON FOOD SECURITY AND THE ENVIRONMENT

Global Food Policy and Food Security Symposium Series

Africa's Food Systems in 2030

Paul Collier, Director, Centre for the Study of African Economies
Oxford University
Derek Byerlee, Independent Scholar
Director, 2008 World Development Report

February 5, 2013

Stanford University

FREEMAN SPOGLI INSTITUTE FOR INTERNATIONAL STUDIES

Stanford WOODS INSTITUTE for the ENVIRONMENT

African Food Systems to 2030:
Toward Inclusive Business Models

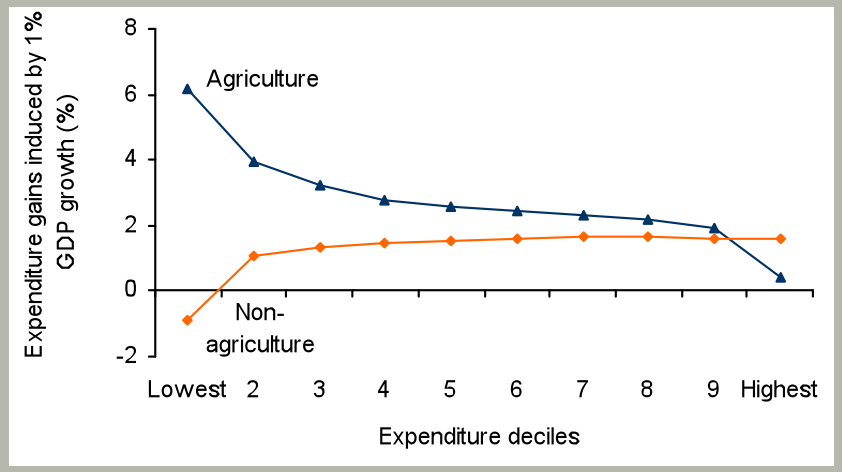
.

Derek Byerlee
Stanford University
Feb 5th, 2013

Agricultural Growth is Especially Effective for Poverty Reduction and Food Security

- Asia
  - Example of Green Revolution
  - Institutional reforms in China
- But
  - High rural inequality reduces effectiveness
  - And slow progress in Africa

GDP growth from agriculture benefits the income of the poor 2-4 times more than GDP growth from non-agriculture (WDR 2008)



Outline: African Food Systems to 2030

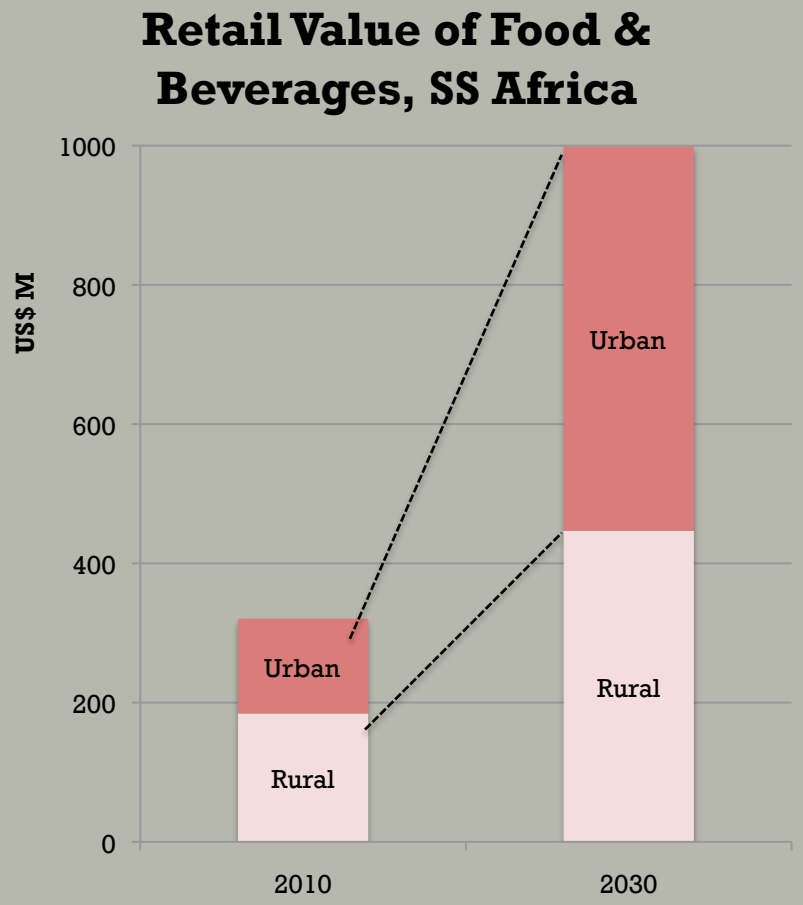
- Opportunities and challenges
  - Markets, jobs, productivity, and prices
- Inclusive business models
  - Recognize critical role of private agribusiness for
    - Increasing farm incomes and/or generating jobs
  - Emphasize emerging success stories
- Elusive quest for enabling policies

Overall optimistic but recognize great heterogeneity within Africa

Two Opportunities and Two Challenges

Opportunity 1: Transformation of Food Markets by 2030

- African urban food markets up 4x
  - High value & processed foods, feed
  - New supply chains—mkt logistics
- Potential of regional markets
  - Now 5-10% of trade
- Global markets
  - Higher prices

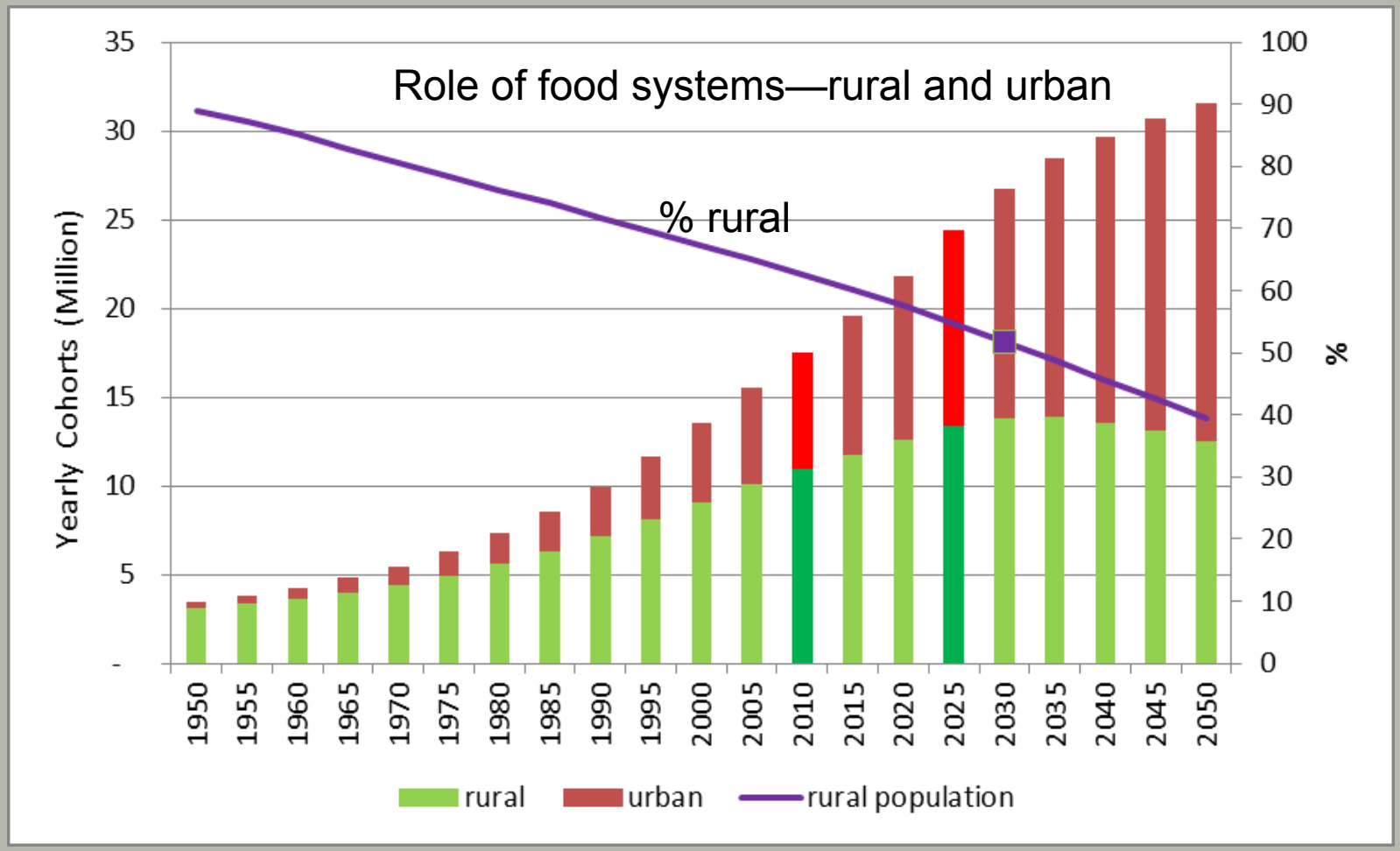


Byerlee et al., 2013

Opportunity 2: Accelerating Food Supply

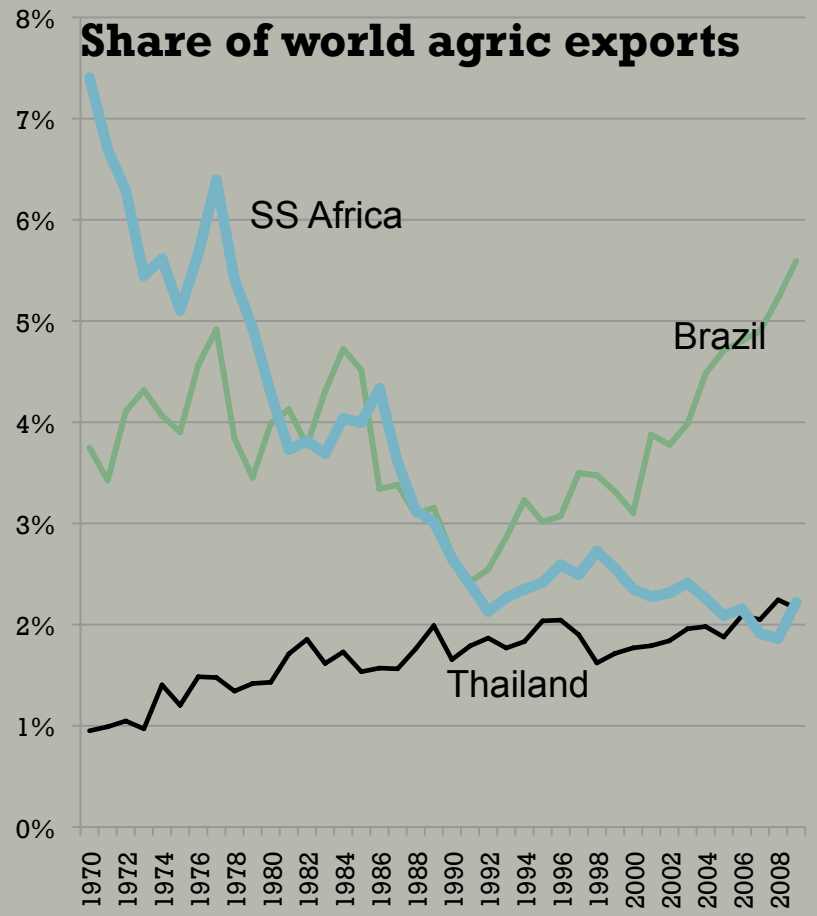
- Comparative advantage from natural resources (in most countries)
  - 240 M ha uncultivated land
  - Less than 20% irrigation potential tapped
  - Yields a fraction of potential
- Much improved macro policies
  - Reduction of high agric. tax (50%)
- Strong private sector interest
  - Local investors, FDI, investment funds

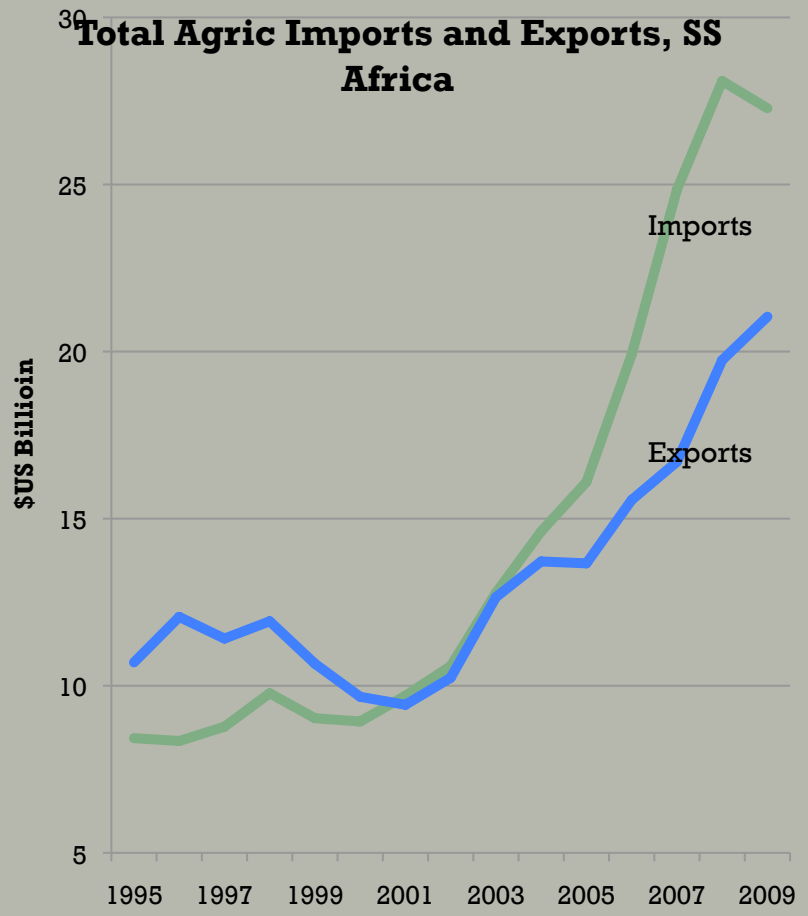
Challenge 1: Creating 25 M Jobs Annually by 2025



Source: Losch, Fréguin-Gresh and White 2012.

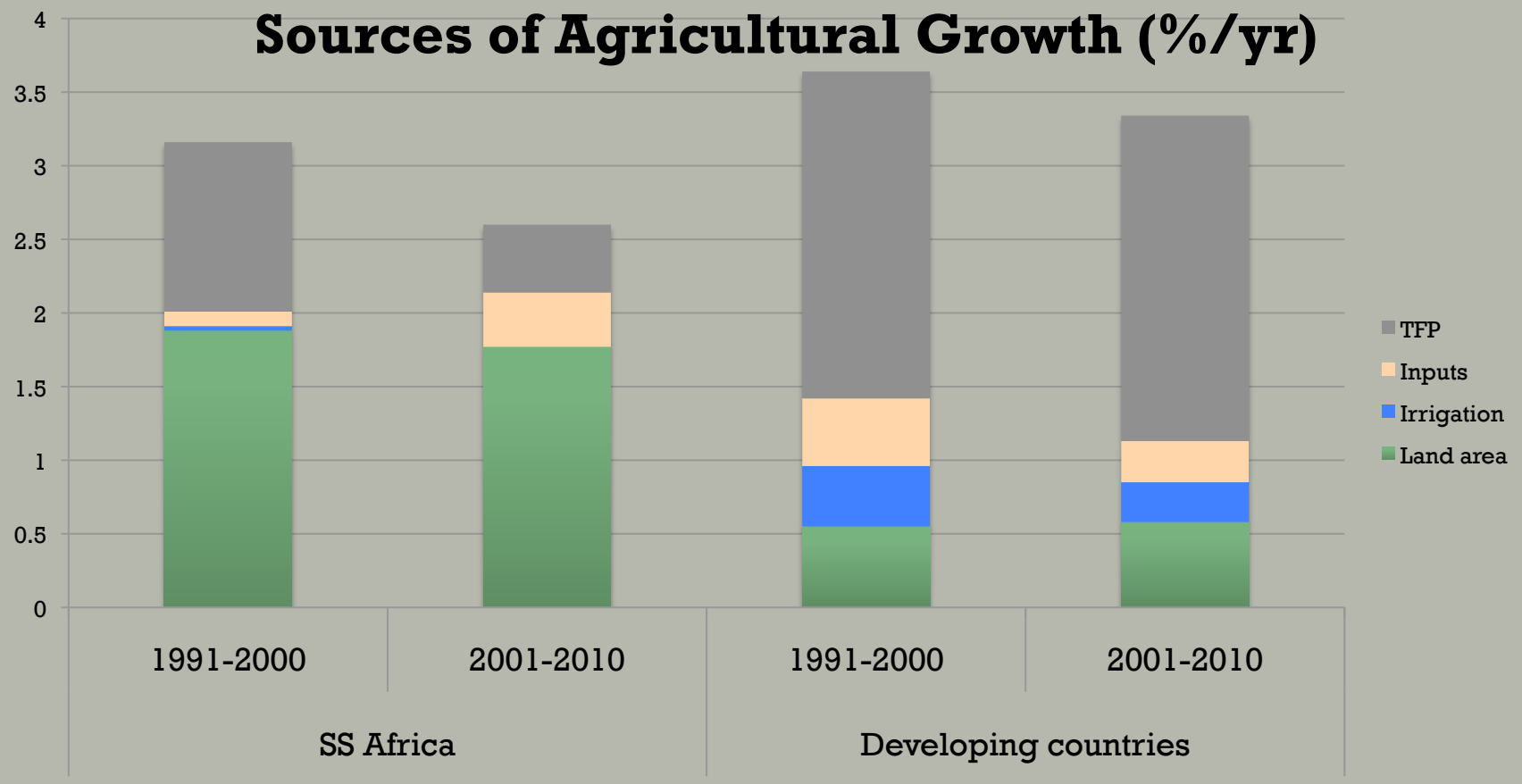
Challenge 2: Improve Competitiveness to Exploit Comparative Advantage





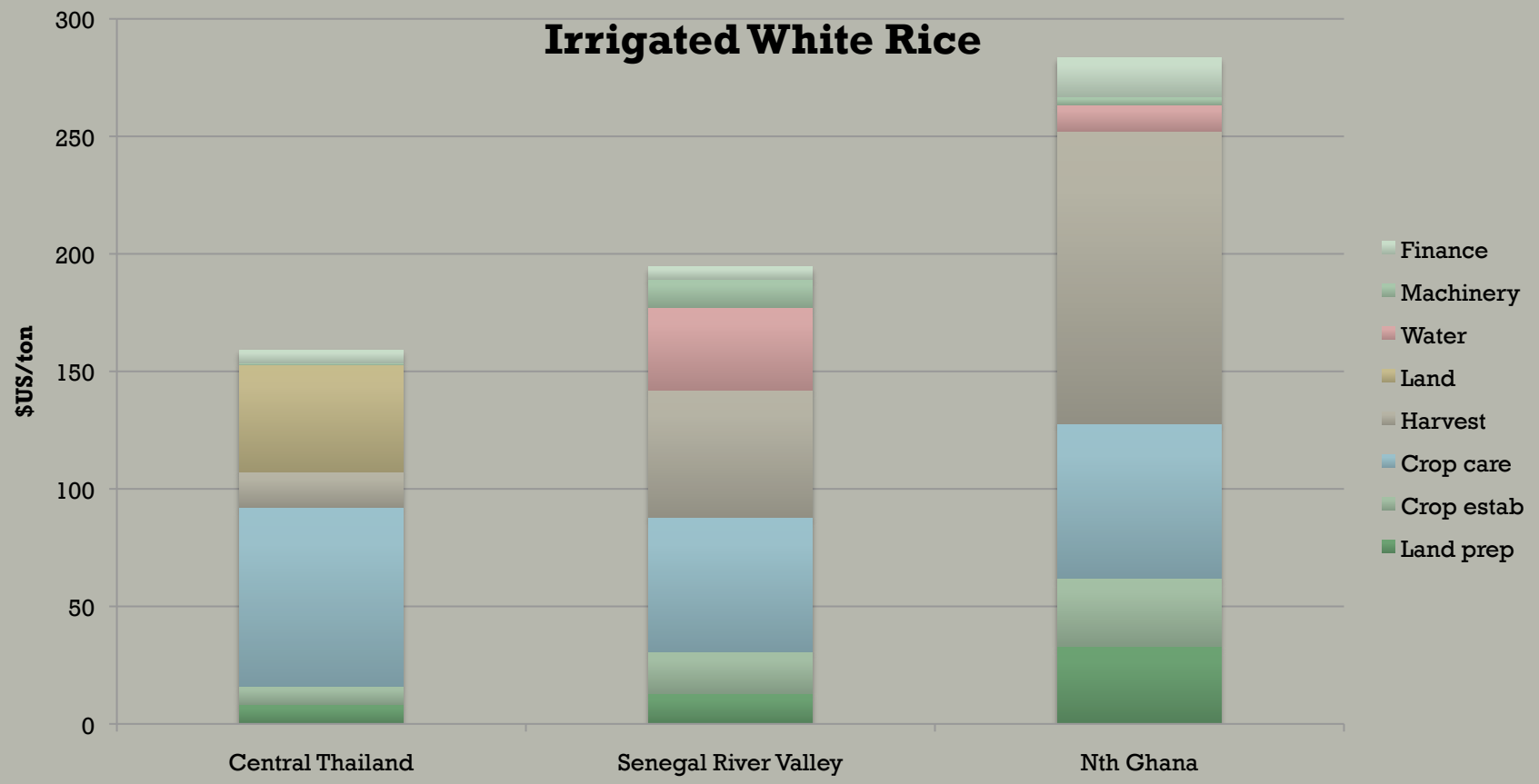
FAOSTAT

Challenge 2: Lagging Productivity Growth



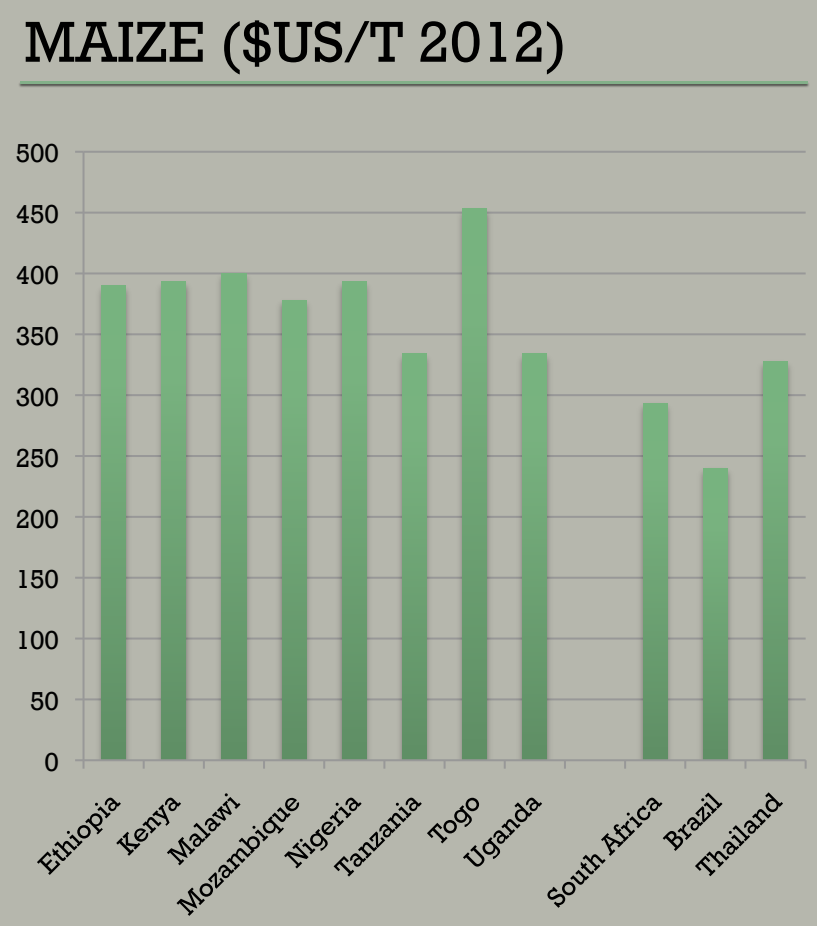
Source: Fuglie, 2012

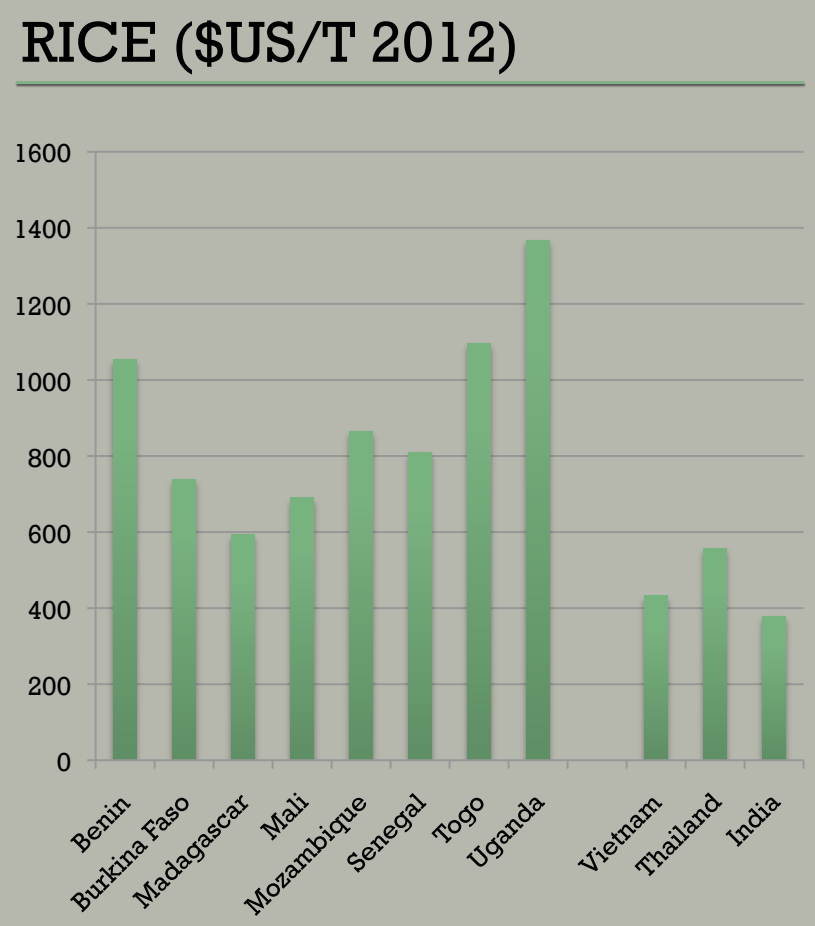
Reflected in High Production Costs Rice: Thai vs SS Africa, 2011



Source: World Bank, 2013

Translates into High Food Prices (Also Protection!)





Source: FAO GIEWS—Average wholesale prices

Inclusive Business Models

Recognize Complementary Assets

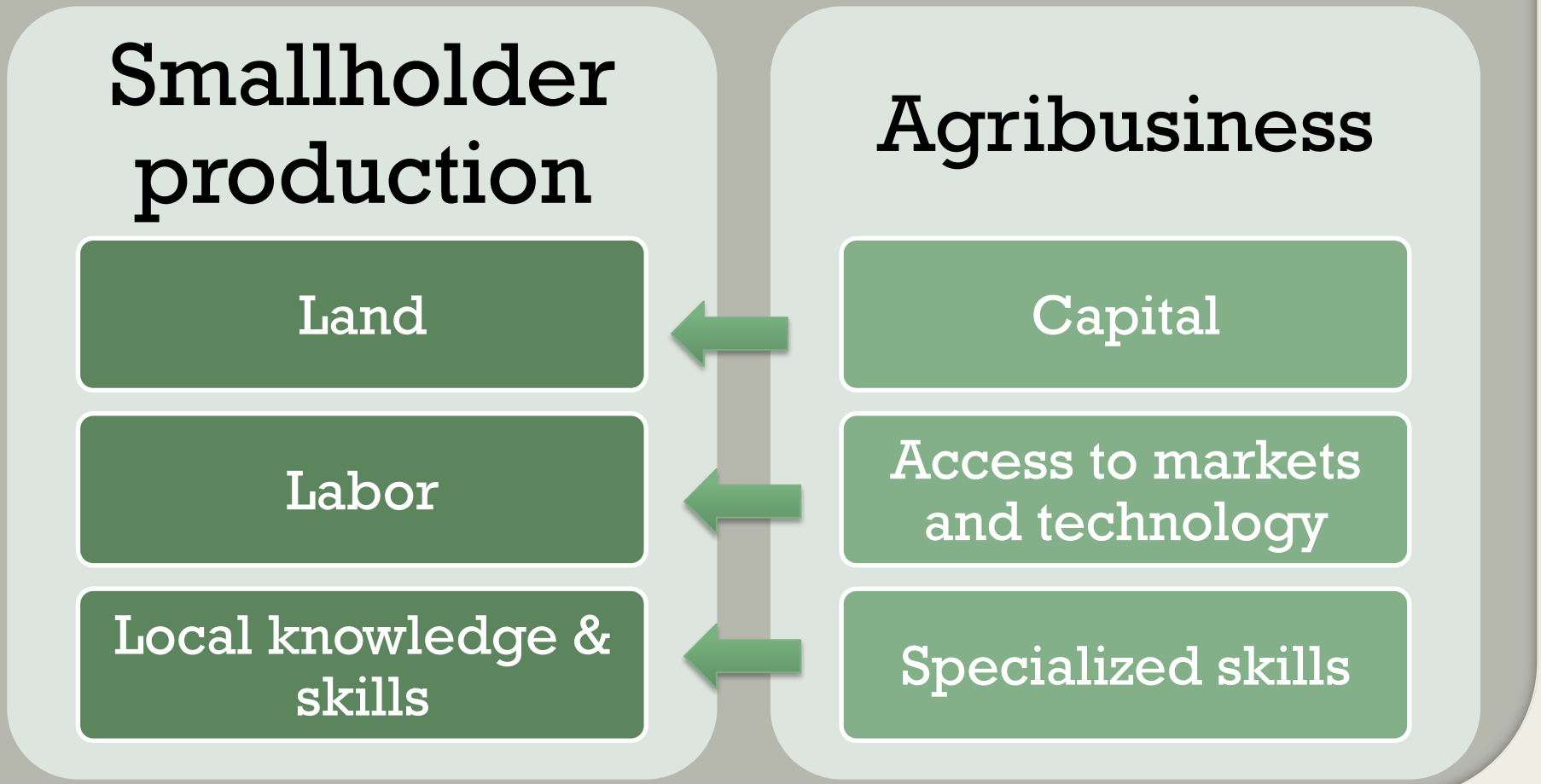
‘Smallholder’ farmers
(Family mgmt.& labor)

- Land
- Labor
- Local knowledge & skills

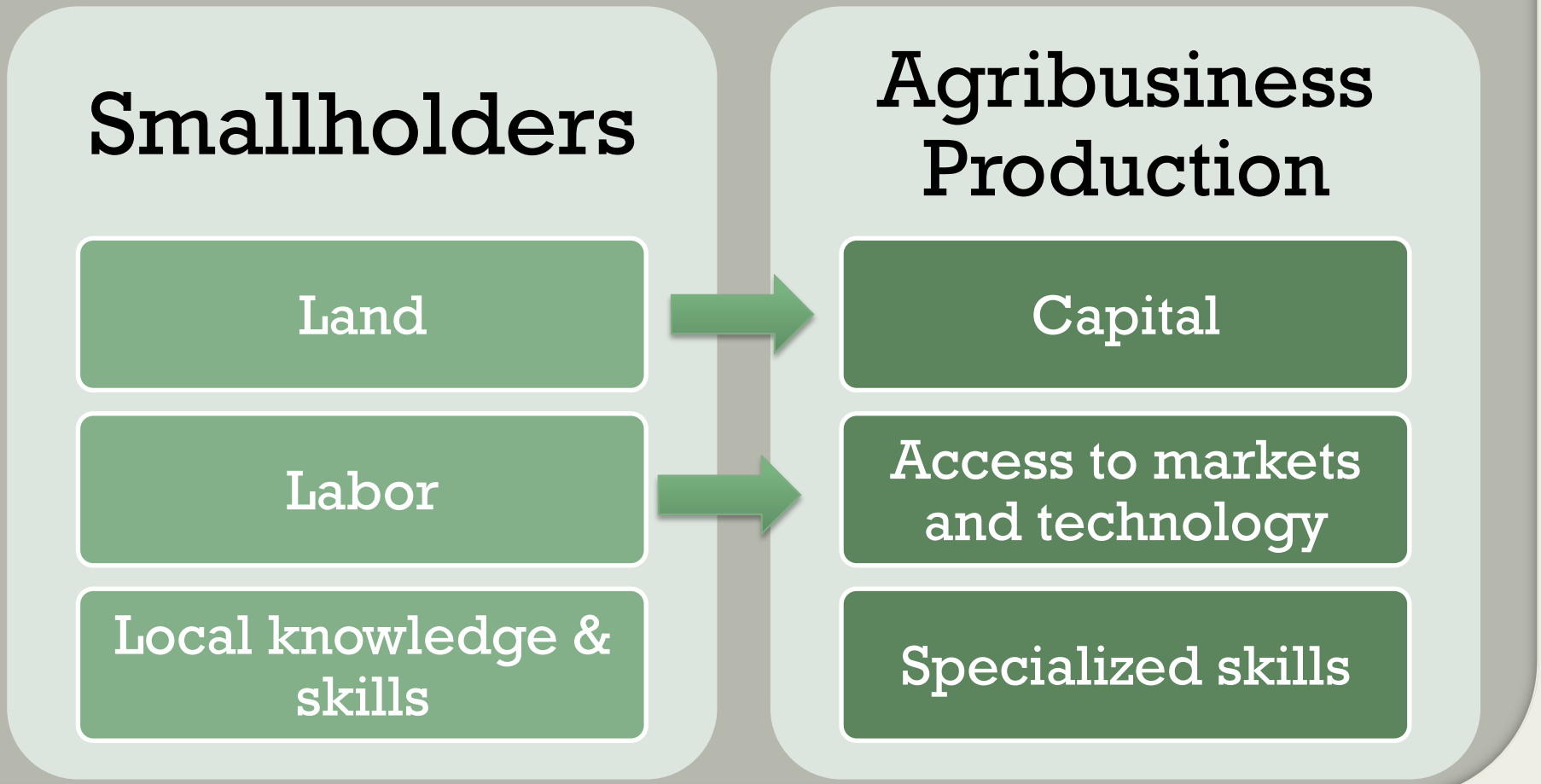
Agribusiness
(company, hired labor)

- Access to markets and technology
- Capital
- Specialized skills

Business Models Based on Smallholder Production



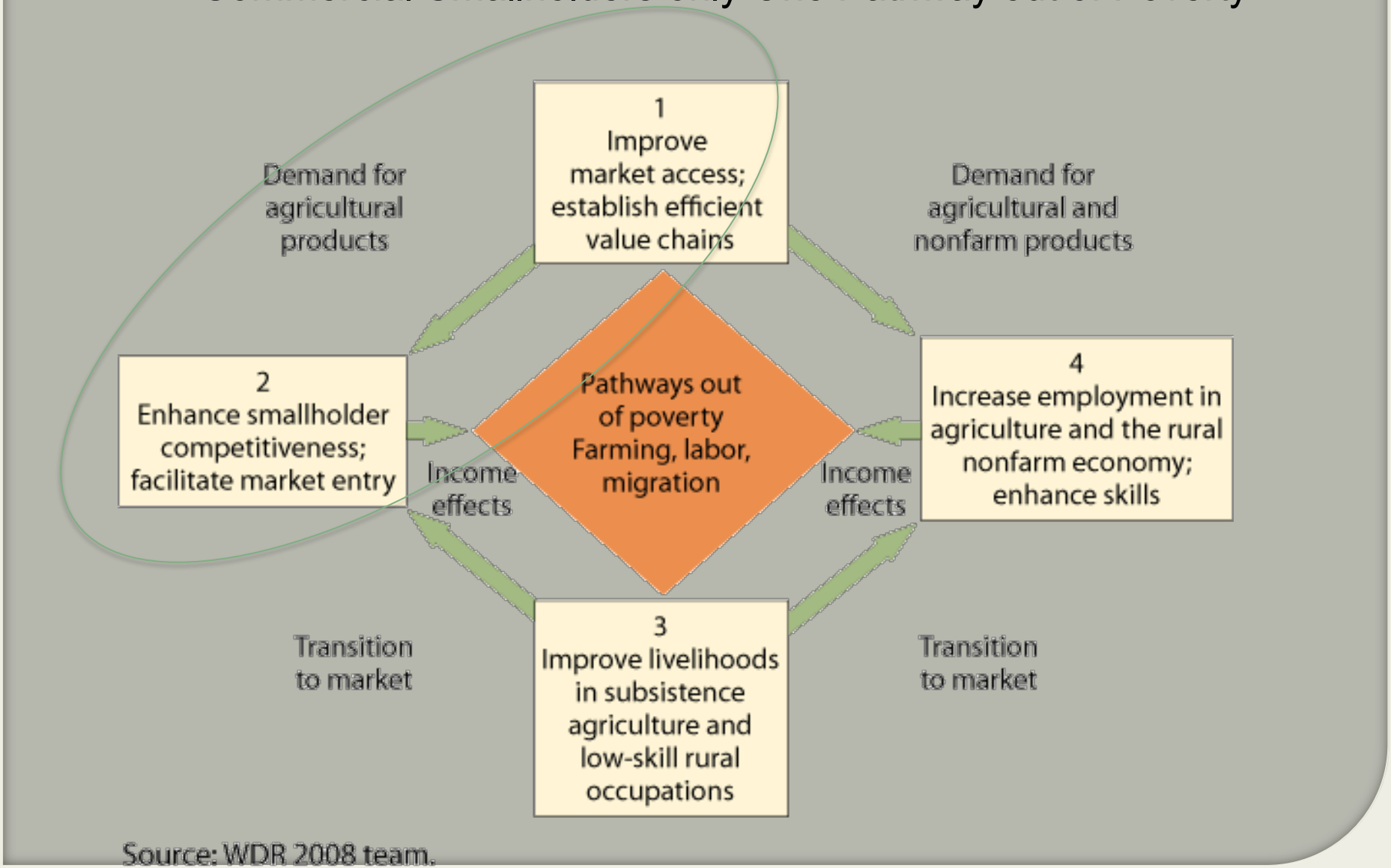
Business Models Based on Agribusiness Production



Key Determinants of Business Models: Relative Transactions Costs

Favor Small Scale	Examples	Favor Large Scale	Examples
Labor intensive	Hort, dairy, tea	Coordination with processing/shipping	Sugar, oil palm, tea, hort exports
Difficult access to land (for outsiders)	Food staples	Compliance with standards/ traceability	Export hort., ethanol
Ability to enforce contracts	Export hort., oilseeds, poultry	Ability to fully mechanize	Grains, oilseeds
Local knowledge	Food staples	Pioneering risks	New crops, new areas
		Access to finance for fixed K	Greenhouse hort, irrigated rice

Commercial Smallholders only One Pathway out of Poverty



Structure of Maize Farmers in Zambia

Smallholder Maize Farmers

	Top 50% sales	Bottom 50%	No sales
Percent of households	3	← 36	← 62
Total cultivated area (ha)	7.2	2.5	1.7
Maize area (ha)	4.8	1.1	0.8
Maize yields (t/ha)	3.4	2.1	1.2
Fertilizer (kg/ha)	247	175	64
Percent animal power	67	23	19
Percent tractor power	4	0	0
Income per capita ($US/yr)	841	250	171

Source: Chapoto and Haggblade, 2012

Emergent commercial farmers (70 ha)
Agribusiness farms > 1000 ha (irrigated)

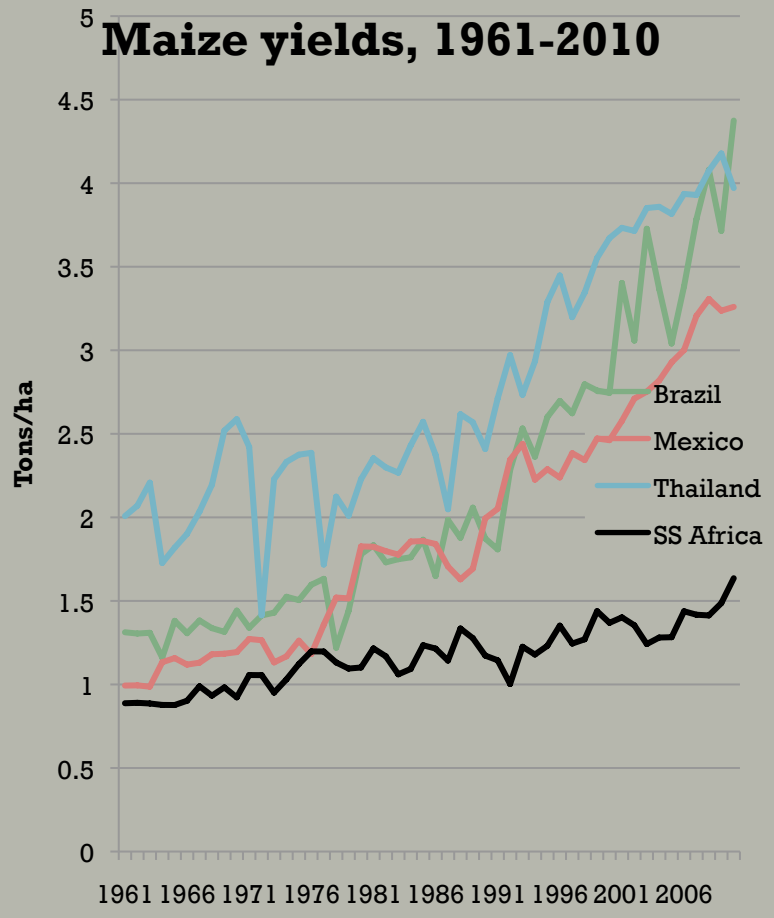
Horticulture: Top 50% sales– 5 ha with 0.6 ha horticulture,
LS export hort > 25 ha

Models based on Smallholder Production

1A: Atomistic in spot markets
1B: Collective Action for services
1C: Forward Integration
1D: Contract farming

Model A1: Atomistic Smallholders in Spot Markets: Maize: Episodes of Rapid Growth

- Kenya—first country for SH hybrid maize adoption, 1970-85
- West Africa—Increased production 8x, 1980-2010
- But:
  - Yield growth overall < half of other rainfed regions, and
  - State driven and unsustainable in E&S Africa



FAOSTAT

Model 1A: Atomistic Smallholders: Maize: Getting Beyond Parastatals

- Input vouchers ('smart subsidies')
  - Malawi + -- Sustainable? Market smart?
- Private sector R&D and input dealers
  - Hybrid maize—Zambia, Fertilizer—Kenya, Machinery rental services?
- New rapidly growing markets for feed
  - Stimulating emergence of new supply chains with small-medium growers (Ghana)
- Long term—Critical role of public goods/serv
  - For decades has been less than half of Asia

Model 1B: Organized Smallholders for Collective Action for Services

- Farmer organizations provide technology, advisory services and training
  - "Interprofessionales" in Cote d'Ivoire with levy to support R&D and extension
  - Could increase R&D on cash crops by 5x and farmer driven research agenda
- Organized value chains through Innovation Platforms
  - Maize in Burkina Faso, E & S Africa (scaleable?)

Model 1C: Organized Smallholders Integrating Forward

- Vertically integrate to processing and marketing
  - Kenya Tea Development Agency Ltd
    - Smallholder owned services—processing, R&D, extension (strong initial donor/gov. support)
    - Top exporter, 550 K smallholders provide 2/3 prod, high yields
  - Emerging examples in dairy coops in E. Africa

Model 1D: Contract Farming

- Companies supply farmers inputs, technical advise and guaranteed price
- Favored by natural monopsony
  - Export hort, sugarcane, oilseeds, cotton
    - Cotton in Zambia—200K smallholders
- Tradeoffs in transactions costs to firms
  - Accessing land and supervising labor vs enforcing contracts and meeting standards
- Can it work for grains?
  - Olam—rice in Nigeria?, Ghana Maize Partnership

Models based on Agribusiness Production

2A: Stand alone enterprises

2B: Large scale with outgrowers

2C: Large-Scale with spillovers

2D: Large-Scale with community equity

3A: Stand-Alone Enterprises

- Sometimes large-scale is most efficient
  - Close coordination with processing
  - Demanding market standards
  - Pioneering risks—new crops in new areas
  - Often all—export hort, sugarcane/ethanol
- Can still be inclusive with good jobs and training
  - Senegal and Kenya export hort moving to large scale but creating good jobs for poor farmers

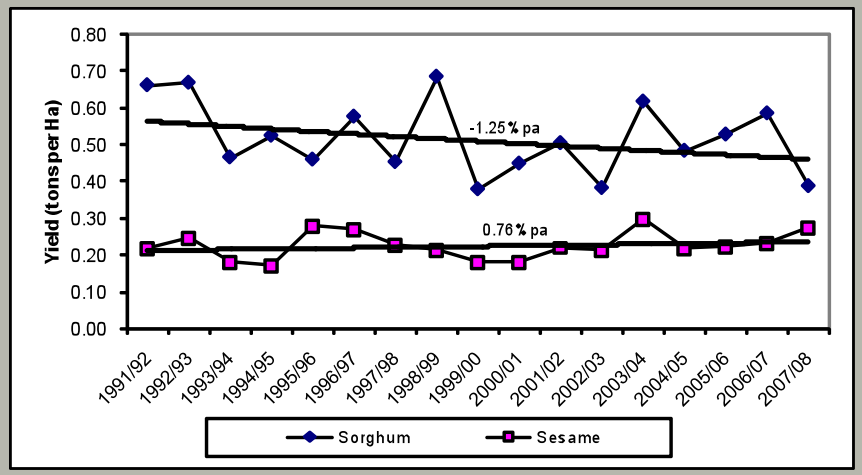
Employment Benefits vary Widely

Commodity	Jobs/1000 ha	Invest $/ha	Invest $ per job
Horticulture	1000+	Var.	Var.
Oil palm + proc, Indonesia	350	$4,000	$11,400
Sugar-ethanol (manual)-Braz	700	$14,000	$20,000
Sugar-ethanol + power (mech)—Sierra Leone	200	$40,000	$200,000
Sorghum Sudan—semi-mechanized	53	$900	$17,000
Wheat-soybean irrig--Zambia	16	$6,000	$375,000
Soy—fully mechanized-Braz	18	$3,600	$200,000

Caution: Legacy of Failure of LS Food Farming in Africa: Sudan as a Breadbasket?

- Semi-mechanized farming schemes 1970s
  - Investors from Gulf and state credit
- Converted up to 11 M ha to large farms
  - Average over 1,000 ha
- Problems well documented
  - Trampled on rights of local pastoralists, land conflicts
  - Low productivity and soil mining—lacked technology

Extremely low yields



Today's Prospects—Food Crops

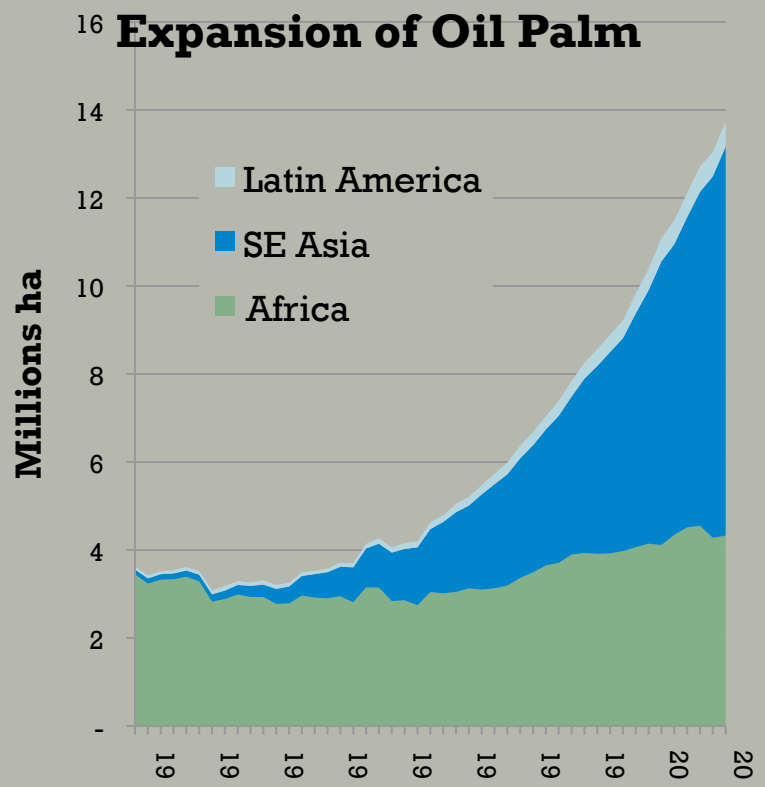
- Potential for large-scale irrigated rice
  - High upfront investment costs ($15K/ha)
    - 2011—37 companies investing (>2000 ha)—some successes (e.g., Tilden, Samford)
      - (But highly protected)
  - Rainfed farming in very low density areas
    - High transactions cost of hired/migrant labor favors mechanization
    - Issues—land rights, transport costs, technology
      - Pro-Savannah—Mozambique (Brazil--Japan)

Today's Prospects: Could Africa Reclaim Oil Palm?

OPPORTUNITY

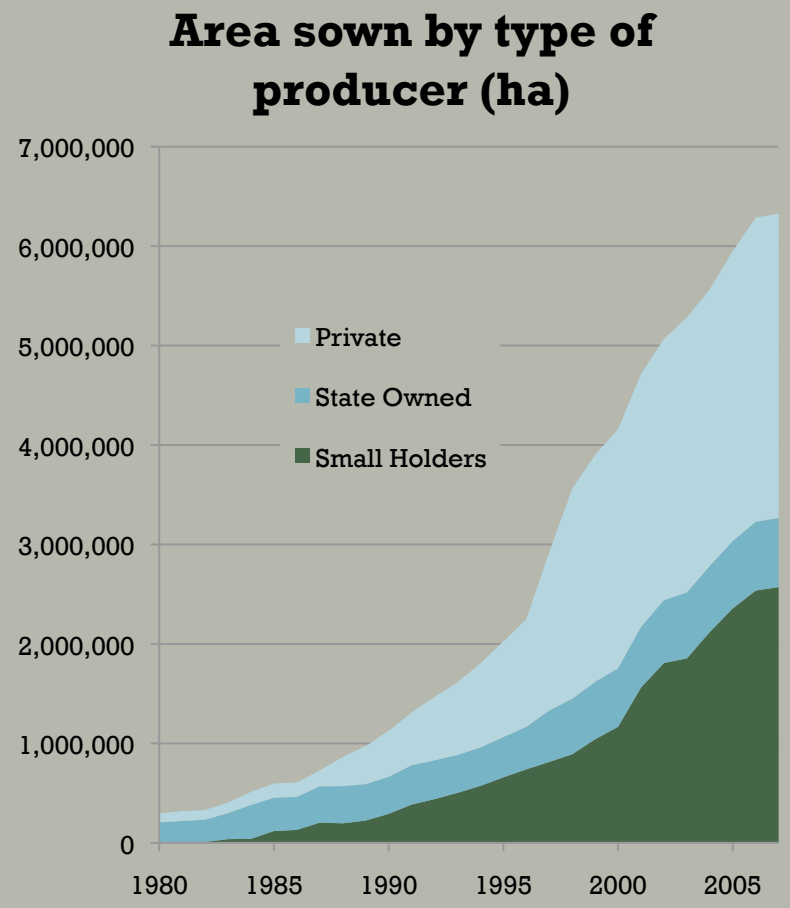
- Value of SE Asian exports of PO > <u>All</u> agric exports Africa
  - Africa imports $3.5 Billion!
- Billions $ at stake
  - Big Asian companies investing in Africa (> $3 M ha)
  - 200-300 jobs/1000 ha
- Much potential for smallholders
  - 40% Indonesia now SH

RISE OF OIL PALM IN SE ASIA



Model 2B: Outgrower Schemes (Investment Capital)

- Linked to nucleus estate and processor
  - Oil Palm—already successful models (GOPC)
  - Sugarcane in Southern Africa
  - Horticulture in Kenya
- State support needed to reduce costs of setting up outgrowers



2C: Large-Scale Enterprises with Community Spillovers/Equity

- New public-private partnerships for irrigation with spillovers
  - Zambia PPPs for irrigation
  - GADCO in Ghana
- Transfer of technology, skills and services
  - Emergent Asset Management—Export hort.
- 2D: Community equity in companies
  - Tea Companies, Tanzania and Rwanda, Sugar, Za.

Elusive Policy Issues

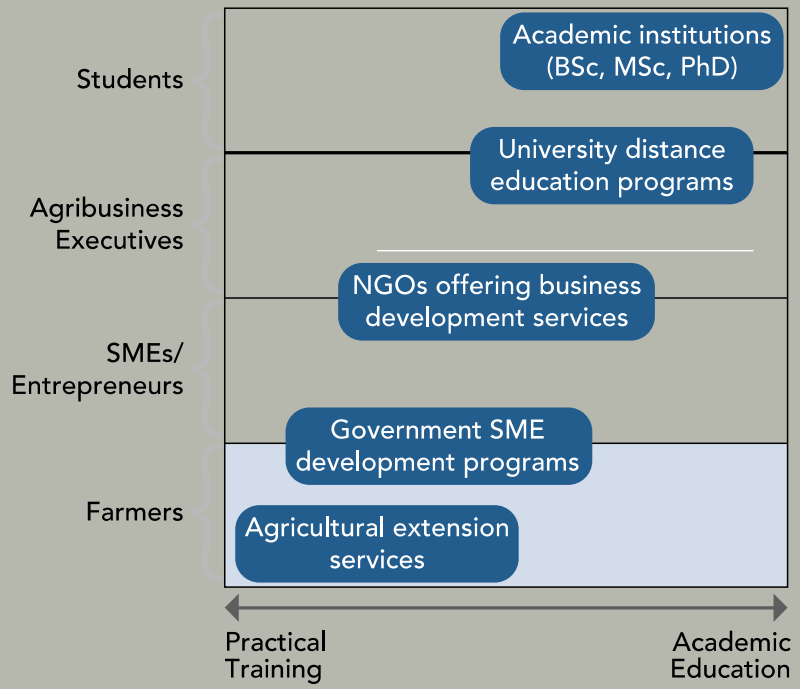
Access to Land and Finance

1. Land markets—secure and transferrable **rights** for communities and investors
   - Refocus from 'land grabs' to smallholder access to land to scale up
   - Rapid low cost recording of customary or individual rights (Ethiopia, Rwanda, Moz.)
2. Access to finance—reducing risks and increased flex (even for LS!)
   - Partial credit guarantees, insurance, and risk analysis. Flex on collateral

Technology, Information, Skills

- Weak and fragmented R&D and extension
  - Farmer empowerment (CI, Uganda)
  - ICT for extension (Kenya)
- Low education
  - 70% youth in ag < prim educ.
- Business skills
  - Songhai Center
  - Market Matters

Figure 6.10: Agribusiness training is needed at many levels



Source: Reproduced from Mabaya, Christy, and Bandama (2010).

4. Developing Regional Markets

- Small, fragmented and volatile national markets
  - High costs of border crossings (+ 100s of km)
  - Increases food price instability
  - Reduces incentives for input industries
- Streamline and liberalize regional trade
  - Eliminate arbitrary import/export bans
  - Common standards and regulations
    - e.g., seed markets but slow

Bottom Line

- Exciting opportunities for African agriculture
  - Market growth, private interest and improved policies
- Much to learn from emerging business models for more inclusive growth
  - Both successes and failures
- Role of state?
  - Level the playing field—invest in public goods/services, avoid cheap land and capital
  - Facilitate smallholder inclusion in business models
  - Role of 'elite' transformation teams to overcome state failures?