Forces Shaping the Agricultural Marketplace of the Future

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June 8-9, 2010
**Focus:** Influence of market fundamentals and policy on 21\textsuperscript{st} century profitability

- **Review of primary demand drivers**
  - Influence on the characteristics of the market and the food system

- **Review of global supply system**
  - Current condition, expected changes, growing constraints

- **Review of policy drivers**
  - Threats to prosperity

**Summary observations**
Overview of Presentation

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Summary observations
Global Population Growth

Source: United Nations, World Population Prospects 2008 Revision
Population Growth by 2025

Distribution by region

4%  
8%  
32%  
<1%  
56%

Source: United Nations, World Population Prospects 2008 Revision
Global Macro Economy

World GDP growth

Source: International Monetary Fund (IMF), World Economic Report, April 2010

Federal Reserve of Kansas City | Forces Shaping the Agricultural Marketplace of the Future | June 8-9, 2010
Global Macro Economy

World GDP growth

Source: International Monetary Fund (IMF), World Economic Report, April 2010

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Growth by Region
2008 to 2020

USD Trillions

<table>
<thead>
<tr>
<th>Region</th>
<th>GDP CAGR</th>
<th>Absolute Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>2.4%</td>
<td>4.8 USD Trillions</td>
</tr>
<tr>
<td>Western Europe</td>
<td>1.4%</td>
<td>2.5 USD Trillions</td>
</tr>
<tr>
<td>Russia</td>
<td>3.3%</td>
<td>0.5 USD Trillions</td>
</tr>
<tr>
<td>China</td>
<td>8.2%</td>
<td>4.9 USD Trillions</td>
</tr>
<tr>
<td>India</td>
<td>6.8%</td>
<td>1.2 USD Trillions</td>
</tr>
<tr>
<td>SE Asia</td>
<td>4.6%</td>
<td>0.8 USD Trillions</td>
</tr>
<tr>
<td>Africa</td>
<td>4.7%</td>
<td>0.8 USD Trillions</td>
</tr>
<tr>
<td>Brazil</td>
<td>4.0%</td>
<td>0.5 USD Trillions</td>
</tr>
</tbody>
</table>

1 Based on real GDP growth rates (expenditure method)

SOURCE: Global Insight World Market Monitor
Dynamics of Food Demand

- **Services**
- **Processed Products**
- **Livestock Products**
- **Commodities**

**Per Capita Income**
- >$10 per day
- $2.50-$10 per day
- $1.25-$2.50 per day
- <$1.25 per day


- 27% of world’s population (Most hunger problems solved at $2.50 threshold)
- 20% of world’s population (2/3rds experience hunger & malnutrition)
Implications

End of the “third world.” “Emerging market’ label now more apt.

Perhaps 50% more agricultural output required by 2030 – approach doubling by 2050.

7+ billion tons output in 2005 – 3 to 4 billion more in 20 years – huge investment required.

Increasing urbanization – tipping point in 2007 – 70% by 2050.

Food production/consumption areas – increasingly disparate – suggests trade increasingly important.
Market Characteristics Changing Rapidly

Developing Countries

- Focus on sufficient calories, improved diets, more animal protein – basic food safety, refrigeration, reduced spoilage, infrastructure

Developed Countries


Requiring adaptation across food system – by farmers, processors and sellers.
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Summary observations
The Supply Side

Today

Surplus Food Producing Regions – Characterized by:

- R&D Investment
- Technological Innovation
- Infrastructure Investment
- Productivity Growth (crops & livestock)

Food Deficit Regions -

- Long-term neglect of rural/ag sectors
  - R&D, Extension, other services
  - Infrastructure (FM roads, storage, water, etc)
  - Poor policies (macro, sectoral, trade)

Result -

- Global ag production plant struggled to keep pace – 2006-2008
- Recession provided a breather
Growing Resource Constraints

*Produce more with less...*

**Land | Water | Labor**

Much of the world’s total arable area already in use – the most fertile requiring least investment

Most remaining land has serious soil and terrain constraints

- Some covered in forests, in protected areas
- Characteristics difficult for agriculture – low soil fertility, high toxicity, hilly and other difficult terrain – human and animal disease, poor infrastructure
- Most located in **Africa, Latin America** and **Black Sea/Caspian Sea Region** (70% suffers soil and terrain constraints)

Further expansion is **controversial** – could jeopardize fragile lands

- Will require considerable capital investment

Source: FAO/FAOSTAT 2007/2008
Growing Resource Constraints

Produce more with less...
Land  |  Water  |  Labor

Most populous countries have least room to expand

Arable Land (ha) per person

11 most populous countries + S. Africa & Zimbabwe

Source: FAO/FAOSTAT 2007/2008
Growing Resource Constraints

*Produce more with less...*

| Land | Water | Labor |

- 70% of the world’s freshwater withdrawals are used by agriculture
  - 90% in India and China
  - 30 developing countries already facing growing water shortages

Water and population unevenly distributed – by 2025:
  - 1.8 bil. People will live in areas with absolute *water scarcity*
  - 2/3rds of world population will live in ‘water-stressed’ areas

Rainfed agriculture practiced on 80% of cultivated land – accounts for 60 of world’s food

Irrigation can increase yields of most crops two-to-four fold

New irrigation technologies can reduce water use 30% to 60% over surface irrigation

*Source: UN-Water and FAO*
Growing Resource Constraints

*Produce more with less...*

**Land** | **Water** | **Labor**

10X more water needed to raise 1 pound of beef than 1 pound of wheat

**Amount of water required for:**

One pound of beef

One pound of wheat

Daily drinking requirements

Source: UN-Water and FAO
Growing Resource Constraints

*Produce more with less...*  
*Land | Water | Labor*

Farm **demographics** (aging) and **migration** to cities importantly influence agricultural **labor availability**

- **70%** of population will be urban by 2050

High-tech machines, complex production processes and strict production regulations require **skilled labor**

Tighter restraint on immigration encourages mechanization, innovation – affects **capital requirements**

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Source: UN Population Division, 2007 Revision
The Backdrop of Climate Change

**Effects on the food supply**

- Drier parts of the world get drier, wetter parts get wetter
- Sea level rises (0.3 to 2.8 feet) by 2100, more cyclones, more frequent hot days
- Tropical food crop yields decline – temperate crop yields rise at first, then decline
- Pests increase, reducing output, raising costs

**Equity Issues**

- Disproportionate effect on agricultural productivity in lower latitudes – where most of the world’s poor live

Source: Intergovernmental Panel on Climate Change (IPCC) 2007, World Bank
The Supply Side
Implications

Huge Challenge Ahead:
Produce more – feed the world better with fewer resources – less intrusion

- 50% more by 2030 (3 to 4 B tons more)
- Reducing the environmental footprint
The Supply Side
Looking Ahead

Some Positive Aspects:

- Structural Change in US and EU Farm Policy
  - Reduced artificial incentives for specific crops
  - Precludes overhanging “surpluses” – JIT inventory system
  - Farmers adjust more rapidly to market signals
  - A more robust system

- New Source Supply Expansion
  - Response to 2006-2008 price hikes – “Global Food Security”
  - Multilateral/National pledges/Initiatives
    - G-20
    - Emerging market governments
    - Multilateral/regional institutions
    - USA initiative
  - Significant investor attention

*Is this time really different?*
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Threats to Prosperity

Rising protectionism – Failure to liberalize trade
- Food trade increasingly important
- System needs strengthening – Dispute resolution, SPS rules

Insufficient infrastructure investment in emerging countries
- Current attention can fade quickly
- Garbled message? Food security ≠ self sufficiency. Result could be huge waste of scarce investment capital into an inefficient, unsustainable system
- Watch state-driven development with minimal private sector role

Lack of innovation – failure to close “the productivity gap”
- The Global Harvest Initiative
- The Global Agricultural Productivity (GAP) Index/Report
Threats to Prosperity

Dangers of never closing the gap:

- Expanded hunger and malnutrition
- Political instability (national security concerns)
- Trade disruptions
- Environmental degradation
- Slowed economic growth overall
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Concluding Remarks

Agricultural market fundamentals are strong

Challenges to the global food system are real – daunting

- Role of governments (policies) critical – no margin for missteps
- World is ever-more interconnected – requires quicker adaptation, action – pace will only accelerate

Great time to be in agriculture
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