

# Reducing Poverty Through Innovation

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# Two Stylized Facts

- Inverse relationship between economic growth and poverty.
- The effect of ODA on growth is insignificant.

# Sources of Growth

- At low levels of income, capital dominates
- As countries catch up, share of total factor productivity (TFP) rises.
- Accelerating technological change following IT revolution, is increasing the contribution of TFP to growth.
- Past growth performance has also depended on availability of cheap energy, other natural resources, and global public goods.
- For future growth and poverty reduction, capital and technology are likely to be key.

# Sources of Growth in East Asia 1975-2003

average annual percentage change

Region/Period	Output	Output per Worker	Contribution of:		
			Physical Capital	Education	TFP
<i>Thailand</i>	6.3	4.2	1.9	0.5	1.7
China	8.7	7.0	2.6	0.4	3.9
Indonesia	5.6	2.9	2.2	0.5	0.1
South Korea	7.0	4.7	2.9	0.7	1.0
Malaysia	6.5	3.2	2.0	0.5	0.7
Philippines	3.2	0.4	0.7	0.4	-0.7
Singapore	6.9	3.8	2.0	0.5	1.3
Taiwan	7.1	4.9	2.5	0.4	2.0
India	5.2	3.2	1.3	0.4	1.5

# What Drives TFP

- Urbanization and transfer of workers out of low value adding rural jobs.
- Technology embodied in plant and equipment.
- Human capital facilitates technology acquisition and development. New technology is skill biased.
- Efficient markets which optimize allocation; good business environment, with low entry barriers.
- Disembodied technological change, associated with tacit knowledge, better work organization, market friendly institutions, sound regulatory practices, etc.
- Factors promoting innovation, e.g. R&D, access to risk capital, entrepreneurial culture.

# What Factors Could Facilitate or Slow Growth?

- Urban dynamism or its absence
- Adequacy of water supplies
- Energy supplies and cost
- Climate change
- Effective and widespread use of ICT
- Technology capability

# How can ODA make a difference?

- By providing capital, technology, and capacity building to exploit or ameliorate these factors.
- Through coordinated efforts by donors.
- By leveraging comparative advantage of donors.
- By providing long-term and stable financing focused on a few areas vital for development.

# Achieving and Sustaining Urban Dynamism

- Scale and agglomeration economies contribute to urban productivity. Each doubling of city size raises productivity by between 3 and 14%. Large cities also more innovative.
- Outcomes depend on :
  - Land use coordinated with transport systems and IT infrastructure to achieve appropriate densities while minimizing pollution, congestion and energy intensity.
  - Fiscal and financial management.
  - Public services and recreational amenities.
  - Governance and E-governance.

# Supplying Water

- Urban and agricultural demand for water to grow. Meat consumption enormously increases water requirements. Production of average T-shirt consumes 1,480kg of water, washing during use consumes an additional 2,720kg.
- Urban households and industry heavy users of water.
- Securing water supplies over the longer term is vital.
- Building urban water and sanitation systems necessary for growing and healthy cities.

# Supplying Water (cont.)

- Foreign assistance and technology transfer can contribute to:
  - Conserving water supplies and achieving more efficient usage.
  - Setting standards, developing equipment and production techniques that minimize water usage
  - Reducing pollution.
  - Augmenting supplies and building storage facilities.
  - Mediating division of water resources among countries.
  - Assisting in the longer term resettlement of people moving out of water scarce areas.

# Water Intensity by Sector

## Case of Denmark, 2004

Final consumption of water and water intensity by industry (1000 cubic meters)	
Agriculture, fishing and quarrying	236,078
Mfr. of food, beverages and tobacco	39,306
Mfr. of textiles and leather	7,118
Mfr. of wood products, printing and publ.	9,778
Mfr. of chemicals and plastic products	15,177
Mfr. of other non-metallic mineral products	5,947
Mfr. of basic metals and fabr. metal prod.	5,259
Mfr. of furniture; manufacturing n.e.c.	494
Construction	619
Hotels and restaurants	4,251

# Assuring Energy for Development

- Modern industry, agriculture, transport, and urban living are (fossil fuel based) energy intensive. 276 million tons of meat produced in 2006 (43kg per capita); 1.24 billion tons of steel; 33 million tons of aluminum (which used 3% of all electricity).
- Rising costs of energy overshadow future development.
- As with water, access to adequate energy supplies and reduction in energy coefficients of activities will be crucial.

# Assuring Energy for Development (cont.)

- ODA can assist with finding solutions through:
  - Capital which enables low income countries to build energy infrastructure (the IEA estimates that total world investment in energy between 2006 and 2030 will be \$22 trillion).
  - Research and technology transfer which improve efficiency of mainstream technologies – transport, power generation and transmission, for example.
  - Research and transfer of technology in new areas e.g. renewable energy distributed energy production and use with PV cells and fuel cells, human kinetic energy conversion to electricity, etc. Also implications in terms of land and water utilization for bio-fuels and land use for wind energy, PV cells and for power storage facilities.
  - Building more energy frugal production and living systems will require national level planning and design especially of urban and transport systems to reduce energy footprint.

# Assuring Energy for Development (cont.)

- A less energy intensive agriculture would require heavy investment in biotech research on drought resistant varieties requiring less fertilizer and pesticide and alternative ways of producing foodstuffs.
- Advanced countries need to cultivate technological capability in developing countries.

# Energy Intensity of Selected Activities

## Case of Denmark, 2005

Energy balances by industry (Gross energy consumption in petajoules)	
Agriculture, horticulture and forestry	45.7
Fishing	8.1
Mining and quarrying	31.9
Mfr. of food, beverages and tobacco	43.5
Mfr. of textiles and leather	2.3
Mfr. of wood products, printing and publ.	14.8
Mfr. of chemicals and plastic products	39.5
Mfr. of other non-metallic mineral products	28.9
Mfr. of basic metals and fabr. metal prod.	30.2
Mfr. of furniture; manufacturing n.e.c.	5.7
Construction	19.9
Hotels and restaurants	9.0
Transport	79.6

# Harnessing ICT

- Direct and spillover benefits from ICT (a general purpose technology) are numerous. However, access is increasing slowly in the least developed countries because initial capital costs are high, and appropriate hardware, software and skills scarce.
- Institutions, networks, and financing to encourage local innovation also missing. ODA can fill some gaps.
- Hardware – transmission equipment, affordable computers, etc – and training in its repair and maintenance would benefit some countries.

# Harnessing ICT

- Technology transfer will have major role:
  - IT can improve efficiency in using electric power;
  - in upgrading logistics and warehousing;
  - in tapping the potential of biotechnology for fighting disease;
  - in developing bio-fuels and hardier crops.
- ODA has a pump priming function, providing some capital, knowledge, and helping build skills.

# Climate Change Handicaps the Poor

- It will reduce water availability in some areas. This plus greater heat and CO<sub>2</sub> will lessen crop yields.
- It will raise energy demands for cooling purposes.
- It will increase vulnerability to extreme weather events.
- It will give rise to problems for coastal cities.

# Climate Change Handicaps the Poor

- Warming raises the capital costs of development by increasing the need for, e.g.
  - water storage and reliable supplies;
  - more robust infrastructure;
  - Enhancing the resilience of coastal cities to rising sea water and hurricanes;
  - Safeguarding water supply and sanitation systems in coastal areas;
  - Accommodating faster migration to cities as agricultural activities are curtailed in some areas.

# Climate Change Handicaps the Poor

- The role of ODA could increase rather than diminish. Scattered, uncoordinated local initiatives will not be sufficient given the magnitude and geographical dimensions of the problems.

# Past is not Prologue

- Path to development is likely to become steeper because of these challenges.
- Reducing poverty by raising growth rates will require more capital and technology in a warmer, drier, energy scarce, urbanized world.
- Stronger macroeconomic, and governance conditions in many countries, the spread of education, better market institutions, and awareness of global opportunities could make ODA far more effective in the future. International relations and political imperatives also different from Cold War period.
- Learning from past mistakes can make ODA smarter.
- While national and local actions will be the main driving force in less developed countries, ODA's role in helping them meet key challenges, managing spillovers with international consequences and safeguarding the health of the global commons, could well be greater.