



Course 1.1

Introduction to Innovation: Role of STI for Growth and Sustainable Development

UN-Wide Capacity Building Workshop on Technology for Development:
Innovation Policies for SDGS in the Arab Region

15 April 2018, Amman, Jordan



Introduction to Innovation: Role of STI for growth and sustainable development

1. What is **innovation**?

2. Why do we **need innovation** (and science, and technology)

3. What is the **role of STI policy**?

4. What are the **components of STI Policy**?

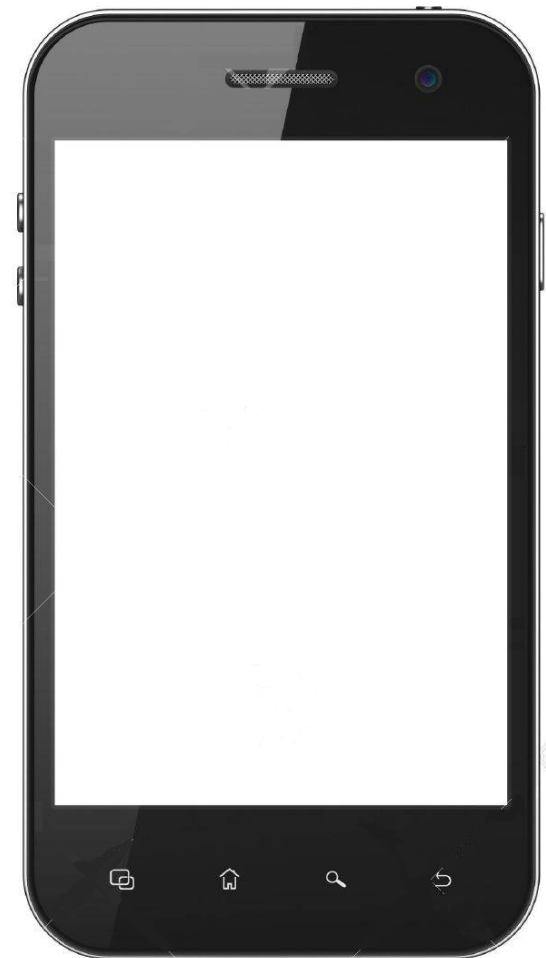
5. Innovation in a **development context**

6. Innovation and **sustainable development**

7. Back to basics: **firms and entrepreneurs**



Apple iPhone 4

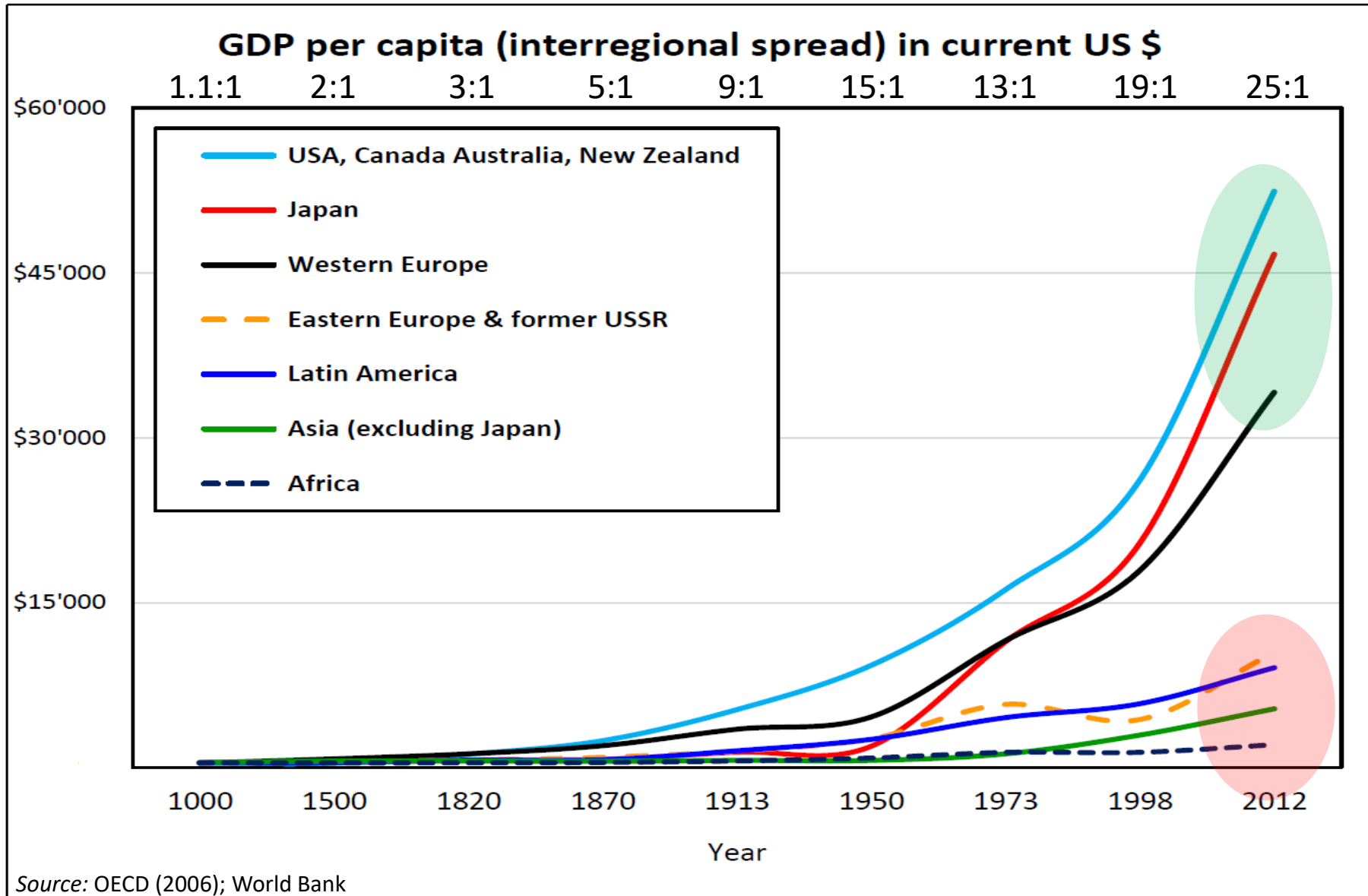


smartphone

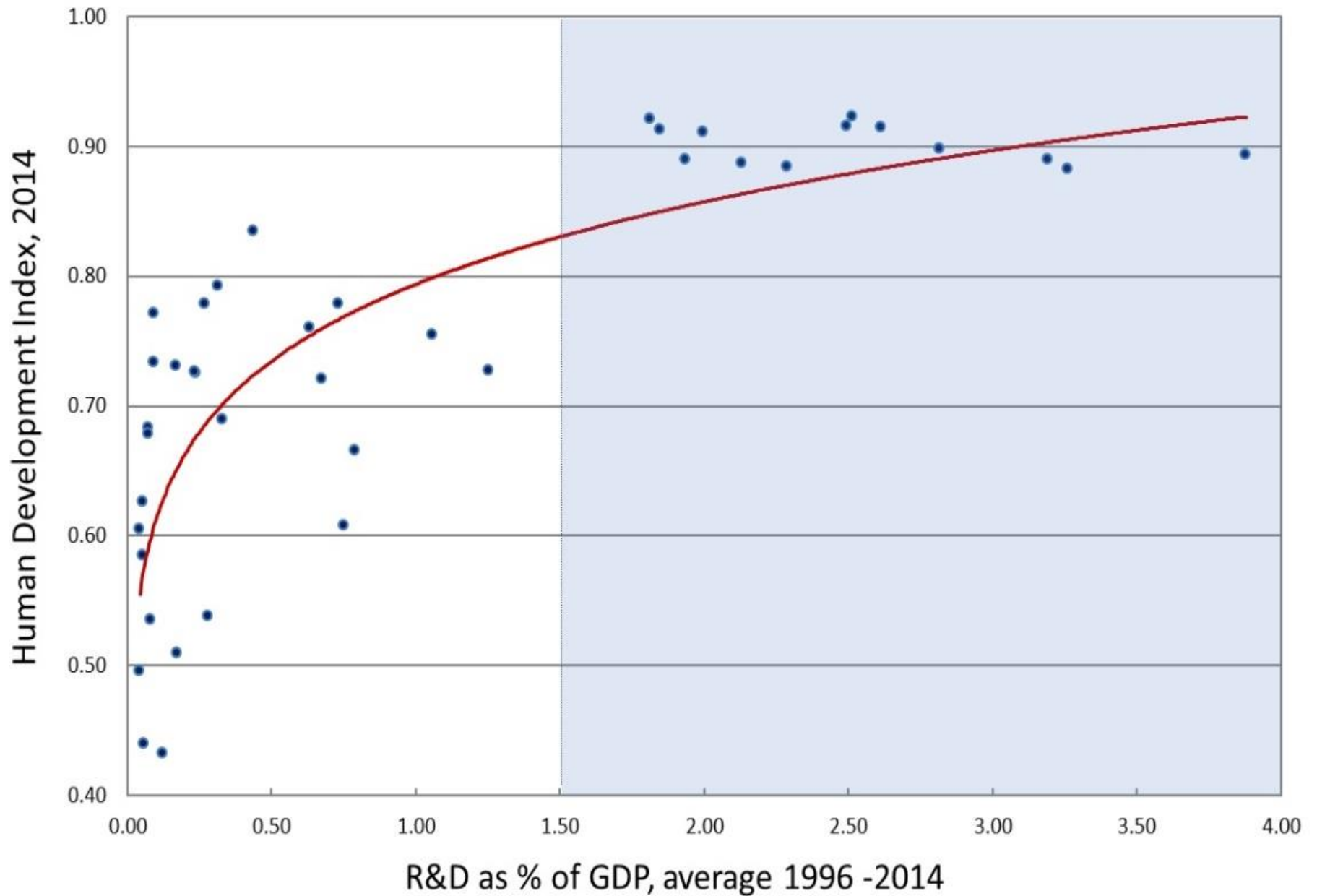
1. What is **innovation**?

- ✓ **Knowledge and technology**
- ✓ **Product, service, or process**
- ✓ **Value: commercial or social (or environmental)**
- ✓ **How new-novel does it have to be?**
- ✓ **What about invention?**
- ✓ **What is the role, why do we need **Science, Technology and Innovation (STI) policy**?**

2.1 Why do we need innovation? (... and science, and technology)



STI and economic development



2.2 Why do we **need** innovation? (... and science, and technology)

- Primary source of **productivity** growth
- Stimulates **trade and investment**
- Drives economic **diversification**
- Enables improvements in **income and welfare**
- Supports sustainable, inclusive **development**
- Needed to **catch-up and compete** with developed countries

2.3 Why do we **need** innovation? (... and science, and technology)

Q: What are the conditions for innovation?

- Sufficient domestic or export market
 - economic experimentation, economies of scale, incentivizes investing in technology and innovation
- Economic, social and institutional culture
 - supports entrepreneurship and risk taking, failure is OK
- Human and physical capacities to innovate
 - industrial R&D, product development/prototyping, economic experimentation and commercial exploration
- Financial capacity for uncertain and high-risk ventures

3.1 Q: What is the role of STI policy?

A: Insufficient investment in STI, poor results of STI...

1. Externalities

2. Uncertainty

3. Indivisibility

=

Market failure

4. More uncertainty

- Market uncertainty (preferences, fads, demographics...)
- Business uncertainty (competitors, suppliers, value chains...)
- Technology uncertainty (will it technically scale in production?)
- Policy uncertainty (change in regulations, policies...)

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1. Externalities

2. Uncertainty

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REDUCE UNCERTAINTY

... uncertainty and innovation

- Business is always risky, but **innovation is uncertain**
- Semantics, scale, too many definitions?
... insurance, speculative, financial, business, entrepreneurs
- Everyday experience, uncertainty = unknown
- Framing, wishful thinking, groupthink and cultural and cognitive biases
- ***Knight (1921):*** risk is measurable, uncertainty isn't
... *distribution, statistical study, observe processes*
... *risk is managed, reserved, hedged, insured, transferred*
... ***uncertainty is the source of profit and failure***

3.2 Q: What is the role of STI policy?

- **Market failure**
- **Systemic failure**
 - Network, linkages, transitional, infrastructure, institutional
- **Policy coordination failure**
- **Directionality failure**
- **Strategic failure**

3.2 Q: What is the role of **STI** policy?

- **Market failure**
- **Systemic challenges**
 - Network, linkages, transitional, infrastructure, institutional
- **Policy coordination challenges**
- **Directionality challenges**
- **Strategic challenges**

4. What are the components of STI Policy?

Q: Is there a correspondence between **failures** **challenges** and policies?

- Economic (and social) policies
- Institutional policies
- Governance policies, social contract
- National vision - development aspirations

4. What are the components of STI Policy?

Q: Is there a correspondence between ~~failures~~ challenges and policies?

- Economic (and social) policies
- Institutional policies
- Governance
- National vision - development aspirations

Q: If not, how does policy manage?

4. What are the components of STI Policy?

- **Economic (and social) policies**

- Agriculture
- Business facilitation
- Competition
- Defense
- Energy
- Environmental regulation
- Exchange rate
- FDI
- Fiscal
- Financial services
- Food security
- Health
- Industrial
- Labour
- Land management
- Monetary
- Public finance, budget
- Public procurement
- Science
- SME support
- Legal, regulatory
- Standards, safety
- Subsidies
- Technology transfer
- Telecoms, Internet
- Trade
- Transportation

5. Innovation in a **development context**

- **Weak (National) Innovation System**

NSI, policy learning, leadership, development-specific, policy coordination, locus of STI policy, commercialization

- **Underdeveloped absorptive capacities**

technological learning, eco/tech experimentation and discovery, competencies, linkages, funding, trade, FDI policies

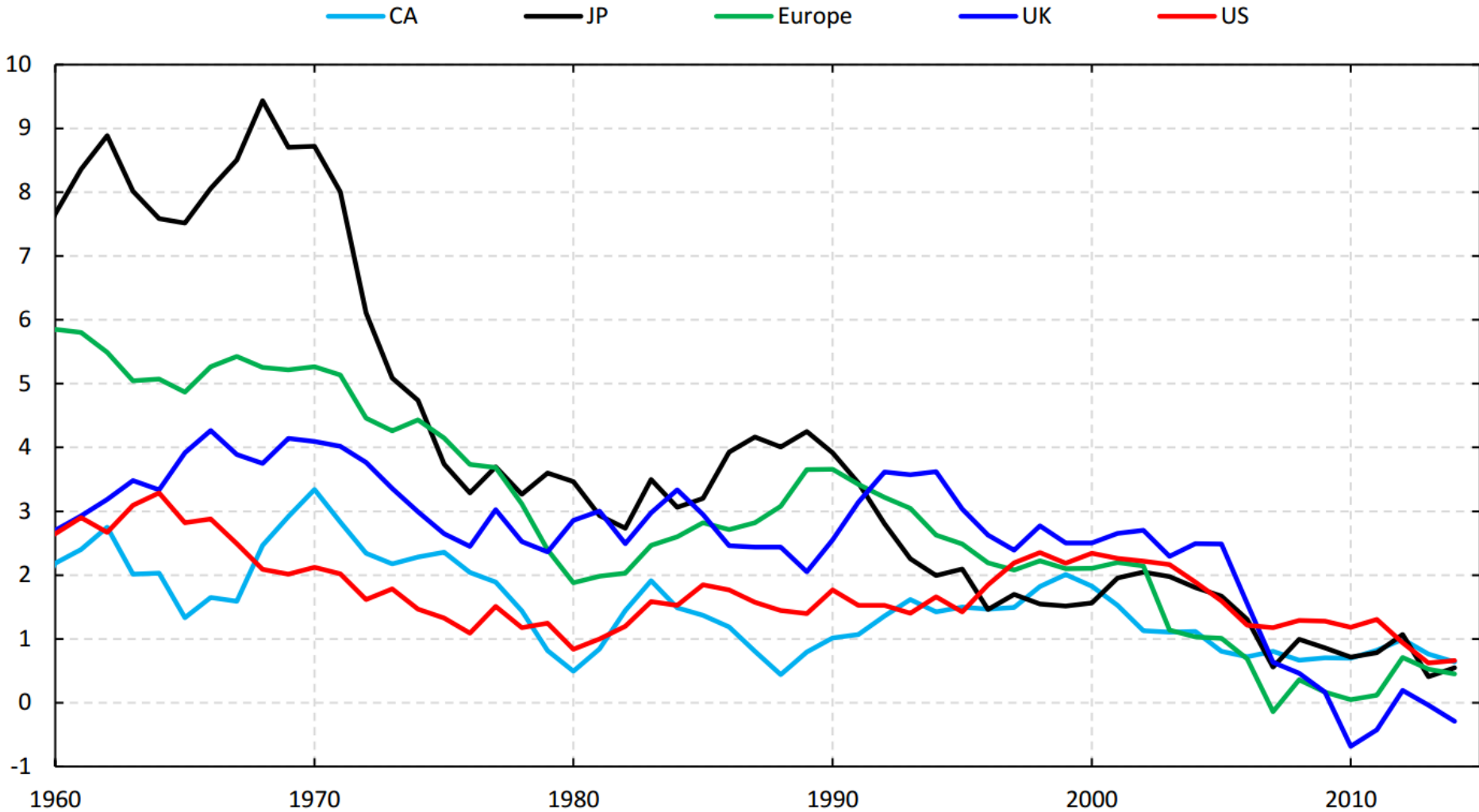
- **Ineffective or weak incentives**

learning interaction/knowledge flows, coop. between firms and knowledge orgs, procurement, horizontal communication, stakeholder participation in policy formulation, IPRs

6. Innovation and **sustainable** development

- **Current path: not sustainable, generalized failure**
- **Innovation lacking, Agenda 2030 is ambitious**
 - reduce climate-change risks, improve energy security, improve access to food, energy and water for the poor, improve environmental quality and public health, act diligently as a steward of biodiversity, respond to aspirations of people in developing countries
- **Burden disproportionately on developing countries**
- **Mode of technology transfer**
- **Determination to implement vs. Resistance**
- **Policy uncertainty: diverging short- and long-term views**
- **Solution? Innovation systems?** ... Course 1.3

Labour productivity growth

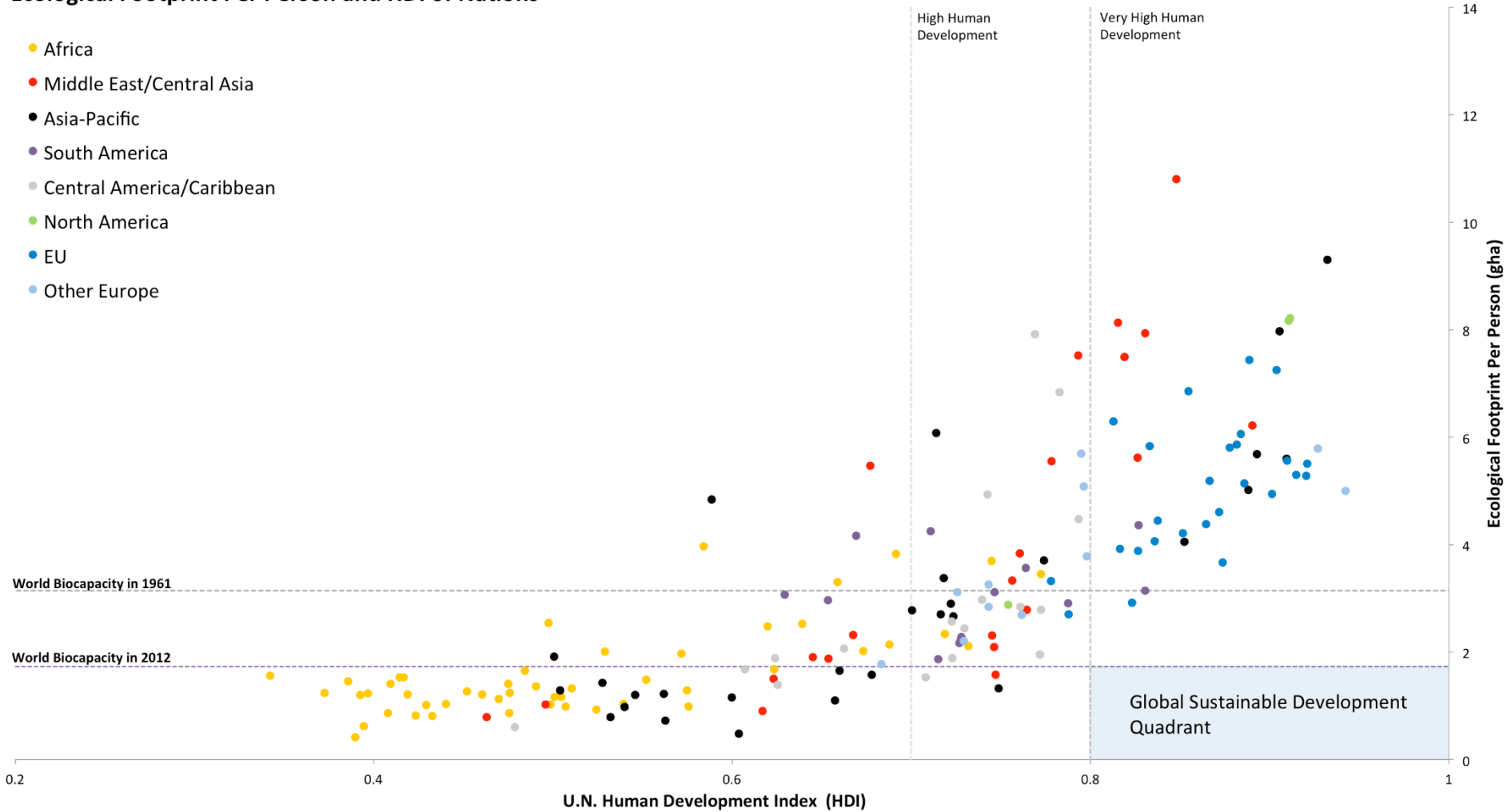


Source: Conference Board Total Economy Database, IMF World Economic Outlook

To live within the means of our planet's resources, the world's Ecological Footprint would have to equal the available biocapacity per person on our planet = 1.7 global hectares.

Ecological Footprint Per Person and HDI of Nations

- Africa
- Middle East/Central Asia
- Asia-Pacific
- South America
- Central America/Caribbean
- North America
- EU
- Other Europe



Ecological Footprint values are 2012 values from the 2016 National Footprint Accounts, Global Footprint Network
2012 values are from the 2015 Human Development Report, UNDP

7.1 Back to basics: firms and entrepreneurs

- Innovation take place in firms
- Innovation is a primary entrepreneurial activity
- Search for new more efficient combinations of resources
- Frontiers of knowledge and technology
- Learn to employ existing knowledge and technologies
- Development perspective: technology acquisition, imitation and adaptation
- Policymakers able to identify and support innovative firms and entrepreneurs: case study exercise

A Bad Skier's Revenge

By Stuart Leuthner

Invention & Technology Magazine, Winter 2004, pg. 50-59

<http://airportjournals.com/a-bad-skiers-revenge/>

A skiing vacation during the winter of 1947 led Howard Head, an engineer at the Glenn L. Martin Company who skied badly, to revolutionize skiing.

Howard Head revolutionized two sports. He didn't set out to do this; it grew out of his enthusiasm for skiing and tennis as recreation, which led him to use his natural inventive talent to try to make them better. When a reporter asked Head how he invented, he said, "I invent when it's something I really want. The need has to grow in your gut. People who go around trying to invent something generally fall on their tails. The best inventions come from people who are deeply involved in trying to solve a problem."

During the winter of 1947, Head and some friends took the train to Stowe, Vt., for a ski vacation. Head, an engineer at the Glenn L. Martin Company, enjoyed the experience, but was "humiliated and disgusted" at how badly he skied.

On the ride back to Baltimore, Head and his friends discussed their adventures on the mountain. Rather than take all of the blame for his poor performance, Head put some of the responsibility on "those long, heavy, clumsy hickory skis."

Head then told his traveling companions that there was no reason they should be skiing on wooden skis in these modern times. He would build a better ski from the materials used in the aircraft industry—aluminum and plastic.



7.2 Back to basics: firms and entrepreneurs

Case study questions:

- Why and how did the entrepreneur become an innovator?
- What particular skills and competencies did the entrepreneur possess?
- What new skills and competencies did the entrepreneur have to acquire?
- What were the motivations to become an innovative entrepreneur?
- What were the main financial incentives and disincentives?
- What favourable conditions did the entrepreneur encounter?
- What unfavorable conditions did the entrepreneur encounter?
- What was the source of funding?
- What was the source of knowledge?
- Were there any knowledge and technology transfer flows and processes?
- What was the role of chance in their success?
- Who were the main counterparts and innovation and business partners?
- How did the entrepreneur discover and engage these partnerships?

Gross R&D as a per cent of GDP, 1981-2009

