

Innovation: Opportunities & Challenges for Emerging Asia

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Outline

- Innovation, National Innovation System & Its Importance for Economic Development
- Overview of Innovation Performance of Emerging Asian Economies
- Innovation Policy Tools
- Key Innovation Policy Issues for Emerging Asia
- Innovation Opportunities for Emerging Asia

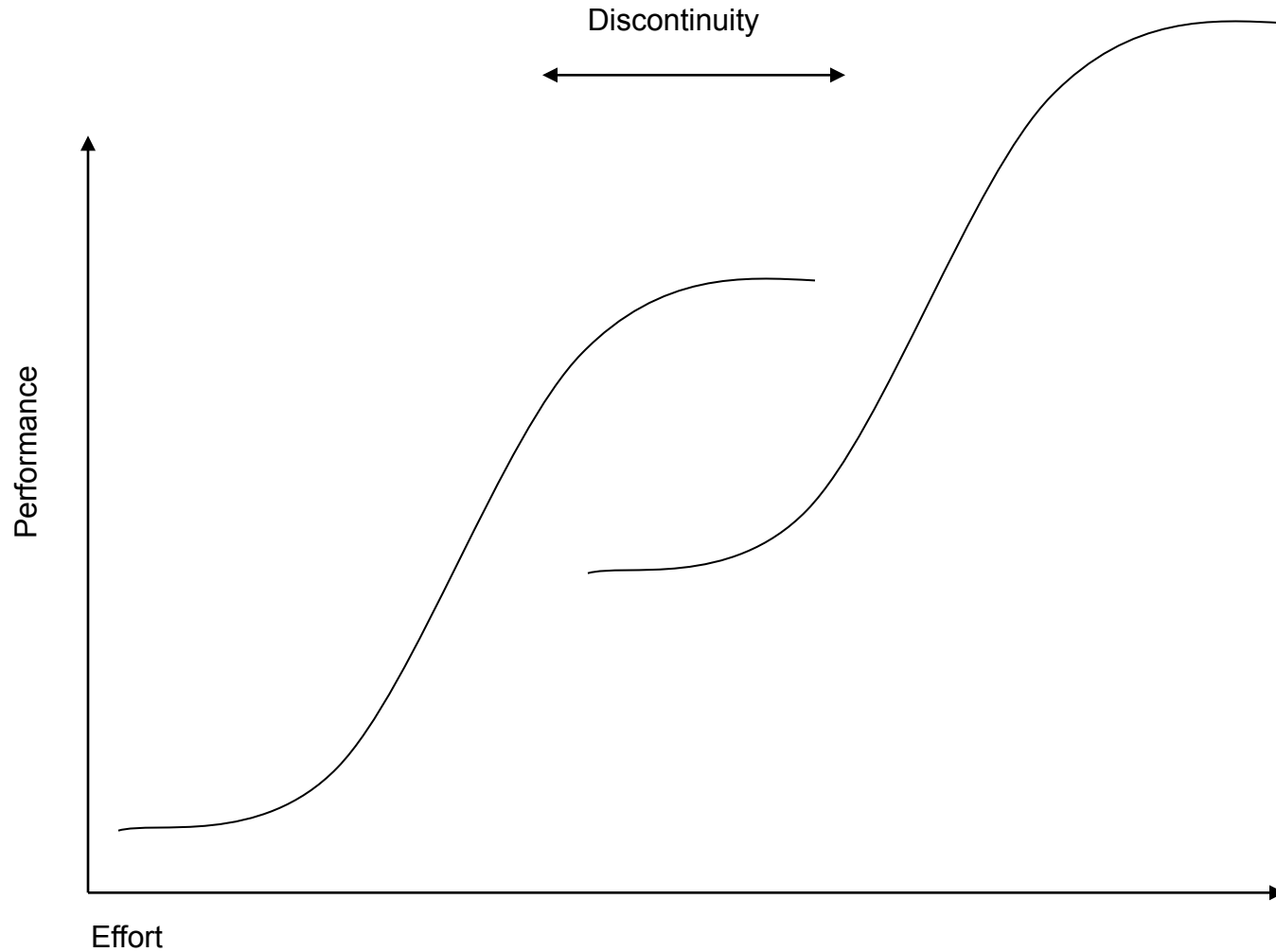
Innovation

- **Innovation:** A New & Better Way of Doing Things
- **Technological Innovation**
 - First Exploitation or Commercialization of a NEW Scientific Discovery or Invention
 - Incremental Improvement to the Cost/Performance Attributes of an Existing technology
- **Non-Technological Innovation**
 - ***Business Model Innovation:*** a NEW business method or way of organizing business activities
 - ***Design and Creative Content:*** New design and original artistic creation

Typology of Technological Innovations

- Radical vs. Incremental
- Discontinuous vs. Continuous
- Disruptive vs. Sustaining (Christensen)

Discontinuous vs. Continuous Innovation



TECHNOLOGICAL CAPABILITY

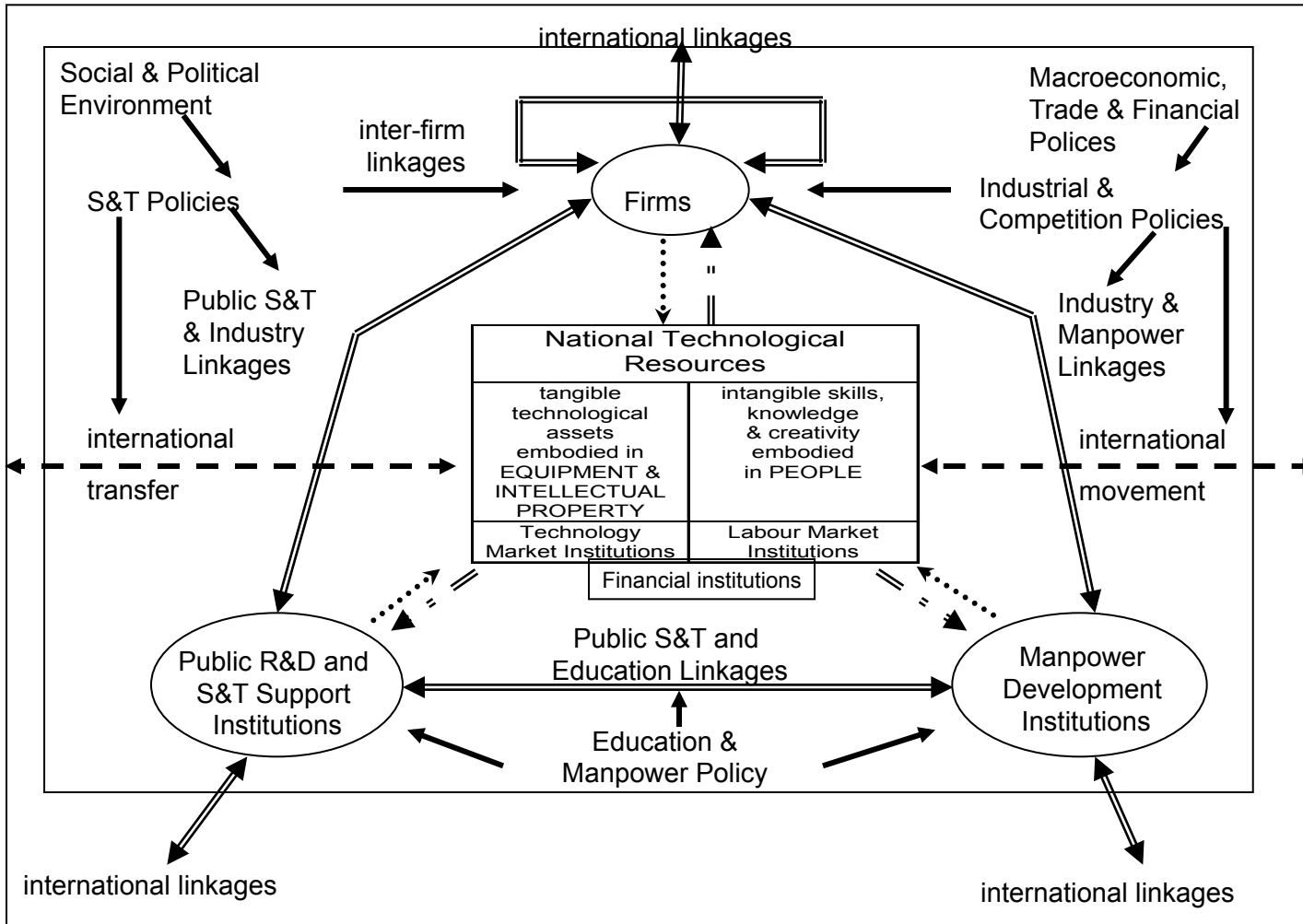
- **Levels** of Technological Capability
 - Ability to Use
 - Ability to Adapt
 - Ability to Innovate
- **Product vs. Process** Technological Capability
- **Forms of Embodiment** of technological capability
 - hardware, software, “humanware” (knowledge/skills, experience), system integration
- **Codified vs. Non-codified (Tacit) Knowledge**
- Underlying **Intellectual Property Rights**

National Innovation System

- An effective innovation system is composed of firms, research centers, universities, consultants and other intermediaries that keep up with new knowledge and technology, tap into the growing stock of global knowledge, assimilate and adapt it to local needs, and create new knowledge (World Bank (2007), p. 24).
- Many factors affect the performance of a National Innovation System. In particular, policies and institutions that promote the *creation* and *use* of new knowledge and technology, and foster effective *interaction* between producers and users of knowledge and technology, are critical to the performance of an innovation system

Key Elements of a National Innovation System (Wong, 2002)

Regional & Global Market/Competitive Environment

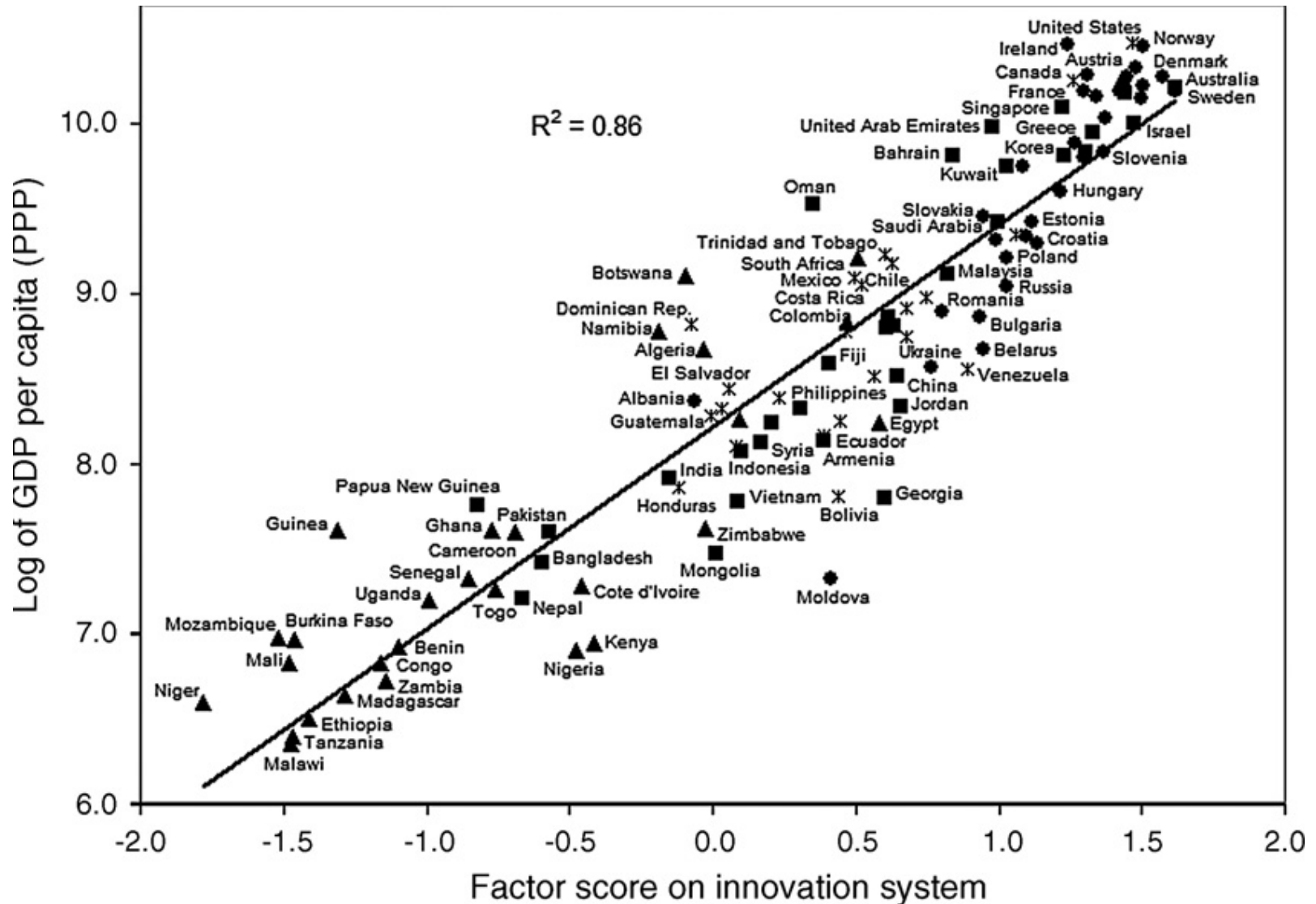


Source:
Wong(2002)

Innovation & Economic Development

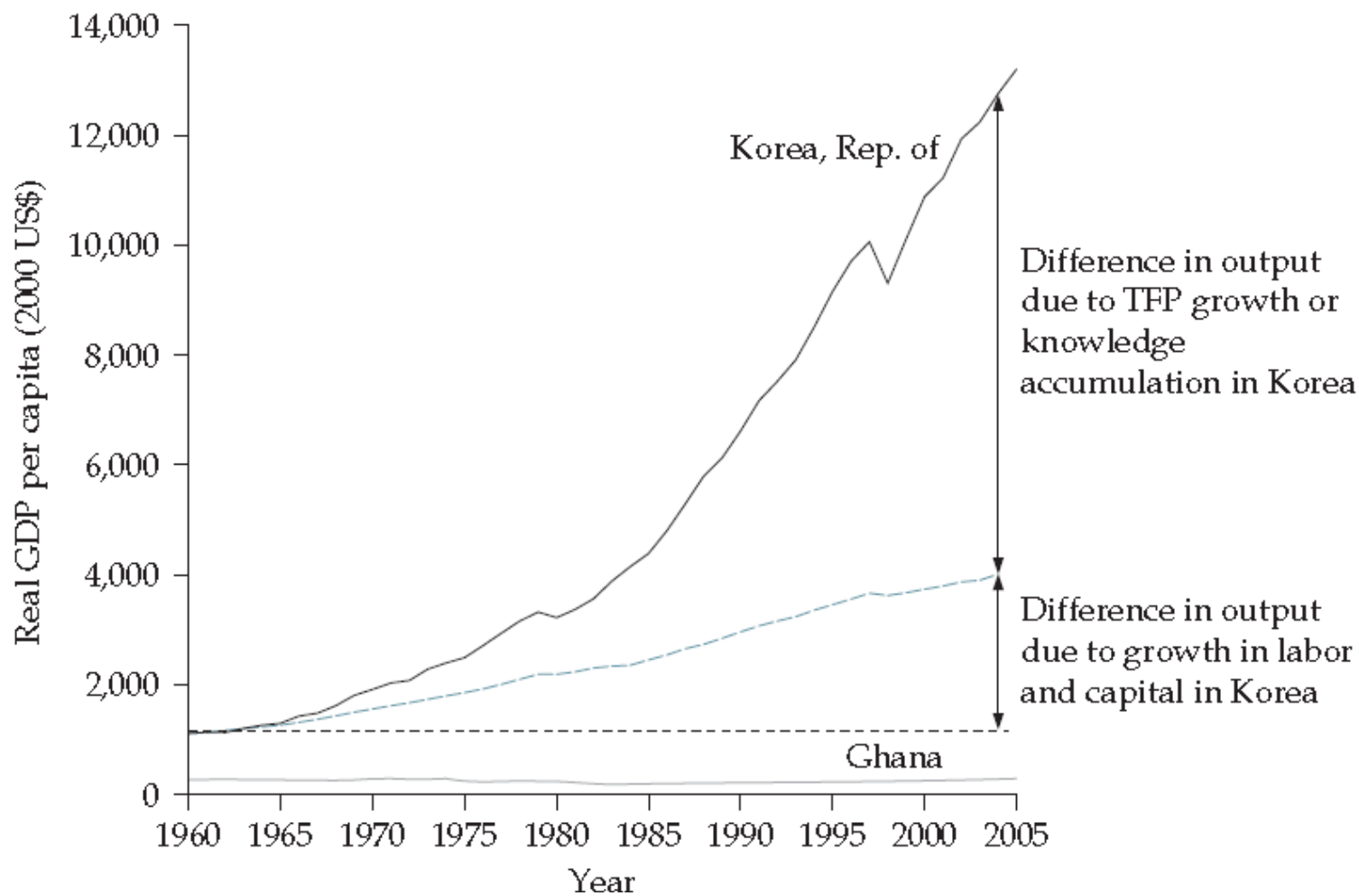
- Innovation has been a critical determinant of economic growth of nations & international competitiveness of firms
 - High correlation between innovation capability and per capita income of nations
 - Significant impact of innovation on the economic performance and competitiveness of firms and industries
 - Increasing share of Intellectual Property income in GNP
- Latecomer nations & firms that have achieved fast catching up with advanced nations and incumbent industrial leaders have done so by investing heavily in technological learning and innovation
 - Japan & the Asian NIEs
 - The rise of globally competitive firms from Asia like Samsung, Haier, TSMC and Infosys

Innovation capability & economic development



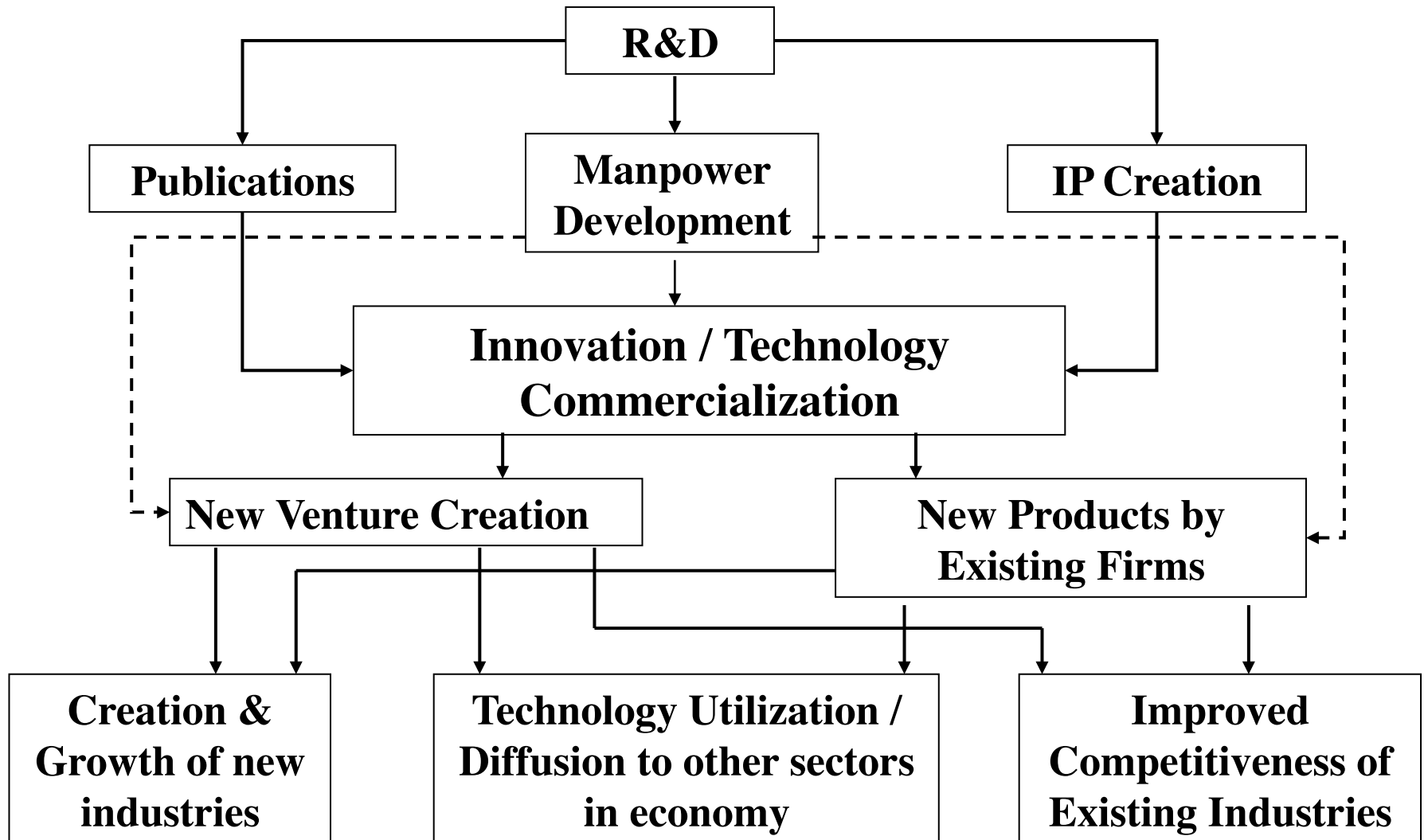
The Tales of 2 countries

Figure 1.3 GDP Growth in Republic of Korea and Ghana over 50 years



Source: World Bank(2007)

Contribution of Research & Innovation to Enterprise Growth



How Does Innovation Create Competitive Advantage at the Firm Level ?

- Improving Competitiveness in Existing Business by:
 - Enabling Cost Reduction
 - Enabling Differentiation of Quality/Attributes of Products or Services Delivered
 - Raising Barriers to Entry/Switching
- Growing New Businesses by:
 - Enabling Entry into Businesses New to the Firm
 - Creating Entirely New Markets/Businesses
 - Upsetting Industry Incumbents by changing the “Rules of the Games”

Growing Importance of Intellectual Property (IP)

- In 2012, the global R&D expenses reached \$1.5 trillion while the worldwide royalties and licensing revenue generated from IP were \$300 billion.
- Asset in the form of IP is estimated to be worth over US\$5 trillion in the US in 2005, or over 45% of US GDP (Shapiro & Hassett, 2005)
- IP-intensive industries accounted for about \$5.06 trillion in value added, or 34.8 percent of U.S. gross domestic product (GDP), in 2010 (US Dept of Commerce, 2012).

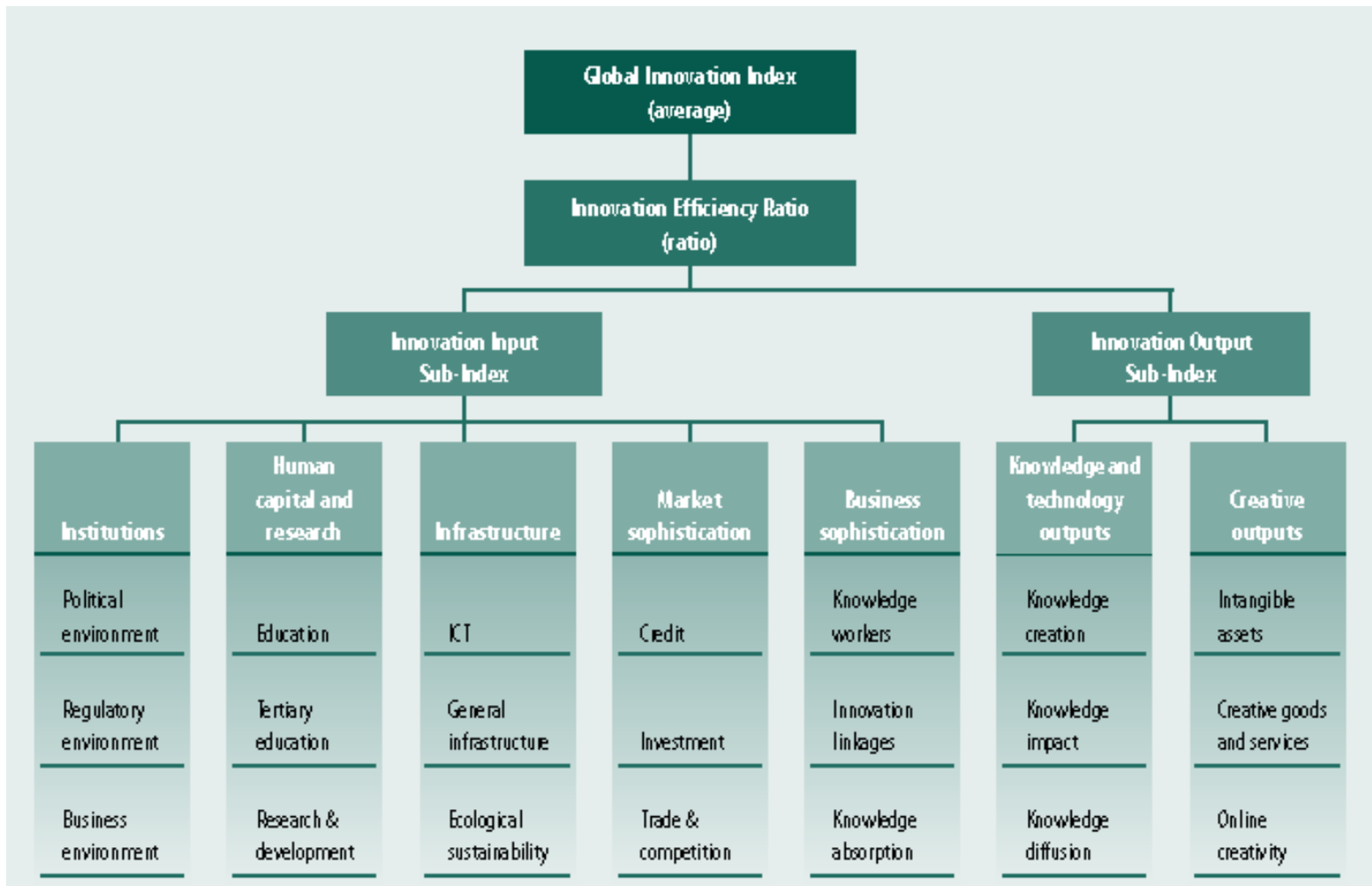
From National to Global Innovation System ?

- With increasing globalization, most national innovation systems have become increasingly integrated within a *global* innovation system, with global actors (multinational corporations) supra-national standards-setting and R&D organizations , global information networks (internet), international/multilateral institutions (international IP conventions like Berne & TRIPS), and globalized resource flows (information, people, money)
- Does globalization leads to greater catching up by the late-comer nations, or does it lead to increasing concentration of innovation activities and resources in a “Rich-men’s club” and growing marginalization of the rest?
- Innovation gaps seem to be widening between the advanced economies and many emerging economies, with the exception of a few economies like China & the Asian NIEs.
- The “middle-income” trap is mainly an “innovation” barrier

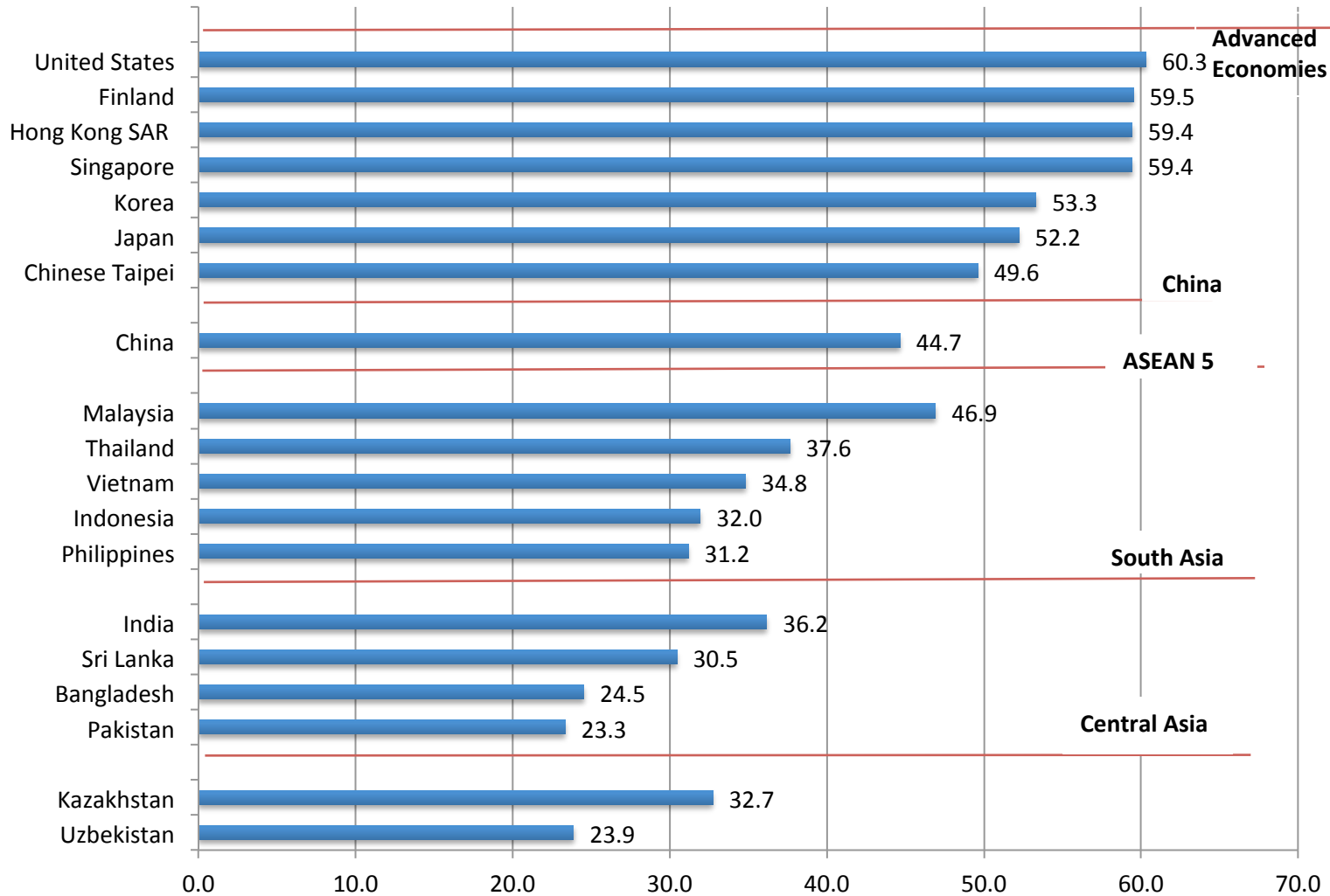
Measures of Innovation Performance

- Innovation Input Measures
 - R&D expenditures
 - Number of Research Scientists and Engineers
- S&T Output Measures
 - Publications
 - Patents
- Innovation Output Measures
 - % of firms involved in innovation activities
 - % of firm sales derived from new products & services
 - Income from Intellectual Property (IP)
 - Market share and Competitive Position
- Composite Measures of Innovation
 - INSEAD Global Innovation Index (incl Creative Output)
 - WEF GCR Innovation Index

INSEAD GII Components



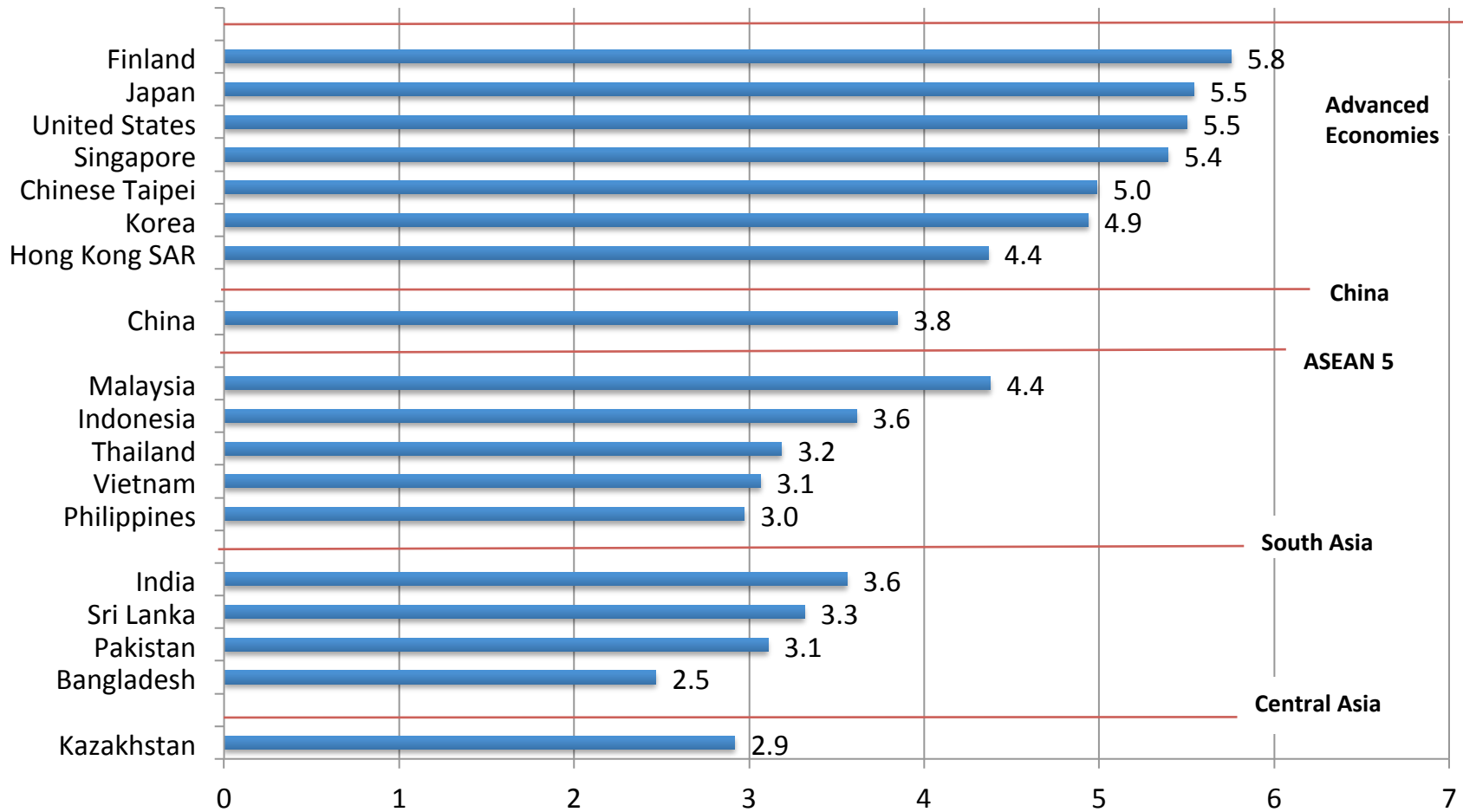
INSEAD Global Innovation Index 2013



Note: The Global Innovation Index (GII) is the simple average of the Input and Output Sub-Indices. Taiwan data is for 2010

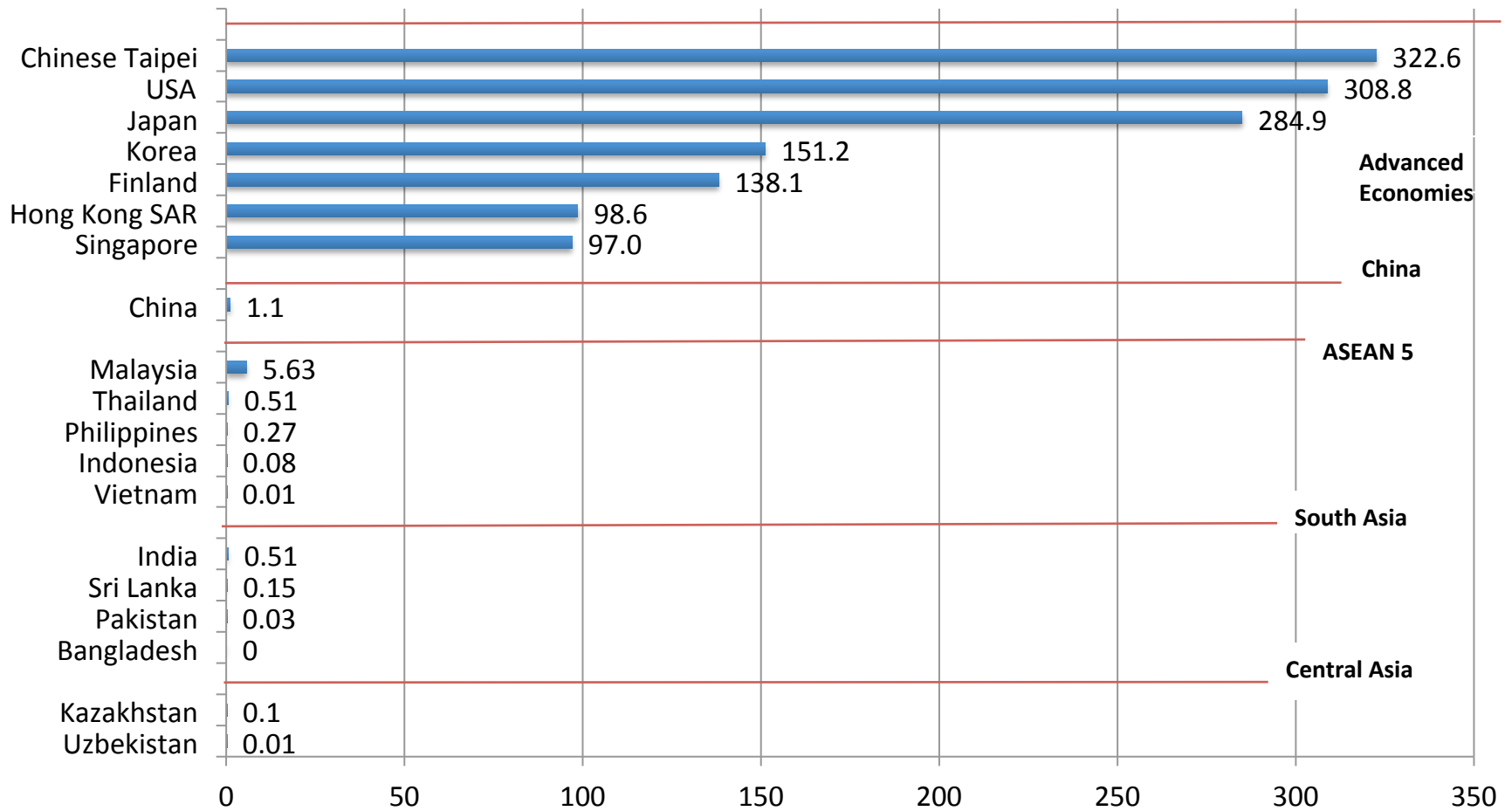
Source: INSEAD, Global Innovation Index 2013

WEF GCR Innovation Index 2012



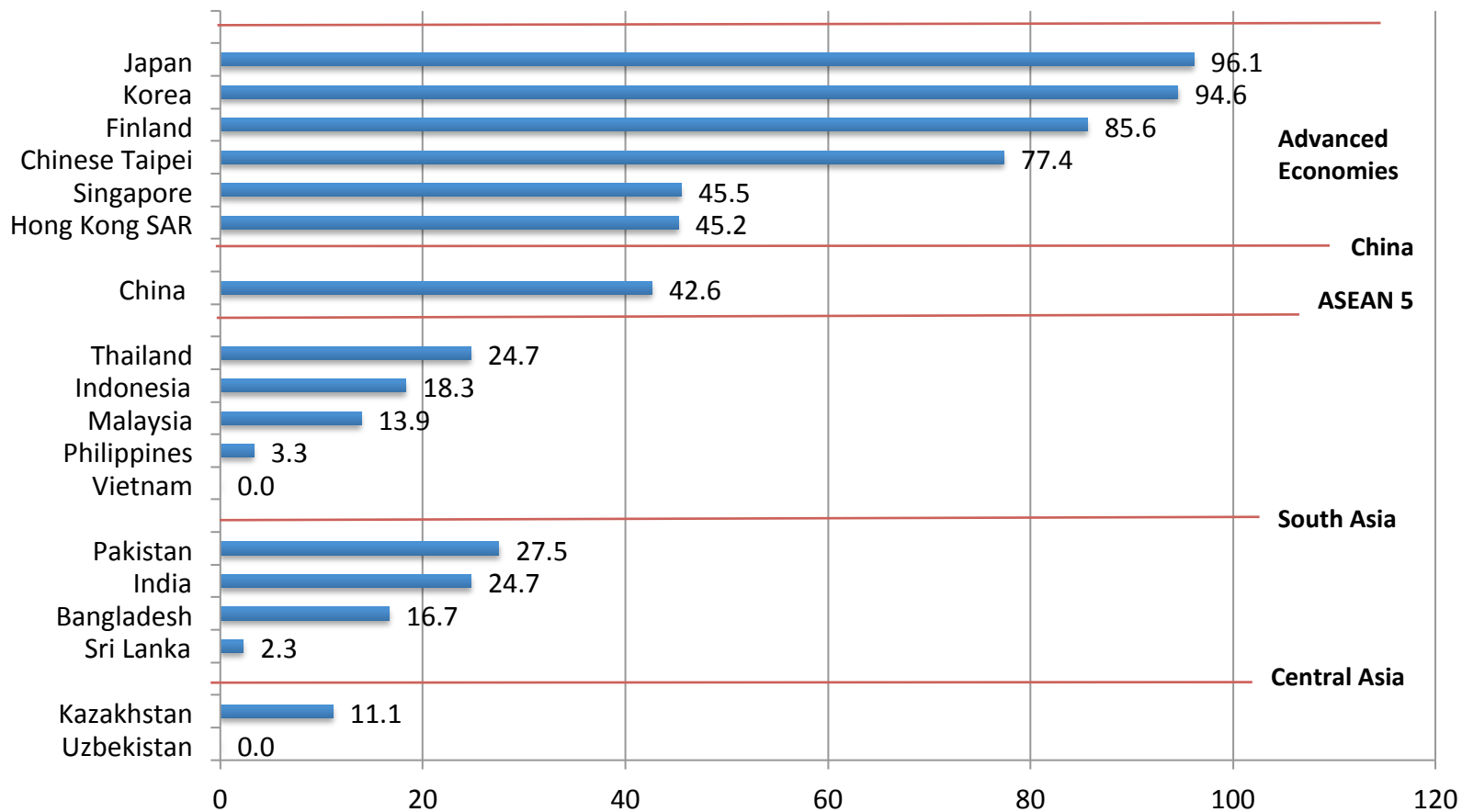
Note: Scale is from 1 to 7
Source: WEF Global Competitiveness Report

Patents Granted by USPTO per Million People, (Av. 2005-09)



Source: World Bank KAM

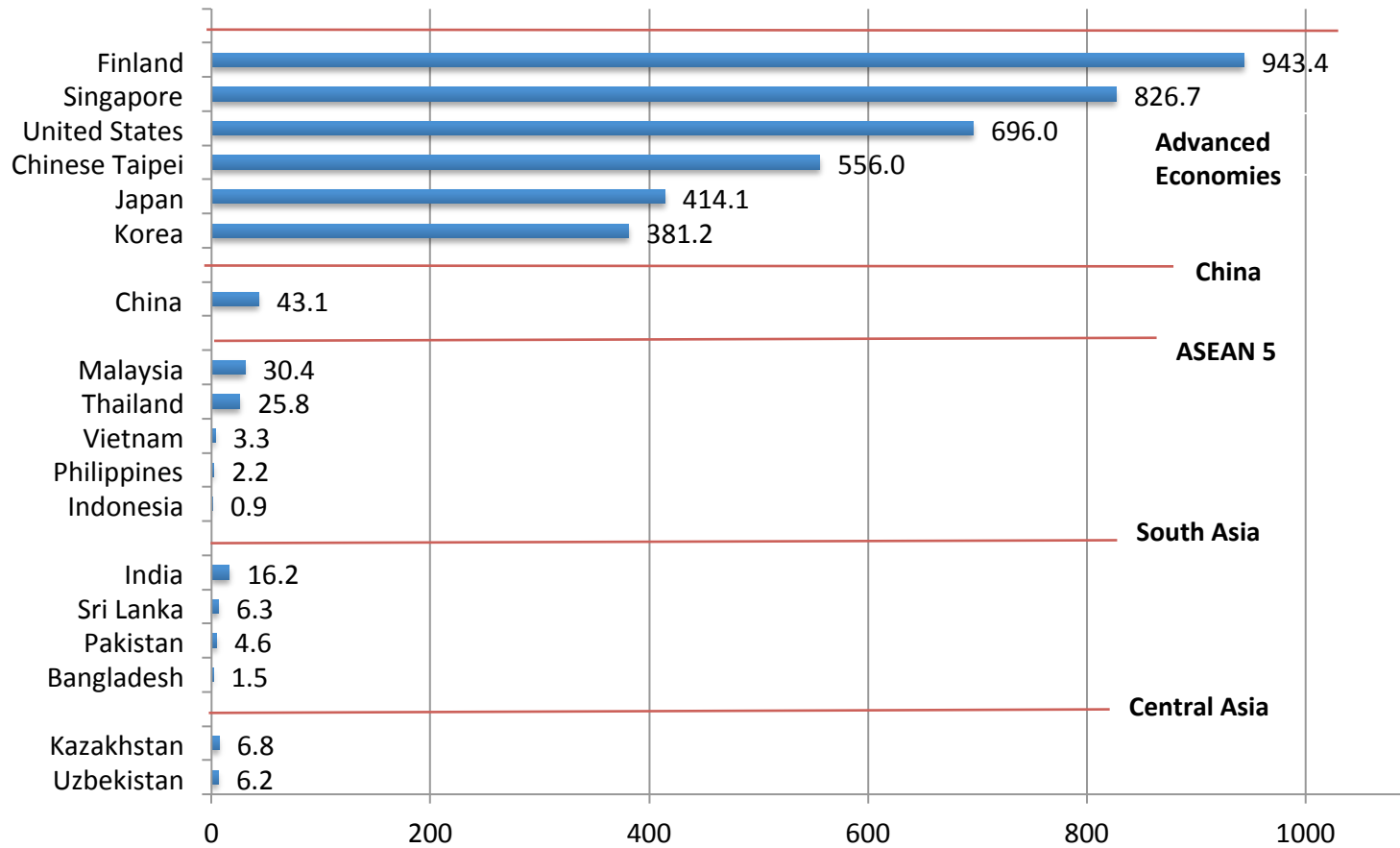
Local Ownership of Patents (% of total US patents issued), 2006-11



Note: Data based on patents granted by USPTO, with at least one inventor from the respective economies. A patent is considered locally owned if at least one assignee is from the local economy

Source: USPTO online patents database

S&E Journal Articles per Million People, 2007

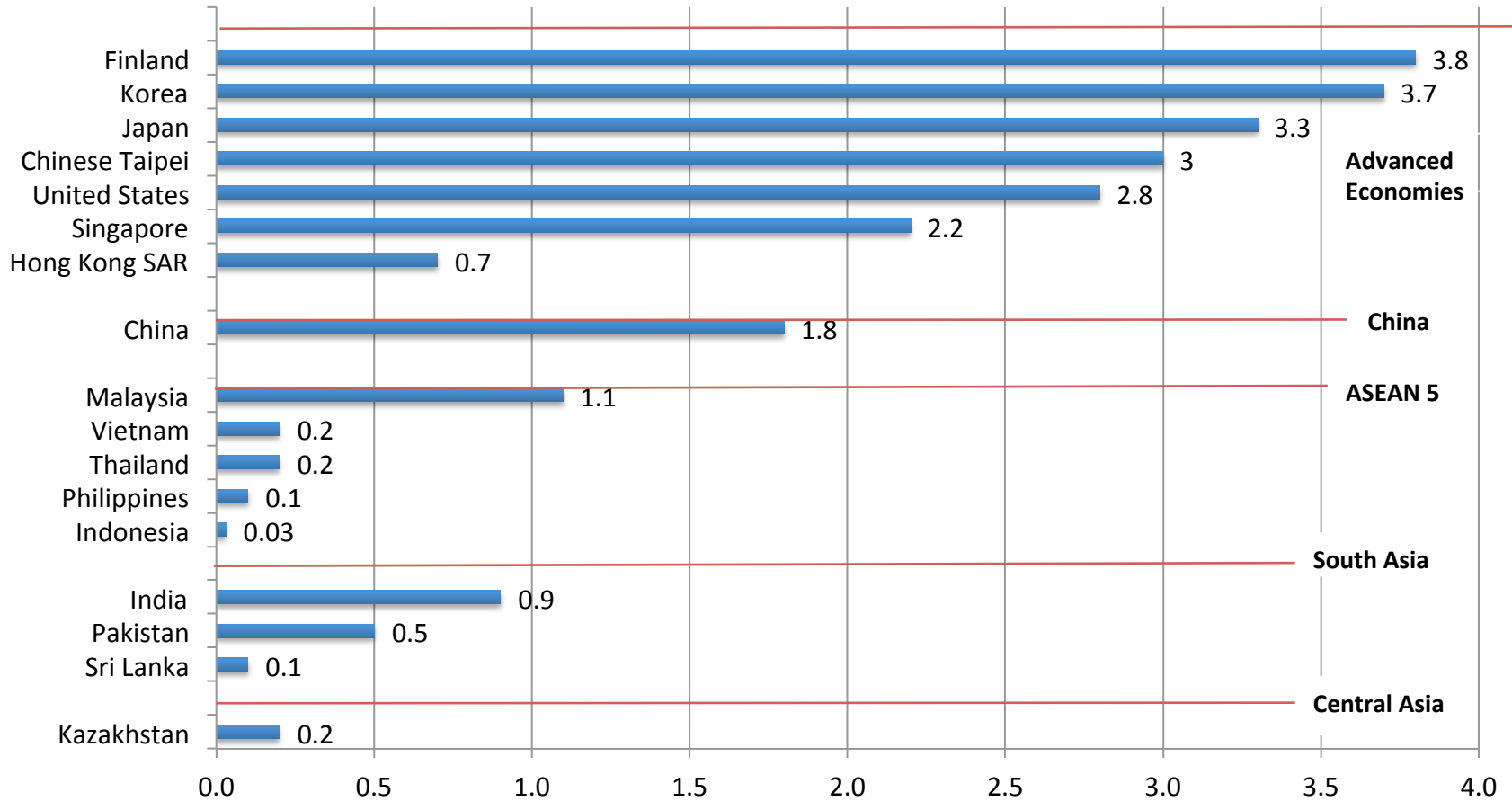


Source: World Bank KAM

Some Innovation Policy Tools

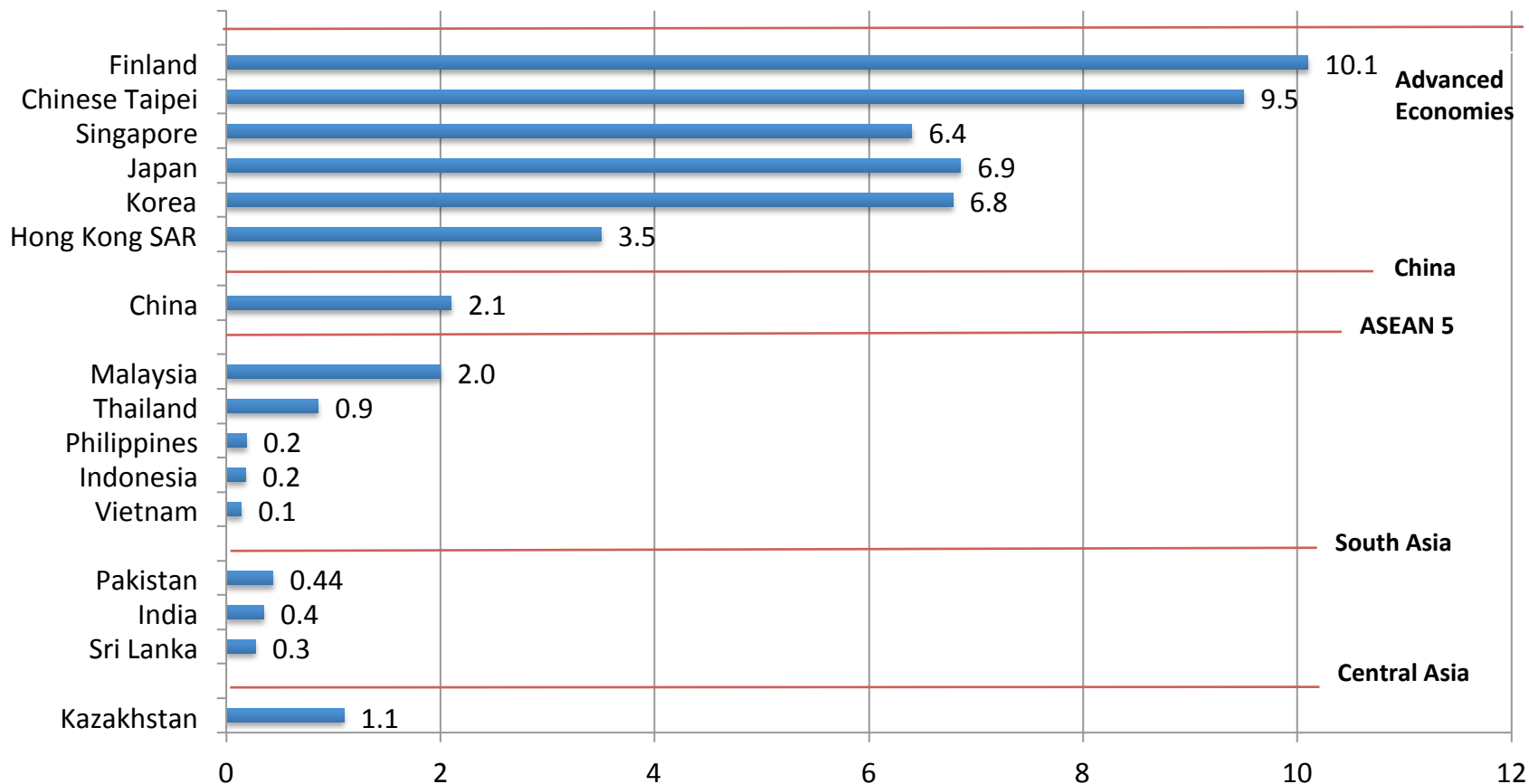
- Public Funding for R&D and Innovation Capability Development
 - Public funding for R&D in PRIs, IHLs and private sector
 - Public funding of S&T manpower & Infrastructure development
 - Tax incentives & subsidies for private sector R&D
 - Legal Protection & Enforcement of IP
- Stimulating Demand for Innovation
 - Public Procurement
 - Subsidies for Adoption & Use of New Technologies
 - Competition Policy, Openness to trade and investment
- Fostering Linkages between the Actors in the Innovation System
 - Development of Innovation Intermediaries (eg TTO, incubators)
 - Financing for Innovative Entrepreneurial Start-ups

Total Expenditure on R&D (% of GDP) 2011



Note: 2010 data for Korea, Japan, Thailand and Indonesia. 2009 data for Philippines and Pakistan. 2008 data for Sri Lanka. 2002 data for Vietnam
 Source: IMD World Competitiveness Report; UNESCO online statistical database

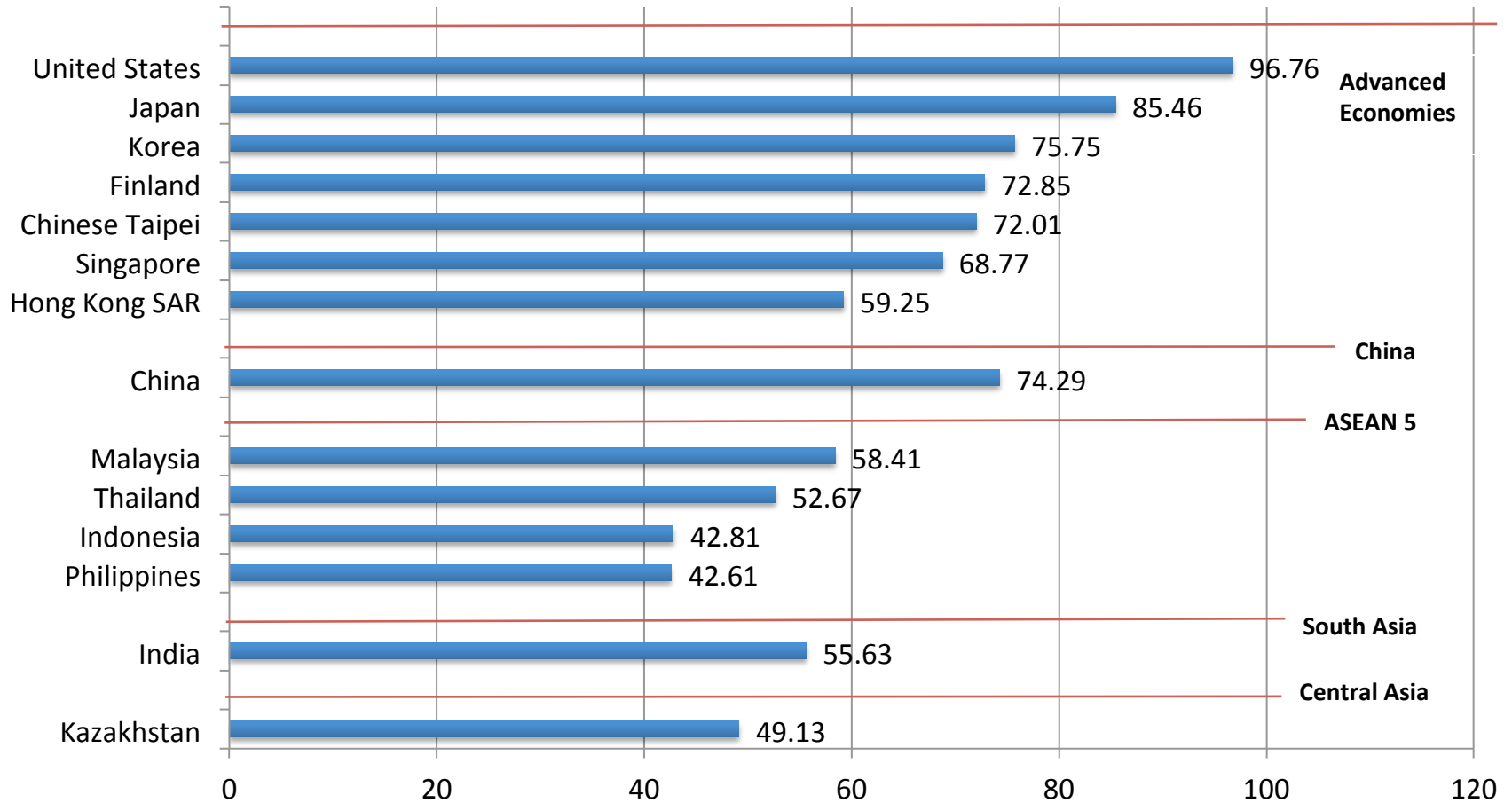
Total R&D Personnel per Capita (FTE per 1000 people) 2011



Note: 2010 data for Japan, Korea, Thailand and Pakistan. 2009 data for Indonesia and Philippines. 2008 data for Sri Lanka, 2006 data for India and 2002 data for Vietnam

Source: IMD World Competitiveness Report

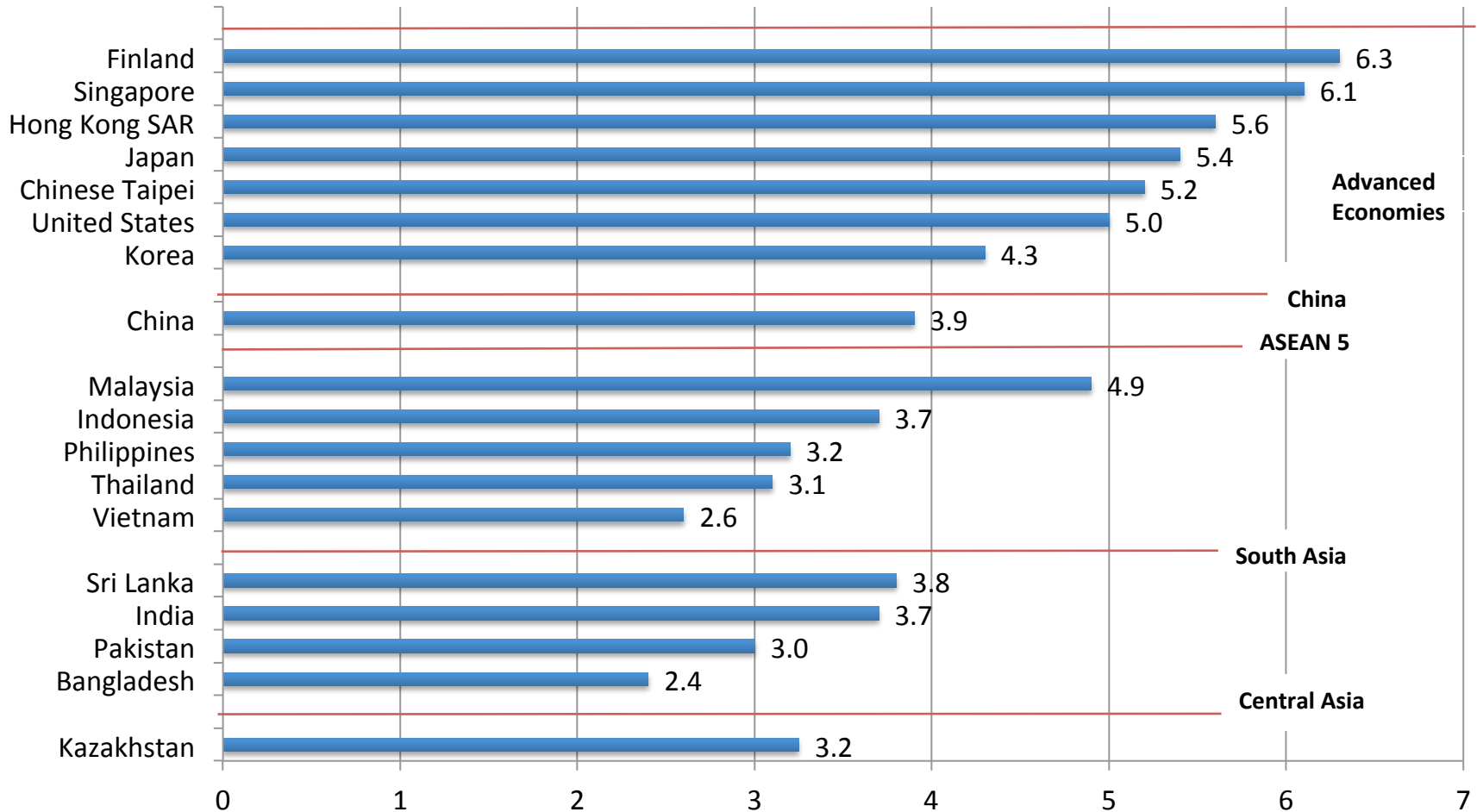
Score for Scientific Infrastructure 2013



Note: Scale is from 0 to 100

Source: IMD World Competitiveness Report

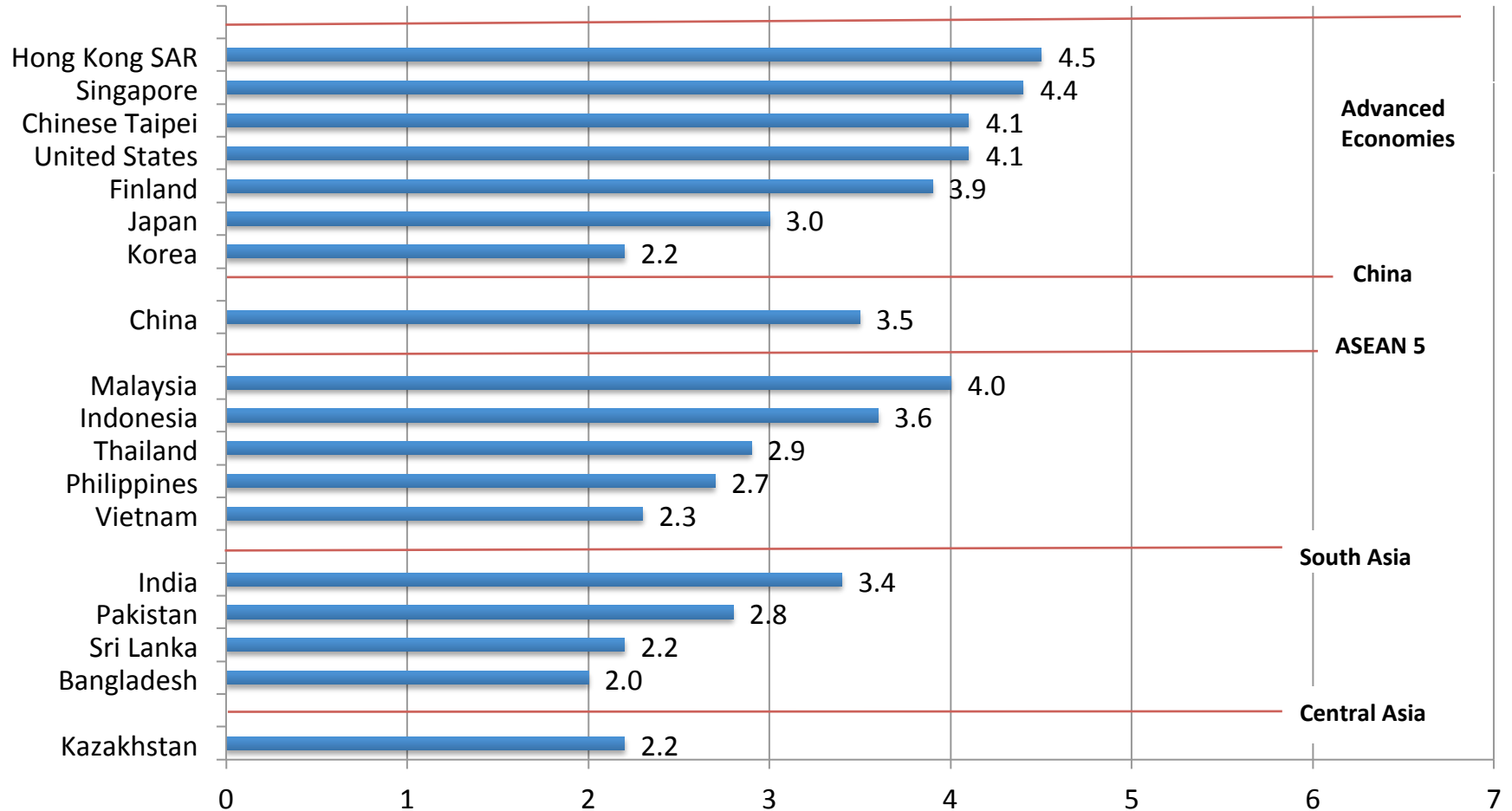
Intellectual Property Protection 2012



Note: Score for the question: How would you rate intellectual property protection, including anti-counterfeiting measures, in your country? [1 = very weak; 7 = very strong]

Source: WEF Global Competitiveness Report

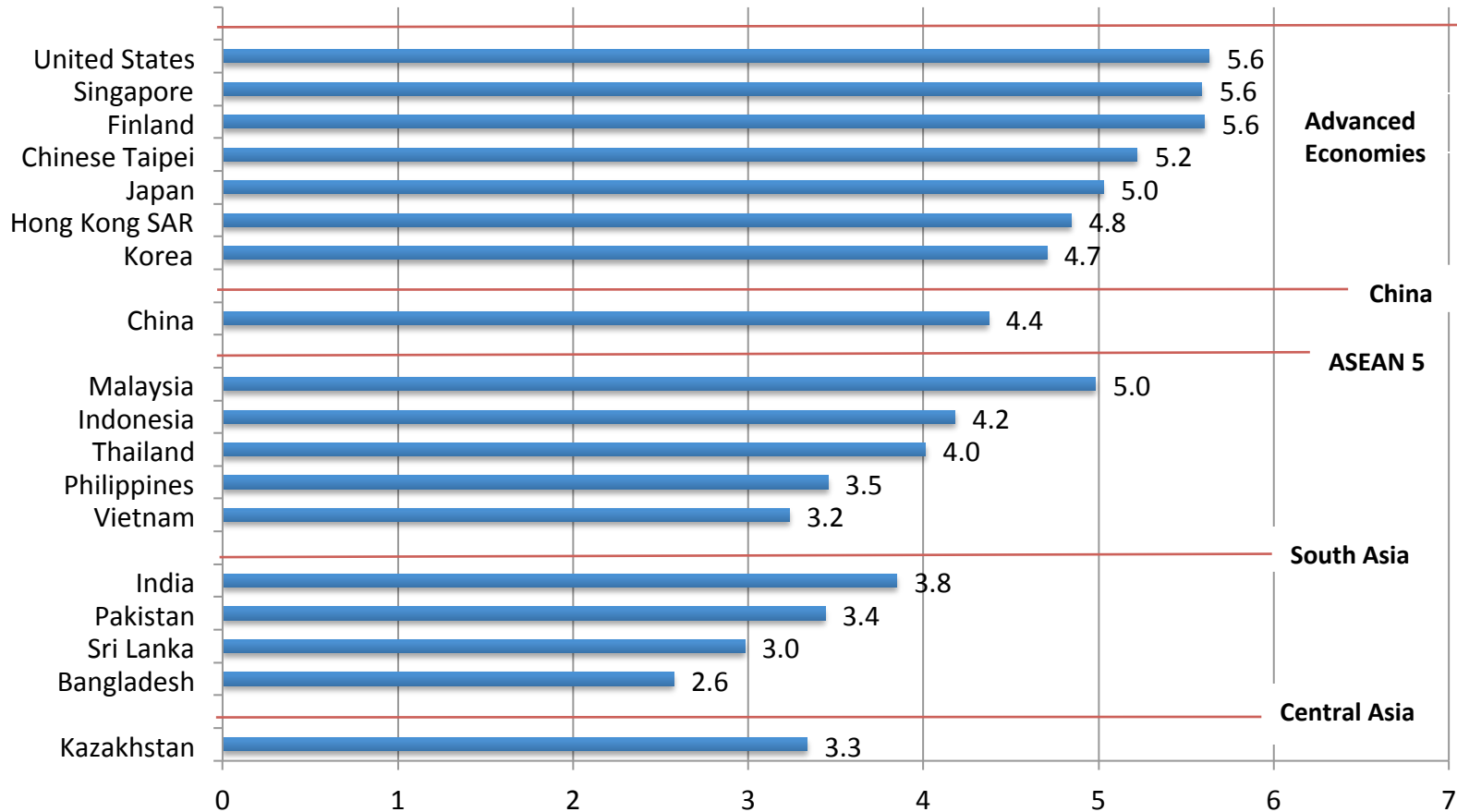
Venture Capital Availability 2012



Note: Score for the question: In your country, how easy is it for entrepreneurs with innovative but risky projects to find venture capital? [1 = very difficult; 7 = very easy]

Source: WEF Global Competitiveness Report

University-Industry Collaboration in R&D 2012



Note: Score for the question: To what extent do business and universities collaborate on R&D in your country? [1 = do not collaborate at all; 7 = collaborate extensively]

Source: WEF Global Competitiveness Report

Global Innovation Policy Index, 2012

	Aggregate	Trade	Science/ R&D	Domestic Competition	Intellectual Property	ICT	Government Procurement	High-Skill Migration
Advanced Economies								
Finland	Upper	Upper	Upper	Upper-Mid	Upper	Upper-Mid	Upper	Lower
Japan	Upper	Lower-Mid	Upper-Mid	Upper-Mid	Upper	Upper-Mid	Upper	Upper-Mid
USA	Upper	Upper	Upper-Mid	Upper	Upper	Upper	Upper	Upper-Mid
Hong Kong SAR	Upper	Upper-Mid	Upper-Mid	Upper	Upper-Mid	Upper	Upper	Upper
Korea	Upper-Mid	Lower-Mid	Upper	Lower-Mid	Upper-Mid	Upper	Upper-Mid	Lower-Mid
Singapore	Upper	Upper	Upper	Upper	Upper	Upper	Upper	Upper
Chinese Taipei	Upper	Lower-Mid	Upper	Upper-Mid	Upper-Mid	Upper	Upper	Upper
China								
China	Lower-Mid	Lower	Upper-Mid	Lower-Mid	Lower-Mid	Lower-Mid	Lower	Lower-Mid
ASEAN 5								
Indonesia	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Lower-Mid
Malaysia	Lower-Mid	Lower-Mid	Lower	Upper-Mid	Lower-Mid	Upper-Mid	Lower	Upper-Mid
Philippines	Lower	Lower	Lower	Lower	Lower	Lower	Lower	Upper-Mid
Thailand	Lower	Lower	Lower	Lower-Mid	Lower	Lower-Mid	Lower	Lower-Mid
Vietnam	Lower	Lower-Mid	Lower	Lower-Mid	Lower	Lower	Lower	Lower-Mid
South Asia								
India	Lower	Lower	Upper-Mid	Lower	Lower-Mid	Lower-Mid	Lower	Lower-Mid

Source: ITIF/Kaufmann, Global Innovation Policy Index

Key Innovation Policy Issues for Emerging Asia

- Tapping Effectively into Global Knowledge vs. Promoting Indigenous Innovation Capability Development
- Innovating to Compete in Global Markets vs. Solving Domestic Needs
- Promoting Innovation Activities for Inclusive Growth
- General vs. Sector-Specific Innovation Policies
- Opportunities for Knowledge-Based Services
- Nurturing “Innovative Entrepreneurs”
- Enhancing Financing System for Innovation
- Reforming Enabling Institutions and Regulations (EIR) to make them conducive for Innovation

Innovation Policy Choice for Emerging Asia

- Policy Choice depends on Stage of Economic Development, Size of Domestic Markets & Natural Resources, and Regional Contexts
- In early development stages, tapping foreign technologies is likely to be more important; developing indigenous innovation capability becomes more important to overcome the “middle-income” trap
- Learn from the Asian NIEs that have developed their innovation capability through diverse strategies
 - Korea: large chaebol, indigenous capability emphasis
 - Taiwan: SMEs, PRI-led consortia-diffusion strategy
 - Singapore: FDI & foreign talent-leverage strategy
 - Hong Kong SAR: creative industry, business innovation
- Adapt specific successful policies and programs to your unique national context

Innovation Opportunities for Emerging Economies ?

- Conventional thinking about innovation capability development of developing countries assume a “catching-up” approach, with the less developed countries following the same path of the advanced countries, first learning how to make the less advanced technological products, and then move up the learning curve to make more advanced products
- However, recent developments suggest that the emerging economies need not just follow this “catch-up” strategy, but could also pursue their own innovation strategy by focusing on the innovation opportunities in the emerging markets, including the needs of the bottom (or lower half) of the pyramid

Examples of Innovators from Emerging Asia leveraging superior knowledge of emerging market needs

- Grameen Bank: Innovator of Micro-Finance for low-income women in Bangladesh
- Haier: Innovator of home appliances adapted to the mass markets of China & other developing economies
- Luyuan: Innovator of electric bicycle in China
- Su-Kam : Innovator of Backup Power Equipment from India, which suffers from frequent power outages
- Aravind Eye-Hospital: Innovator of eye-surgery hospital adapted to the BOP market in India

- As some of these examples have shown, rather than trying to catch up with technological leaders in advanced economies, many indigenous innovative firms from emerging markets are pioneering their own “frugal innovations” to produce low-cost products that meet the needs of low-income consumers and businesses in these markets.
- Some of these innovations are later diffused to advanced economies and become known as “Reverse Innovations”.
- In addition, some of these emerging economies have developed distinctive open innovation ecosystems, such as the “Shanzhai” system for mobile devices in China, that combine a mixture of imitation and innovation to enable rapid and flexible product innovation.

- These “trickle-up/reverse innovation” and “open imitation-innovation” phenomena are prompting some of the leading global MNCs from advanced economies to re-think their conventional innovation strategy, and to learn to plug into such emerging market innovation ecosystems in order to compete.
- Innovation policy makers from Emerging Economies should likewise consider adopting policies that promote such indigenous innovation systems that target the needs of the lower-income population in their own or other similar emerging markets
- Besides complement the traditional technological catch-up learning strategies, such policies also contribute to the goal of “inclusive” development

- Over the last 2-3 decades, many economies from emerging Asia have successfully exploited the wave of outsourcing of manufacturing from advanced economies, while India has done so in the outsourcing of IT services
- Pervasive deployment of internet & mobile communications on a global scale is now heralding a second wave of global outsourcing, this time in knowledge-based services (KBS).
- There is thus an opportunity for emerging Asia to also become the world's KBS exporters. However, emerging Asia must invest significantly into human capital, ICT infrastructure and services innovation to capture this opportunity

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Thank You !