

# Digital Trade, Digital Technology and Implications beyond GDP Measures & Policies

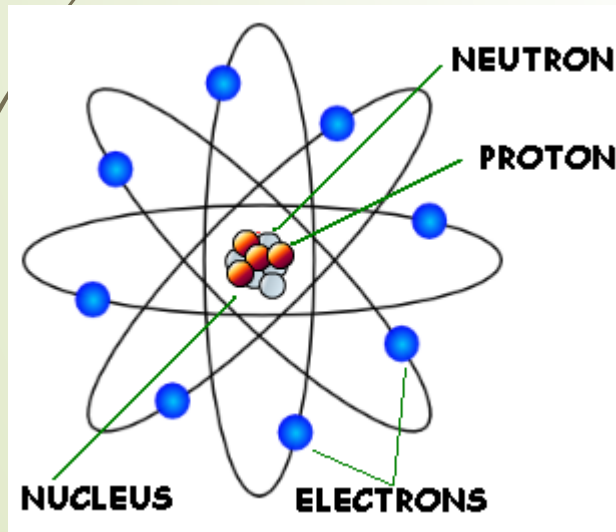
PECC International Seminar Series 2019: Asia-Pacific  
Strategies for the Global Trade System

Session 2A: Trade in the Age of the Fourth Industrial  
Revolution, Digital Trade 29 October, 2019

Vancouver, Canada

# Shifting in Paradigm for Trade economics

- Atoms → Bits → Quantum Physics
- Ownership → Rights
- The End of Private Assets?
- Finished Goods → Unbundling
- Openness → Proprietary (Technology rent)
- Job creation → Job Deflator (Jobless Growth)



1 Byte		8 Bits
1024 Bytes	2 <sup>10</sup>	1 Kilobyte
1024 Kilobytes	2 <sup>20</sup>	1 Megabyte
1024 Megabytes	2 <sup>30</sup>	1 Gigabyte
1024 Gigabytes	2 <sup>40</sup>	1 Terabyte
1024 Terabytes	2 <sup>50</sup>	1 Petabyte
1024 Petabytes	2 <sup>60</sup>	1 Exabyte
1024 Exabytes	2 <sup>70</sup>	1 Zettabyte
1024 Zettabytes	2 <sup>80</sup>	1 Yottabyte
1024 Yottabytes	2 <sup>90</sup>	1 Brontobyte
1024 Brontobytes	2 <sup>100</sup>	1 GeopByte

## A Technology Scientist View:



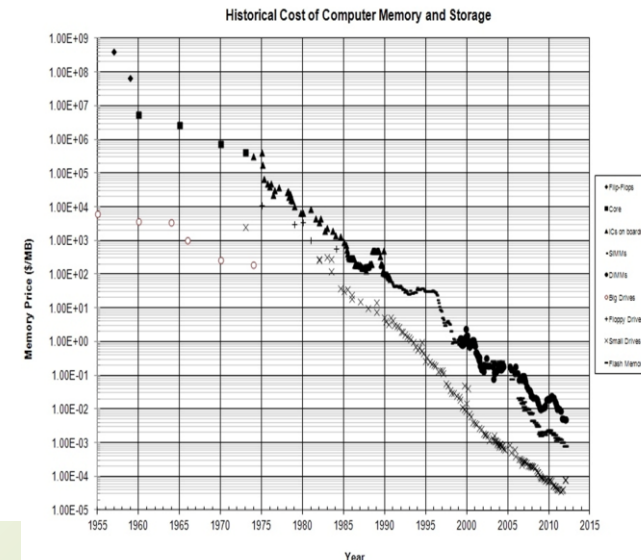
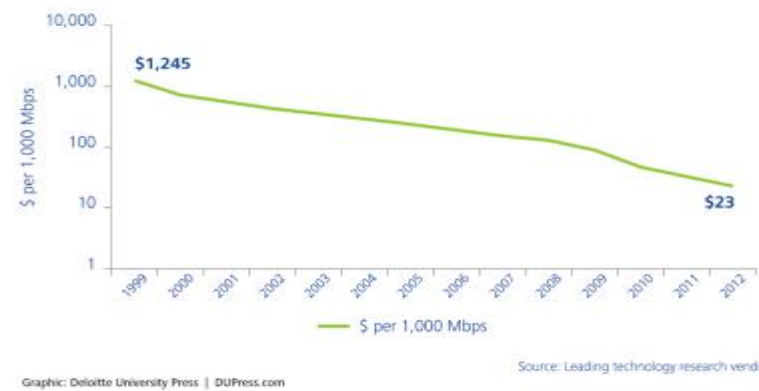
"New capabilities emerge just by  
virtue of having smart people with  
access to state-of-the-art technology."  
-Internet pioneer Robert Kahn

# An Economist View:

Put differently, the ICT revolution can be seen as a large and long-lasting positive supply shock, causing higher and possibly also more stable economic growth without extra inflation" (Houben & Kakes, 2002).

Internet Transit Pricing (1998-2015)			
Source: <a href="http://DrPeering.net">http://DrPeering.net</a>			
Year	Internet Transit Price		% decline
1998	\$1,200.00	per Mbps	
1999	\$800.00	per Mbps	33%
2000	\$675.00	per Mbps	16%
2001	\$400.00	per Mbps	41%
2002	\$200.00	per Mbps	50%
2003	\$120.00	per Mbps	40%
2004	\$90.00	per Mbps	25%
2005	\$75.00	per Mbps	17%
2006	\$50.00	per Mbps	33%
2007	\$25.00	per Mbps	50%
2008	\$12.00	per Mbps	52%
2009	\$9.00	per Mbps	25%
2010	\$5.00	per Mbps	44%
2011	\$3.25	per Mbps	35%
2012	\$2.34	per Mbps	28%
2013	\$1.57	per Mbps	33%
2014	\$0.94	per Mbps	40%
2015	\$0.63	per Mbps	33%

Figure 3. Bandwidth cost-performance (1999-2012)







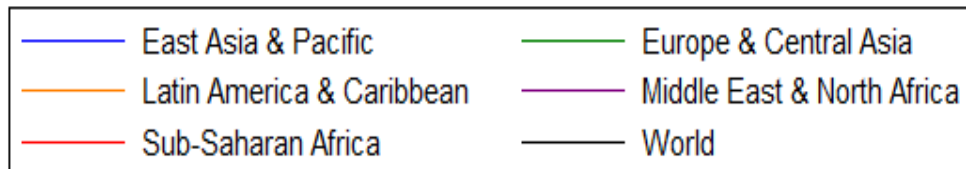
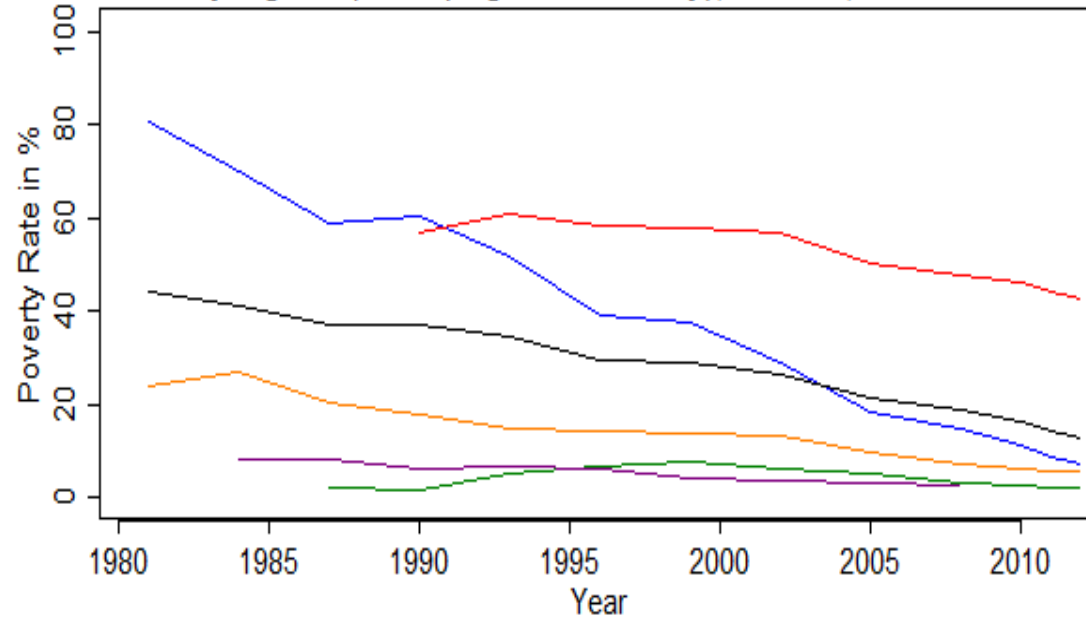
# Immediate Impact

- 
- The Future ability to export
  - The Future ability to produce (manufacturing)
  - The Future ability to access technology (permission-less innovation)
  - The Future of Governance i.e. disinformation as a service, multisided market

# Trade and Development

## Poverty Rate

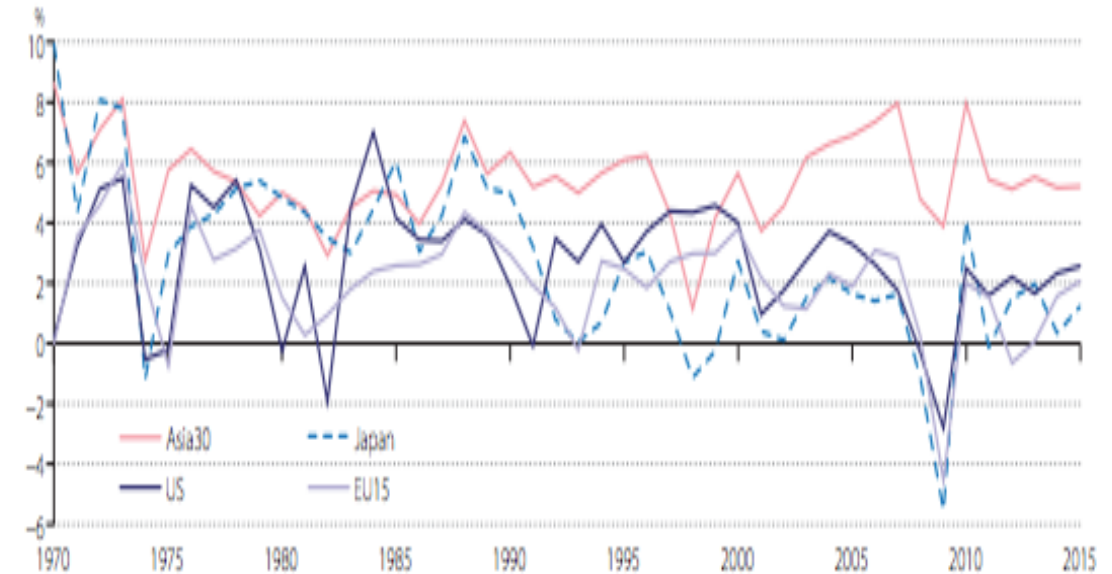
By regions (developing countries only),  $z=1.90\$$ , 1900-2012



Source: The graphs are based on data provided at <http://data.worldbank.org>.

Trade development alone  
eliminated 50% of the world's  
poorest in less than 1 decade

Trade remain strong and resilient to global  
economic growth i.e. pink line























**Figure 1** GDP Growth of Asia, the EU, Japan, and the US, 1970-2015

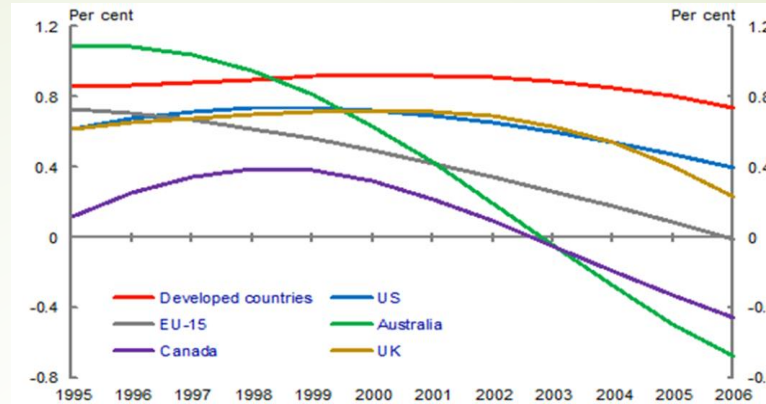
— Annual growth rate of GDP at constant market prices

Sources: Official national accounts in each country, including author adjustments.

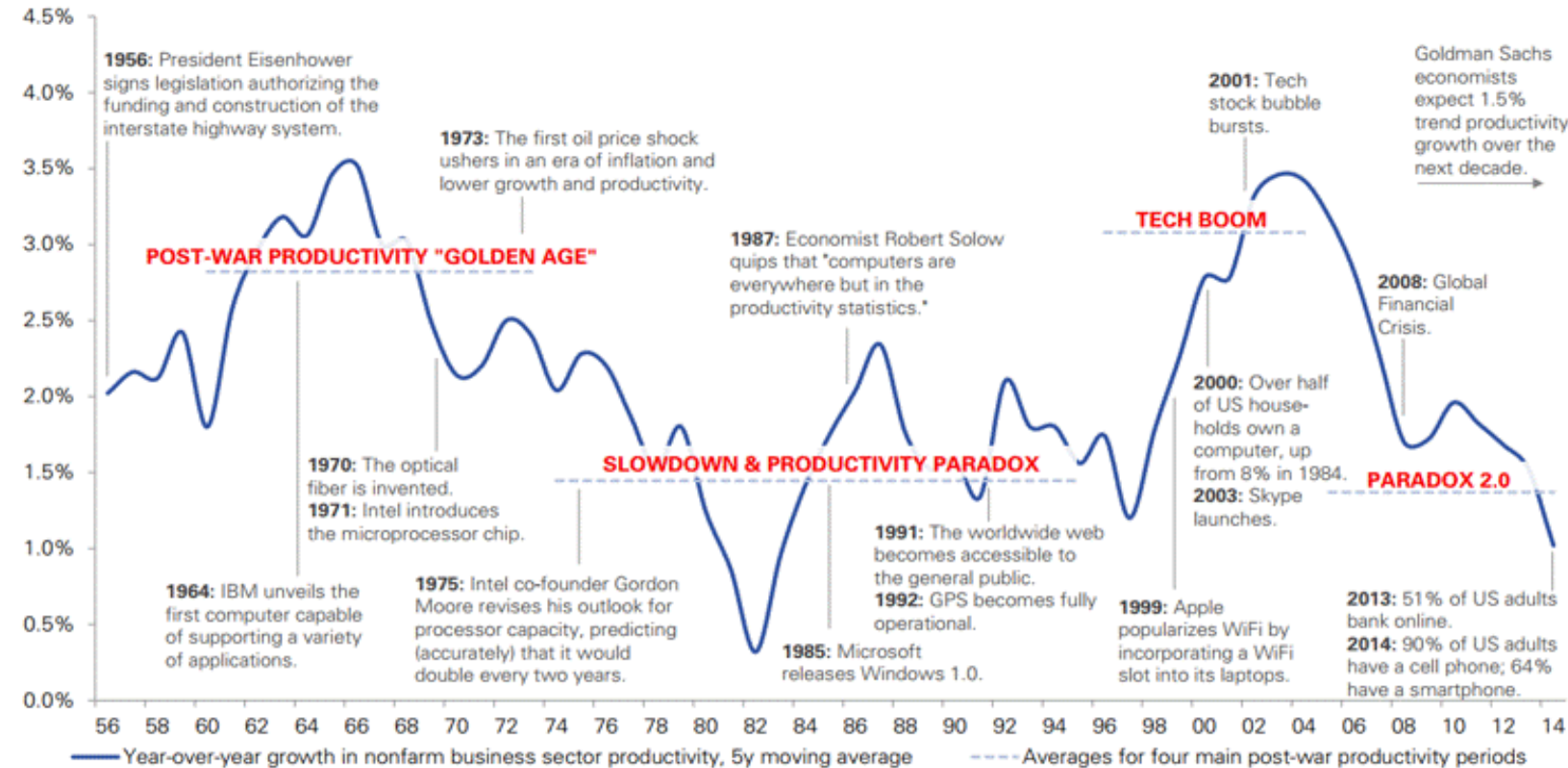
# Top 20 ccTLDs vs GDP – recession proof domains?

Country	2012 q4 Domain name rank	2012 GDP rank (IMF)	DN/GDP rank difference	Domain L12M growth	12 /11 GDP growth
 Germany	1	4	3	3.69%	-6.67%
 Tokelau	2	N/A	N/A	73.96%	N/A
 United Kingdom	3	7	4	4.60%	0.10%
 China	4	2	-2	73.33%	-8.10%
 The Netherlands	5	17	12	6.58%	5.57%
 Russia	6	9	3	10.76%	13.05%
 EU	7	N/A	N/A	5.95%	N/A
 Brazil	8	6	-2	12.77%	-2.72%
 Australia	9	12	3	11.99%	3.71%
 France	10	5	-5	3.13%	6.79%
 Italy	11	8	-3	7.53%	-9.93%
 Argentina	12	27	15	10.85%	-7.12%
 Poland	13	23	10	4.26%	-8.58%
 Canada	14	11	-3	9.70%	1.79%
 Switzerland	15	19	4	6.28%	3.83%
 USA	16	1	-15	2.20%	-5.74%
 India	17	10	-7	13.14%	-9.41%
 Spain	18	13	-5	24.17%	6.57%
 Colombia	19	33	14	19.15%	11.53%
 Belgium	20	22	2	10.40%	-7.35%

# Productivity Paradox



## Putting productivity growth in perspective



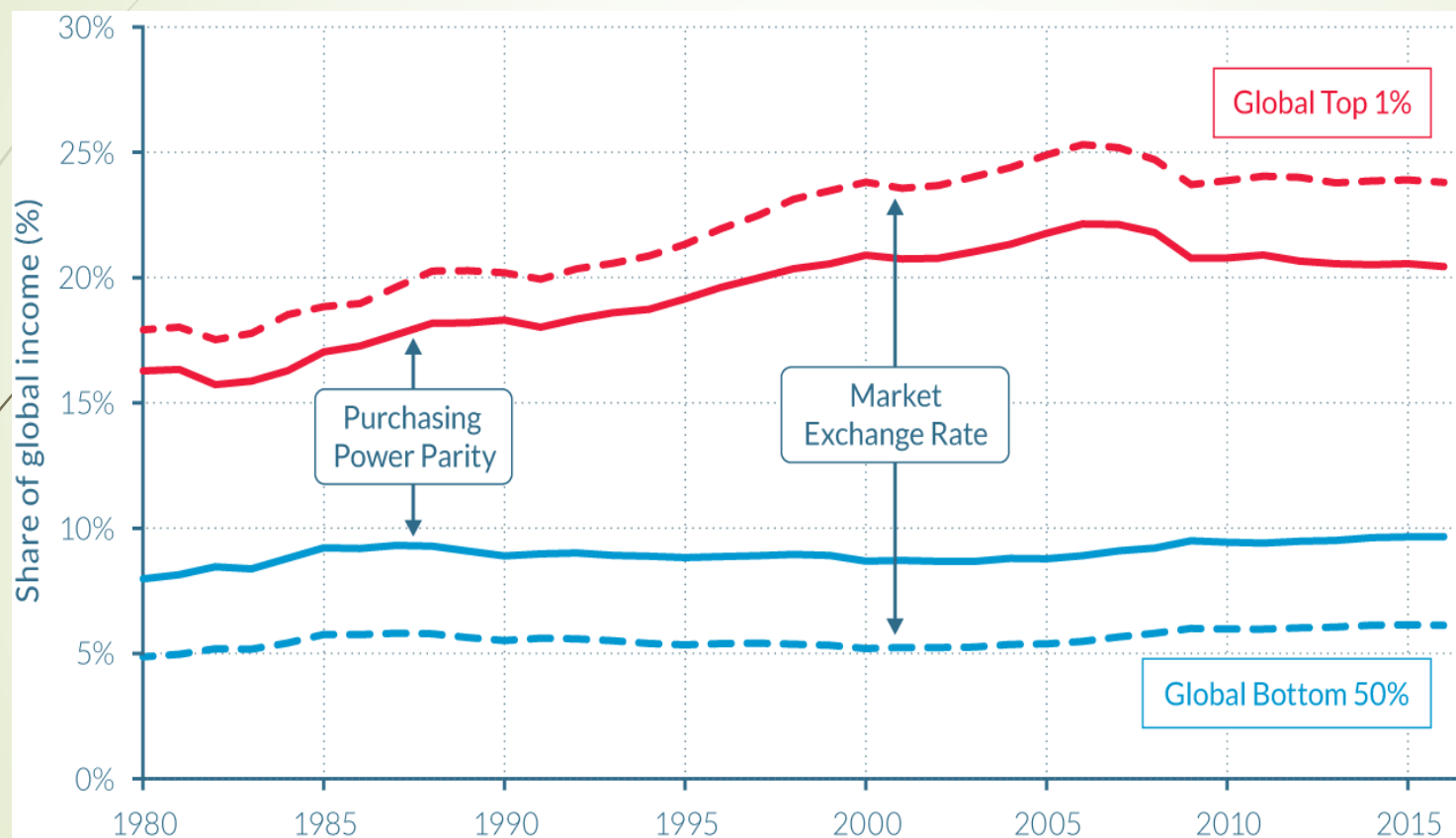
Source: BLS, Pew Research Center, US Census, PBS, various news sources, Goldman Sachs Global Investment Research.



**Jobless  
Growth**



# Development Vs. Viral Inequality

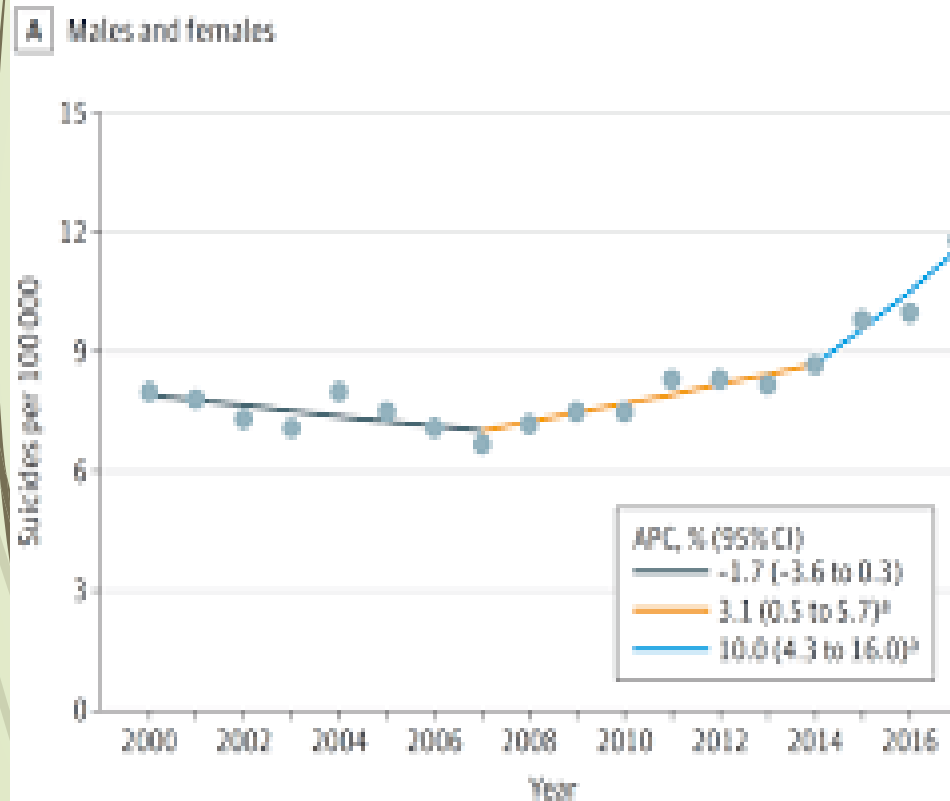


Source: WID.world (2017). See [wir2018.wid.world/methodology.html](http://wir2018.wid.world/methodology.html) for data series and notes.

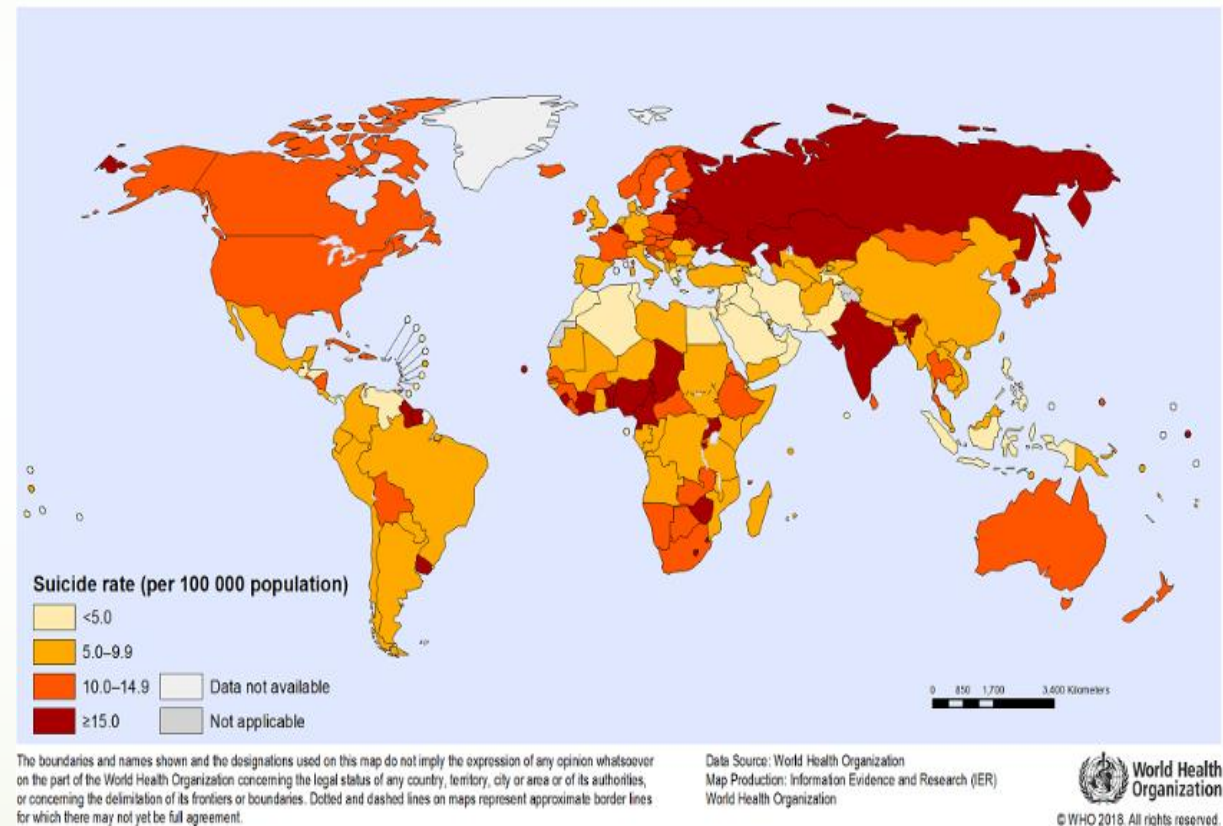
In 2010, the Top 1% received 24% of global income when measured using Market Exchange Rates (MER). When measured using Purchasing Power Parity (PPP), their share was 21%. Thick lines are measured at PPP values, dashed lines at MER values. Income estimates account for differences in the cost of living between countries. Values are net of inflation.

# Cost of Progress: Growing Suicide Rates

Figure 1. Trends in Suicide Death Rates at Ages 15-19 Years

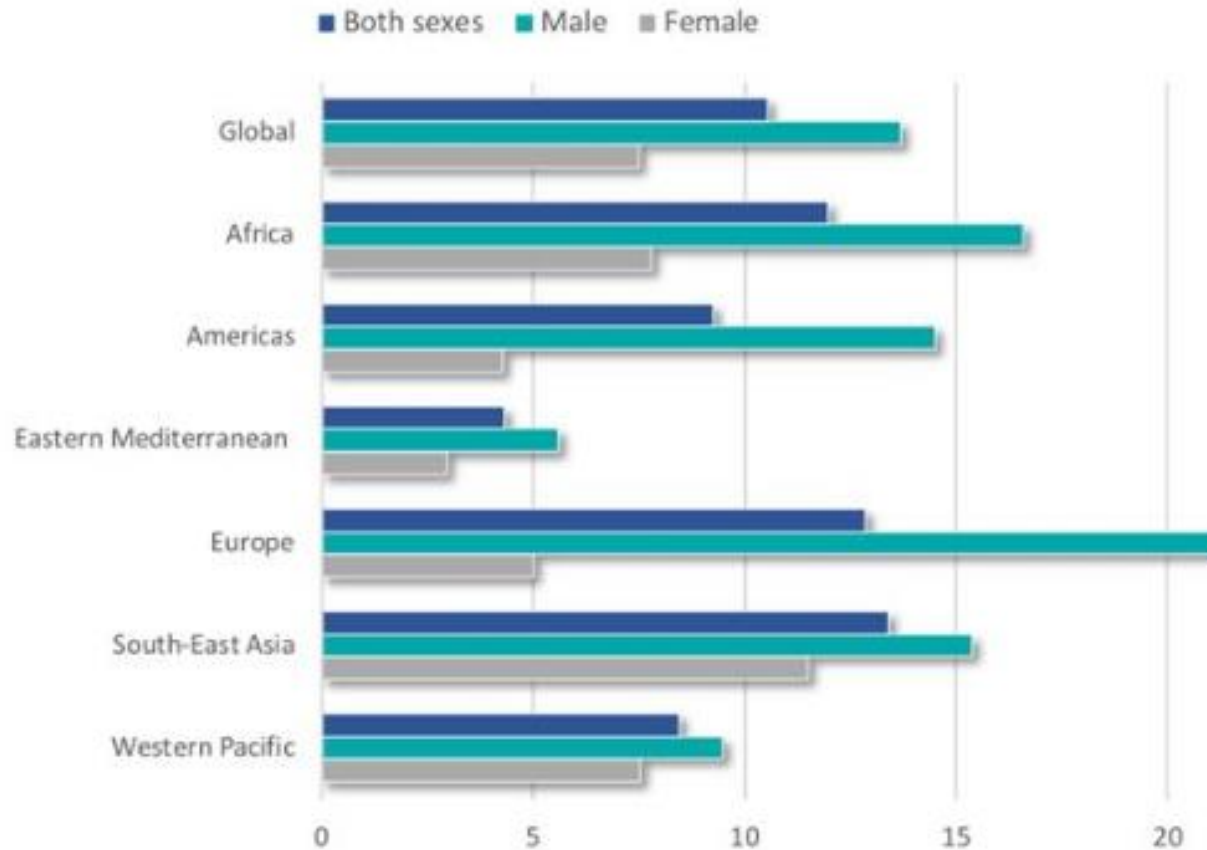


Age-standardized suicide rates (per 100 000 population), both sexes, 2016



# Global Suicide Rates by

**Suicide rate per 100,000 population by WHO region, 2016**

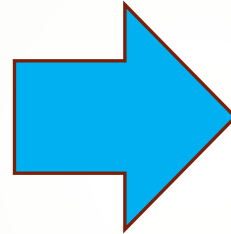


Source: WHO Global Health Estimates ([http://www.who.int/healthinfo/global\\_burden\\_disease/estimates](http://www.who.int/healthinfo/global_burden_disease/estimates))  
Regional data shown are age-standardized estimates.


Highest suicide rate are found in Europe, Africa and Americas. Followed behind by South East Asia and Western Pacific

# Main Paradigm Shift: What is a Market?

1. Unbundling effect
2. Network effect
3. Connectivity driven (Internet, digital technology)
4. Trade Facilitation



1. Long tail effect
2. Multisided market effects (aggregator)
3. Information-Data rich (non-rival)
4. Customs 4.0 and Paperless Trade

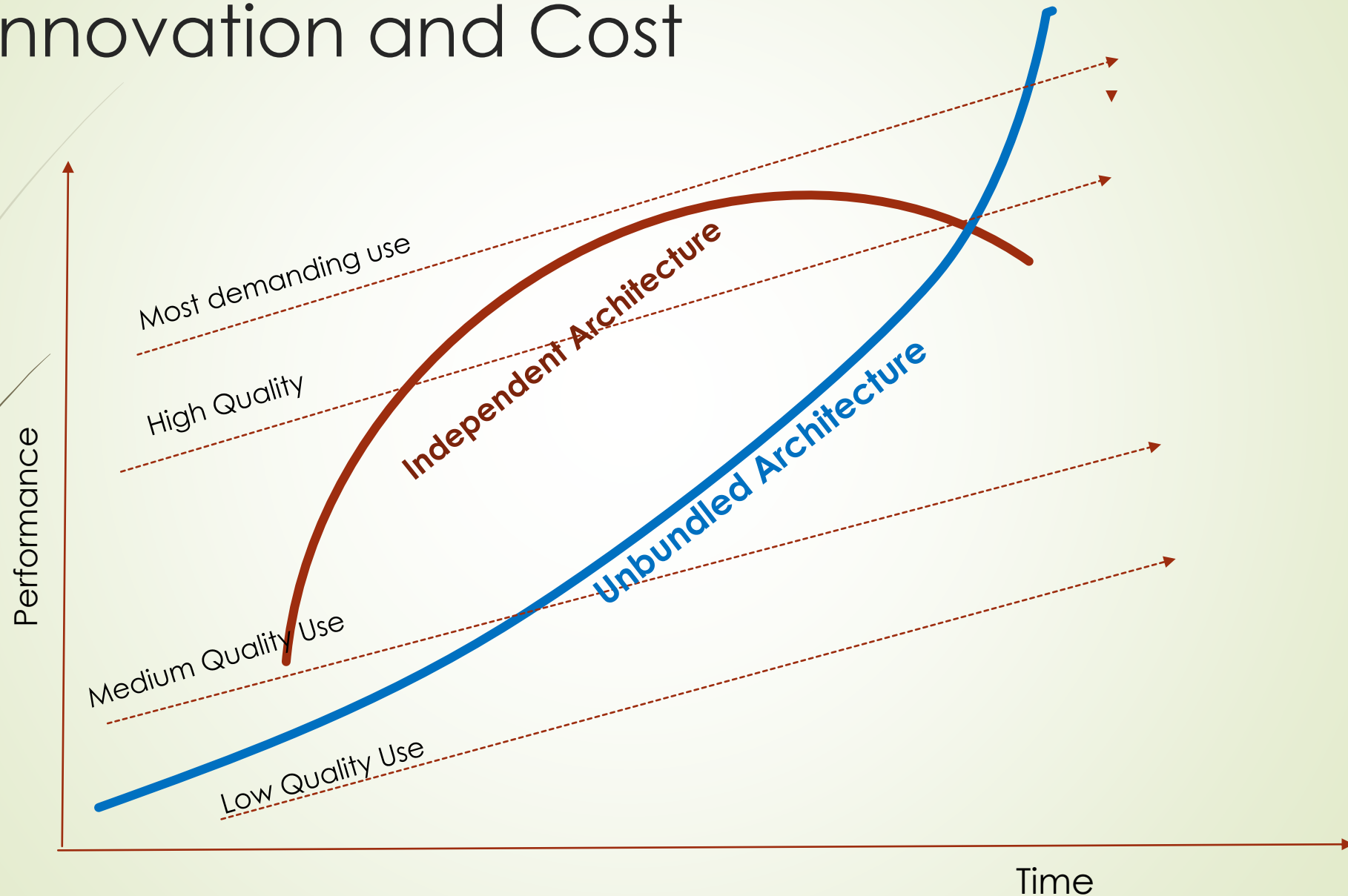
- 
- 1) High volume
  - 2) Low value per unit
  - 3) Demand Pull
  - 4) Market Concentration-  
Monopsonist, Oligopolist
  - 5) IPR



# What is Technology's role in SDG 2030?

- Only 1% of R&D by MNC addresses agriculture problems for developing countries.
- Around 1% of drugs developed in the past 30 years by large pharmaceutical companies addresses developing countries healthcare concerns (priority diseases)
- Growing trends in the privatisation of knowledge i.e. access to science and technology and its use

# Unbundling is Critical to Disruptive Innovation and Cost



# Is there any changes to the value creating process?

?

**Are these the  
real challenges  
to the traditional  
economics?**

## Digital products and digital assets

- No marginal cost, or it is near to zero
- Challenges to the economy of scale
- Challenges to the diminishing returns

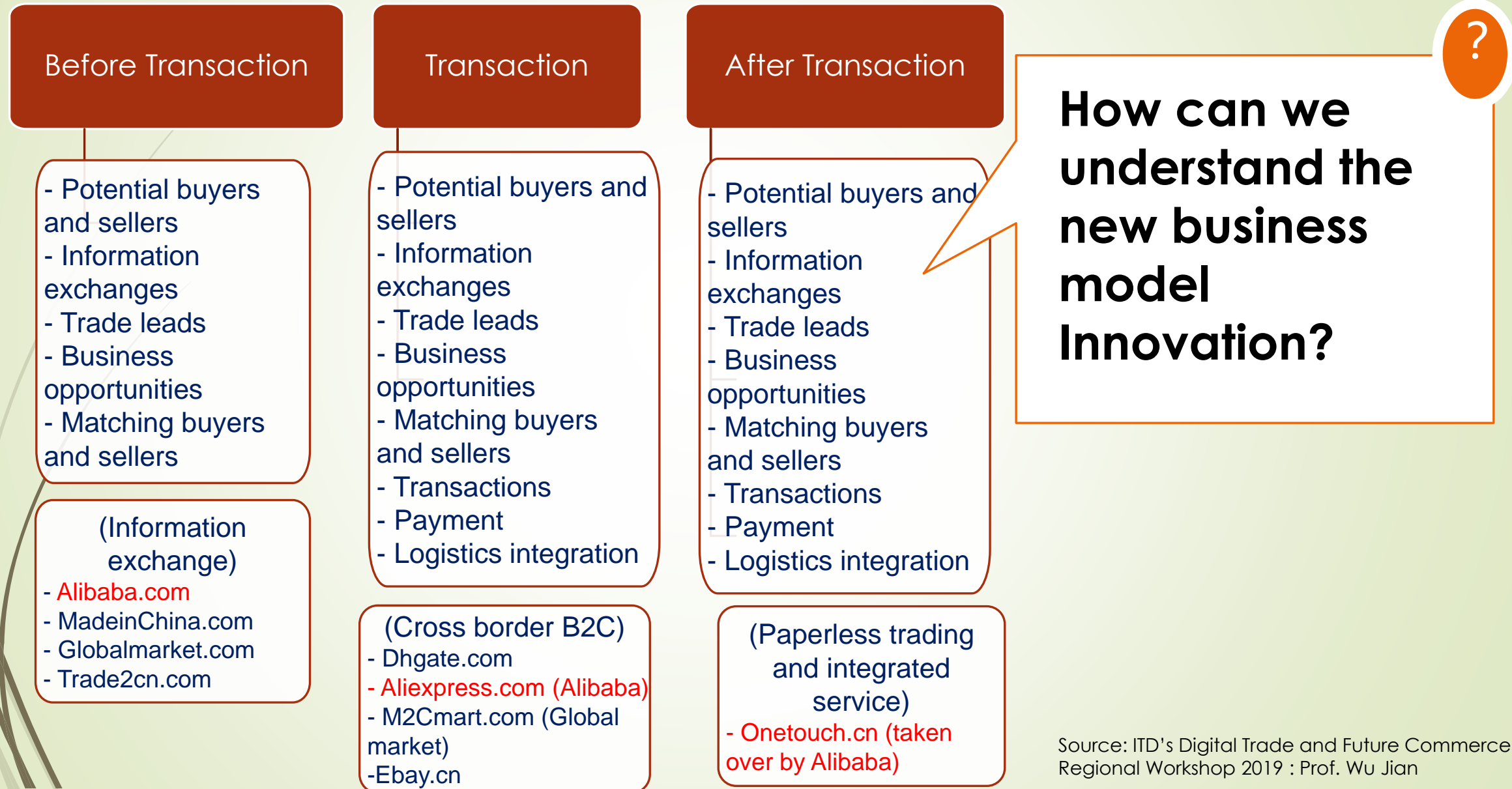
## Non-linear value creating process

- Input-output analysis
- Return on investment

## Leading to New business models

- New business model (banks are out of date)
- Venture capital

# Cross-border E-commerce Innovation in China?

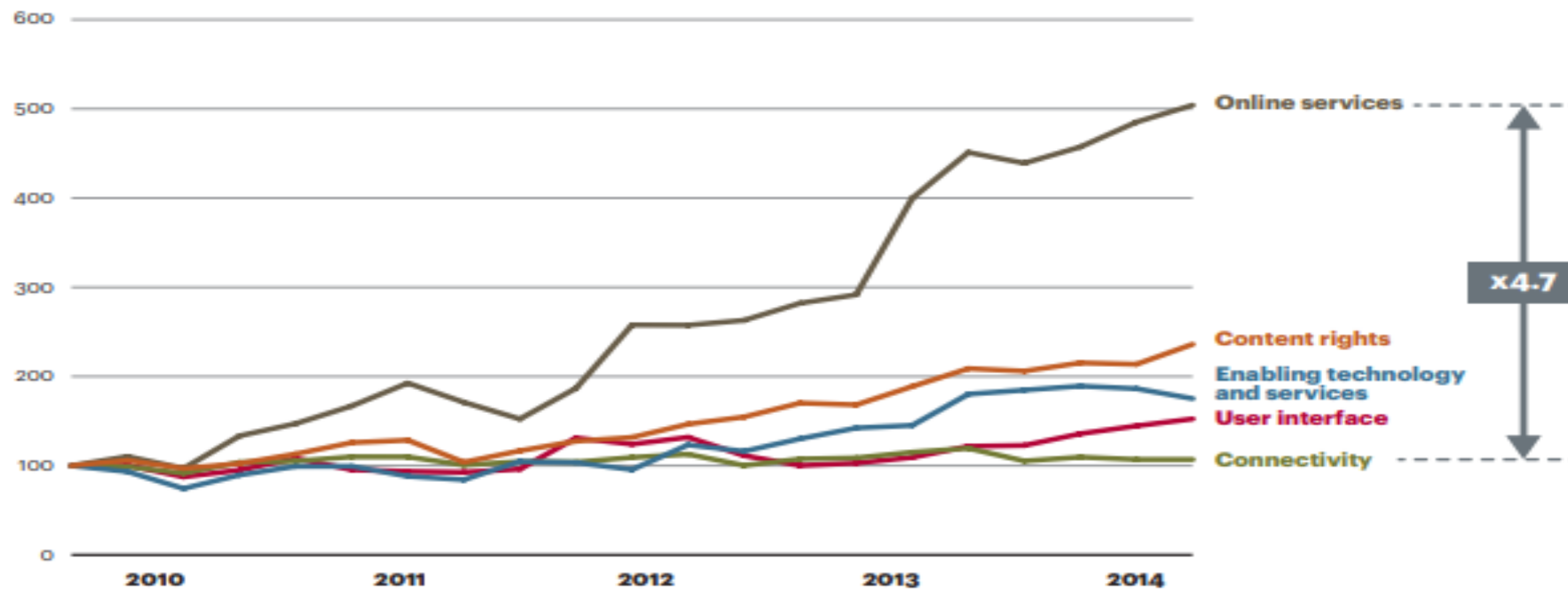




**Figure 3**

**In the past five years, online services have created close to five times the value of connectivity**

**Indexed market cap**

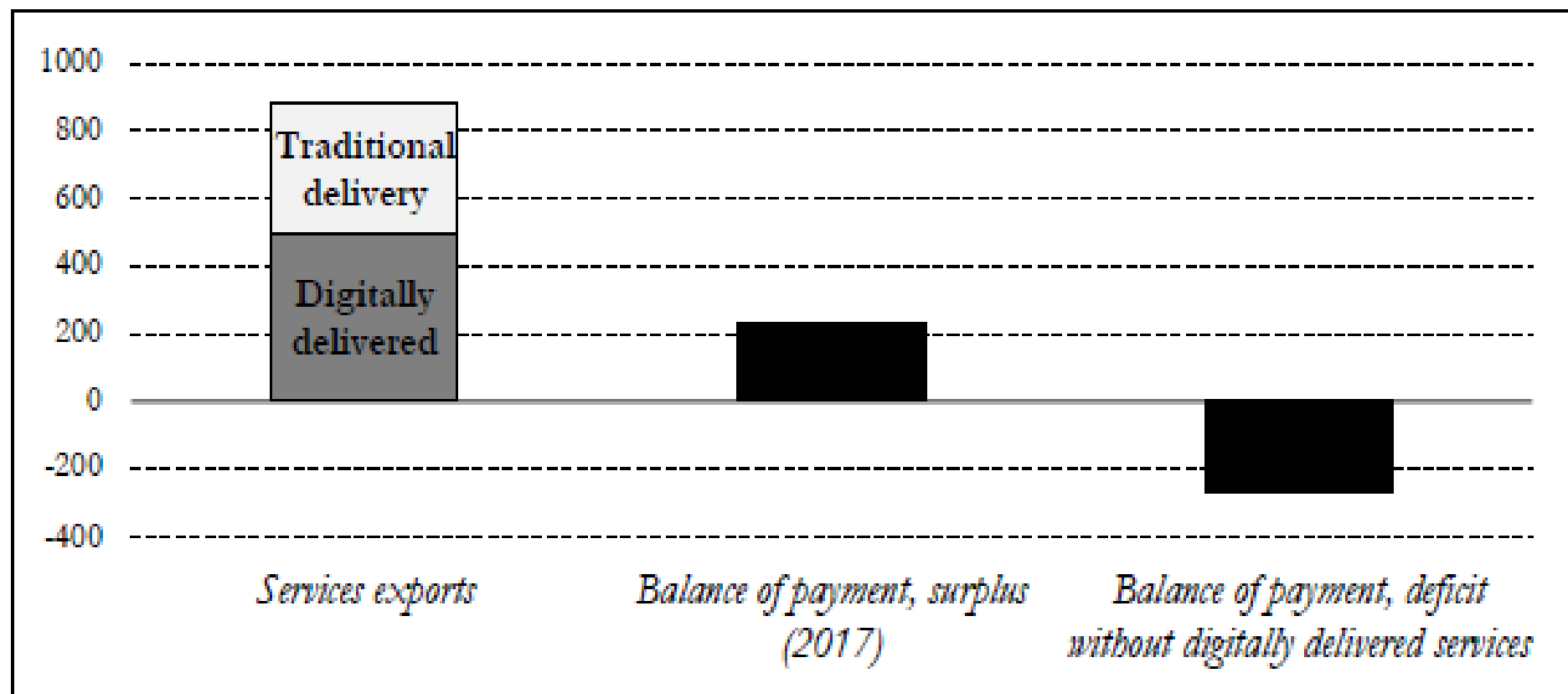


Notes: Content rights: Comcast, Vivendi, Dish Network, Time Warner, and Sky. Online services: Netflix, Facebook, Amazon, Baidu, eBay, and Expedia. Enabling technology and services: Akamai, WPP, Google, and Verisign. Connectivity: AT&T, BT, NTT, Vodafone, Deutsche Telekom, and France Telekom. User interface: Microsoft, Lenovo, Apple, and Acer.

Source: A.T. Kearney analysis

# Servification and Trade in Services

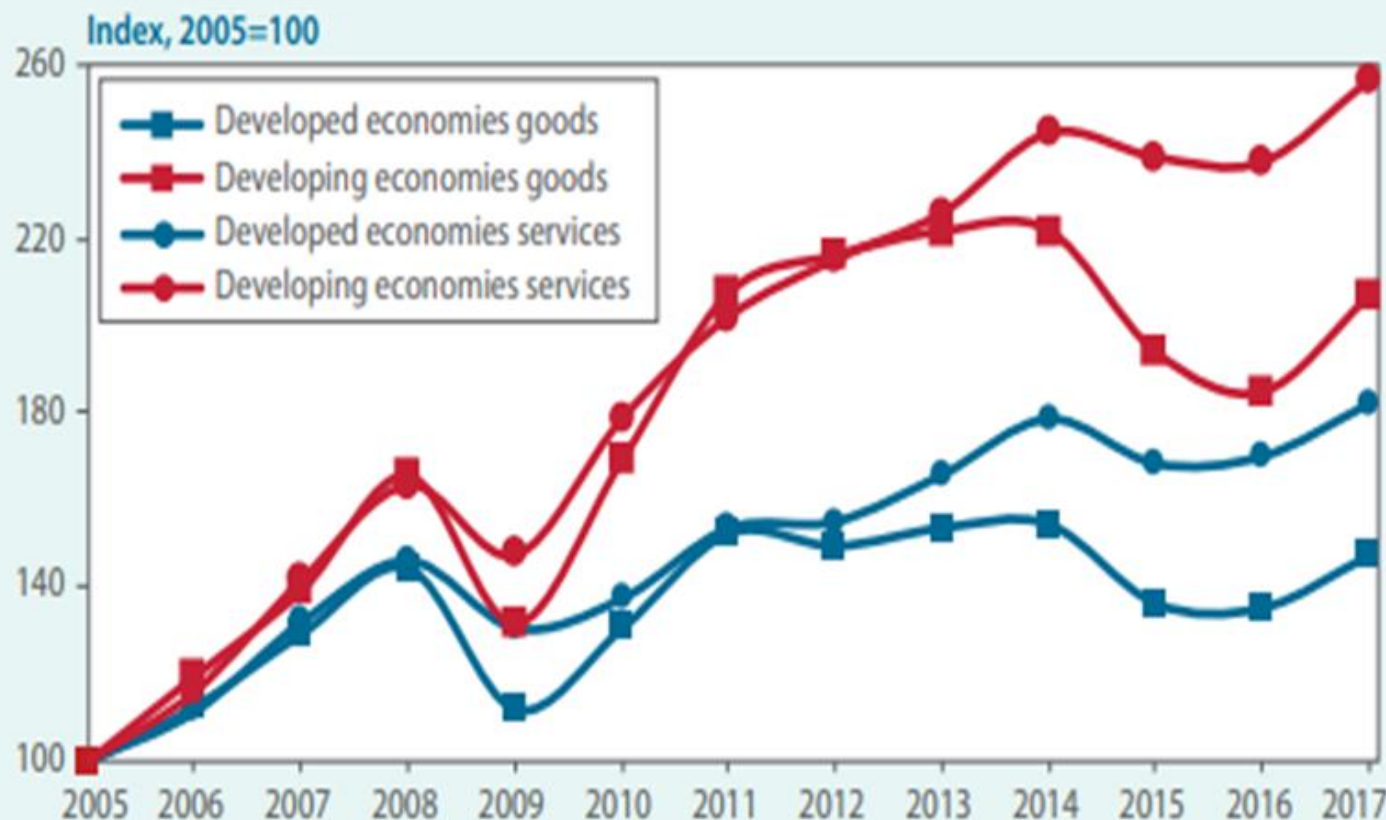
*Figure 1 — EU enters into a balance of payment deficit without digitally supported service*



*Source: author's calculations based on Eurostat, 2018; Nicholson, 2017*

# Trade in Services from Developing Countries Outpaced Trade in Goods

Figure I.6.1  
Services and goods exports (value), 2005–2017



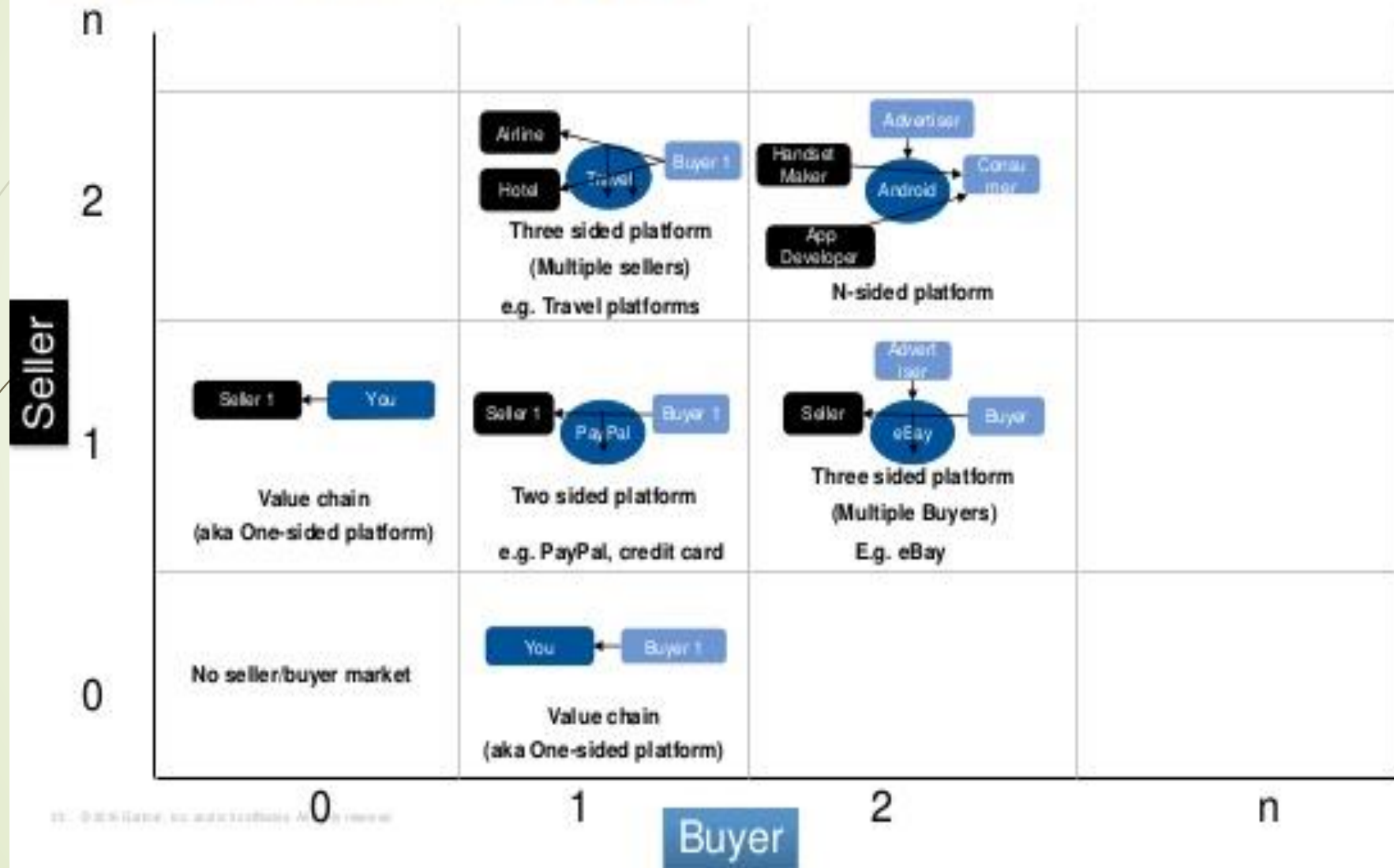
Source: UNCTAD secretariat  
calculations, based on  
UNCTADstat.

# Local Content Policies

- Promote the collection, localisation and preservation of content to be disseminated by reducing the price of recording media for content creators and distributors can help promote the recording and dissemination of local content. This includes open free online tools and materials, as well as open access to content, especially local scientific content, are an increasingly important way for users throughout the world to access sophisticated software, tools and services that can help in all steps of content creation. Make and promote Creative Commons mandatory.
- Policy makers could examine the development of domestic content hosting services and look for ways to promote the development of a local content hosting as a way to reduce international transit costs and increase the speed of content storage and delivery. i.e. IXP
- 21<sup>st</sup> Century skill development and proficiencies- to create an enabling learning environment. Key steps include improving basic literacy (e.g. drafting, language, etc), critical thinking ability, as well as media, information and digital literacy skills. Policy steps to improve ICT, digital, media and information literacy should include both the formal educational system and lifelong learning

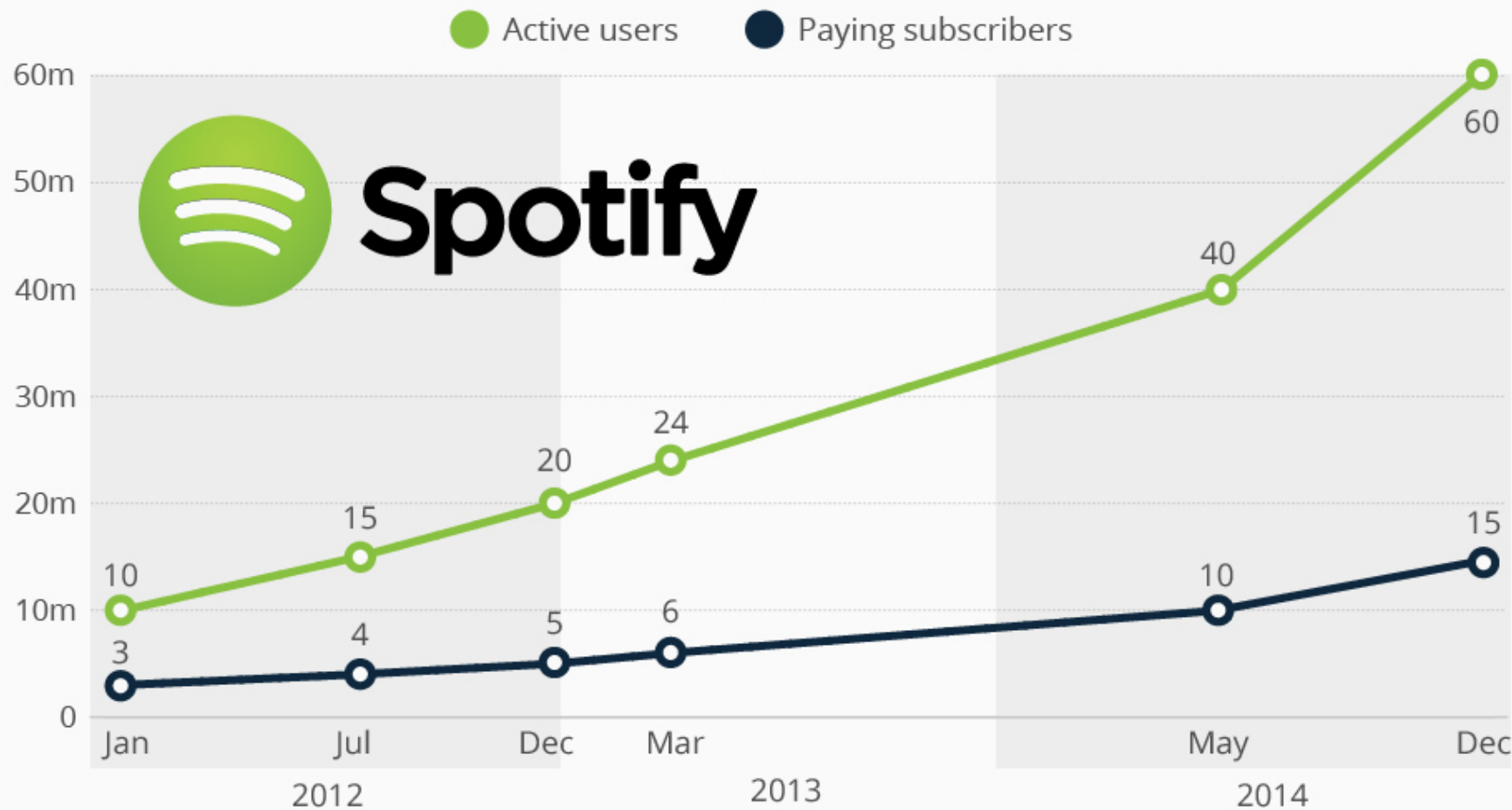


# Multi-sided Market Styles



# Spotify Has 60M Users But Only 1 in 4 Pays

Worldwide active users and paying subscribers of Spotify (in millions)

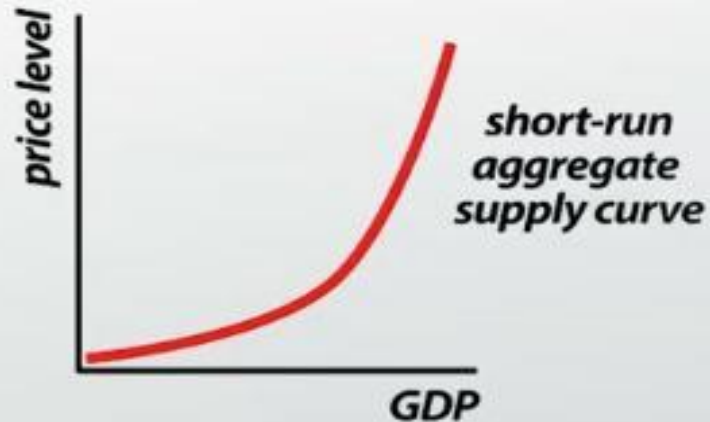


# Aggregate Supply Curve and Price

## DEFINITION OF AGGREGATE SUPPLY CURVE

### aggregate supply curve

*shows the quantity of all the goods and services that businesses in an economy will sell at a particular price level*




Disruptions on Price and Demand


# What's Changed?

- Cross-border e-commerce is based on a secured, trusted global environment?
  - ❖ Accessibility, traceability, privacy, platform governance (Cross-border Certification)
  - ❖ Global governance
- Cross-border e-commerce is based on a well-regulated efficient and harmonized system?
  - ❖ Stability, predictability, consistency (PPP) i.e. trade facilitation, trade logistics
- Cross-border e-commerce is not imposed with extra cost?
  - ❖ Customs duties and tax, administrative cost (De Minimis Threshold)
- Cross-border e-commerce can be done within the appropriate legal environment?
  - ❖ Consumer protection, non-discrimination, co-operation and mutual respect (Cross-border data flow)





# Some Immediate Challenges to the Multilateral Trade System

- 
- Market Access
  - Anti-Dumping and Quantitative Measures
  - Rules of Origin
  - Technology trade (NTB)
  - Technology neutrality (e-Commerce definition)
  - GDPR and National Treatment
  - De Minimis and e-Commerce
  - E-Commerce and Illicit Trade
  - IPR vs. TPM
  - Jurisprudence of Cyberspace????



# AI and Development Policies





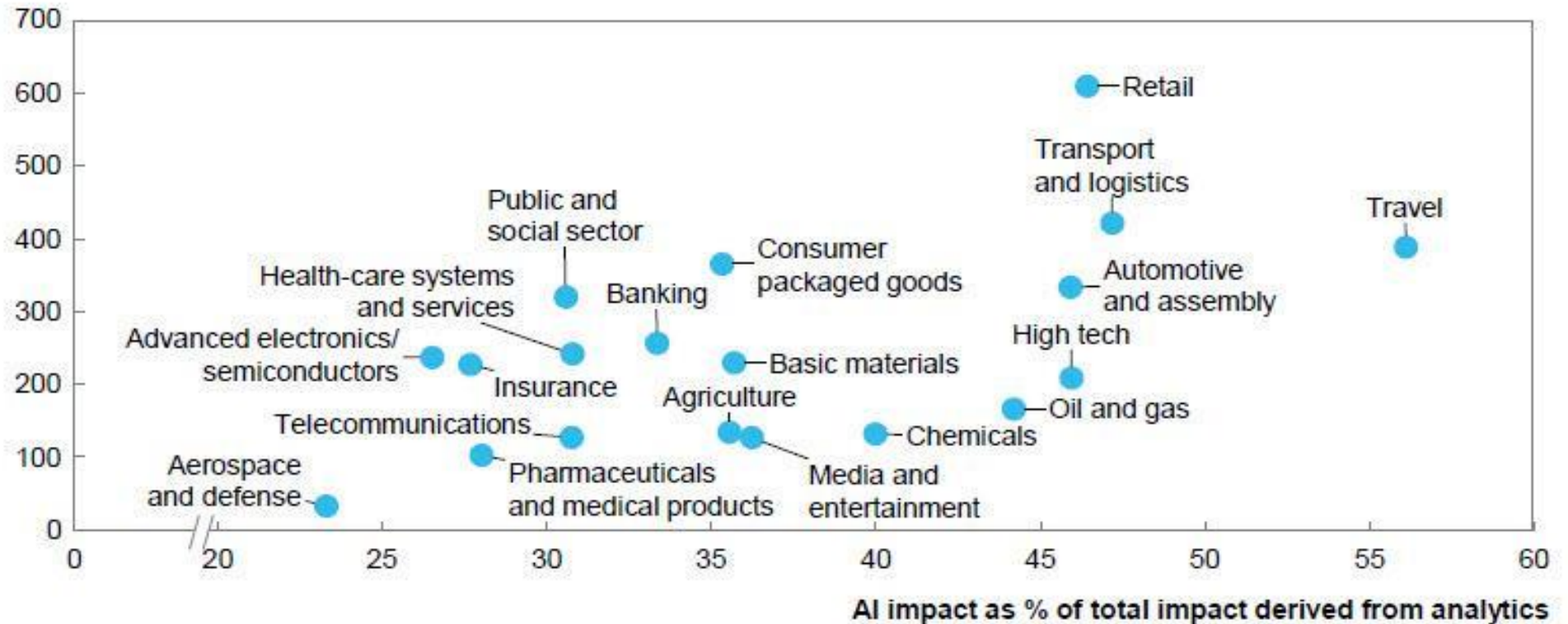
# With AI-what changes?



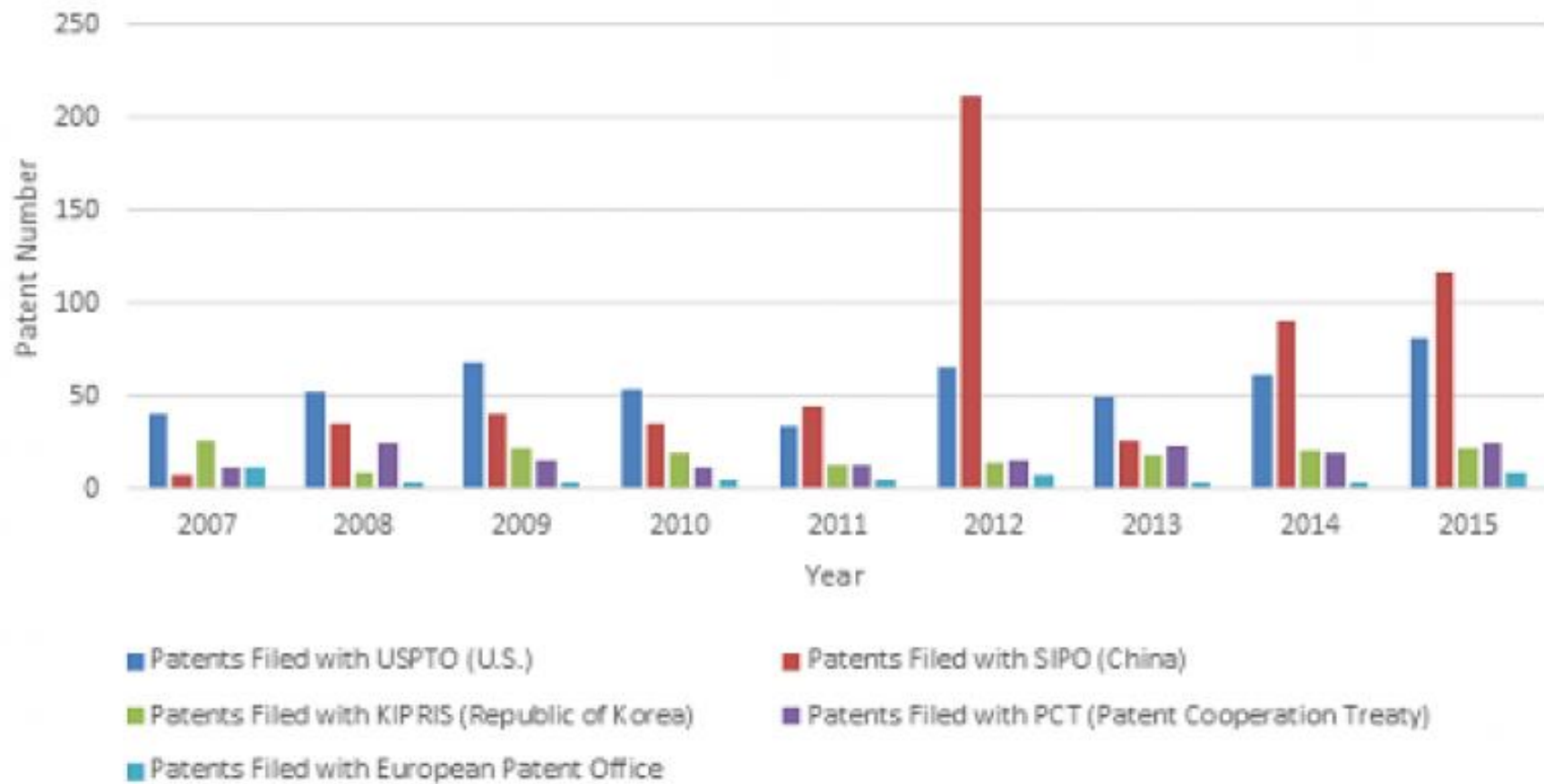
# AI is add-on Value to Digital Trade and Servification

AI has the potential to create annual value across sectors totaling \$3.5 trillion to \$5.8 trillion, or 40 percent of the overall potential impact from all analytics techniques

AI impact  
\$ billion

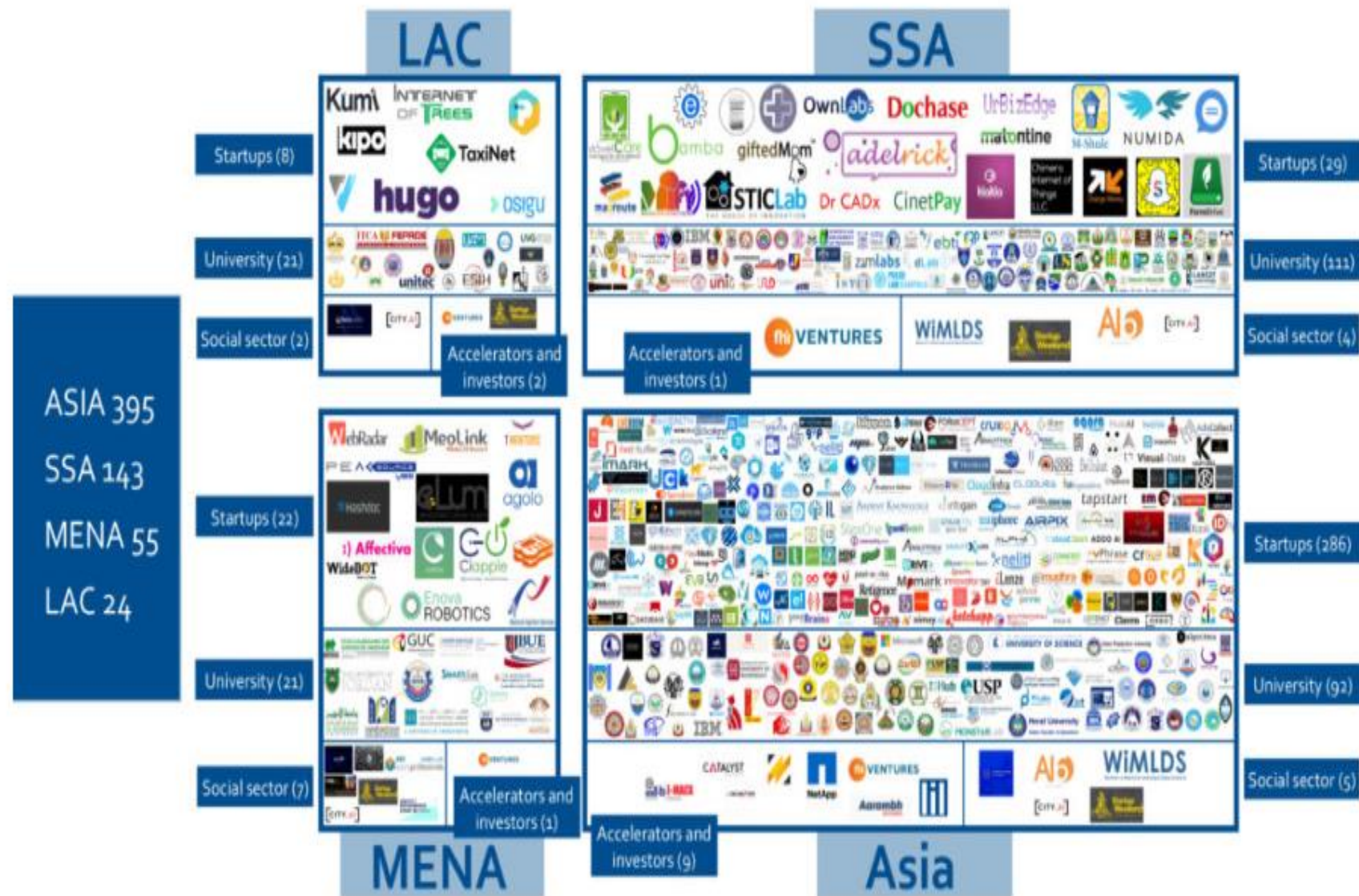


## AI-related Patent Registration





# AI Ecosystem in Developing Countries



# AI Basics

An AI Ecosystem described in 4 layers.

LAYERS	EXAMPLES
④ Applications	Alexa, Siri, Driverless cars, cancer detection, stock prediction
③ Technologies / Models	Deep learning, Machine learning, CNN, GAN, RNN.
② Programming + Platforms languages	Python, R, CUDA, Tensorflow, Azure ML, Sage Maker
① Hardware	GPU, TPU, FPGA CPU

- Still no international standards
- Leverages several elements: Standards (IEEE, IETF, ISO, Data, etc.), ICT hardware, Data Governance, Legal Framework, Digital Rights Management, IPR, AI Chip, Data etc.
- Customising AI capacity on small devices (latency, power source, duration)



## China Learns Quickly

 China  
 U.S.  
 England  
 Australia
  Canada  
 Japan  
 Germany



## The Fight for IP

	2010	2011	2012	2013	2014	2015	2016
<b>Amazon</b>							*
<b>Apple</b>							
<b>Facebook</b>				*			
<b>Google</b>	1						
<b>IBM</b>							
<b>Microsoft</b>							

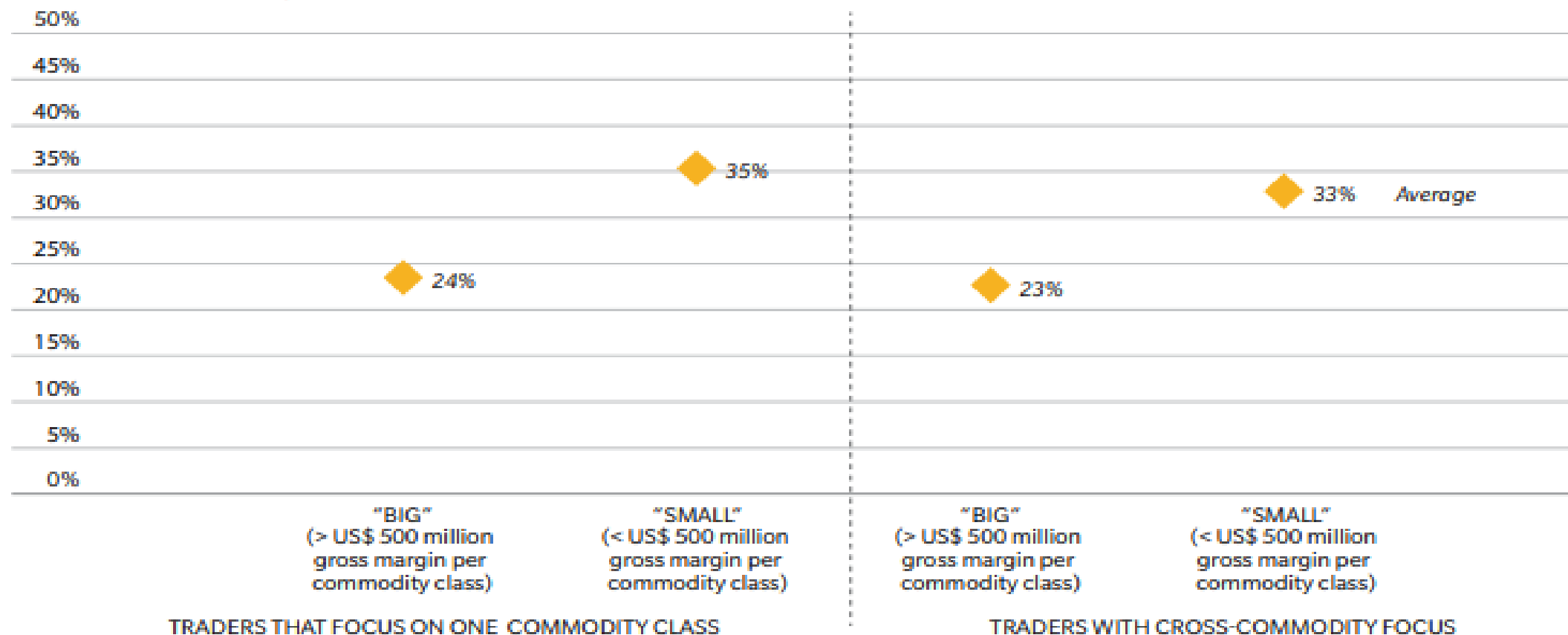
# US Trading Commodity Futures (CFTC)

- Between 2012-2016, Futures trading systems and their transactions are mainly automated using AI
  - Energy 50%
  - Precious metals 100%
  - Agriculture products 200%

# Trading by AI vs. Non AI

## GROSS MARGIN VOLATILITY DEPENDING ON SIZE AND FOOTPRINT

% VARIATION FROM  
AVERAGE GROSS MARGIN, 2010-2016

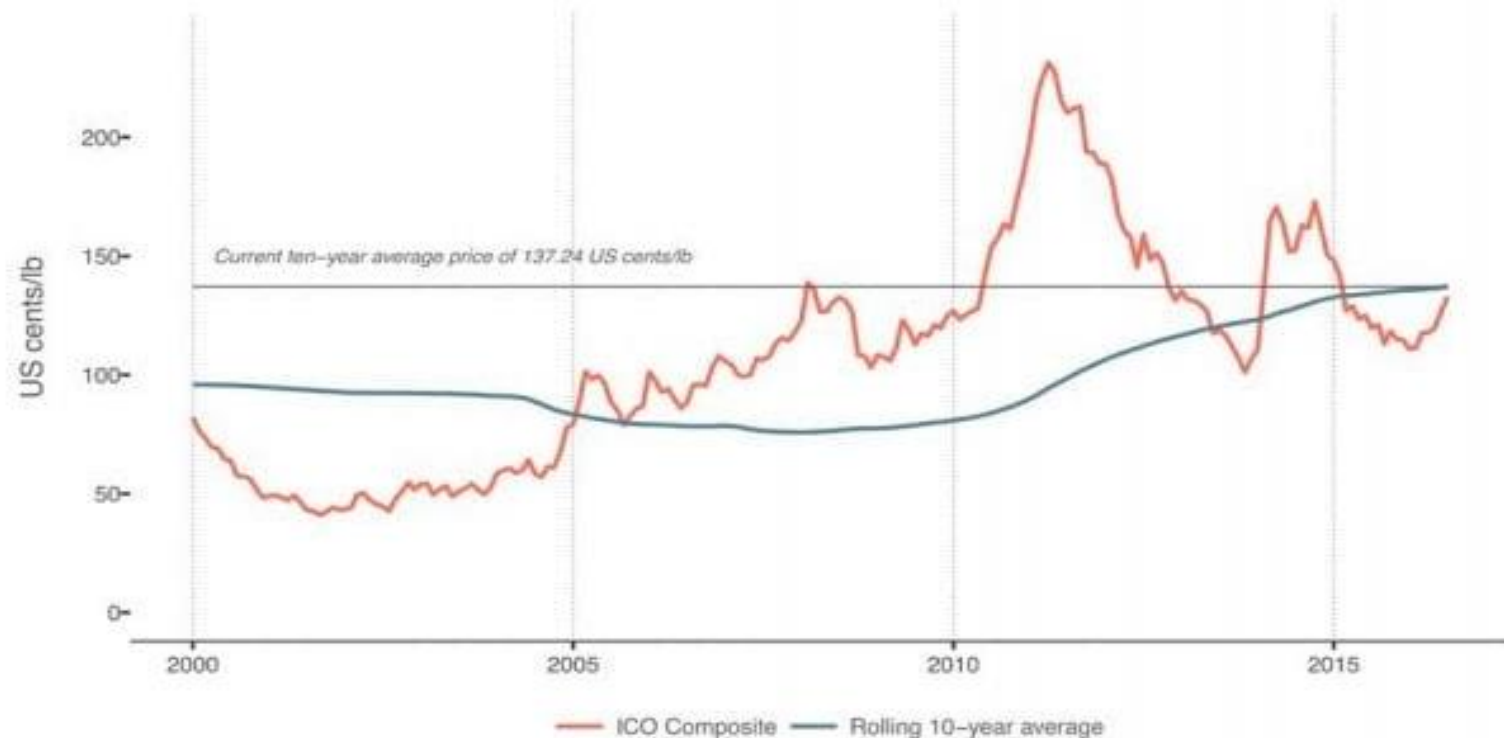


Source: Publicly available data, Oliver Wyman analysis

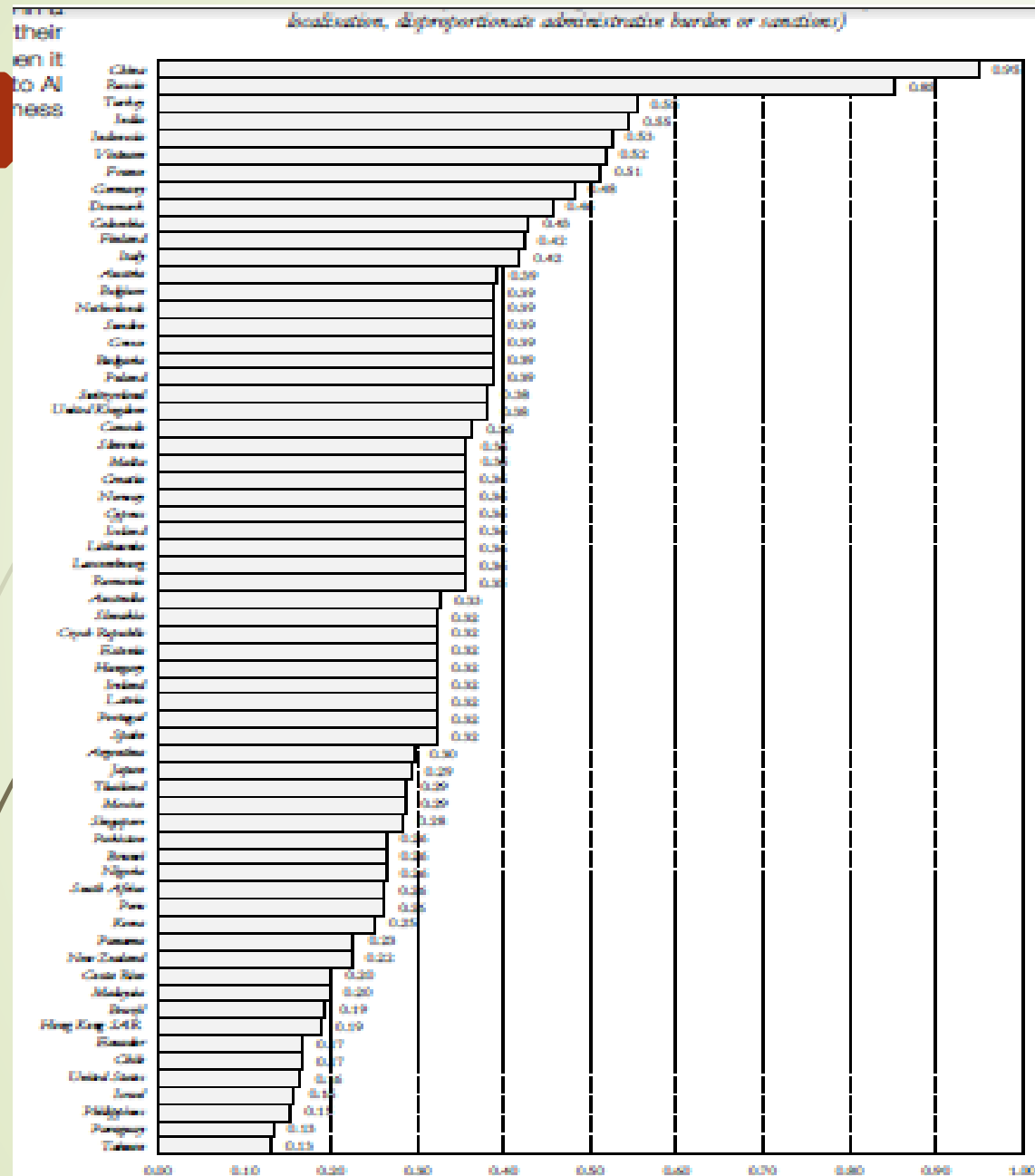


# Unstable Coffee Market Prices

Graph 1: ICO composite indicator price since 2000



*Coffee prices since 2000. Credit: ICO; graph taken from Assessing the economic sustainability of coffee growing (2016) under Fair Use policies.*



1. China
2. Russia
3. Turkey
4. India
5. Indonesia

42. Japan
- 43. Thailand**
44. Mexico
45. Singapore

55. Malaysia

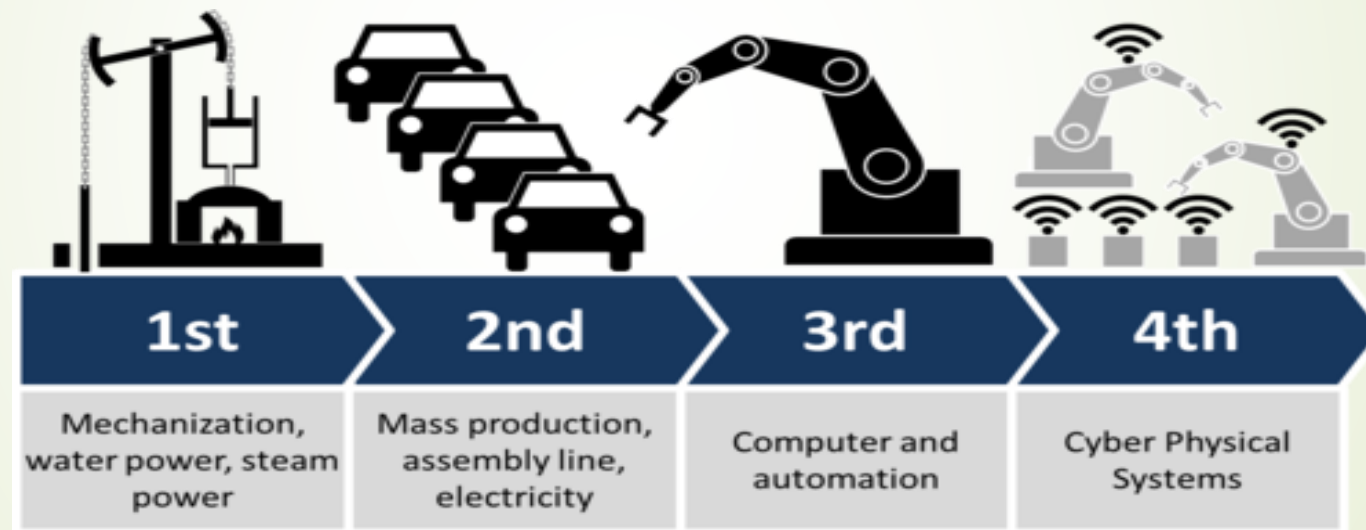
57. Hong Kong SAR
60. United States
61. Israel
62. Philippines

64. Taiwan

More  
restricted

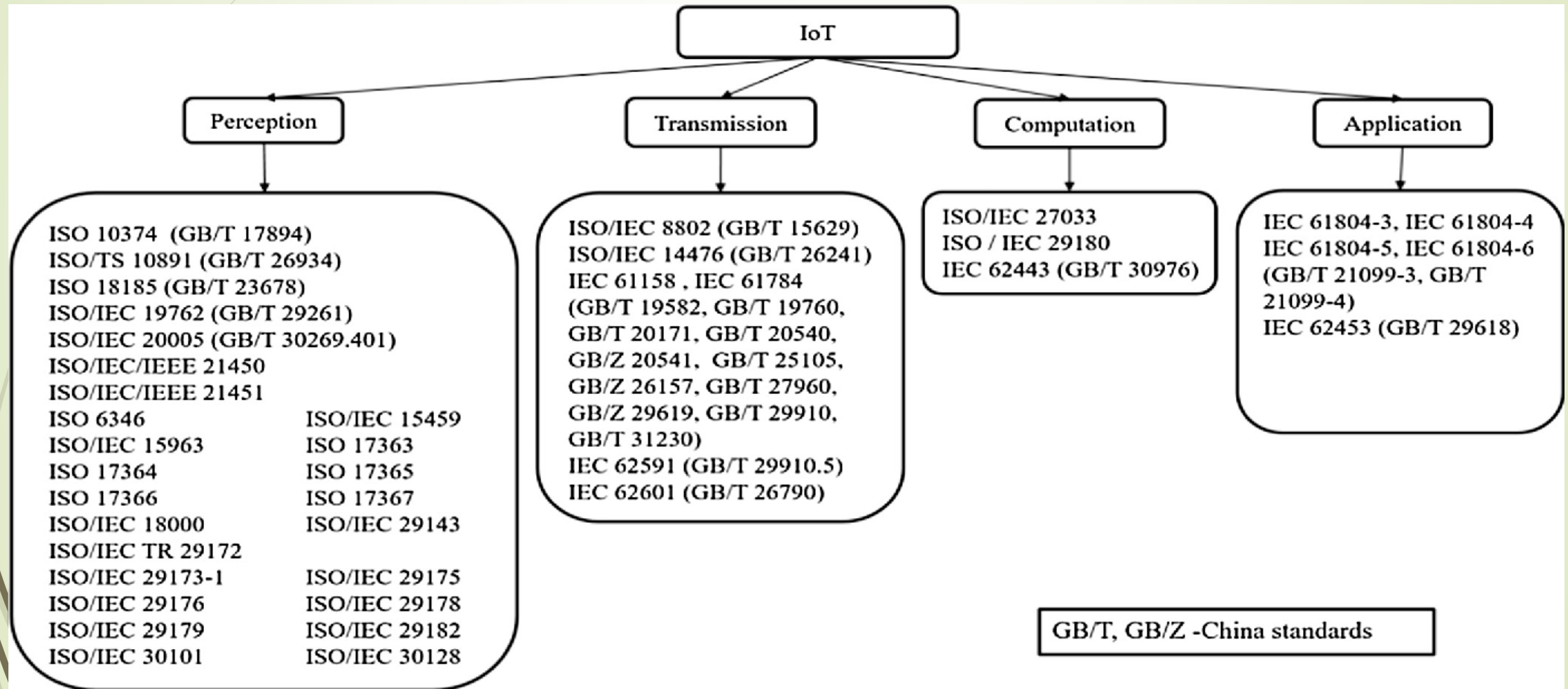
Less  
restricted

A **technological revolution** is a period in which one or more technologies is replaced by another technology in a short amount of time. It is an era of accelerated technological progress characterized by new innovations whose rapid application and diffusion cause an abrupt change in society.



# Standard Essential Patents: Internet of Things (IoT)

The need for Fair  
Use, FRAND





## Traditional Measures (STATIC EFFICIENCY)

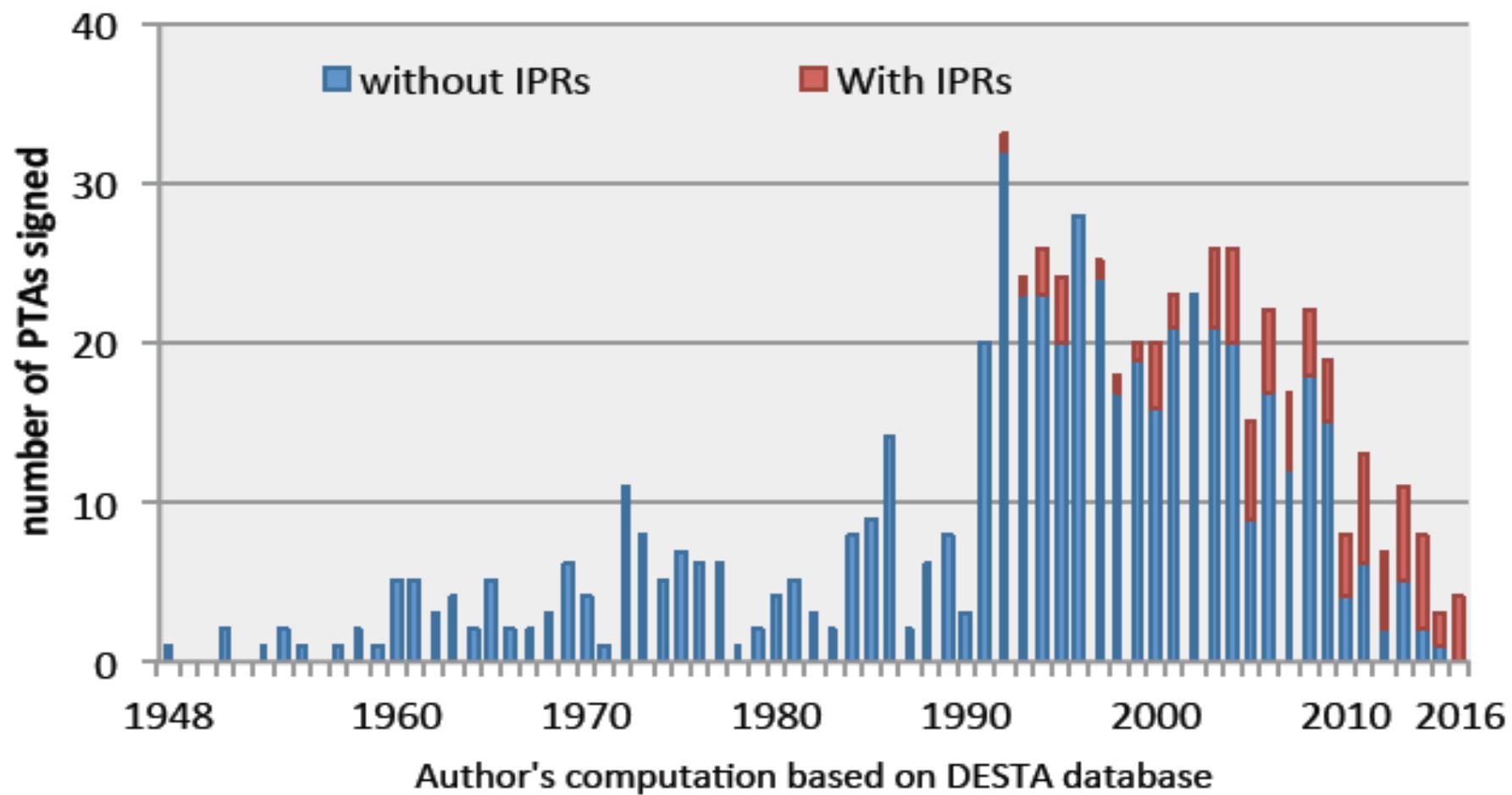
- Fair Use
- Technology Neutrality (Practical)
- FRAND
- Non-Tariff Barriers i.e. IPR
- Market access i.e. Trade facilitation, Investment Treaties

## Emerging Measures (DYNAMIC EFFICIENCY)

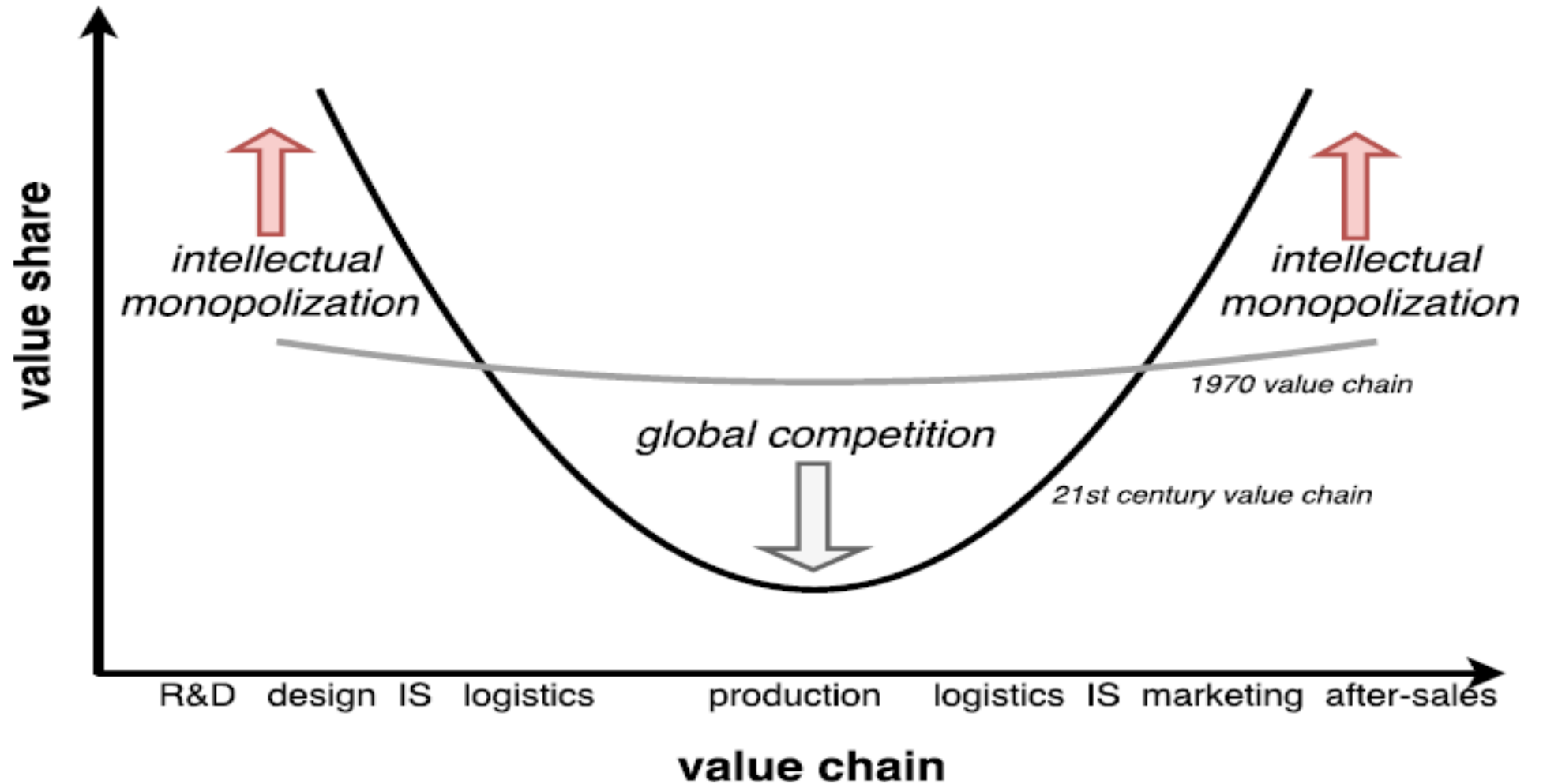
- Fair Use i.e. innovate
- Technology Neutrality (Practical) i.e. Open Standard, Open Source, non-proprietary
- FRAND i.e. SEP
- Digital Rights Management
- Data Regulation, Privacy, Security
- Algorithm i.e. Text and Data Mining, Source Code Disclosure
- Market competition regulation i.e. domestic market, IRC, digital taxation
- Consumer Welfare
- Sustainable Development i.e. inequality, gender dimension, carbon footprint, green technology
- Non-Tariff Barriers



## Trade Agreements and IPRs



## Intellectual monopolization versus global competition

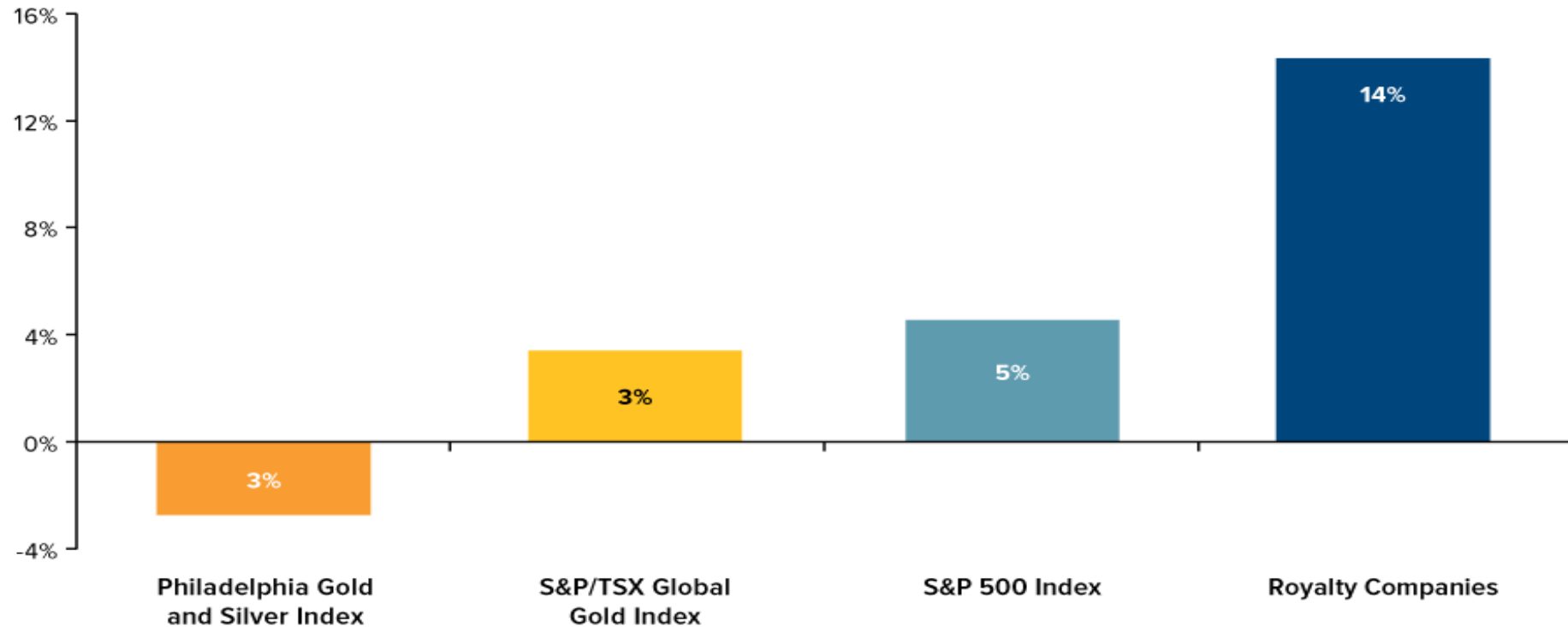


# IP business or Innovation Business

Wealth vs. Jobs

## Royalty Companies Provided Better Dividend Growth than Producers and the Broader Market

Dividend Per Share, Compound Annual Growth Rate, 2007-2014



**Note:** "Royalty companies" includes Franco-Nevada, Silver Wheaton and Royal Gold.

**Source:** Dundee Capital Markets, U.S. Global Investors

# GDPR – New Norm (technical barrier)

- Processing and handling personal data of EU citizens based on the following principles or rights:
  - Right to access of services (Geoblocking)
  - Right to data portability
  - Right to be forgotten
  - Right to be informed
  - Data protection (safe)
  - Transparency and enforcement (notification or fined 4% of global turnover or EUR 20million (max))



# De Minimis Threshold?





# The Butterfly Effect

- One isolated event (however small) can determine the final outcome of another system.
- The small can topple the big! (**leading indicator**)
- Critical threshold is key. Identifying and managing then, the “Critical Few” will be key. (**tipping point factor**)

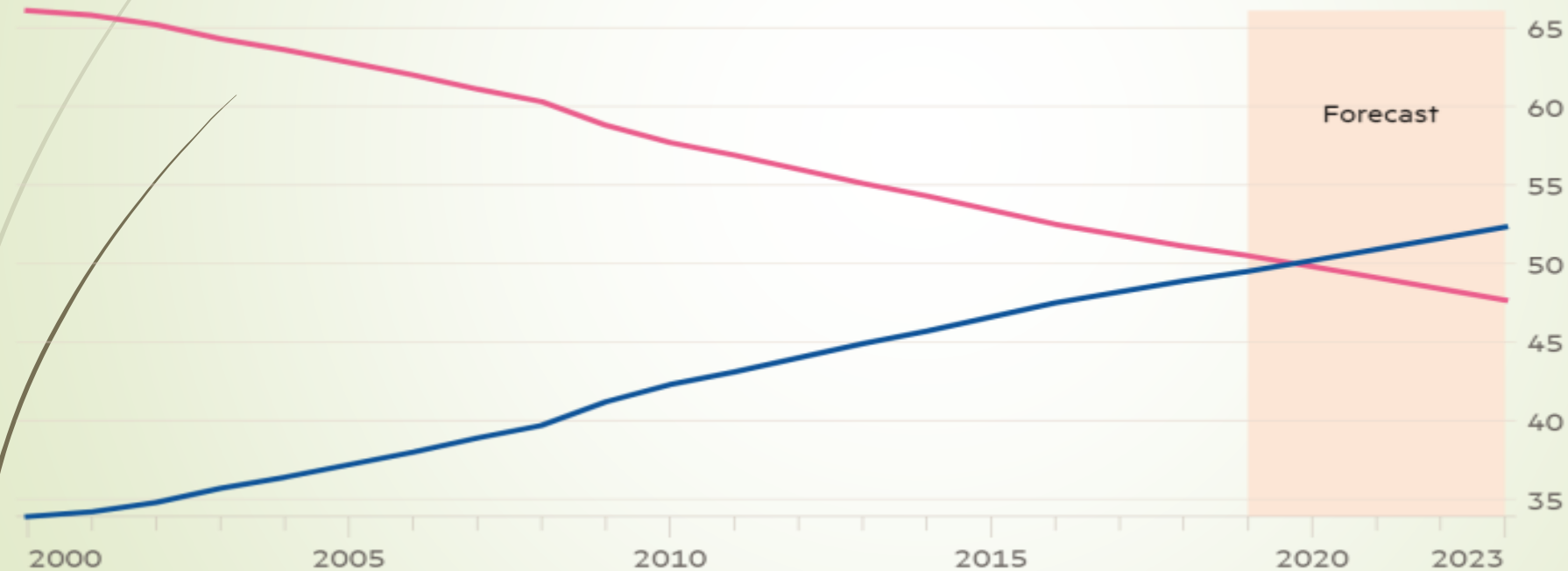


# Asian Century Approaching.....

## The Asian century is about to begin

Share of world GDP at PPP \$

— Asia — Rest of the world



Unctad definition of Asia

Sources: IMF, @valentinaromei

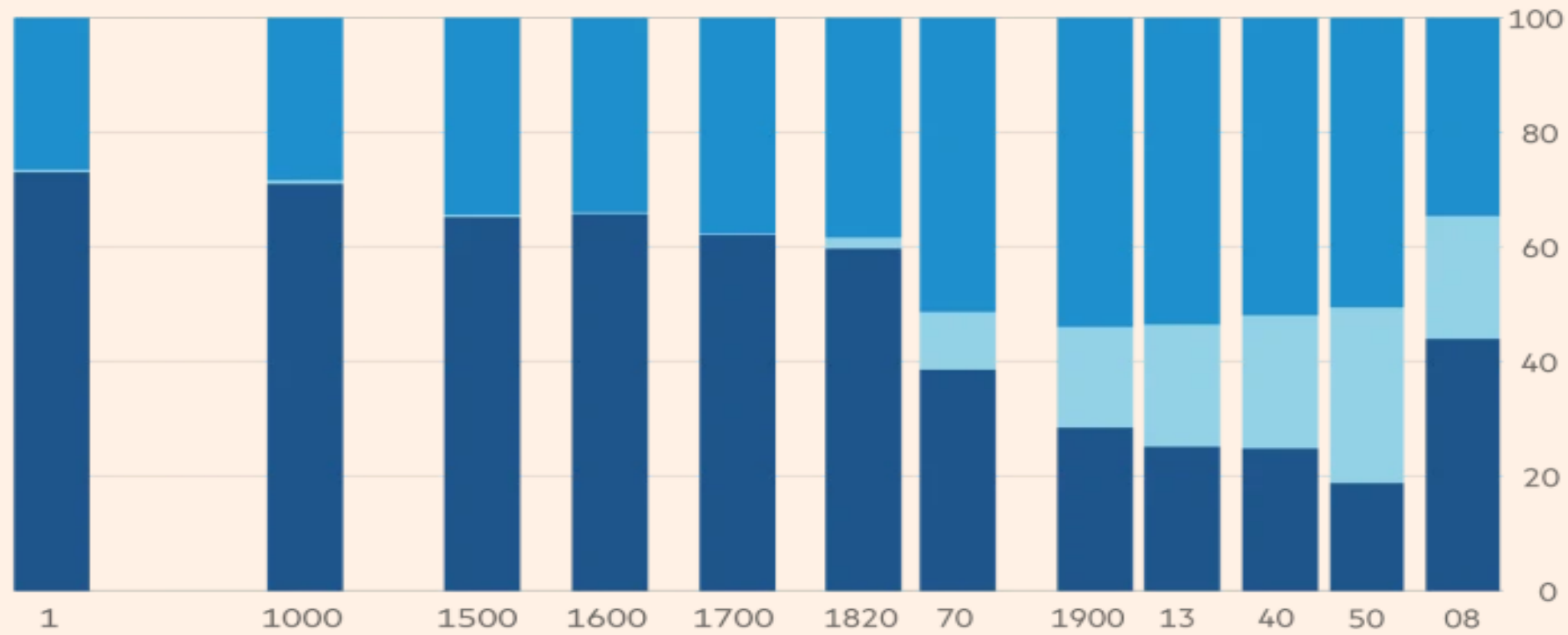
© FT

# Role of Asia

## Historical role of Asia

Share of world GDP at purchasing power parity

■ Asia    ■ US, Canada, Australia and N Zealand    ■ Rest of the World



Source: Angus Maddison  
© FT

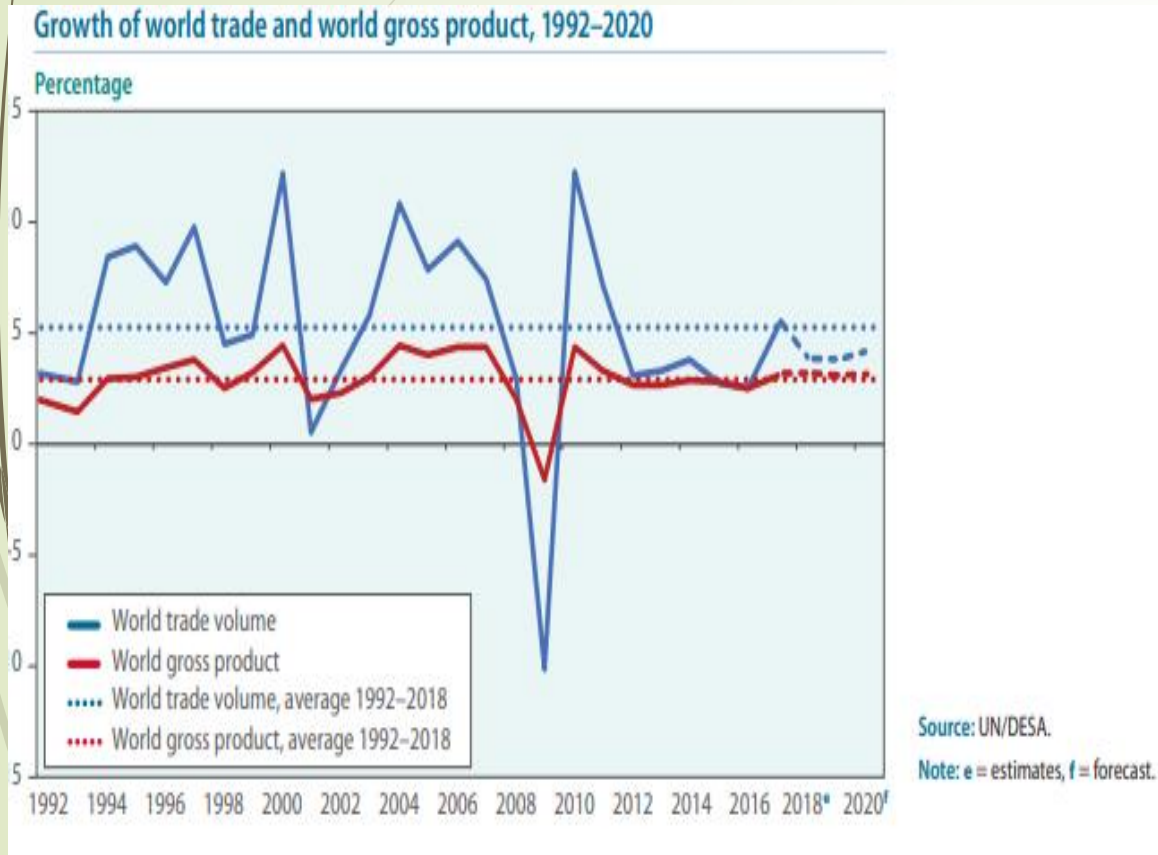
# Return on Investment in Emerging Market Declining!



Sources: Financial Times  
and CEIC.

- 8 Additional information on monetary and fiscal policy assumptions underpinning the forecast is reported in the Appendix to this chapter.

# Going Beyond GDP....Humanity Centered Progress



GDP is not a good  
measure of **economic  
performance**, it's not a  
good measure of  
**well-being**

Joseph Stiglitz  
Economist





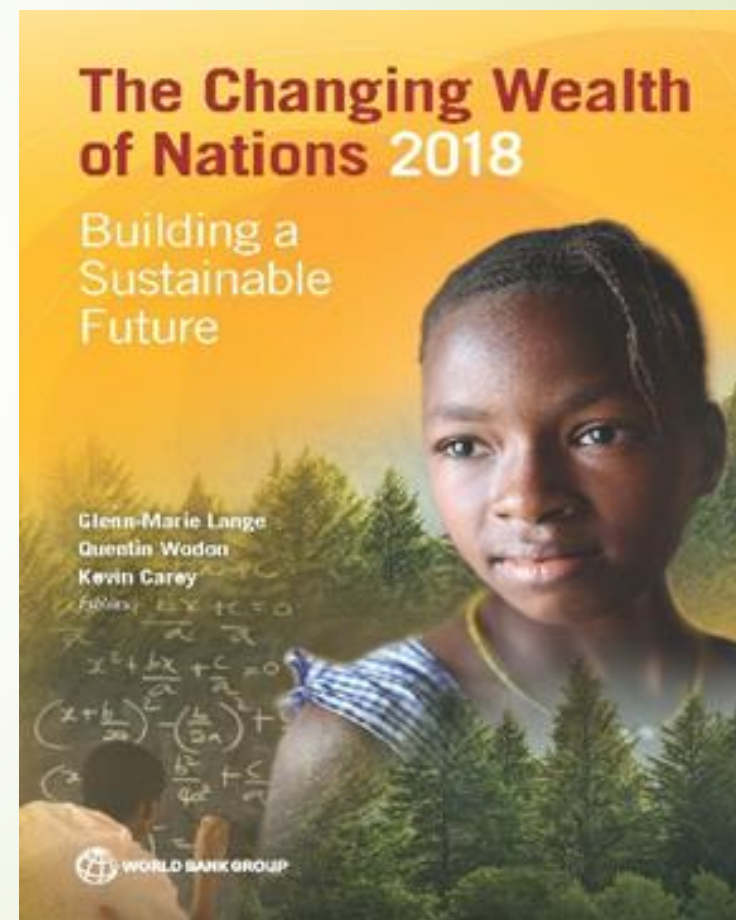
# New Approach to Measuring Wealth and Well-Being

Our New Context

The Changing Wealth of Nations 2018: Building a Sustainable Future covers national wealth for 141 countries over 20 years (1995–2014) as the sum of produced capital, 19 types of natural capital, net foreign assets, and human capital overall as well as by gender and type of employment.

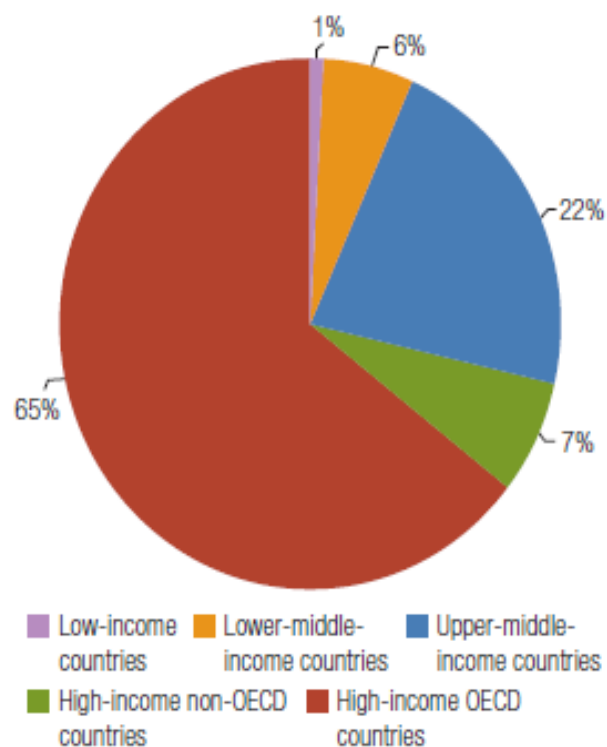
New data substantially improve estimates of natural capital, and, for the first time, human capital is measured by using household surveys to estimate lifetime earnings. The Changing Wealth of Nations 2018 begins with a review of global and regional trends in wealth over the past two decades and committed to building a sustainable future for the planet.

“Lange, Glenn-Marie; Wodon, Quentin; Carey, Kevin. 2018. The Changing Wealth of Nations 2018 : Building a Sustainable Future. Washington, DC: World Bank. © World Bank.  
<https://openknowledge.worldbank.org/handle/10986/29001> License: CC BY 3.0 IGO.”



# Current Wealth (not GDP)-reflect diff view

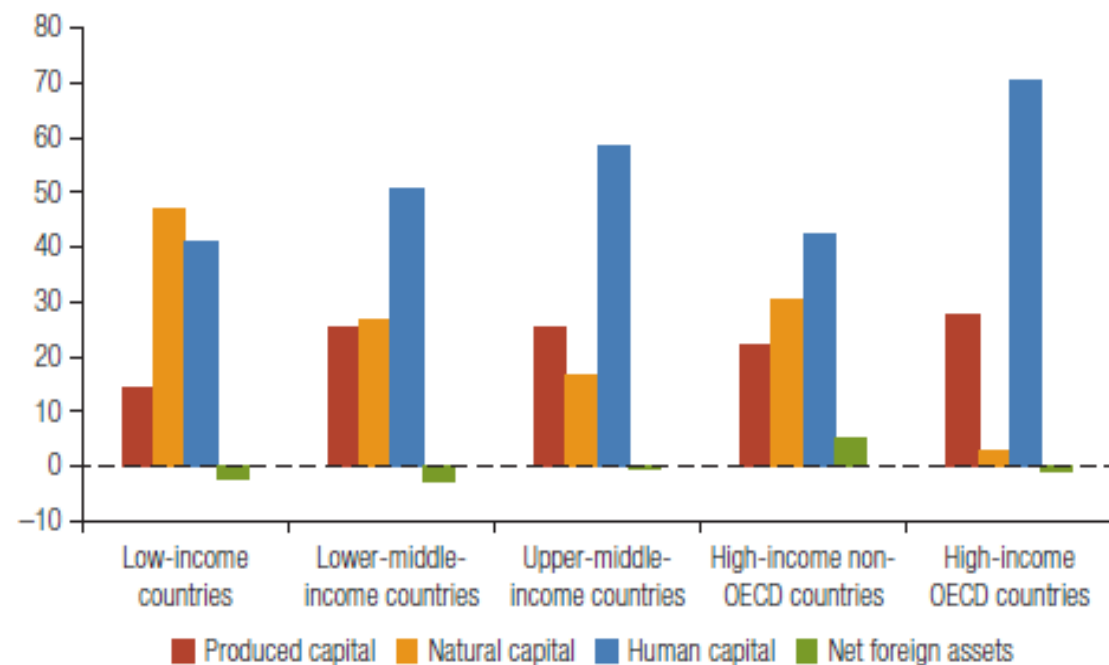
**FIGURE 2.1** Distribution of Global Wealth, by Income Group, 2014



Source: World Bank calculations.

Note: OECD = Organisation for Economic Co-operation and Development.

**FIGURE 2.2** Composition of Wealth, by Income Group, 2014  
percent



Source: World Bank calculations.

Note: OECD = Organisation for Economic Co-operation and Development.



# OECD Framework on Measuring Well-Being and Progress

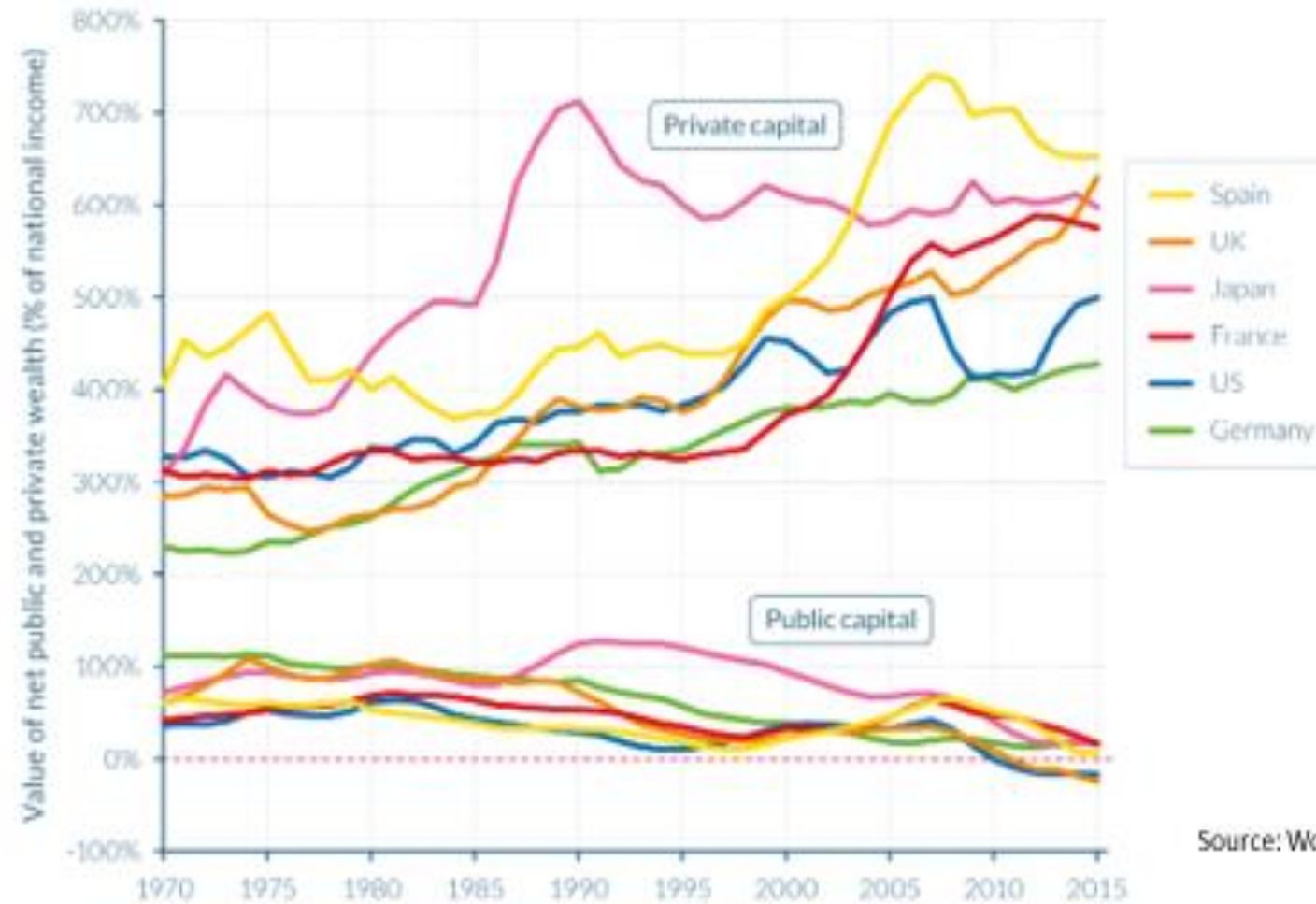
## OECD Framework for measuring well-being and progress



**Beyond GDP**  
Measuring What Counts for Economic and  
Social Performance  
and  
**For Good Measure**

*Beyond GDP* and *For Good Measure* are the final reports of the High-Level Expert Group on the Measurement of Economic Performance and Social Progress (HLEG), the successor to the 2009 Commission on the Measurement of Economic Performance and Social Progress ("Stiglitz-Sen-Fitoussi" Commission). The Commission had concluded that we should move away from over-reliance on GDP when assessing a country's health, towards a broader dashboard of indicators that would reflect concerns such as the distribution of well-being and sustainability in all of its dimensions. The HLEG, an independent group of experts that has been hosted by the OECD over the past five years, aimed to provide impetus and guidance to the various initiatives currently ongoing on measuring people's well-being and societies' progress. The Group was co-chaired by Nobel Prize winner Joseph E. Stiglitz, leading well-being economist Jean-Paul Fitoussi, and the OECD Chief Statistician Martine Durand.

# The Diminishing Role of Government (Developed)



Source: World Inequality Report 2018



# Future of the Internet: Vint Cerf

DIGITAL LIFE IN 2025

“

AI and natural language processing  
may well make the internet far more  
useful than it is today.



— VINT CERF, GOOGLE VICE PRESIDENT AND  
CO-INVENTOR OF THE INTERNET PROTOCOL

”





Q&A

[duangthip@itd.or.th](mailto:duangthip@itd.or.th)

Director

International Cooperation

International Institute for Trade and Development

