Challenges for Regional Policy in the age of Globalising Technologies: Reflections of a Policy Maker

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Challenges for Regional Policy in the age of Globalising Technologies: Reflections of a Policy Maker

- The New Machine Age: Accelerating Innovation
- A Shrinking World: Global Value Chains
- The Promise of Smart Specialisation: Regional Policy in the context of the Knowledge Economy
- Rewiring European regions to Global Value Chains: Challenges and Limitations

The New Machine Age: Accelerating Innovation

- Last part of the 20th century witnessed a major acceleration in scientific and technological advances.
- The knowledge-based economy that introduced recently the fourth industrial revolution (Artificial Intelligence, Big Data, Analytics and Robotics), a game changer for economic development at national and regional levels
- Internet's arrival in the mid-90's completely changed the innovation paradigm, enabling the reconfiguration of the process of disruptive innovation: a large new base of generic technologies made available through a model favouring new views and approaches, heavy user feedback and new methodologies for rapid prototyping and product / process initiation.
- General Purpose Technologies (Bresnahan T.F., Trajtenberg M. 1995) based overwhelmingly on ICT have enabled the knowledge economy where knowledge and its applications define competition versus older models based on capital, labour and infrastructure.

Source:
McKinsey Global Institute, 2013

Disruptive technologies: Advances that will transform life, business, and the global economy

Connecting rate of improvement and reach today …

$5 million vs. $400
Price of the fastest supercomputer in 1975[1] and an iPhone 4 with equal performance

230+ million
Knowledge workers in 2012

$2.7 billion, 13 years
Cost and duration of the Human Genome Project, completed in 2003

300,000+
Miles driven by Google's autonomous cars with only one accident (human error)

3x
Increase in efficiency of North American gas wells between 2007 and 2011

85%
Drop in cost per watt of a solar photovoltaic cell since 2000

1 For CDC-7600, considered the world's fastest computer from 1969 to 1975; equivalent to $32 million in 2013 at an average inflation rate of 4.3 percent per year since launch in 1969.

… with economic potential in 2025

2–3 billion
More people with access to the Internet in 2025

$5–7 trillion
Potential economic impact by 2025 of automation of knowledge work

$100, 1 hour
Cost and time to sequence a human genome in the next decade[2]

1.5 million
Driver-caused deaths from car accidents in 2025, potentially addressable by autonomous vehicles

100–200%
Potential increase in North American oil production by 2025, driven by hydraulic fracturing and horizontal drilling

16%
Potential share of solar and wind in global electricity generation by 2025[3]

2 Derek Thompson, "IBM's killer idea: The $100 DNA-sequencing machine," *The Atlantic*, November 16, 2011.
3 Assuming continued cost declines in solar and wind technology and policy support for meeting the global environmental target of CO_2 concentration lower than 450 ppm by 2050.

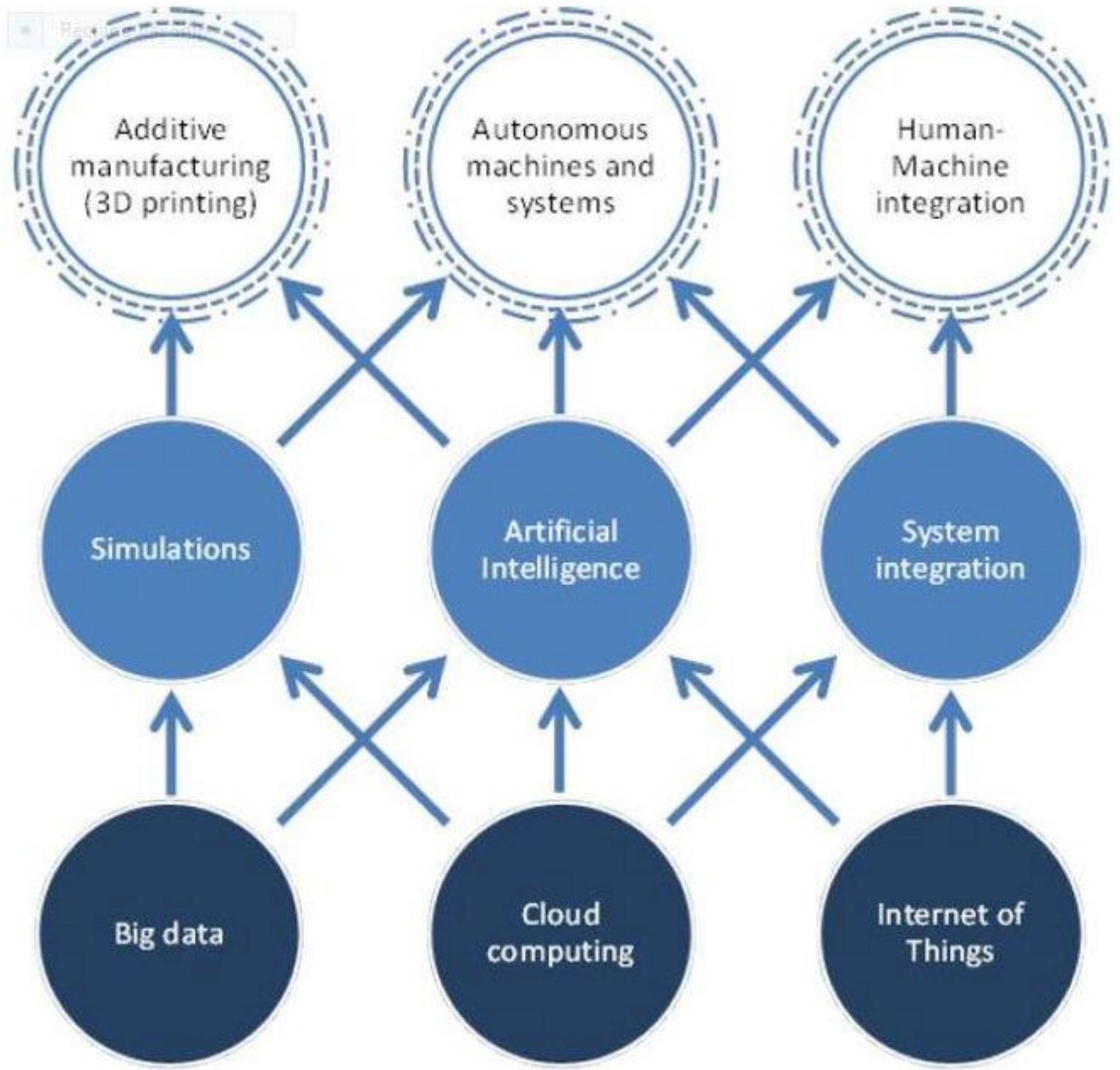
Five game-changing technologies (source Eurofound (2018) Game changing technologies: Exploring the impact on production processes and work)

Table 1: Description of the five technologies

Name and acronym	Description
Advanced industrial robotics (AIR)	Advanced industrial robotics is the branch of robotics dedicated to the development of robots which, through the use of sensors and high-level and dynamic programming, can perform 'smarter' tasks, that is, tasks requiring more flexibility and accuracy than those of traditional industrial robots – for example, a robot that can handle lettuce without damaging it. The term applies to digitally enabled robots working within industrial environments that are equipped with advanced functionality (for example, sensors detecting potential collisions, and halting or performing a programmed motion with a very limited lag), allowing them to deal with less structured applications and, in many cases, collaborate with humans (instead of being segregated from them).
Additive manufacturing (AM)	Additive manufacturing is a technique using the super-imposition of successive layers to build a product. It is additive in the sense that products and product components are built up rather than cut out of existing materials – subtractive manufacturing. The key prerequisite of the AM process is that products can be digitally modelled before being physically generated. The 'revolution is … the ability to turn data into things and things into data' (Gershenfeld, 2012).
Industrial internet of things (IIoT)	Sensors applied to the manufacturing industry create cyber-physical systems where the information collected from the sensors is fed, through the internet, to computers in order to gather data about the production process and analyse these data with unprecedented granularity. In advanced cyber-physical systems, a whole factory can be digitally mapped and enabled using such sensors.
Electric vehicles (EVs)	Electric vehicles are vehicles for which the main system of propulsion depends on electricity and not on fossil fuel. The vehicle relies on the storage of externally generated energy, generally in the form of rechargeable batteries. The main current example is the battery electric vehicle.
Industrial biotechnology (IB)	Industrial biotechnology is the use of biotechnological science in industrial processes. Modern biotechnology is based on the most recent scientific insights into the specific mechanisms of biological processes within living organisms (for instance, through systems genomics and metabolomics research). These are used to design processes in industry using yeasts, bacteria, fungi and enzymes (biological catalysts that improve reaction processes and that are relatively easy to obtain) to produce biomaterials and biofuels.

Key technologies enabling the industrial digital transformation

(*source: OECD (2017) "Enabling the Next Production Revolution", OECD publishing, Paris*)



Disruption goes global

- **Global growth shifts**: Globalization of digital products and services is surging, while the globalisation map is changing: from the dominant once BRIC (Brazil, Russia, India, and China) a new model emerges: ICASA (India, China, Africa, and Southeast Asia)
- **Accelerating industry disruption:** New 'Combinatorial Technologies" take the lead in mixing already disruptive trends : digitization, machine learning, and the life sciences are together redefining the industrial ecosystem *(Source: McKinsey Global Institute)*

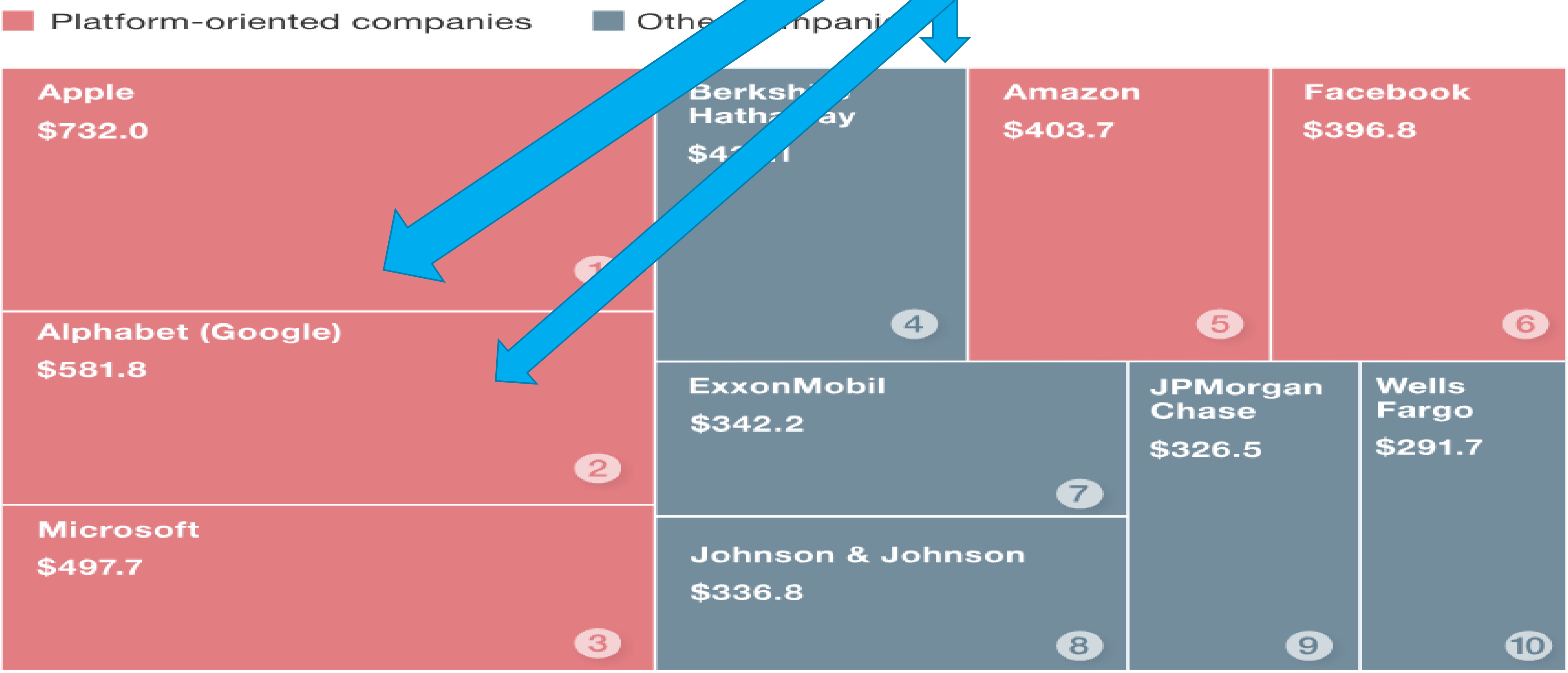
The Platform Economy

- Older linear value chains are being transformed because of the IT revolution
- New horizontal digital platforms emerge typically organising and adding value to information and services. Here one finds giants like Google, Amazon, and Facebook accounting at present for five of the ten largest US companies by market capitalisation
- A new company model "*Any-to-any*" emerges, critically enabled by the presence and functions of the new platform economy (e.g. Uber and Airbnb). Such companies most often do not have significant hard assets, they are mostly transactional

Platform-oriented companies represent half of the top ten US public companies by market cap

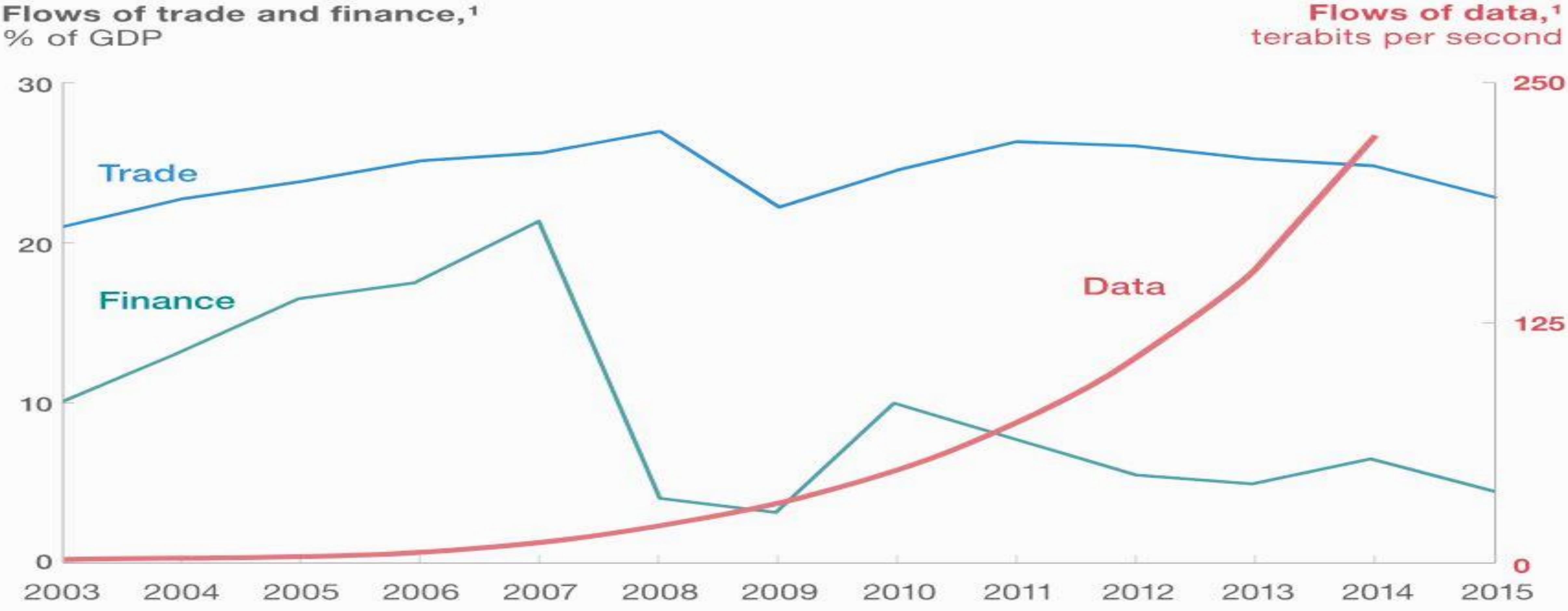
All 3 now reached market cap of 1 Trillion $

March 8, 2017, market capitalization, $ billion



McKinsey&Company | Source: Corporate Performance Analytics by McKinsey

Global flows of data have outpaced traditional trade and financial flows.

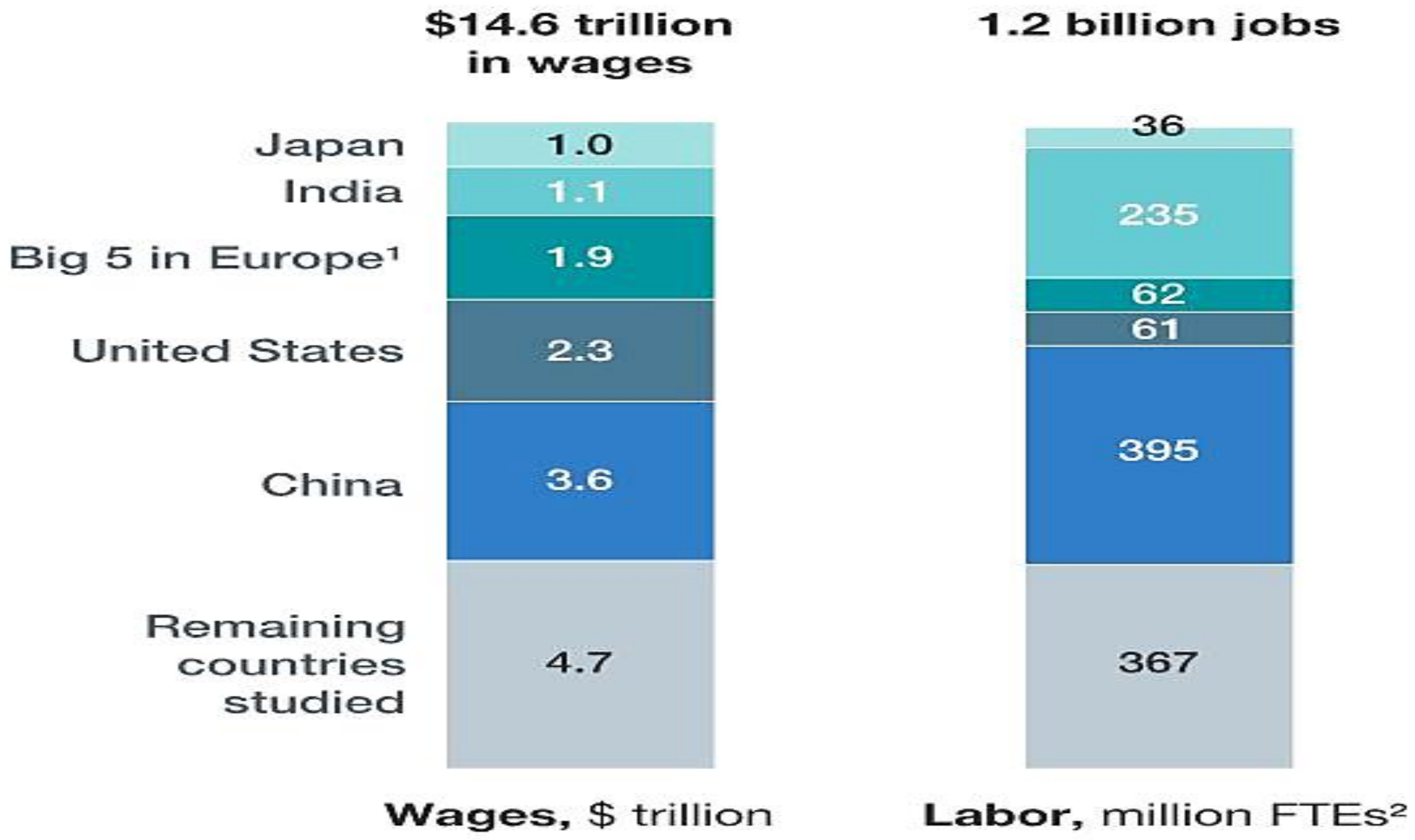


[1]Trade and finance are inflows; data flows are a proxy to inflows, based on total flows of data.

Source: IMF Balance of Payments Statistics; TeleGeography, Global Bandwidth Forecast Service; UNCTAD; World Bank; McKinsey Global Institute analysis

McKinsey&Company

Using currently demonstrated technologies, the number of tasks that can be automated would affect $14 trillion in wages and a billion jobs.



[1]France, Germany, Italy, Spain, and United Kingdom.
[2]FTEs = full-time equivalents.

Source: *A future that works: Automation, employment, and productivity*, McKinsey Global Institute, January 2017

A Shrinking World: Global Value Chains

- What used to be once overall localised production of goods, has largely morphed in a network scheme, scattered across different production spots across the planet, depending on a wide range of variables like *facility of access, local skills, and economic, institutional and financial environments*. These networks have come to be widely known as Global Value Chains (GVC) (Cattaneo O. et al, 2010) and they are now key for shaping the international economy.

- Sophisticated advances in information and communication technologies, coupled with even more efficient software applications facilitating global transactions across the globe, coupled with an increasing liberalisation of world trade, fuelled the emergence of GVCs (Baldwin, 2016). As Koen De Backer and Dorothée Flaig of the OECD Secretariat point out "*The co-ordination and transaction costs associated with international fragmentation (e.g. communication, information and governance costs) fell quickly below the expected cost advantages through specialisation, economies of scale and differences in (labour) costs; this has motivated companies to organise their production processes on an international scale" (OECD, 2017)*

Connectedness to GVC defines national or regional growth

- Translating the real technological but also the organisational and financial capabilities of their participants, GVCs are now responsible for the majority of global trade transactions as they play a defining role for the economies that are associated with their creation and functioning.

- They are so important that their connectedness determines largely the global value of the constituent members as well as their positioning in the international competitive global marketplace.

- Failure to participate or a weak participation to GVCs indicates a country or region dangerously disconnected, with declining economic prospects. Increased use of rationalisation in conception, design, production and commercialisation of products and services, results in high selectivity, effectively excluding the weakest players from GVCs networks.

- This rationalisation may lead entire regions to relative redundancy, giving prominence to stronger peers. Inability to integrate the prevailing GVCs matching the particular specialisations of countries and regions, is set to lead these places in progressive relative marginalisation and economic decline.

OECD Employment Outlook 2017 - © OECD 2017
Chapter 3 Figure 3.4. The rise of global value chains
Version 2 - Last updated: 26-Jun-2017
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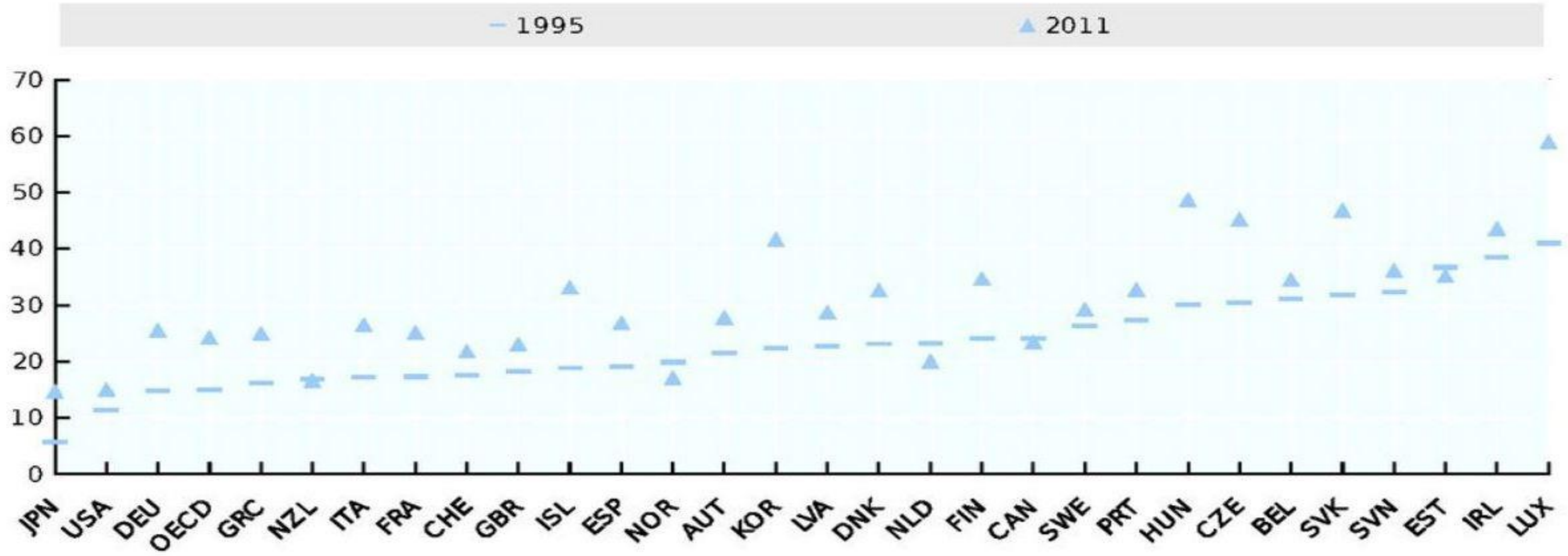
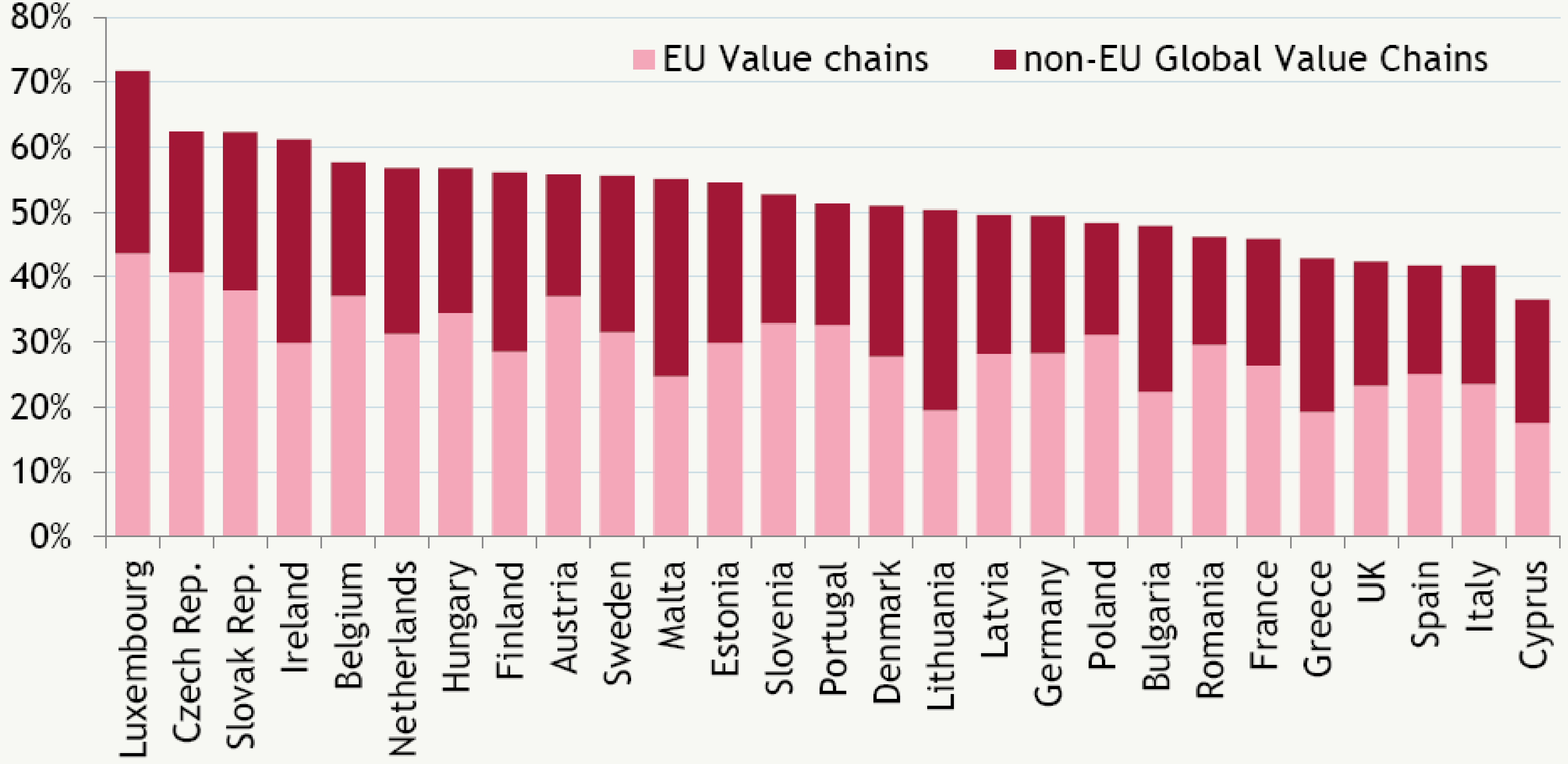
Figure 3.4 The rise of Global Value Chains
Increased linkages through global value chains, selected OECD countries, 1995 to 2011
Change in foreign value added share of gross exports, 1995 to 2001



In 2009, (on average) **53%** of EU countries' exports were involved in Global value chains

...of which (on average) 56% in European value chains.



Source: Bruegel Manufacturing Blueprint (2013) Participation in GVC is measured as the share of foreign inputs embedded in a country's exports (backward participation) plus the share of domestic inputs of that country embedded in other countries' exports (forward participation).

Where Europe stands in terms of global innovation capacity

- Despite the existence of a strong population of highly innovative European companies, on the whole:
  - ❑ Europe has consistently failed to exploit its potential for innovation-based growth despite long-term innovation structural policies (including the efforts of the European Structural and Investment Funds)
  - ❑ Structural deficiencies block the EU innovation system
  - ❑ Europe has great difficulties addressing transformative innovation; in particular achieving higher degrees of specialisation in new innovation based growth sectors and firms
  - ❑ Many commentators argue about European fragmentation of EU's science, technology and innovation system: we are indeed missing "European Innovation Value Chains"
  - ❑ The Union seems to lack the ability to transform knowledge into world-leading commercial products and services (market-creating innovation)
  - ❑ Countries and regions still unable to form a better integrated European Innovation System

(adapted from R.Veugelers, BREUGEL)

Europe's corporate R&D fails to specialize in innovation based growth sectors

RTA Indices

Specialisation in "Dynamic" Sectors

	EUR	US
Aerospace & defence	*1,5*	*1,13*
Biotechnology	*0,32*	*2,2*
Computer hardware & Computer services	*0.08*	*1,39*
Health care equipment & services	*0,7*	*1,86*
Internet	*0*	*2,54*
Pharmaceuticals	*1,27*	*1,16*
Semiconductors	*0,5*	*1,72*
Software	*0,51*	*2,05*
Telecommunications equipment	*1,38*	*1,09*
All IBG sectors	***0.89***	***1.43***

Specialisation in "Classic" Sectors

Industrial machinery	1,84	0,24
Industrial metals	1	0,3
Electrical components & equipment	1,56	0,18
Fixed & Mobile telecommunications	1,53	0,2
Chemicals	1,31	0,64
Automobiles & parts	1,26	0,58

Europe's corporate R&D misses "Yollies" in innovation based growth sectors

	EU	US
Share of Yollies in number of region's leading innovators	23%	51%
R&D intensity of Yollies Ollies	 4% 3%	 10% 4%
Share of the region's Yollies in Innovation Based Growth Sectors	62%	84%
R&D intensity of Yollies in Innovation Based Growth Sectors	13.9%	12.6%

Source: Veugelers, R. and M. Cincera, 2010, **Europe's Missing Yollies**, Bruegel Policy Brief 2010/06, Bruegel Brussels

The Promise of Smart Specialisation: Regional Policy in the context of the Knowledge Economy

- Smart Specialisation pays particular attention to regions' connectivity to value chains, stressing the importance of a more organic integration to the economic environment

- Specifically the JRC RIS3 Guide has numerous references to Value Chains:

- " …*In other words, a region should be able to identify its competitive advantages through systematic comparisons with other regions, mapping the national and the international context in search of examples to learn from, or to mark a difference with, and performing effective benchmarking. Moreover, a region should be able to identify relevant linkages and flows of goods, services and knowledge revealing possible patterns of integration with partner regions. This is particularly important in the case of less developed regions that would often need to source know-how and technology from the rest of the world. The position of regional businesses within international value chains in this respect is a crucial element to be considered*…"

Rewiring European regions to Global Value Chains: Challenges and Limitations

- The task of benchmarking, connecting and integrating countries and regions to Global Value Chains becomes particularly challenging, given the speed and complexity of the process.
- GVCs are being reconfigured quickly, shaped by new technologies, capital flows and market decisions, factors that are not most of the time under control by local stakeholders, let alone government planners and policy makers
- While Smart Specialisation provides a meaningful channel for attempting connectivity, a series of other factors would play an important role. Related variety could be a starting point. Network linkages that can have a real transformative effect on the regional economy will be a critical factor for the development process

Thank you!