

Digital Technologies and Global Economic Convergence

KDI-Brookings Institution's
Digital Transformation and Artificial Intelligence: Implications for
Inequality and Global Economic Convergence Workshop

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October 22, 2024

Convergence: Part of a multi-pronged objective

- Competitiveness

- Efficiency
- Better products and services
- Market share

this is the focus of most tech companies
... and many governments who worry about
having their own 'digital champions'

- Geographic convergence

- Catching up of lower income areas
- Connecting areas with lower economic activity

- Market inclusion

- Small firms
- New firms
- Lower income households and individuals
- Lower skilled workers
- Under-represented groups (ethnic, racial, gender, religious)

Are we asking the right questions
about convergence?

- Narrow questions of access are not sufficient
- Debate: How can broader inclusion itself be a source of competitiveness?

Framing debates on “convergence”: 3 usual reactions

1. **“Digital divide” as an infrastructure question** – how to connect remaining 2.6 billion people?
 - And regulatory issues are focused on internet providers and incentivizing them to expand coverage – at more affordable prices
 - “People” are largely treaded as consumers
 2. **“Robots/AI are coming!! What will happen to our jobs?!!!”**
 3. **Existential angst about extent of disruption - and there is little we can do about it**
 - AI will destroy the world, aka we are doomed
- Most optimism on addressing #1 – BUT it also misses most of the agenda on how digital technologies can contribute to more inclusive development outcomes, firm and job dynamics
 - Need more focus on productive use
 - On strengthening systems that are inclusive (by design)
 - Lots of hype on #2 - but evidence here is also cautiously optimistic – and it matters a lot which type of technology for which types of jobs
 - Tech is not monolithic in its potential impacts; different sectors and occupations vary in the scope for substitution and complementary use of technologies
 - Yes, #3 is a worry. But there are many choices we can make.
 - They are political
 - There is scope for policies to shape outcomes – *if* we choose them
 - Be more intentional about the trade-offs and synergies that come with these choices

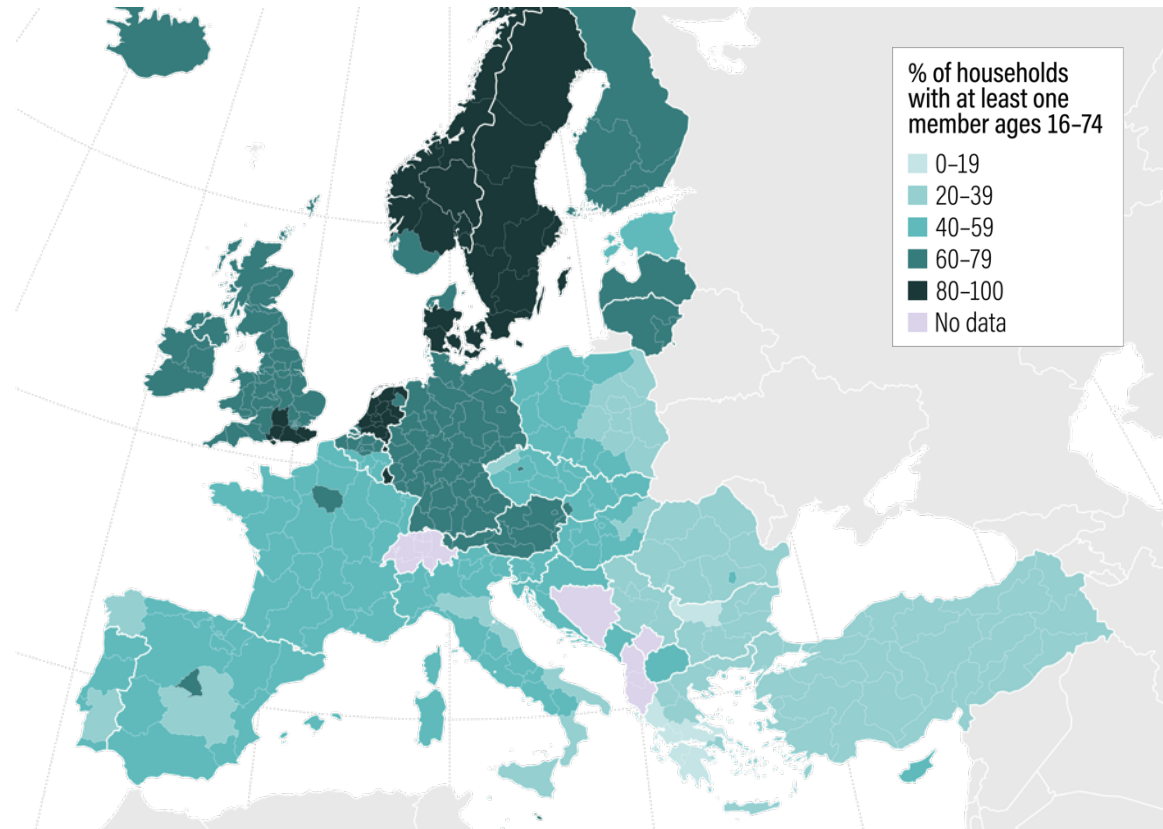
#1: “Convergence as an infrastructure agenda” is clearly not sufficient, but ‘easy’ to get agreement on

- This is not a new critique, but it lingers as it is rarely controversial
 - IDA replenishment themes to G20 communiques focus on closing the infrastructure gap
- Access to ICT is not sufficient to ensure productive use
 - Factors external to the firm:
 - The World Development Report 2016 on Digital Dividends emphasized the need for ‘analog complements’
 - E.g. roads to enable delivery of ecommerce goods; digital skills etc.
 - My research also emphasizes trust, dispute resolution mechanisms, credit systems
 - E.g. in many low and middle income countries e-commerce is all cash-on-delivery
 - A willingness to use the internet for entertainment and social media, but not to conduct economic transactions: issues of credit, trust, taxes
 - Factors internal to the firm
 - Firm Tech Adoption surveys show how few firms adopt even a basic digital technology let alone use it intensively as the primary means of accomplishing tasks – or extensively across multiple tasks (Cirera, Comin, Cruz 2024).
 - Addressing obstacles to adoption and use needs more attention, including training on management skills

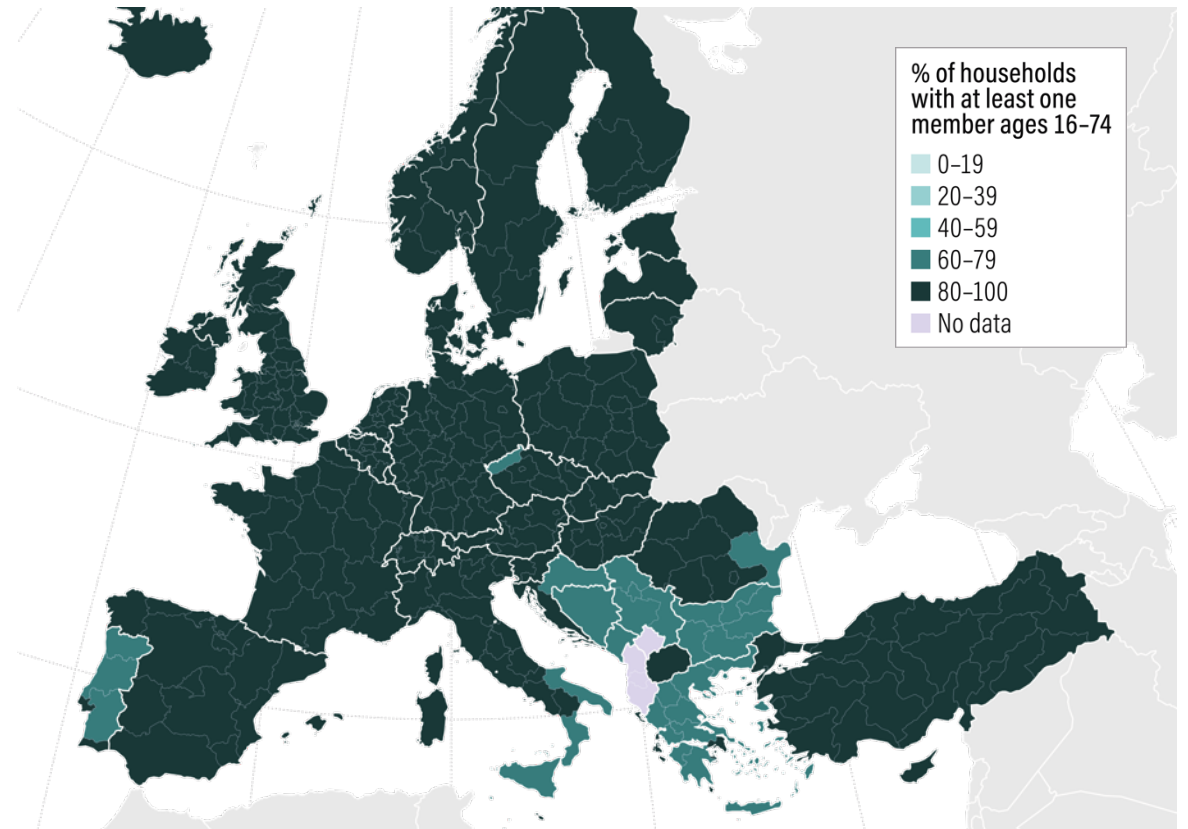
Europe has converged in digital infrastructure...

Households with broadband access

2008



2019



Source: Authors' calculations based on Eurostat.

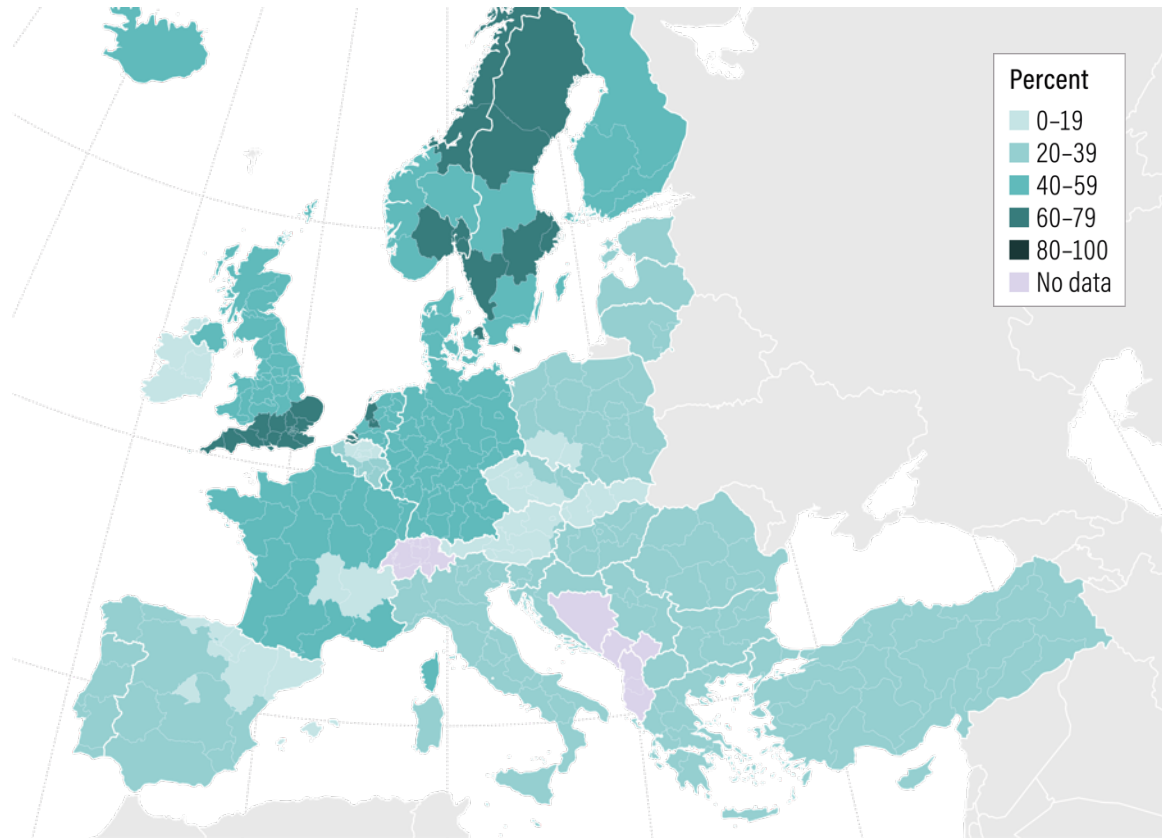
Notes: The maps reflect NUTS 2 level data. Due to lack of data, Poland, Germany, the United Kingdom, Turkey, and Greece reflect NUTS 1 level data. In addition, France reflects NUTS 1 level data in 2019 and national data in 2008 (except for Île-de-France and Auvergne - Rhône-Alpes in 2008).

Source: Hallward-Driemeier, Nayyar, Fengler, Gill and Aridi, 2020

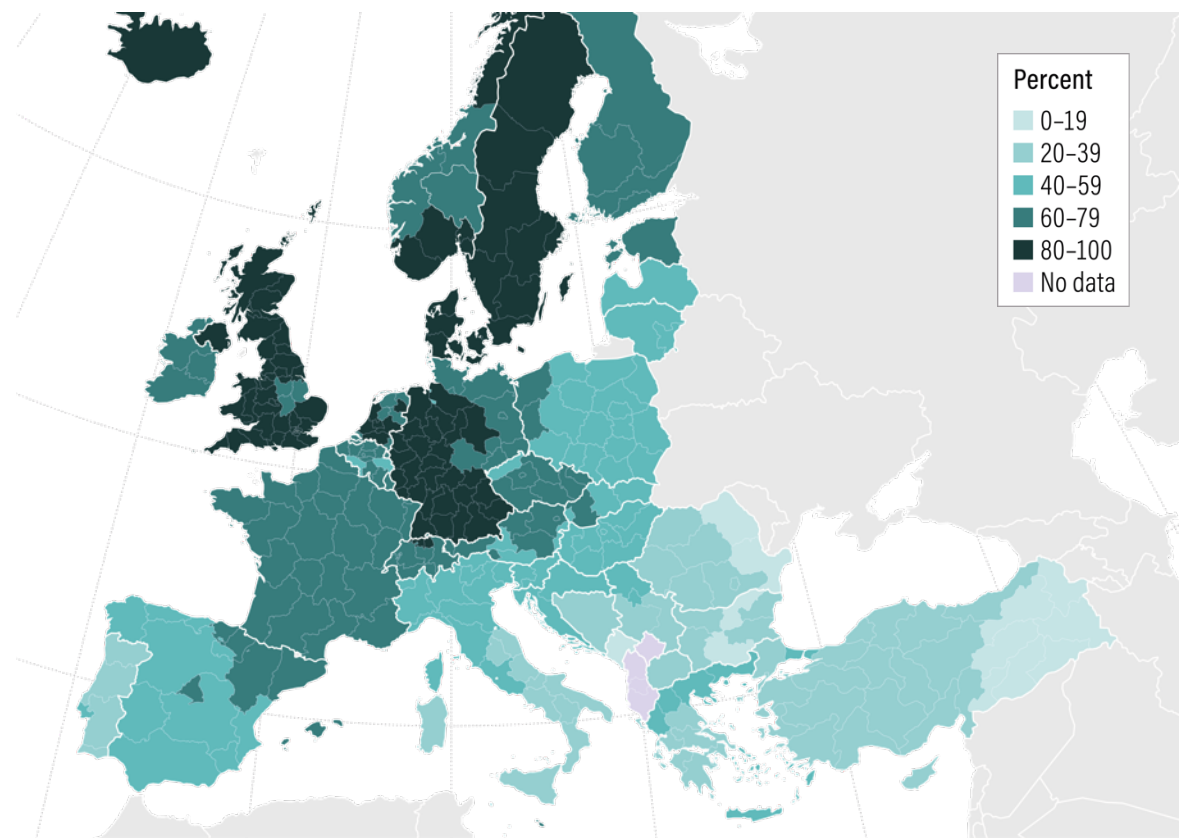
...but more needs to be done to accelerate commercial use

Individuals aged 16-74 who ordered goods or services online for private use in the last year

2008



2019



Source: Authors' calculations based on Eurostat.

Notes: The maps reflect NUTS 2 level data. Due to lack of data, Poland, Germany, the United Kingdom, Turkey, and Greece reflect NUTS 1 level data. In addition, France reflects NUTS 1 level data in 2019 and national data in 2008 (except for Île-de-France and Auvergne - Rhône-Alpes in 2008).

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Beyond “universal access”, ensuring ‘uses’ are inclusive

Regulations need updating to address digital’s dynamics:

- Competition policy: given network effects, scale economies and ‘free’ prices
- Innovation policies: incentives to adopt and adapt vs create own champions
- Worker protections for gig workers; facilitate reskilling

Need more attention on what data can be used for (including for those not connected):

- Hope: Improving the systems in which firms and workers operate
 - E.g. Smart transportation networks can improve energy efficiency and save on transit times
 - E.g. improving transparency and monitoring of government services and regulatory enforcement can level the playing field and improve targeting of where programs can be most effective
 - BUT, watch for bias and risks of exclusion if data is not representative
- Worry: Use data not just for price discrimination, but explicitly for exclusion
 - Regulatory stance (or non-stance) will affect some key industries’ business models
 - E.g. Health insurance as risk pooling vs using data and AI to reduce risk of insurers with better targeting
 - Limits on “consent” when others’ data can be used for – and against – you too

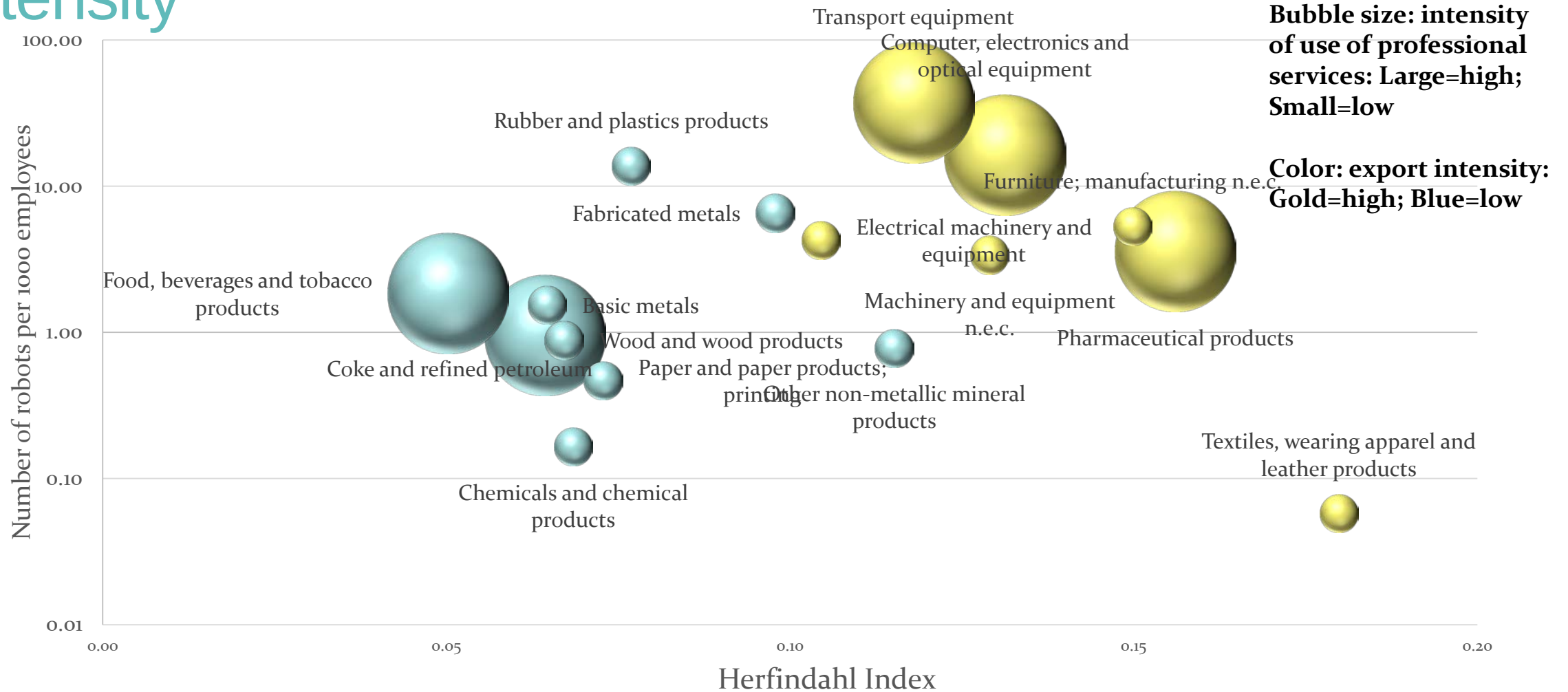
#2. Jobs!

Here is it important to recognize:

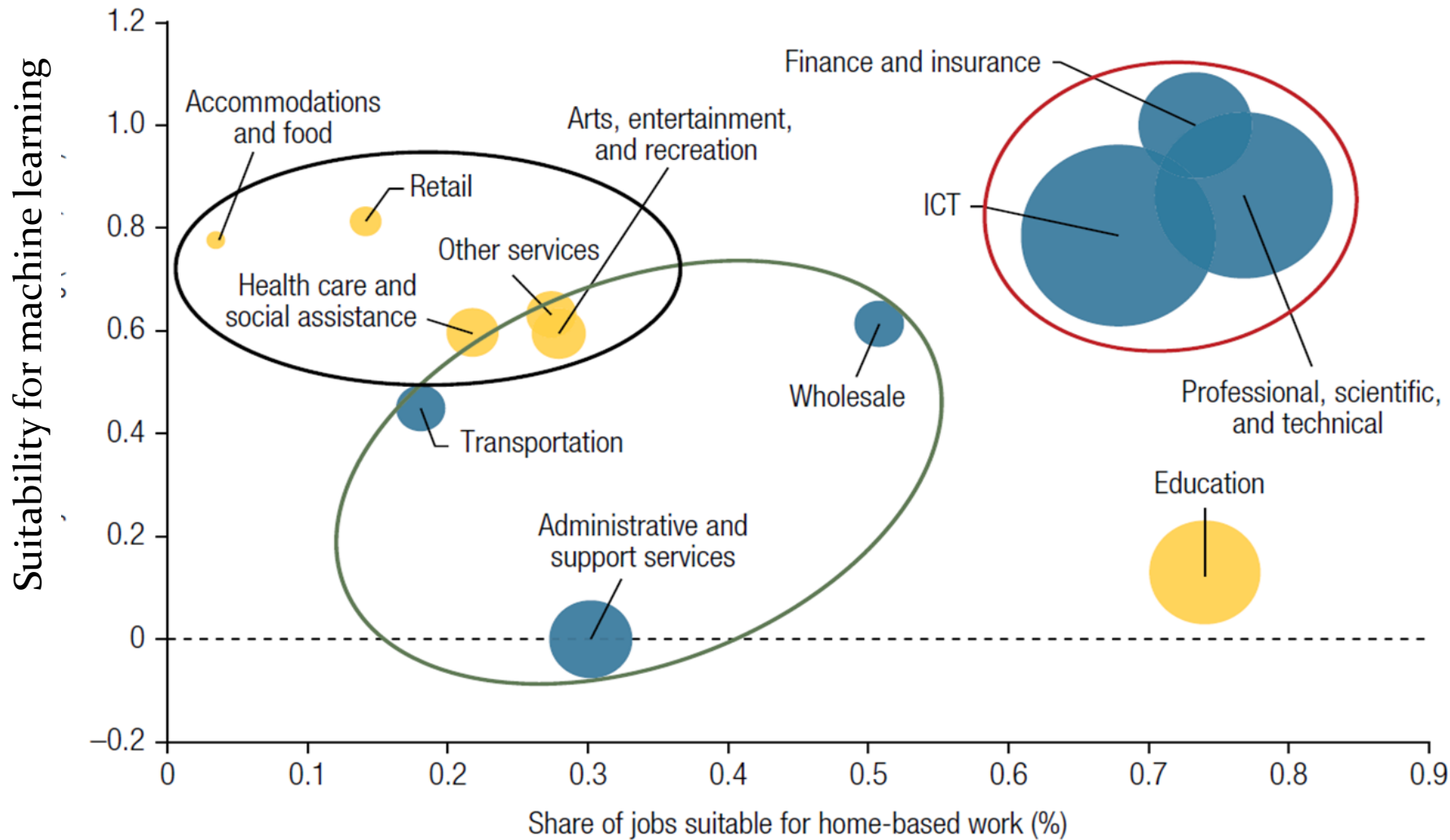
1. Sectors and occupations vary in how exposed they are to new technologies – and whether workers are likely to be replaced or complemented by them
2. New technologies are not monolithic
 - They can solve some market failures (e.g. provide more information, facilitate matches)
 - But they introduce others (e.g. economies of scale give market power)
3. There is still a lot of uncertainty on what the impacts will be

Sectors not monolithic: Manufacturing

How sectors vary by use of robots, tradeability, R&D intensity



Services: Impacts of reduced need for proximity, increased automation, intangible capital and forward linkages vary by sub-sectors and can inform priorities



Digital trade in services has grown faster than overall trade – and global GDP.

Digital technologies are not monolithic either...



Technology category	TRANSACTIONAL	INFORMATIONAL	OPERATIONAL
Source of efficiency gains	Matching supply and demand	Computing and storage	Replace labor
Types of technologies	Platforms Blockchain	Cloud computing Big data analytics Machine learning	Smart robots 3D printing Drones
Examples of companies	Amazon Marketplace, Alibaba, Uber, Spotify	Google, Facebook, Tencent, SAP	Yaskawa, Fanuc, ABB, Siemens, Rockwell

Source: Hallward-Driemeier, Nayyar, Fengler, Gill and Aridi, 2020

Bringing differences in technologies' impacts and characteristics of sectors together provides more tailored advice



TRANSACTIONAL TECHNOLOGIES



INFORMATIONAL TECHNOLOGIES



OPERATIONAL TECHNOLOGIES

a. Digital technologies vary in their contributions to Europe's Triple Objective

Competitiveness



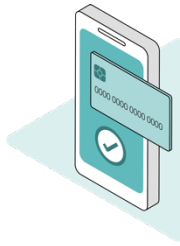
Market inclusion



**Geographic
convergence**

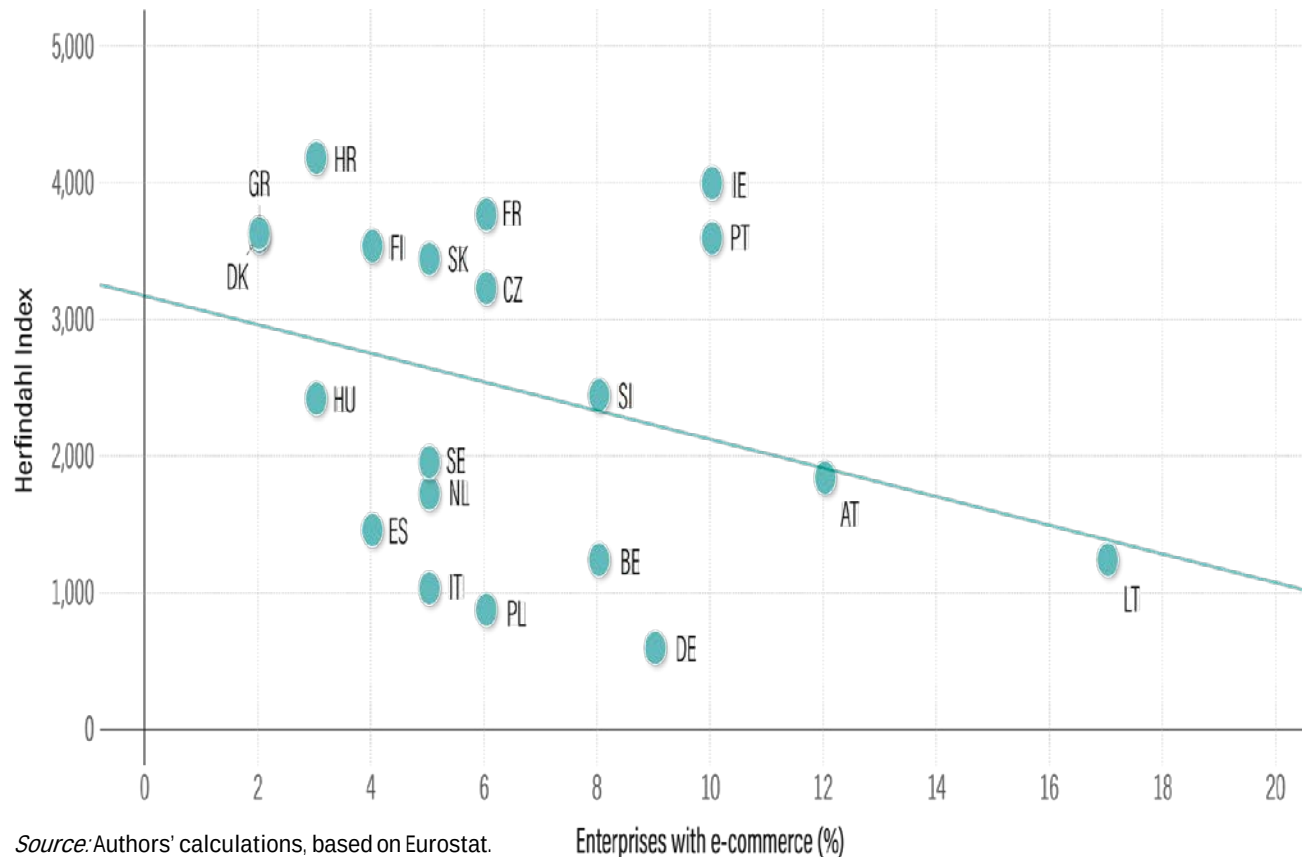


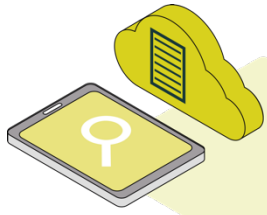
Source: Europe 4.0 Team



Transactional technologies enable geographic convergence

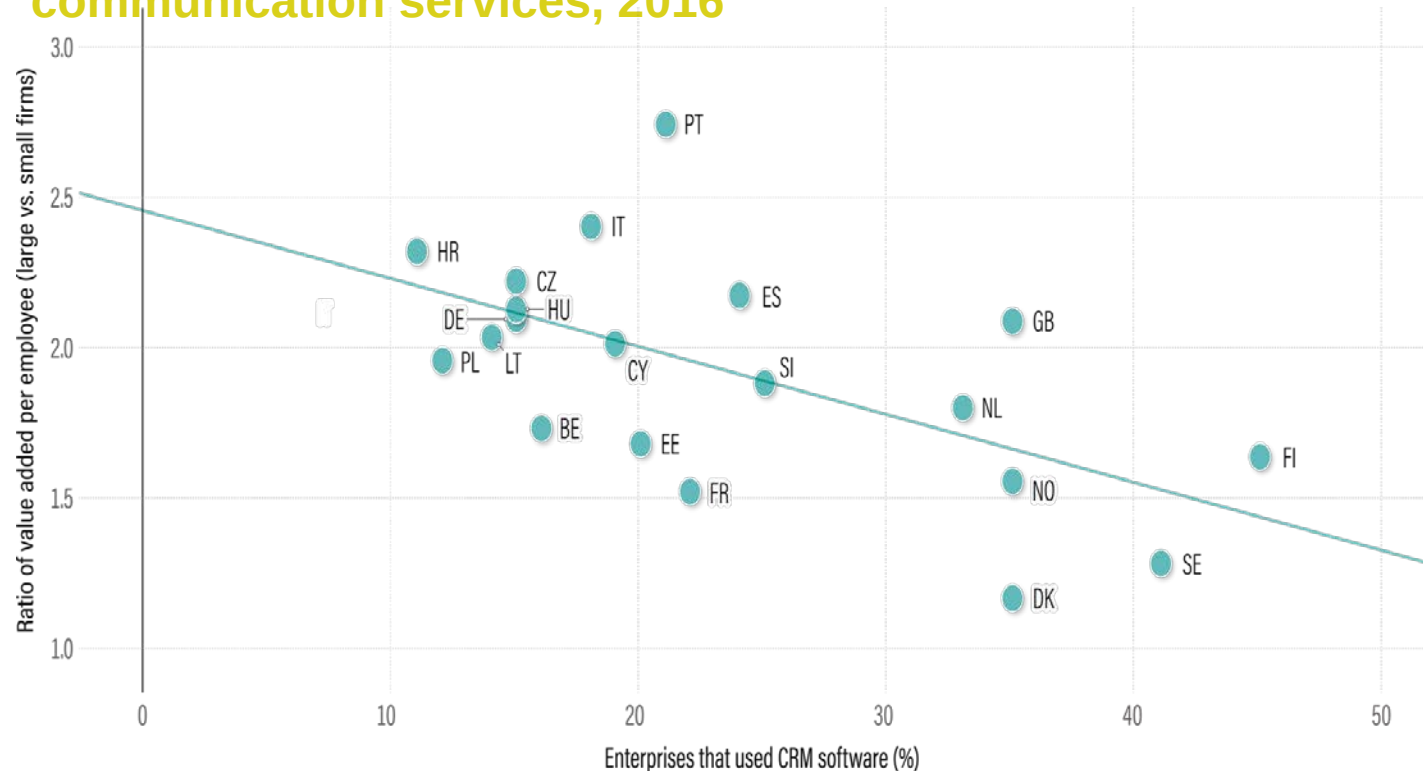
Higher use of e-commerce platforms is associated with spatial concentration in ICT services, 2018



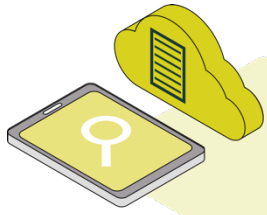


Older informational technologies boost market inclusion

Higher use of customer relationship management (CRM) software is smaller productivity gaps between large and small firms in information and communication services, 2016

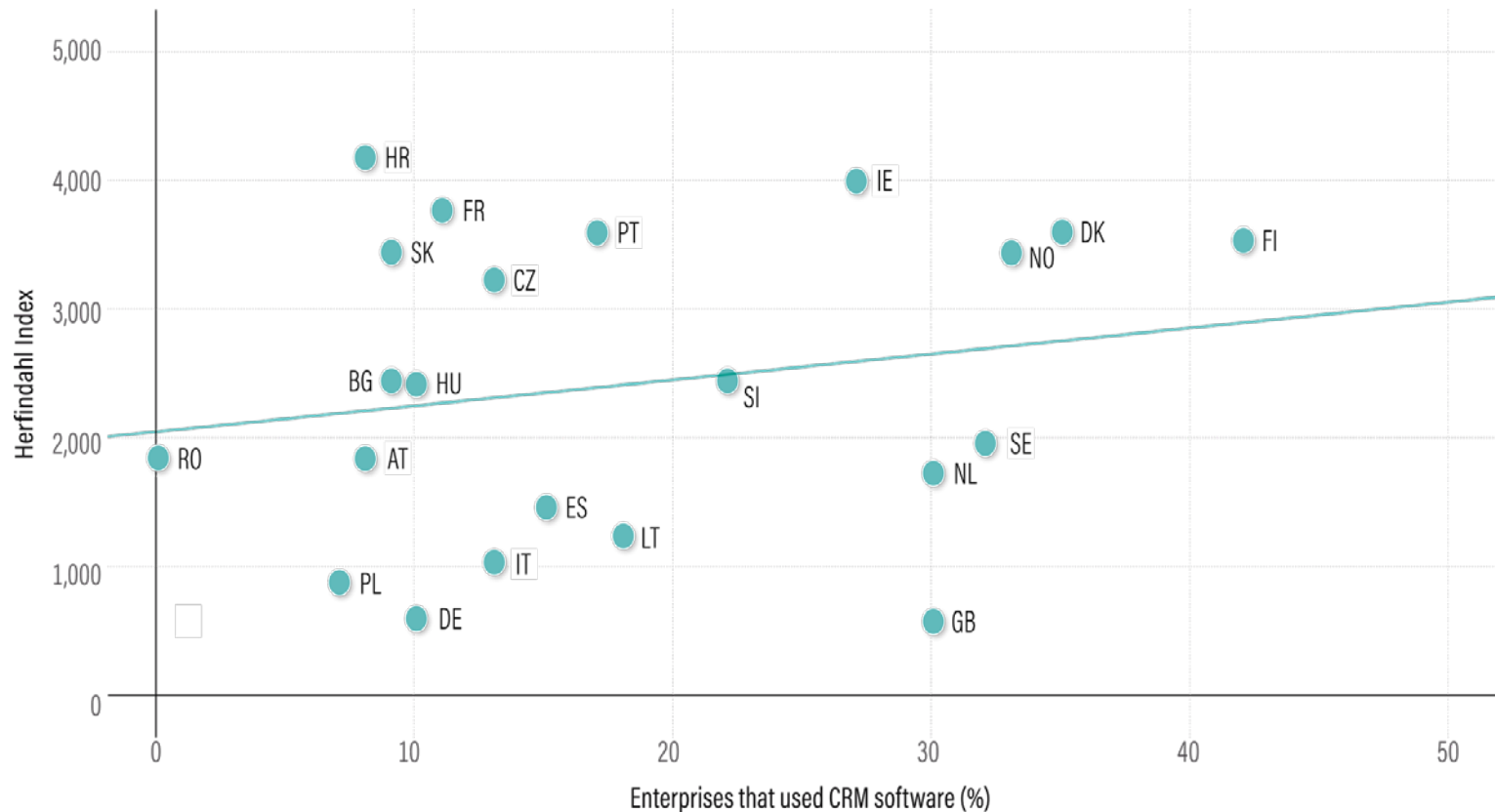


Source: Authors' calculations, based on Eurostat.

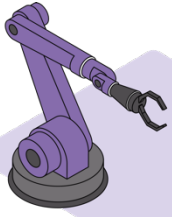


... but they have not enabled greater convergence

The use of CRM software has not reduced the spatial concentration of information and communication services, 2016

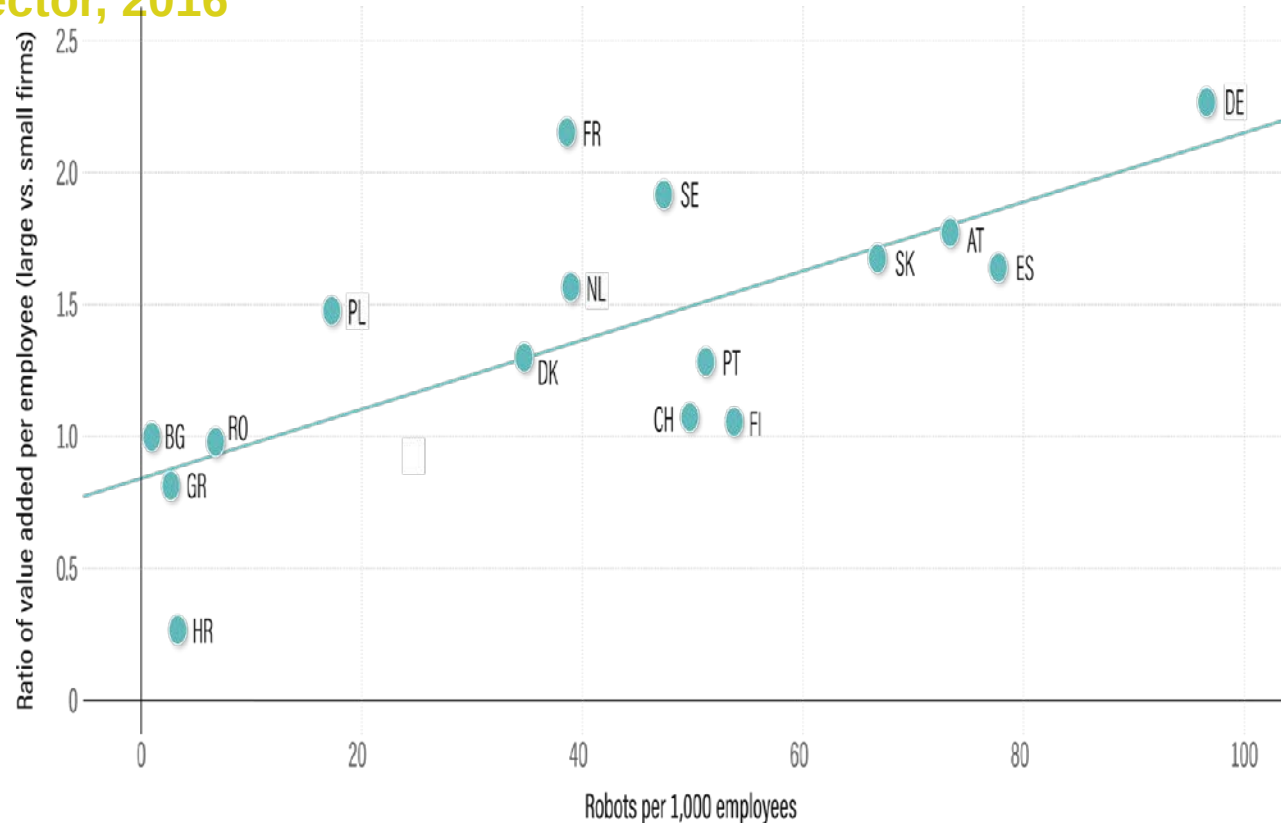


Source: Authors' calculations, based on Eurostat.



And operational technologies lower market inclusion

Robots per 1,000 workers are associated with a productivity gap between small firms in sectors that are highly automated, e.g. the transportation sector, 2016



Source: Authors' calculations, based on Eurostat and International Federation of Robots data.

Broader policy debates



TRANSACTIONAL TECHNOLOGIES



INFORMATIONAL TECHNOLOGIES



OPERATIONAL TECHNOLOGIES

Digital dilemmas

Contributes to all three

Some earlier software were inclusive, but new opportunities that big data are more

Raise productivity, but favor large firms and increasingly concentrate production

Policy directions

Scaling markets

Shaping commercial use of data

Smoothing adoption in and lagging regions

Broader policy debates

What is needed – more champions or more digital markets?

Can regulatory approach be source of comparative advantage and way to global standards?

Is leapfrogging possible or wider support to tech needed?

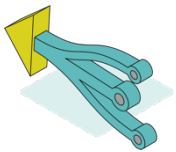
#3: Doom or Policy Choices?

Exacerbate tradeoffs or synergies between objectives is itself a choice in the convergence agenda

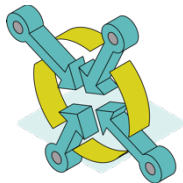
If focus on competitiveness as global champions:

- Competition rules should favor larger firms
- Allocation of investment funds to larger incumbents
- Emphasize innovation over diffusion

us (a lot of resources) to have "own digital champions"

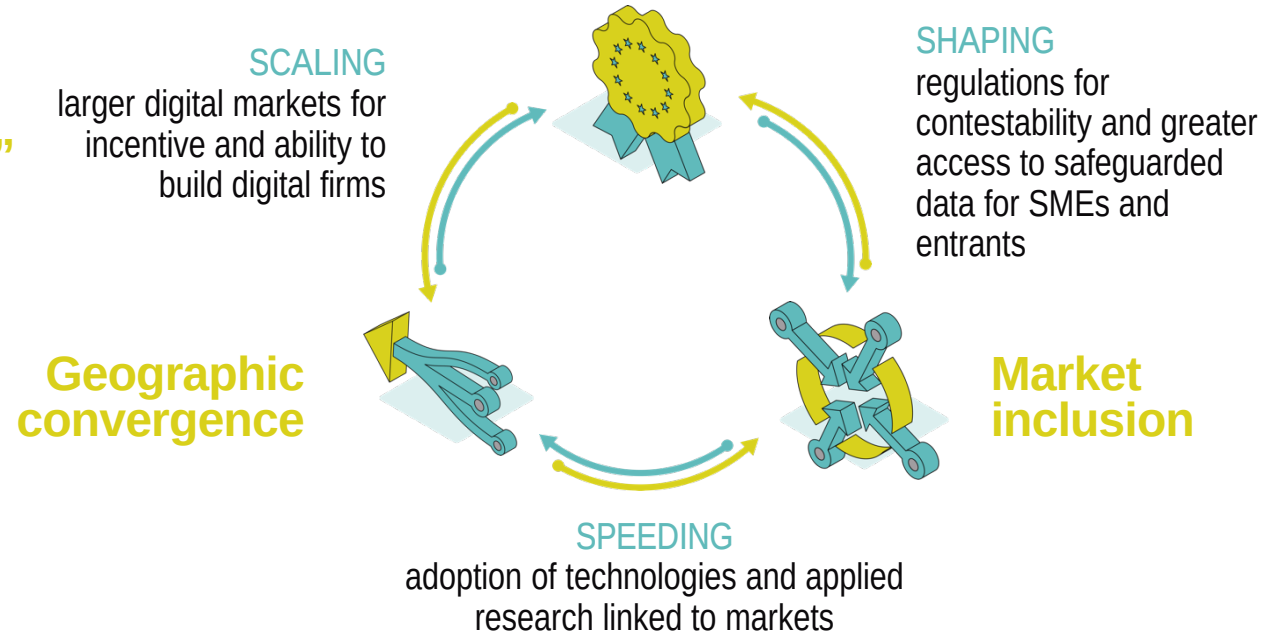


**Geographic
convergence**



**Market
inclusion**

Globally competitive champions



And, realizing a dynamic digital economy could well make it more likely that more competitive firms emerge– and thrive