



# Mapping the Fintech Ecosystem in the EU

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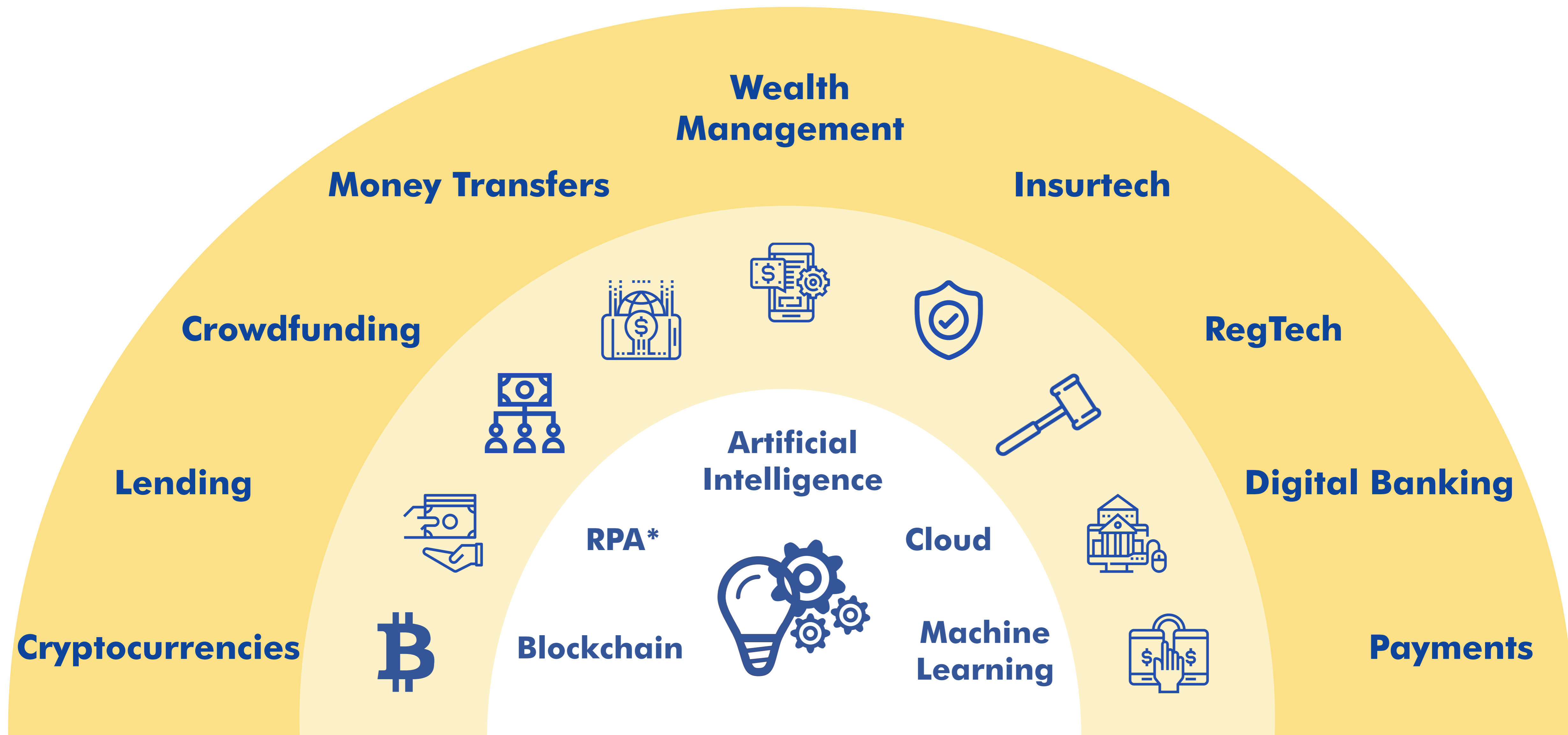
# Agenda

- 1 Definition of Fintech and methodology**
- 2 Results**
- 3 Regulatory challenges and global policy response**
- 4 The future of Fintech regulation**

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# **Definition of Fintech and methodology**

# The diversity of Fintech sub-sectors & technologies



\*Robotic Process Automation

# The advantages of machine learning



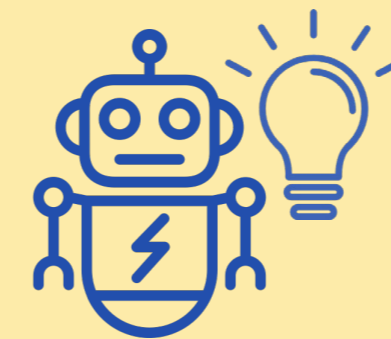
## Motivation

There is no definition of Fintech that is universally agreed upon, and currently available databases focus mostly on investment deals, or aggregate statistics. This is the first attempt to construct a comprehensive Fintech database with firm-level balance sheet information, using the Orbis dataset.



## ORBIS Database

- Bureau van Dijk; 54M+ companies in the EU
- Aggregates/harmonises firm-level data from business registers, national banks, annual reports, etc.
- Offers:
  - detailed industry classification but no Fintech category
  - business descriptions of main firm's activity



## Why Machine Learning?

- Population too large to manually classify companies
- Other approaches may not yield comprehensive data
- ML effectively and automatically exploits trends in data without explicit instructions
- ML tools are customized to our definition, reproducible and can be used across multiple databases



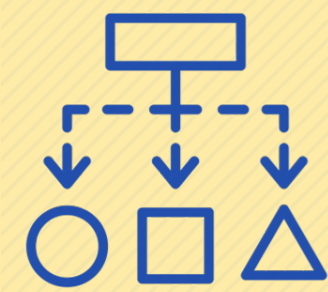
# How do we define Fintech?

Financial technology (Fintech) is the use of innovative technology to automate and ease the delivery, access and use of financial services.

## **Practical criteria to implement our definition in the ORBIS database:**

- For-profit enterprises operating at every stage of growth with a registration date circa 1995 onwards
- Firms within financial services (K) and information technology (J) sectors of EU's NACE codes
- The company must either leverage financial technology to operate its core business, or its core business should constitute developing and commercializing the key technologies that power financial service providers
- The company's headquarters and primary operations must be located within the European Union

# ML adapted to the Fintech mapping exercise



## Methodology

- Cleaning of Orbis EU28 population → 780,000 firms
- Customization of EIF's machine learning approach to classify firms' business descriptions as Fintech
- Manual classification of 25,000 randomly extracted firms
- Conversion of "text" (business descriptions) into "numbers" (word embeddings) using pre-trained representations
- Use of word embeddings to train our neural network
- Final test of algorithm on larger population to capture Fintechs



## Limitations & Challenges

- ORBIS descriptions are sometimes vague
- Manual classification can sometimes be subjective
- ! **The analysis presented here is based on a random subset of the population (150,000 firms). The random nature of the sample should guarantee that statistics hold with respect to the overall population.**

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**At last, the results!**

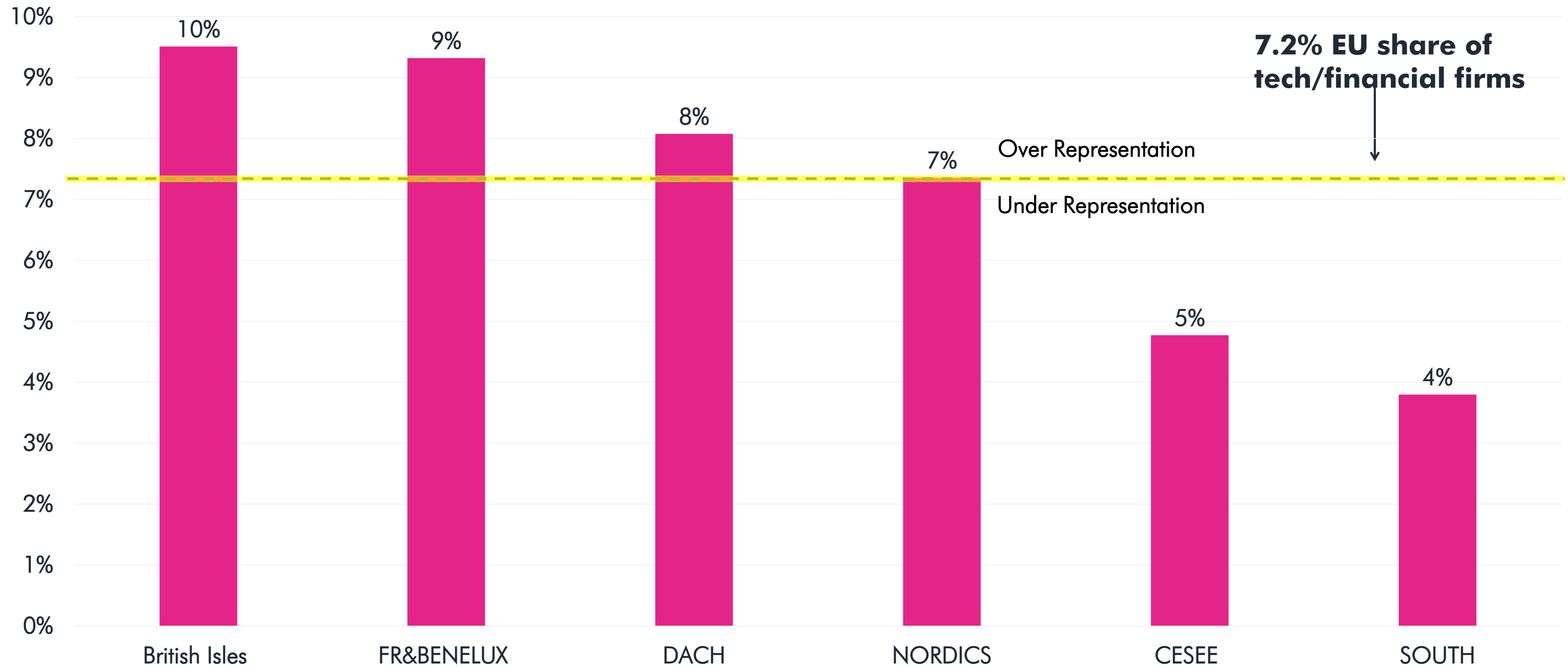




# Representation of IT/financial firms by macro-regions

Figure 1: Share of Tech/Financial firms (NACE sections J-K) over total firms

Source: ORBIS



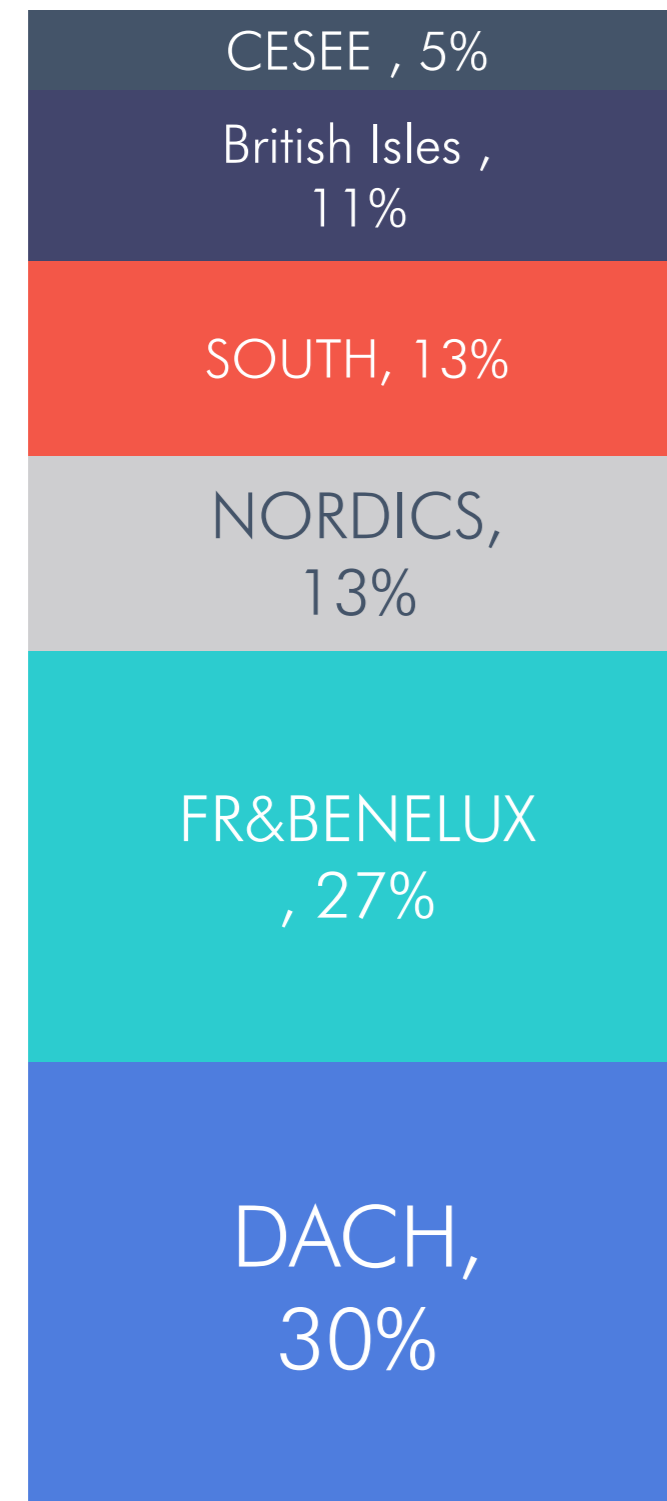
DACH: AT, CH, DE; NORDICS: DK, FI, NO, SE; FR&BENELUX: BE, FR, LU, NL; SOUTH: GR, ES, IT, MT, PT; BI (British Isles): IE, UK; CESEE: BG, CZ, EE, HR, HU, LT, LV, PL, RO, SK, SI, CY

# Mapping the distribution of Fintechs by macro-regions



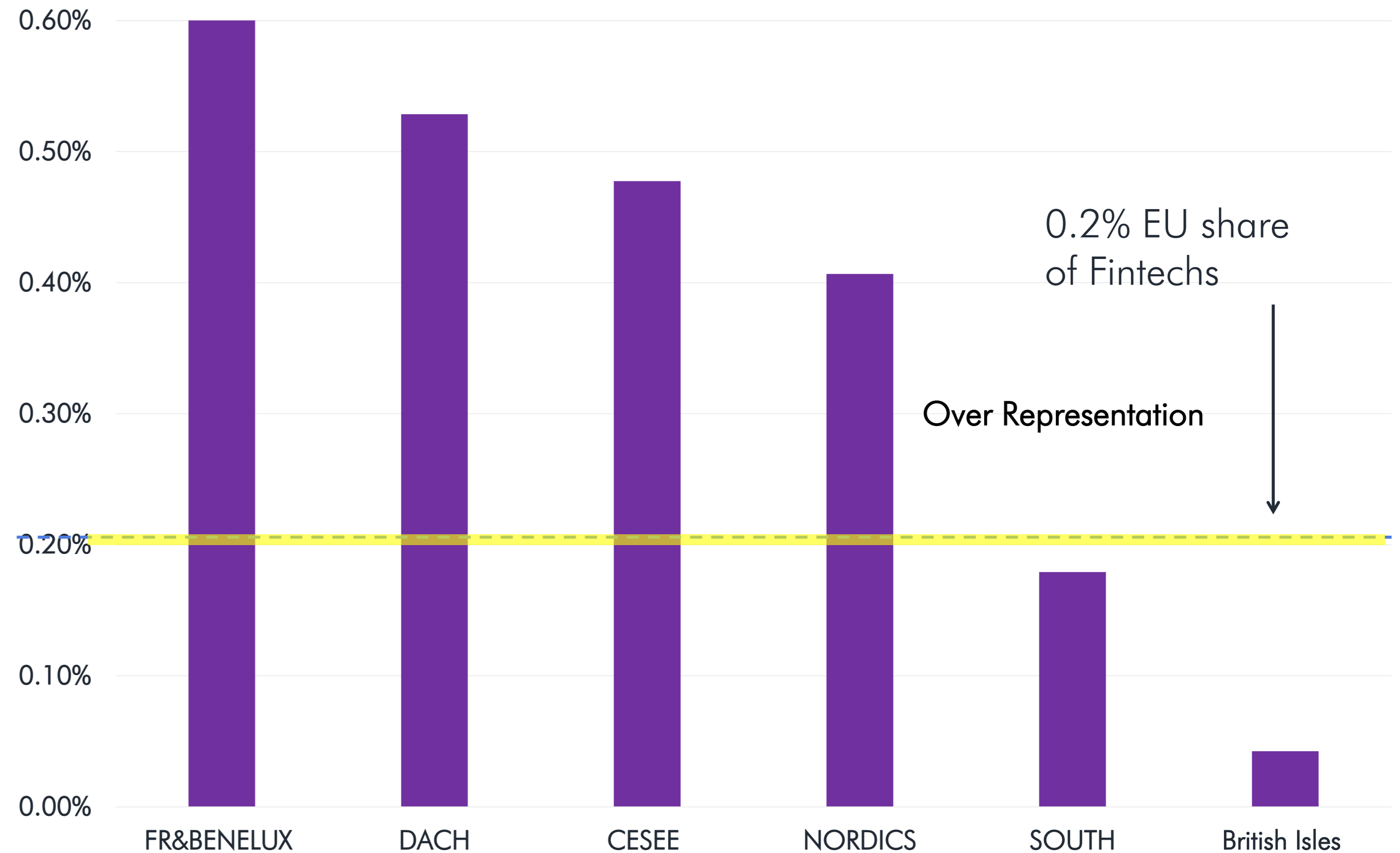
## Fintech Distribution by Macro-region

Source: ORBIS (sample)



## Share of Fintechs within IT/Financial Services (NACE J-K)

Source: ORBIS (sample)

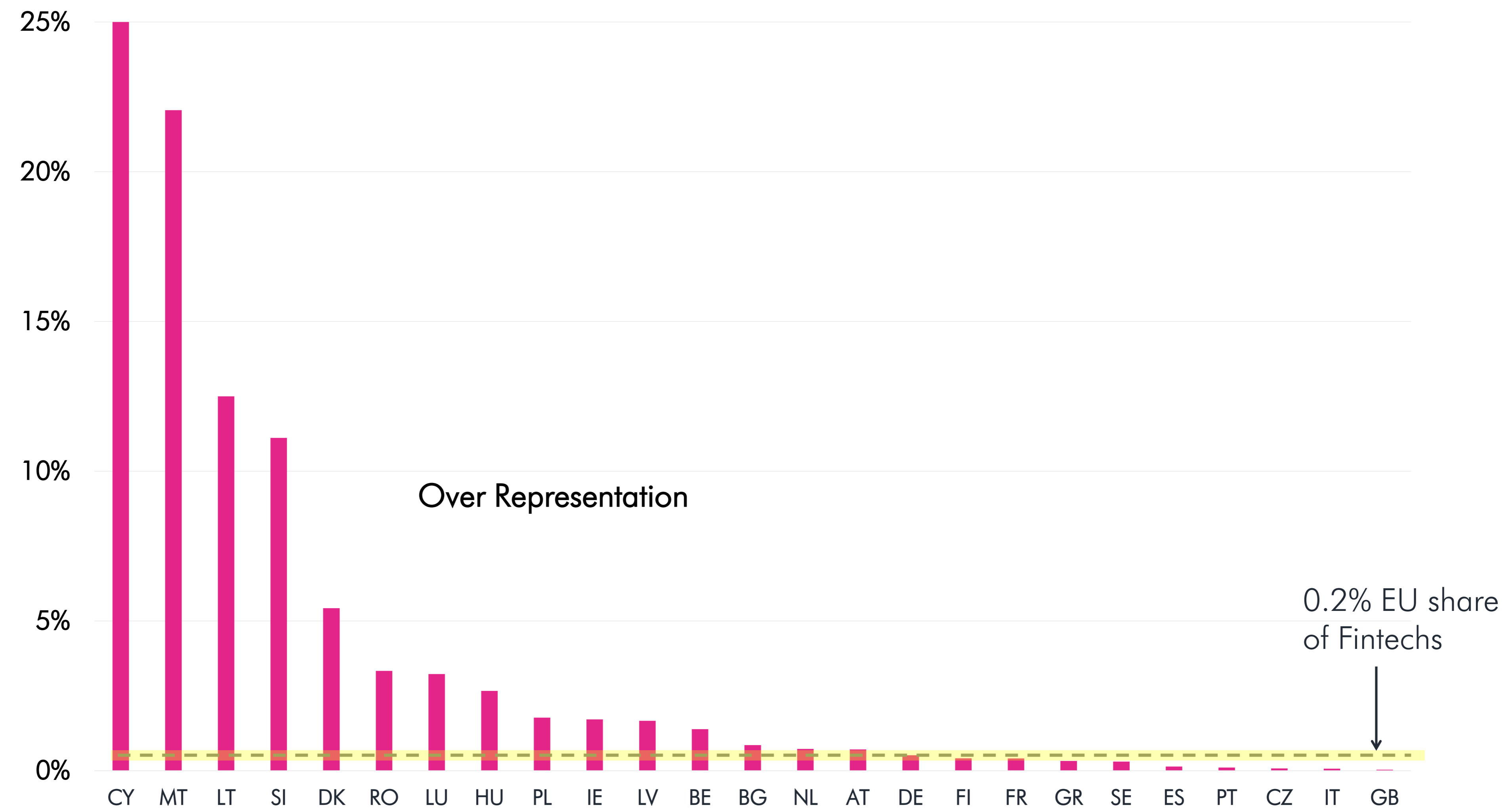




# Mapping Fintech penetration by country

## Share of Fintechs within IT/Financial Services Industry

Source: ORBIS (sample)

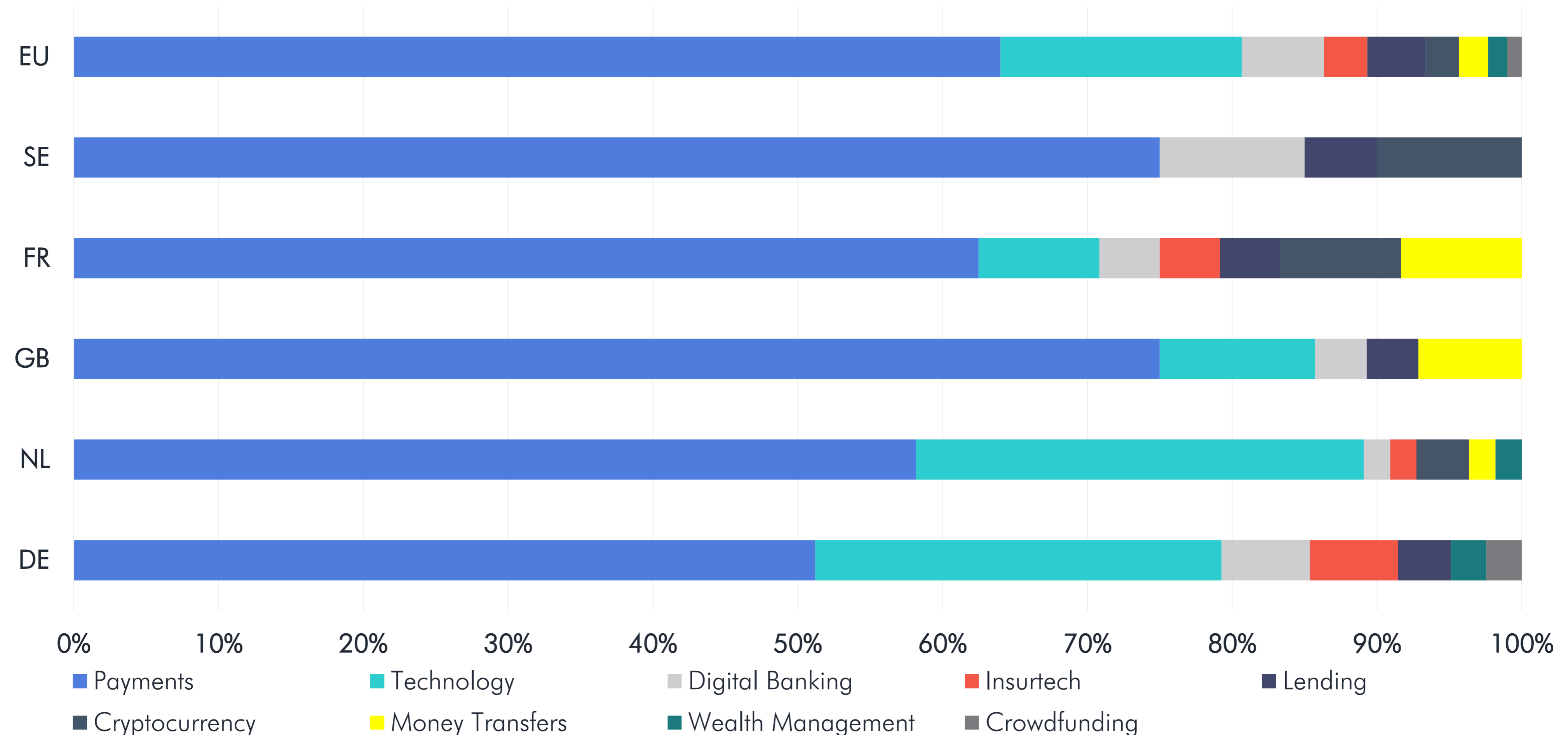


# Sub-Sector Analysis of the Firms



## Sub-Sector Breakdown by Country

Source: ORBIS (sample)



# 3

## **Regulatory challenges and the global policy response**



# Risks & challenges associated with Fintech regulation

31%

**Not subject to any regulation**

14%

**Subject to national regulation**

47%

**Subject to EU regulation**

Source: EBA 2017 Discussion Paper

## Risks of limited regulation



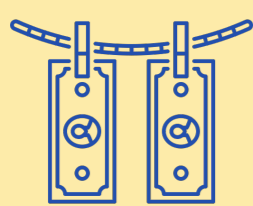
### **Consumer Mistreatment**

Data privacy violations | KYC infractions



### **Fraud**

IP theft | Trading violations



### **Money Laundering Activities**

Terrorist financing



### **Default Risk**

Credit Risk

## Challenges with regulating Fintechs



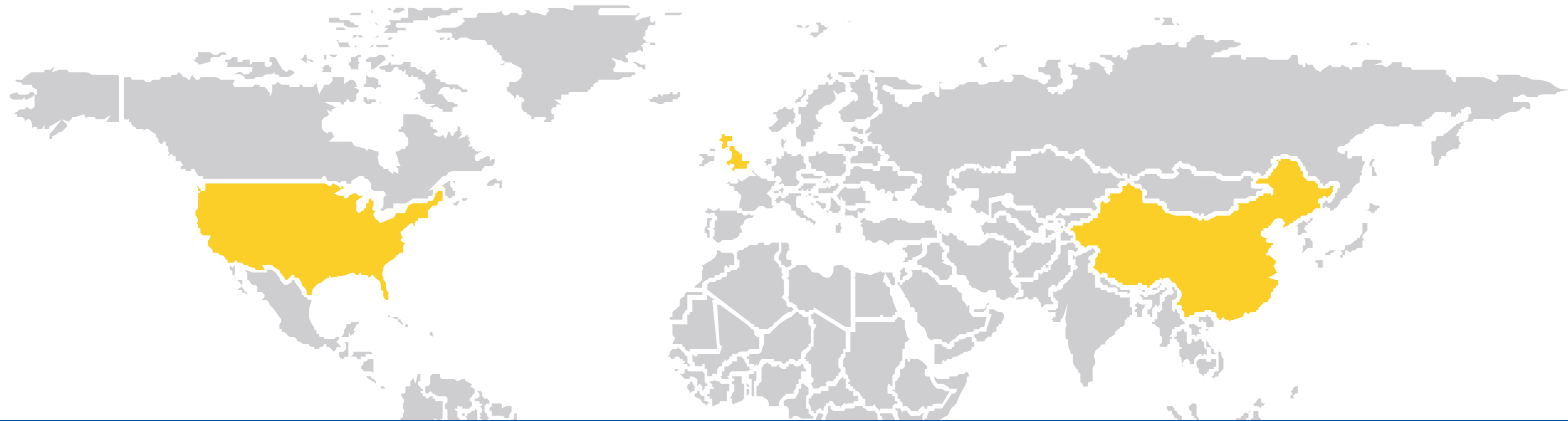
**Crafting policies that effectively regulate Fintechs without stifling innovation and growth**

- Increase barriers to entry and limit competition
- Inhibit businesses from operating at scale



# Current Global Policy Landscape

Leaders in Fintech promote different approach to regulating the market



## Legislative frameworks to regulate Fintechs

- United States: National charter
- United Kingdom: Project Innovate (FCA)
- China: “Guiding Opinions” charter
- European Union: PSD2, GDPR

## Innovative solutions to encourage Fintechs

- “Financial sandboxes”
- Innovation hubs & accelerators
- Regulation technology (Regtech)

Harmonizing the tradeoff between growth & regulation should be at the forefront of every policy-maker’s agenda

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## **The future of Fintech regulation**





# The Future of Fintech Regulation



Secure regulatory frameworks can drive Fintech competition, encourage innovation and foster financial inclusion

## Why

encourage  
& regulate?

- Improving the supply and demand for financial products and services
- Limiting threats of market failures and protecting consumers

## What

should  
regulators do?

- Clear policies
- Promote initiatives that foster Fintech innovation
- Develop risk mitigation mechanisms
- Standardize data frameworks and regulation across borders

## How

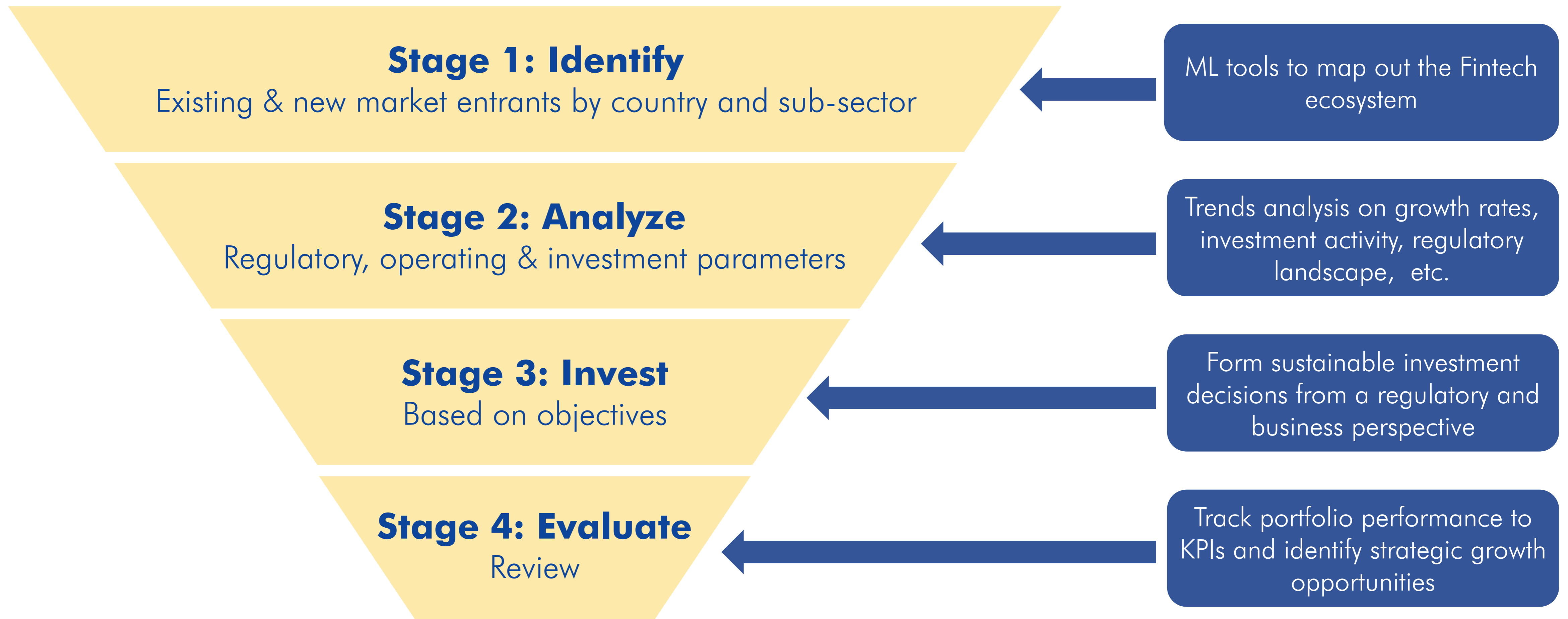
should it be  
done?

- Engage with Fintech players and technologies
- Apply Fintech principles to inform policy-making
- Cross-border collaboration and greater pan-EU legislative measures

# Institutional Actors Play an Important Role



As regulation evolves, institutional actors like the EIF should effectively **monitor** and **invest** in the burgeoning Fintech industry





# Appendix



# Performance of our ML model

Figure 1: Training and validation performance

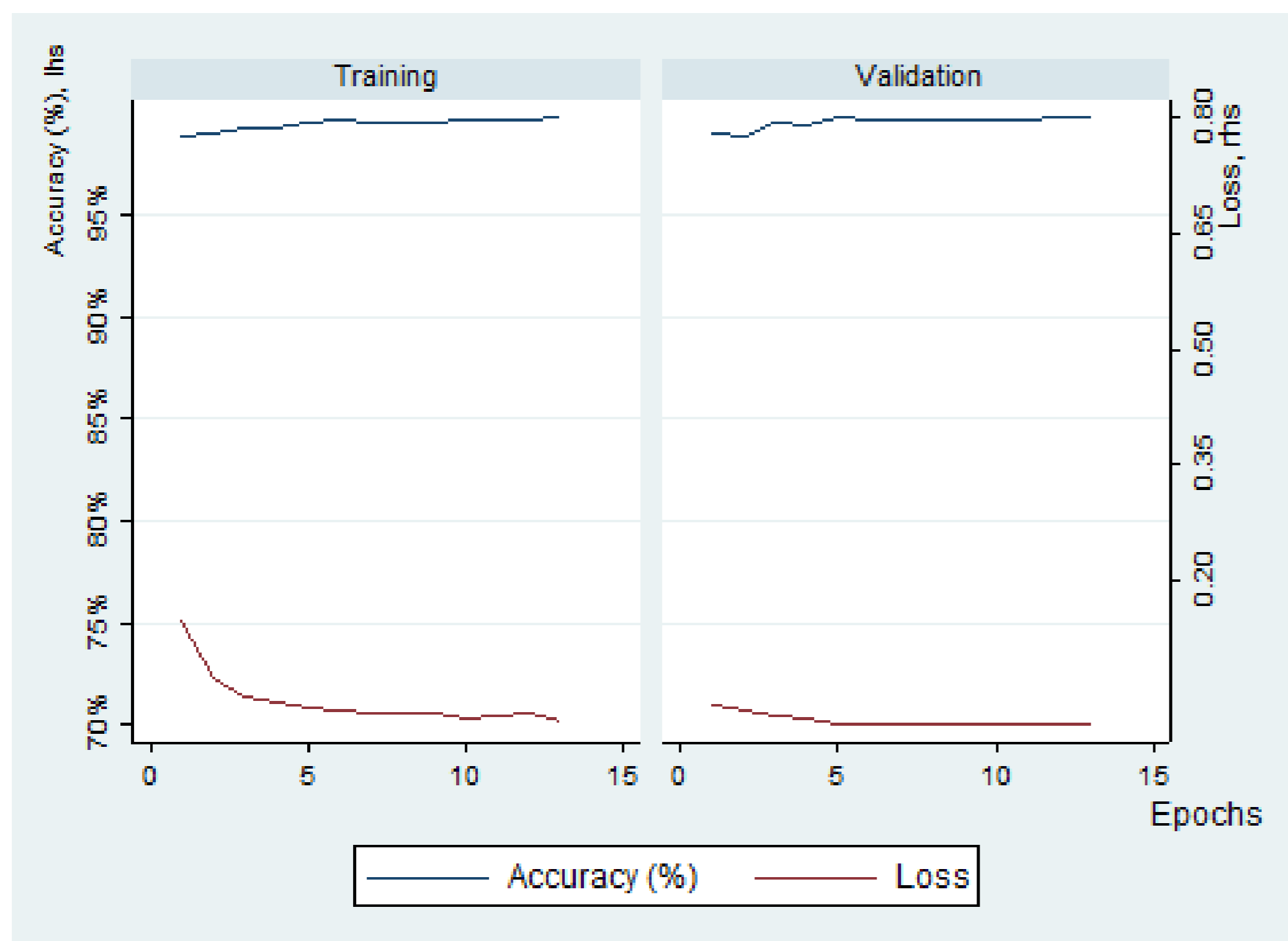
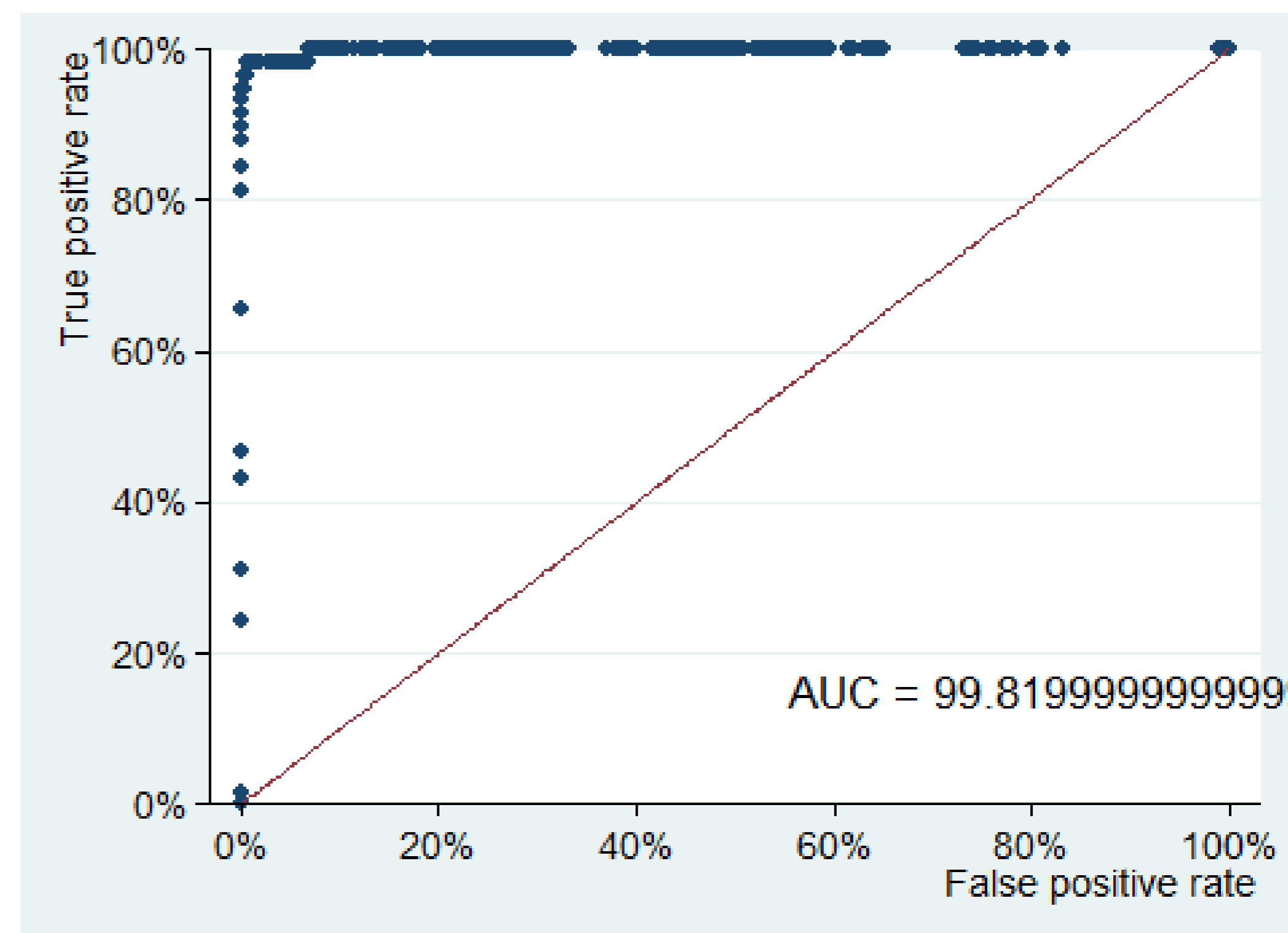


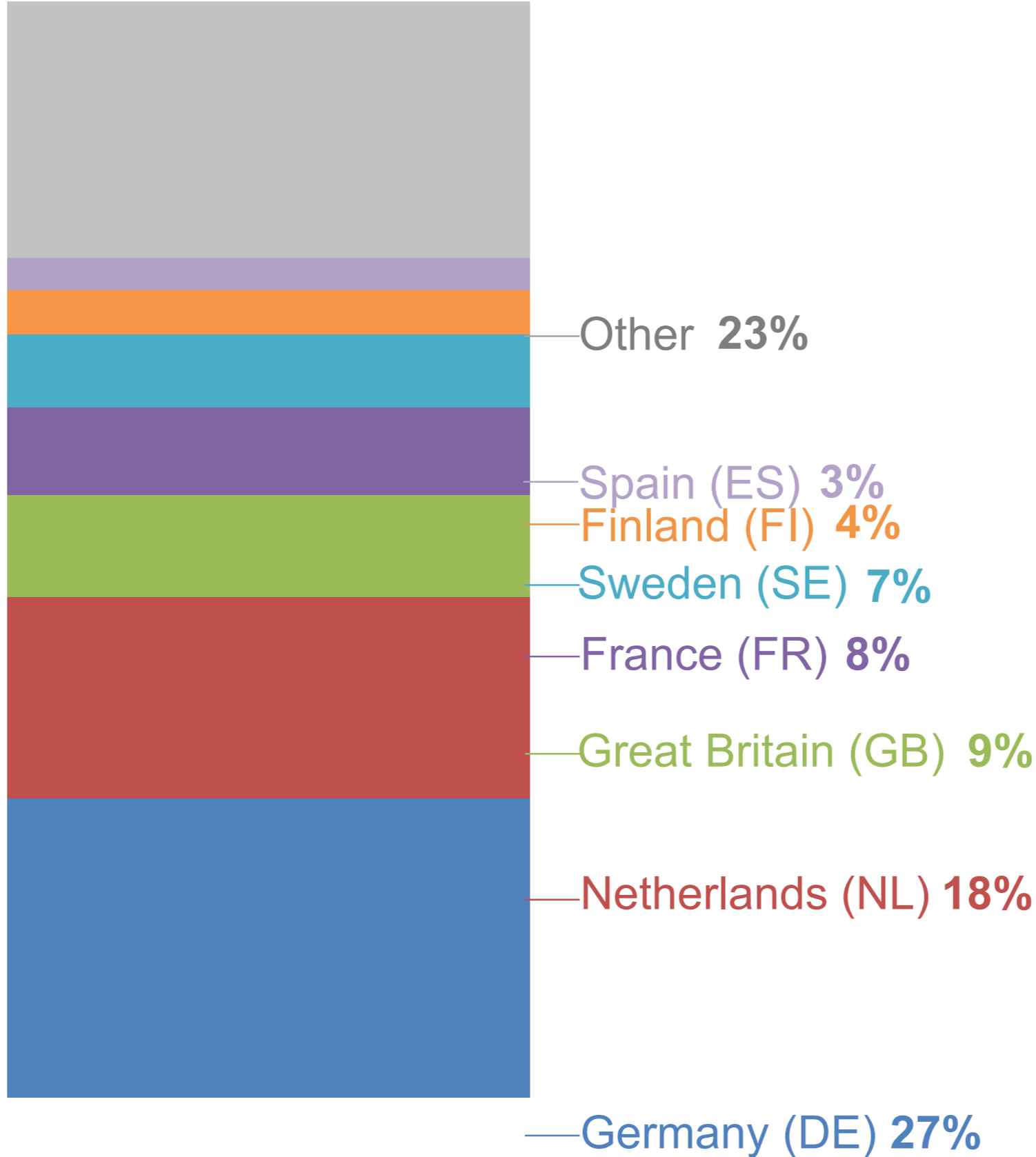
Figure 2: Area under the receiver operating characteristic (ROC) curve





# Fintech Distribution by Country

Source: ORBIS sample population

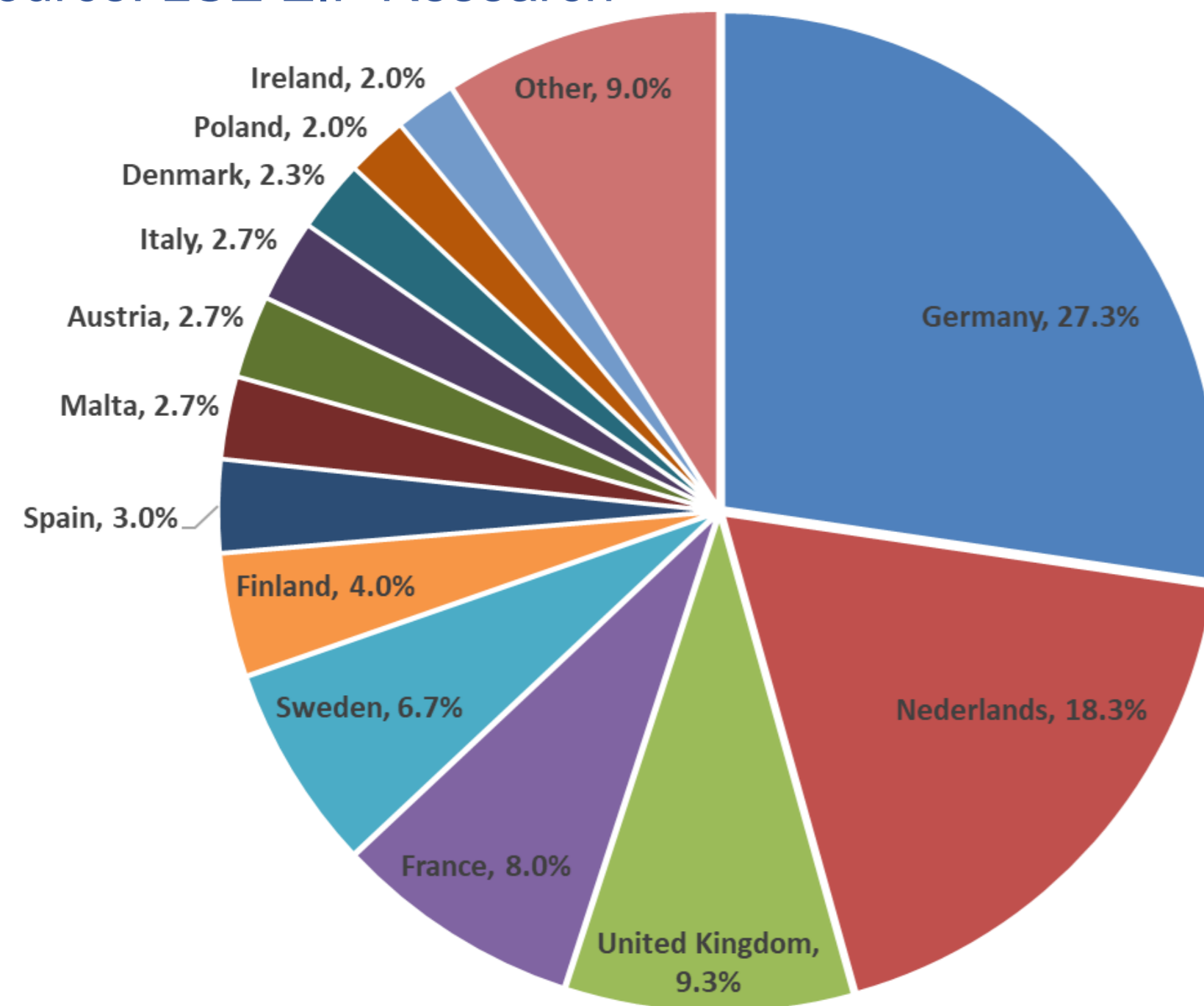




# Fintech Trends from the Data – Country Analysis

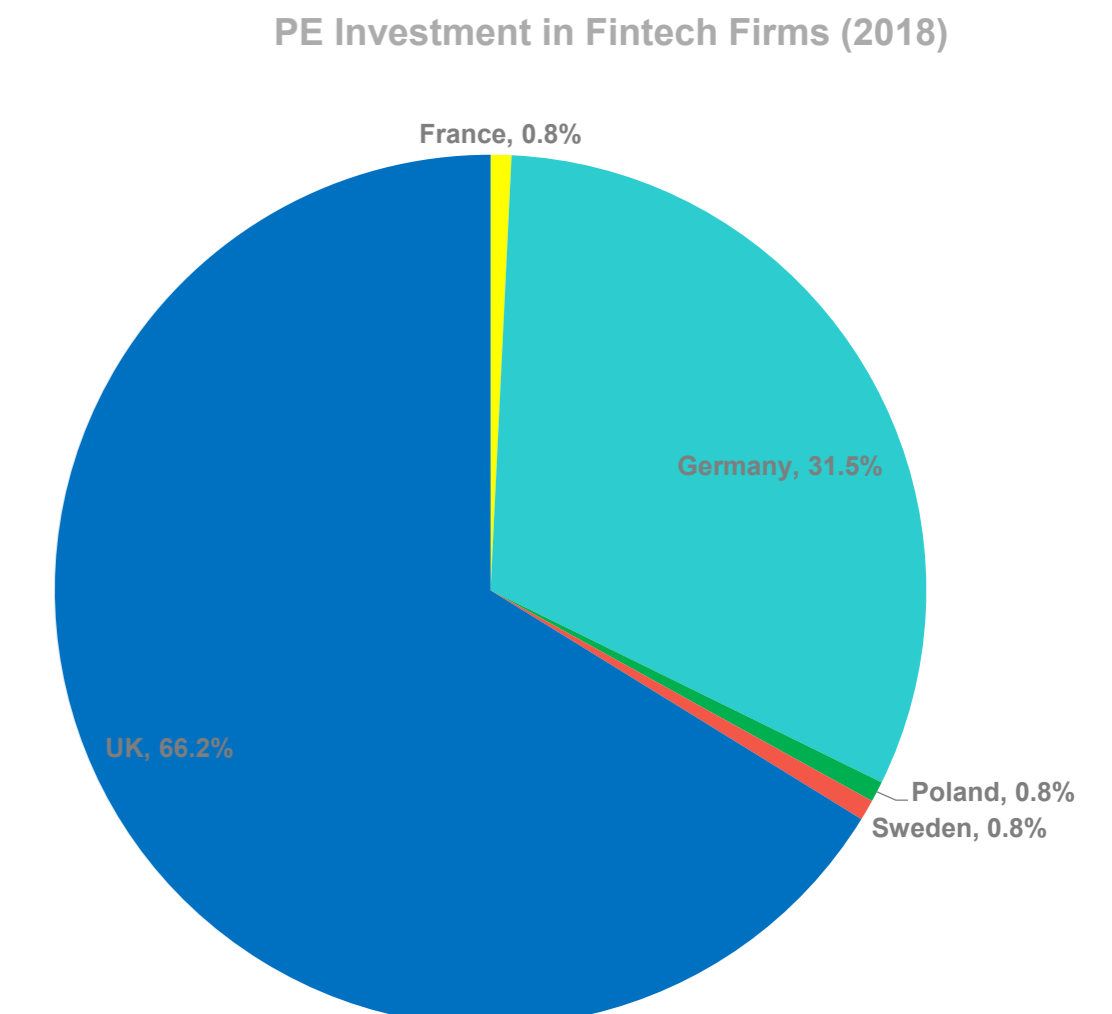
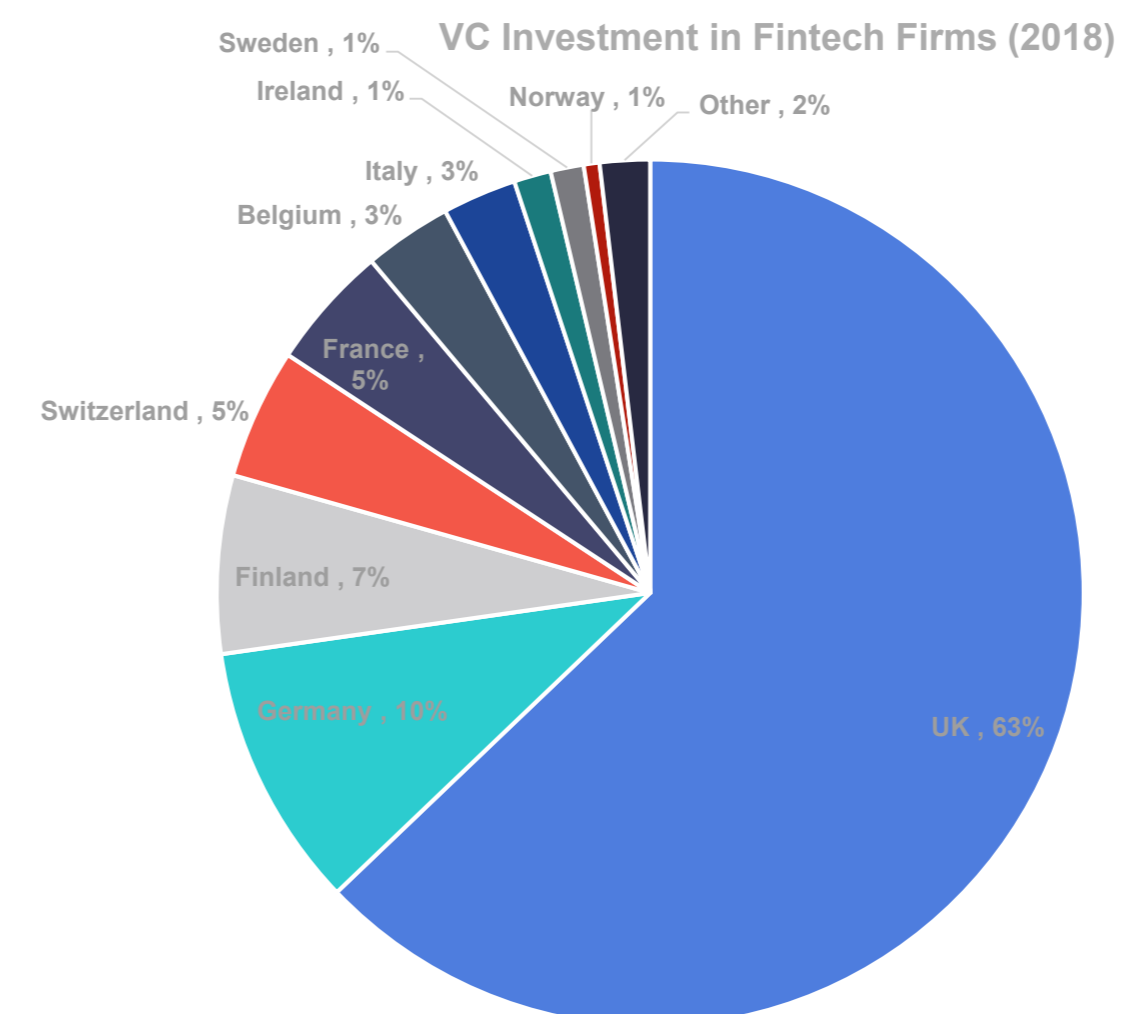
**Figure 1: Fintech Distribution by Country**

Source: LSE EIF Research



**Figure 2: VC & PE Investments by Country (2018)**

Source: Fintechstartups.co



- Germany dominates (
- Progressive policy landscape in the UK attracts VC investment
- UK being the pioneer in the sector within the Europe is seeing its market mature and hence attracts PE investments
- Germany follows UK in attracting investments. Technology sector drives Fintech investment in Germany while Product sector drives Fintech in the UK.