Central banking in the digital world[1]

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This article aims to provide an overview of the main implications of digitalisation for central banking and financial sector regulators. In addition to surveying the current state of the art, it highlights several implications for central bank policy and research agendas. The main claim made here is that the digital era will require taking on new responsibilities while continuing to provide services to traditional, branch-based banking, which for the foreseeable future will remain present alongside innovative digital services. Successful adaptation to digitalisation will therefore mean preserving existing competencies and simultaneously developing new ones in the areas of programming, machine learning analysis, and big data processing.

INTRODUCTION

Digitalization is a very important megatrend with a dramatic structural impact on all sectors of the economy, including finance. In his June 2018 speech[2], Pentti Hakkarainen, Member of the Supervisory Board of the ECB, listed some awe-inspiring figures: the majority of European Internet users are now banking online, the global annual IT spending in the finance sector has reached €3 trillion, and European banks closed down over 9,000 branches in 2016, which is a 4.6% reduction in a single year. In light of this fact, the popular talk of data as the "new oil" powering the economies of the future appears appropriate, especially considering some of the unique properties of data, such as being infinitely durable and reusable (Marr 2018).

Nonetheless, it is important to keep in mind that the situation around Europe is not homogenous. Digitalization is the most advanced in the Scandinavian countries as well as the Netherlands, where close to 90% of people already bank online. That means that banking online is the default approach for the majority of the inhabitants of these countries, with traditional, branch-based alternatives being increasingly limited to a niche. In Slovakia, the share of people using Internet banking is just 50%, which is close to the EU average. Meanwhile, in the laggard countries, such as Romania and Bulgaria, the traditional, branch-based approach is still the default one, and only a small minority of less than 10% of population banks online (Figure 1). In consequence, the extent to which the finance sector has to reflect digitalization dynamics differs between countries and makes finding a one-size-fits-all response on the European level unlikely.
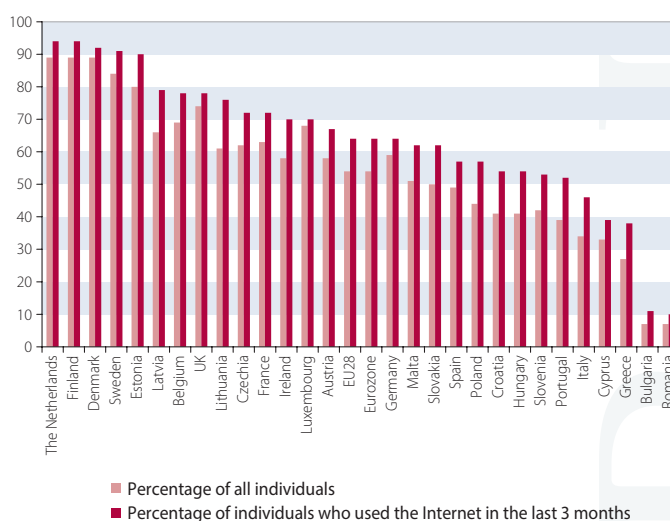
The continued dependence of customers on cash for most payments is another factor potentially slowing down the transition towards predominantly digital finance. According to a recent ECB study, 79% of transactions amounting to 54% of the total value of all payments are still carried out using cash (Esselink and Hernandez,

2017). Slovakia, with 78% of transactions amounting to 66% of the value of payments, represents a country that is close to the average in terms of moving away from cash, trailing behind the cashless economy leaders, such as the Netherlands, Estonia, and Finland, but nonetheless ahead of the strongly cash-based Southern economies (Figure 2). Furthermore, shopping will increasingly take place online, which will have a significant impact on inflation dynamics (Fabo 2018).

The central banks will, therefore, have to develop and maintain understanding of both new and traditional ways of delivering financial services. The ascent of digitalized finance will thus imply important new research and policy agendas that central banks will need to incorporate. The same trend, however, will likewise impact the way central banking is organized. One obvious implication is that many routine jobs will be automated away, and additional analytical competences will need to be developed to handle the challenges

Figure 1 Share of population that has used online banking within the last three months in 2018

Percentage of all individuals
Percentage of individuals who used the Internet in the last 3 months

Source: Eurostat.

Figure 2 Share and volume of cash transactions in the euro area

Source: ECB.

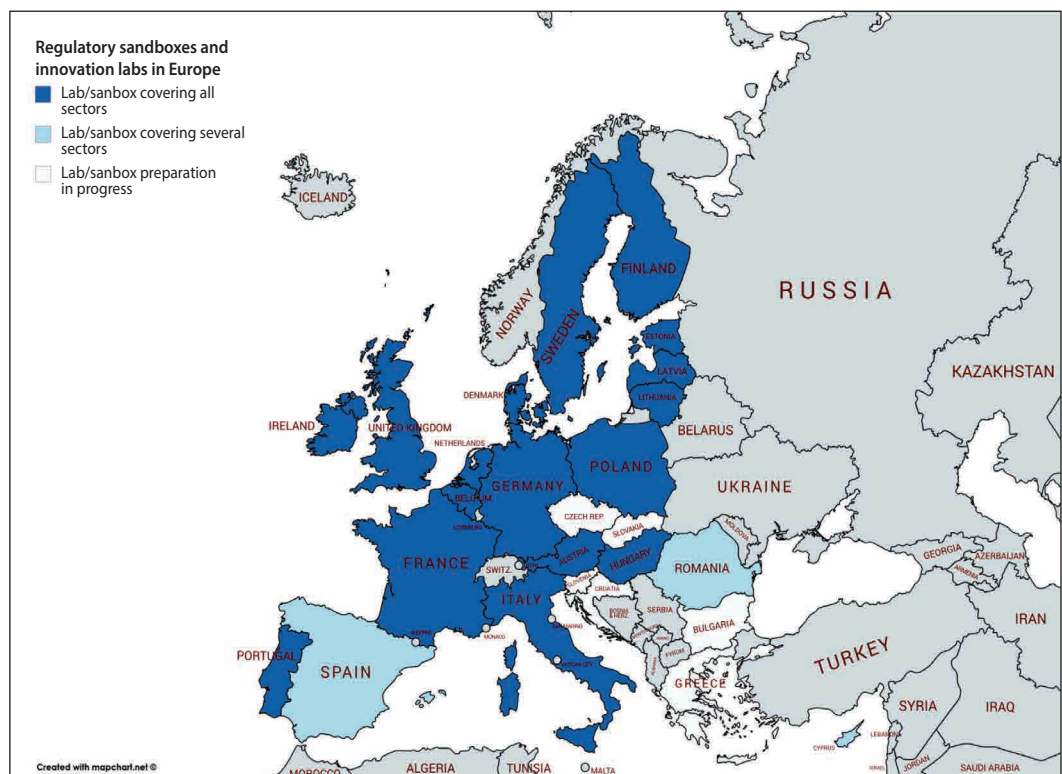At the workshop, several aspects were identified as crucial.

Firstly, few digitalization efforts can be successful without sponsorship from the top-level management of the bank. While limited progress can be achieved by individual initiatives, progress can only be sustained if sufficient resources are made available.

Secondly, there is a need for a change of mentality in a way that allows mistakes and failures. Traditionally, mistakes are very costly in central banking, so avoiding mistakes is the top priority. Nonetheless, technology is not yet at a stage that would allow a successful shift to digital technologies without some mistakes being made along the way. Therefore, the correct degree of balance between preventing mistakes and fostering creativity has to be found.

Thirdly, digitalization must be combined with user-centred design thinking that is built around the needs of the end users. Data must be stored and accessible in such a way that is compatible with the users' needs, and smart business intelligence tools need to be deployed to allow staff to safely experiment with innovative approaches.

Finally, digital initiatives require flexible cooperation across departments as well as with external actors, such as fintechs and academia. For that reason, some central banks and other supervisory institutions have established "labs" or "sandboxes" to enable such cooperation (Figure 3). As of now, such facilities are available or about to be open in all EU countries.

of processing and making sense of the large volume and complexity of data generated by a digitalized financial sector.

EMBRACING THE DIGITAL FINANCE

Central banks around Europe have started developing digital activities. To facilitate cross-fertilization of ideas and spreading of best practices, the Deutsche Bundesbank has organized a workshop in December 2018 to discuss how to ensure central banks develop the necessary capabilities to keep up with the digitalization of finance.

Figure 3 Presence of innovation labs/sandboxes in the EU countries

Source of data: EBA (2019). Own visualisation made using the mapchart.net tool.

Services offered in these facilities differ between individual countries. Typically, they refer to a helpline offering fintechs a streamlined way to access regulatory advice. However, in some countries, they have evolved all the way to fully fledged supervisory "sandboxes" that allow fintechs to test new solutions under close supervision and assistance by the regulators.

DEVELOPING THE RIGHT SKILLS FOR THE DIGITAL ERA

The shift towards digital will also require central banks to develop new competencies. Traditionally, analytical toolsets within central banking have closely resembled the academic discipline of economics. Building upon theoretical understanding of economic dynamics, central bank analysts develop mathematical models that are useful for developing informed expectations about the future (forecasting) and the way these expectations can be affected by different policies. On the basis of these models, analysts utilize econometric methods to analyze developments in the economy. These empirical findings are useful to inform the theory and improve the models, leading to a better understanding of the economy and sounder policies.

The current policy and economic research activities of central banks lead to the need for acquisition and development of analytical capabilities. These skills will remain crucial but going forward, will need to be supplemented by some additional skills and competences:

Firstly, as the finance sector turns digital, the volume of available data will increase manifold (Lagarde 2018). In turn, there will be a need to develop big data processing and analysis capabilities. This entails a range of different skills, from maintaining data warehouses to ensuring the data is secure but, at the same time, available to analysts and – if relevant – also to external parties.

Secondly, the availability of big data creates space for utilizing machine learning analytical techniques (Mullainathan and Spiess 2017). Unlike traditional econometrics, machine learning does not build on a theoretical understanding of how the economy works, but rather identifies patterns in large volume of data. While these patterns cannot be directly used to develop policies, they can nonetheless significantly improve central banks' ability to detect potential disruptions and identify key trends.

Finally, and importantly, to take advantage of big data and machine learning, central bank analysis departments will need to enrich their economics-focused teams with analysts skilled in programming, specifically analysts who can effectively master tools such as R, Python, and Hadoop. Additionally, due to a large volume and complexity of the datasets, the analysts of the future will increasingly utilize artificial intelligence, which is likely to develop parallel with other applications in finance.

CONCLUSION

In the foreseeable future, European central banks and supervisors will be increasingly operating in an environment combining traditional branch-based approach to finance with digital technologies. This transition will have an implication for both skills and competencies that will need to be developed among staff and for the services provided. While routine labour will be increasingly automated, central banks will require human resources to cover areas such as big data, machine learning, programming, and AI. At the same time, supervisory bodies will need to adapt to the fast-moving and experiment-oriented environment of fintechs. The varying pace of digitalization makes a one-size-fits-all European policy unfeasible. However, a wide spectrum of activities developed across the EU offers ample opportunities for policy learning and cross-fertilization of ideas and best practices.

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