The Relevance Of FinTech For The Serbian Innovation Ecosystem And The Role Of Regulatory Sandboxes

Abstract

FinTech lies in the intersection of finance and technology. While technology has supported the financial industry for decades, the latest FinTech wave has occurred following the aftermath of the Global Financial Crisis of 2008. Multiple stakeholders are present in the FinTech space – entrepreneurial start-ups, incumbents, technology companies, regulators and end-consumers. The main aim of FinTech is to make financial products cheaper, simpler to use and faster to access.

Financial industry regulators have started to experiment with novel ways of supporting innovation. Among the new concepts is the regulatory sandbox, which provides space for innovators to test new value propositions in a safe environment, simulating real market conditions. The concept was first launched in the UK by the Financial Conduct Authority, and subsequently has quickly spread to other countries, both developed and emerging. The concept has also been adopted by several financial regulators in Central and Eastern Europe, with the examples of Poland and Hungary as the most advanced ones.

In Serbia, FinTech is an important part of the innovation ecosystem, which in turn is an important part for the country's overall economy. National Bank of Serbia (NBS), the relevant regulator, has initiated the sandbox concept in 2018. However, the real impact of the sandbox remains unclear due to the lack of relevant information. In contrast to the examples of the UK, Poland, Hungary and the majority of other countries in the EU, the Serbian sandbox is not accompanied by an innovation hub, nor does the country have a designated FinTech strategy. Creating a strategic framework and increasing transparency should be among the NBS's main priorities to successfully support the FinTech ecosystem.

Table of Contents

Introduction

New technological trends - cloud computing, big data, artificial intelligence, machine learning, natural language processing – to name a few, are radically disrupting industry landscapes globally. One of the industries being disrupted is the provision of financial services where the FinTech advancement has been profoundly changing the ways consumers access financial services.

The term FinTech is an amalgamation of the words finance and technology, intuitively the trend refers to the intersection of these two industries. While there is no one single, commonly agreed upon definition in academic circles to describe FinTech, a synthesis crafted from a number of peer-reviewed articles on the topic considers FinTech "a new financial industry that applies technology to improve financial activities", (Schueffel 2017).

FinTech is a complex phenomenon. According to Lee and Shin, there are five principle stakeholders that play in this ecosystem – entrepreneurial start-up companies, incumbent financial service providers, technology developers, regulators and consumers, (Lee and Shin 2018). While each of these stakeholders have their own role to play, the shared ultimate objective is to make financial services cheaper, simpler and faster to access / execute. This thesis will address the challenges that new entrants to the FinTech space are facing and the role that financial regulators have in fostering innovation.

FinTech is not a new topic, it has been a subject of debate in both academia and industry circles, as demonstrated by the numerous papers which have been published in recent years. According to researchers who observed the highest-ranking articles – VHB ranking B, A and A+, there were 83 articles published articles on FinTech between 2009 and 2015, with a noticeable spike in later years, (Gomber, Koch, and Siering 2017). At the same time, many prestigious academic institutions, including Harvard, (Harvard University 2020) and University of Pennsylvania, (University of Pennsylvania 2020) have launched their own specialization programs focused on FinTech. On top of that, multiple other research papers, coming from both, less well-known academic outlets and business circles, have been published on the topic. Nevertheless, large body of work remains concentrated within a few select areas – primarily specific disruptive business models like digital financing, block-chain technology, and specific markets - notably in China and emerging markets. Few in-depth research and reports address the state of FinTech in the region of Central And Eastern Europe (CEE), though only at a macro, region-wide level.

Similar is true when it comes to the academic research on regulatory sandboxes, a novel innovation launched by regulators globally to create a safe environment for innovative FinTech business model. The academic research so far has mostly been focusing on understanding general trade-offs (i.e., risks and benefits), mapping the Sandbox process and surveying existence and performance of regulatory sandboxes in specific countries and regions. Several papers have focused on the impact of the first regulatory sandbox, the one launched by the UK's Financial Conduct Authority (FCA), while very few have covered the topic of regulatory sandboxes in Central and Eastern Europe.

While a global phenomenon, FinTech is likely to be influenced by the intricacies of the local markets, mainly the overall economic and regulatory context of each market. There is probably no starker contrast to this, but to compare the FinTech ecosystem and the way it has evolved in China to the FinTech ecosystem and its evolution in the U.S. or Europe.

Understanding the local context, especially from the regulatory side is specifically what this paper will aim to do. The way the paper will explore the matter is by using the case example of the FinTech ecosystem in Serbia and the relevant support that the National Bank of Serbia (NBS) as a regulator has been using to support innovation. The main question the paper is trying to answer is what steps should the NBS take to facilitate the growth of FinTech in a way it extracts the most value for all stakeholders – incl. entrepreneurs and consumers of financial services.

Through this case study, this paper should help narrow down the research gap by showcasing a market which, so far, has not been thoroughly explored. To understand the state and potential of the FinTech ecosystem in Serbia and the role of regulators, most notably the NBS in supporting the FinTech ecosystem, the paper will look at the examples of other countries and learnings that were developed on the basis of their regulatory sandboxes, as well as the feasibility of their implementation – and overlay these with the context of Serbian economy and financial system in a form of a case study.

As it will be showcased in the analysis part, FinTech constitutes a significant part of the Serbian innovation ecosystem. The lack of a strategic framework that would specifically address FinTech makes it difficult for the country to realize the full potential that this industry could bring. The NBS has adopted multiple measures to foster and promote innovation, most notably the setting-up of the regulatory sandbox and the establishment of the instant payment system. To maximize the value of these initiatives, the NBS should put more focus on orchestrating cross-sectoral dialogue and providing more transparency on its initiatives, especially when it comes to terms, conditions, and impact, as has been the case with the regulatory sandbox.

The structure of this paper is as follows – *Chapter I* frames the contemporary context of financial innovation, namely the rise of FinTech, and the role of financial regulators in facilitating innovation. This chapter also reviews the existing academic and business literature on the topic and identifies area for further exploration; *Chapter II* details out the research question and the approach the paper will take; *Chapter III* brings international learnings from regulatory innovation in the UK, Poland and Hungary; *Chapter IV* presents and analyzes FinTech landscape in Serbia and surveys the efforts of the NBS on developing and running the regulatory sandbox; *Chapter* V discusses the difference in approach between NBS and showcased international examples and presents policy recommendations to the NBS in order to best support the emerging FinTech ecosystem in Serbia.

Chapter I: The cornerstones of FinTech research, latest trends and the relevance and role of regulators

The cornerstones of FinTech research

As briefly stated in the introduction, FinTech has been high on the radar of both academic researchers and industry professionals. Still, given the broad definition of the topic, research has covered various aspects to a different extent.

Comprehensive literature overview of the space was performed by Gomber et al in 2017, (Gomber, Koch, and Siering 2017). This analysis takes into account publications in high-performing journals (VHB ranking B, A and A+,) in the period between 2009 and 2015 and shows that most of the research focuses on banking, no research was identified that would focus on the insurance space. Furthermore, within banking functions, the research shows most of the literature is focusing on digital financing / lending, while very few papers focus on digital money (i.e., crypto-currencies), and digital investing (e.g., robo-advisory services and crowd-investing). There are several articles that touch upon the regulatory topics, though only within a context of a specific case-study or specific product / service – such examples include the research by Ernkvist (2015) on electronic options exchanges and the corresponding regulatory environment which was published in Technological Forecasting and Social Change Journal and the research by Reynolds et al. (2009) on the regulatory considerations with regard to the establishment of an online brokerage in Autralia, which was published in Proceedings of the Thirtieth International Conference on Information Systems. Specifically, the authors of this analysis mention that "In general, the impact of regulation on FinTechs and new technologies, …, cannot be found among the papers in our literature analysis", (Gomber, Koch, and Siering 2017). The analysis then specifically singles out the new concept of regulatory sandboxes and contemplates that studies focusing on "national FinTech ecosystems" would be helpful.

To the best of author's knowledge, there has not been a similar, sector-wide literature review in the period between 2015 and 2020. Multiple papers reflect on regulatory aspects of the FinTech disruption – Philippon outlines and provides a high-level evaluation of the new regulatory initiatives following the Global Financial Crisis (Philippon 2016), while several other papers compare the differences in regulating incumbents and regulating FinTechs and other new entrants, like shadow banks (Lee and Shin 2018), (Goldstein, Jiang, and Karolyi 2019), (Buchak et al. 2018).

To the best of authors knowledge, there have not been many articles in high-performing journals that would address the topic of regulatory sandboxes – other than an article by Fáykiss et al in Hitelintézeti Szemle, (Fáykiss et al. 2018a) and an article by Haddad and Hornuf in Small Business Economics, (Haddad and Hornuf 2019). Still, there have been multiple insightful working papers on the topic of regulatory sandboxes, among the most notable ones being the effort to compare sandboxes across different countries, (Wechsler, Perlman, and Gurung 2018), the effort to compare different regulatory initiatives among themselves, (Zetzsche et al. 2017), (Buckley et al. 2019), (de Koker Louis, Morris Nicholas, and Jaffer Sue 2020).

Very few papers address the state of FinTech or the state of the innovation ecosystem in Serbia, several articles by Pitic et al published in the local Ekonomika Preduzeca Journal shed light on to provide overall context for digital transformation and the innovation ecosystem (Savić, Pitić, and Lazarević 2018; Pitić, Savić, and Verbić 2018)

FinTech advancement in the aftermath of the Global Financial Crisis

According to some authors, early signs of technology actively being used to advance financial services can be tracked to as early as mid-XIX century and the utilization of telegraphs, railroads, and steamships to advance financial connectivity, (D. W. Arner, Barberis, and Buckley 2018).

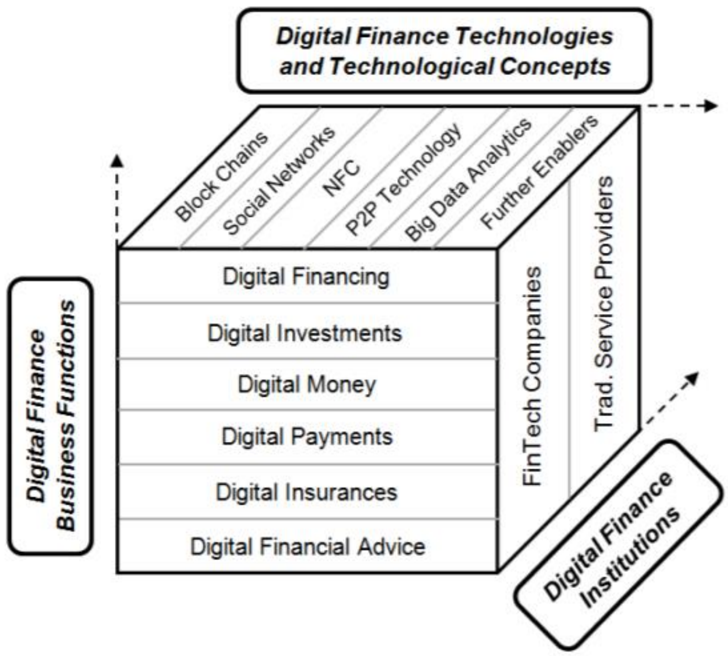
This thesis, however, limits itself in scope to the latest, more contemporary trend of FinTech innovation, emergence of which most authors date to the aftermath of the Global Financial Crisis (GFC) of 2008. Given the context of the GFC, it is of no particular surprise that regulators focused on enhancing anti-money laundering (AML) and know-your-customers (KYC) measures, the outcome of which led to a drastic hike in compliance costs, (D. W. Arner, Barberis, and Buckley 2018), at least for legacy institutions. High compliance spending has incentivized many to try and use technology and innovation to re-invent the way these processes are concluded.

As many authors believe, the post-crisis context created a fertile ground for the latest FinTech boom. Contributing factors to this context have included – the worsening public image of traditional financial institutions, the new wave of entrepreneurs (incl. previously laid off financial service professionals) and the changing regulatory environment which shifted incentives of traditional financial service providers, (D. Arner et al. 2015).

The appeal of disrupting the financial industry, while first expressed by entrepreneurs and start-ups, was not limited only to these organizations. Many technology companies globally have recently launched or are vocal about intending to launch value propositions that could disrupt the financial industry, (WIRED 2019). Typically, these companies are starting from payments, but eventually expanding along the value chain – examples include Alibaba's and Tencent's subsidiaries in China and big U.S. tech giants – Amazon, Apple, Facebook and Google, (Frost et al. 2019).

As it was stated before, the overarching consensus on what constitutes FinTech is broad in its definition. Researchers have tried to map and structure this space in several ways, one of them being the one proposed by Gomber et al who have devised a concept of the Digital Finance Cube, (Gomber, Koch, and Siering 2017). Digital Finance Cube segments the FinTech space into three verticals – business functions, which can also be understood as financial products and services, technologies and concepts and service providers. Digital Finance Cube, while not fully exhaustive in its nature, is a useful tool that helps visually illustrate the solution space that the FinTech trend is creating.

Exhibit 1: Digital Finance Cube, as devised by Gomber et al



Given the complexity of the space, it is not easy to pinpoint and measure the impact and scale of the disruption that FinTech is creating at an aggregate, macro level. This is because the FinTech activity is not uniform across the board. Research by McKinsey shows that certain sectors have higher level of the FinTech activity than others:

- product/service-wise - a bit less than half (43%) of all FinTech start-ups are focusing on payments, around a quarter (24%) on digital financing, with the remaining categories sharing the rest
- segment-wise - almost two-thirds (62%) of FinTech start-ups are targeting retail customers, (McKinsey & Company 2016).

At an individual level however, there are numerous examples of FinTech value propositions bringing genuine benefit to consumers, primarily by making the services cheaper, simpler and faster to access / execute. Examples of such value propositions can be found throughout the field, be it the low-cost investment robo-advisors that democratize access to wealth management and make it accessible to the mass market, the digital lenders that are able to perform risk scoring with only a subset of traditional information or the peer-to-peer money transfer and remittance operators that enable transactions to be complete in near real-time, often for a fraction of the cost incumbents would charge.

In a similar fashion, FinTech innovation is not uniform across different markets. A report by CB insights shows that more than half (38 out of 67) of all FinTech unicorns, a colloquial industry term for start-up companies valued to the north of $1B, come from the U.S., 8 come from the U.K., with the remaining countries having 5 or less of such companies, (CB Insights 2020). While it is true that several developed countries, notably the U.S. and the U.K, do have a strong FinTech scene, which one could attribute to their culture of entrepreneurship, pro-competitive regulatory frameworks and concentration of venture capital (VC) funds, it is by no means accurate to say that FinTech is a trend only relevant for developed countries. Ant Financial, the FinTech arm of the Chinese giant Alibaba, is the largest FinTech unicorn in the world, with an implied valuation of around $200 billion, more than all of the U.S. unicorns combined, (Reuters 2020). The comparison of the two types of unicorns may simply imply that while in developed markets, the FinTech wave is mostly driven through bottom-up initiatives, as numerous start-ups are launching value propositions around specific pain points, the wave in China is mostly driven through top-down initiatives, as existing technology giants expand across verticals and use FinTech to lock-in their customers in vast ecosystems.

While disruption caused by innovation typically leads to long-term benefits across all industries, including financial services, (de Koker Louis, Morris Nicholas, and Jaffer Sue 2020) it does come with a unique set of opportunities and threats. '*Is that app for seamless and cheap peer-to-peer money transfer secure?*', '*Can I trust my wealth-management robo-advisor to grow my savings effectively, while adhering to my personal risk appetite?*', '*Will my mobile-only bank keep my deposit safe?*'. These are just some of the concerns that many of the people who consider using digital financial services may have.

This brings us to the role of market regulators, which is today as important as ever. In this complex, competitive and contentious environment, the financial regulators globally would need to reconcile their principle mandate of preserving financial stability and ensuring consumer protection with an overarching goal of fostering growth and innovation in the financial industry, (D. W. Arner et al. 2017).

As observers and arbiters, the regulators would need to get familiarized with the increasingly more complex nature of tech innovation, would need correctly assess the trade-offs between risks and rewards of introducing a specific innovation and would need to steer relevant industries in the direction most beneficial for the common good, all that preferably in the shortest time possible and with the lowest costs.

The novel times therefore require the regulators to adopt more flexible and more inclusive approach which would be backed by actionable data, rather than rely on historical facts, (Fenwick, Kaal, and Vermeulen 2016).

The solution space for regulatory innovation

Banking is intrinsically complex. The right approach to regulate financial services has continually been a source of public debate among policymakers, scholars and industry stakeholders. Failure of regulators to act timely and appropriately to constrain risky behavior and preserve the stability of the system can lead to major economic and social consequences, as observed during the GFC of 2008. On the other hand, it is in the same manner true that pro-active action taken by regulators to foster innovation and relax some of the restrictions can lead to greater competitiveness and broader economic gains, (Tomas Helm, Alex Low, and Joshua Townson 2019).

While it is accurate to say that banking by itself is complex, it is also accurate that the rise of FinTech and the increased heterogeneity of the financial service providers have added an additional layer of complexity to the role of regulators.

There have been several approaches developed and tested by regulators to foster FinTech innovation. While the solution space is vast and there are numerous specificities that vary from jurisdiction to jurisdiction, there are a few main archetypes that outline general direction each regulator may take.

Below is a framework of regulatory design choices and their characteristics, as outlined by Zetzsche et al, which is featured in several topical studies.

Exhibit 2: Landscape of design choices for regulatory authorities, (Zetzsche et al. 2017):

0) Institutional knowledge exchange to facilitate communication between regulators and FinTech through innovation hubs

1) doing nothing: either by not regulating FinTech or by enforcing the same level of regulatory scrutiny as with all other financial institutions;	**2) case-by-case experimentation**: mainly through no-action letters, restricted licenses, special charters and partial exemptions	**3) structured experimentation**: most commonly through the sandbox approach	**4) formal regulatory reform**: either by permanently amending existing regulation for all participants or by adopting new regulation

Arguably, the truly novel design choices are those falling under 2) and 3), as choices 1) and 4) could be considered as more traditional, well-established regulatory levers (and hence will not be considered in more details here). At the same time, innovation hubs, while newer in this format, are essentially a modern twist to the old problem of making information sharing structured, transparent and scalable. While these concepts – the innovation hub, case-by-case experimentation and structured experimentation, are not necessarily mutually exclusive, the sequencing of these measures can create different implications on the market.

The obvious regulatory question coming out of this framework is – where does one start and how does one generate optimal results?

The answer – it depends, not only on the trade-offs between these different formats, but also on the objectives each regulator is pursuing and the mandate the regulator is bound by, and also, it depends very much on the intrinsic local context that every regulator finds itself in.

Let us firstly understand how these additional concepts function in practice and what could be the main strengths and weaknesses of each.

The first innovation hubs among EU member states were established in 2014, majority of which became operational during 2016-2017, (European Securities and Markets Authority 2018). Main role of such hubs is to serve as a digital point of single contact for innovators to interact with regulators and to seek corresponding, non-binding guidance, (European Securities and Markets Authority 2018). Innovation hubs also serve as designated points of contact between countries, hoping to facilitate cross-border cooperation and ease restrictions for entrepreneurs. Such practice appears to be particularly relevant for small, open economies. As an illustration, the FinTech office of the Monetary Authority of Singapore has set-up 33 FinTech co-operation agreements between

2016 and 2019, mainly to facilitate information sharing, work on joint projects and to create a referral mechanism for innovative businesses, (Monetary Authority of Singapore 2020).

Given its scope and role, as outlined here, innovation hubs typically do not require a sophisticated tech-infrastructure to be set-up. In addition, many regulatory authorities may already have similar departments / teams that could be re-purposed and empowered to take up a role of a hub. Both in the UK and Australia, innovation hubs preceded the establishment of sandboxes, (Buckley et al. 2019). Another example is that, among EU member states, there is no country which does have a regulatory sandbox and does not have an innovation hub, while the opposite is not true (i.e. plenty of countries only have an innovation hub), (European Securities and Markets Authority 2018).

Case-by-case experimentation refers to different discretional levers the regulators are able to leverage when deemed fit. No action letter is a common term for an opinion that a regulator may write to an entity informing them that, at that specific point in time, the regulator does not intend or anticipate pursuing regulator action against the entity over a particular state of affairs or particular conduct'(ASIC 2009). Restricted licenses, special charters and partial exemptions are other related regulatory documents with a similar purpose – providing a tentative yellow signal to market participants.

Regulatory sandbox is a novel practice in financial regulation. Financial regulators have started to establish regulatory sandboxes since the mid-2010s, most of them claiming to hope to foster innovation, while ensuring financial stability and consumer protection, (D. W. Arner, Barberis, and Buckley 2018). Regulatory sandbox concept was first initiated in developed countries with strong financial centers, namely the United Kingdom, Singapore and Australia, (Buckley et al.

2019). As the thesis will outline, the concept quickly spread to other countries, including emerging and developing countries.

The concept itself, at a high level, means that the relevant authority will grant certain exception(s) from standing regulation to business entities that are developing a new, innovative, technology-enabled service / value proposition, (Bromberg, Godwin, and Ramsay 2017). The overarching purpose of the concept is to create a safe environment for innovation to happen, while still safeguarding some of the fundamental customer protection principles (e.g., handling of personal information). In practical terms, the concept typically envisages a digital interface through which a programmer can test the features of products and services with real customer data, (Johnson 2020).

The sandbox approach has become increasingly popular with regulators in a relatively short amount of time - between 2016 and 2019, authorities in over 50 countries have adopted the approach, (Buckley et al. 2019), although the exact concept varies from one jurisdiction to another. While the sandbox concept is relatively new, it is possible to identify key benefits across different stakeholder groups. Ring and Ruof provide a following interpretation of key benefits, (Ringe and Ruof 2020):

Exhibit 3: Benefits of regulatory sandbox for main stakeholder groups and for overall financial stability:

Regulators: enables the regulators to amass and preserve significant amount of data, learn from new trends and apply some of the innovative technologies withn its own processes (e.g., distributed ledger technology)	**FinTechs**: reduces regulatory uncertaintly, levels the 'playing field' and helps accelerate time-to-market, most notably by streamlining regulatory authorisation process	**Consumers**: innovative products tend to be more affordable and more convenient, while having them tested in the sandbox environment also ensures they are safe

Financial stability: helps reduce entry barriers and increase diversity of the industry, puts pressure on incumbents to embrace innovation, and helps identify treats to financial stability earlv

There are several design choices regulators typically need to consider when launching a regulatory sandbox. Wechsler et al provide a list of five key components / design principles (in a similar fashion as most of the other authors) that should be thought through when implementing a regulatory sandbox, (Wechsler, Perlman, and Gurung 2018):

Exhibit 4: Main design principles, as outlined by Wechsler, Perlman and Gurung:

Objectives and Scope

- Typically, inter-linked with the regulator's intrinsic mandate and may call out financial stability, consumer protection and enhancement of competition;

Eligibility Requirements / Evaluation Criteria'

- May infer several different limitations to the entity participating in the sandbox and the innovation itself:
  - Administrative restrictions - e.g., entities registered within a specific regulatory jurisdiction, existence of a license to provide financial services;
  - Restrictions regarding the nature of innovation - e.g., uniqueness in the market, identifiable benefit to end-users, technical feasibility;
  - Restrictions regarding the entity's go-to-market strategy - e.g., innovation would be deployed within a specific regulatory jurisdiction, innovation is ready to be tested, specific number of customers served / volume generated;
- Justification – e.g., reason the innovation requires to be tested in a sandbox environment;

Risk Management, Safeguards, Records and Reporting'

- would include a set of steps to be taken to safeguard customers, a testing plan and key performance indicators the innovator would measure

Entry, Fees and Duration

- Would detail out application and admission process, the time innovators may spend in the sandbox and any associated fees

Exit Procedure

- Stipulations for transitioning out of the sandbox, either voluntarily, upon the expire of the testing period or upon a request from the regulator

It is evident that sandbox approach represents a more focused and a more resource-intense approach – given the technological capabilities the regulators need to set up in order to make their sandbox environment safe and functional. It may be further argued that the sandbox approach is less inclusive than the innovation hub set-up, given that only a subset of selected companies are able to participate in this experimentation; it is also possible to claim that different case-by-case experimentation approach can be less risky and more effective than the sandbox approach because the regulators can fine-tune the exceptions based on individual merits and characteristics of each specific innovation. At the same time, the sandbox approach does have one undisputed advantage, which is as Buckley et al put it, its ability to convey 'strong message' to the market, (Buckley et al. 2019). The novel nature of this innovation, as well as the fact that the regulators in leading developed countries with strong pro-competitive track-record are pursuing the sandbox approach is what gives it a perceived seal-of-approval among the market participants.

When reflecting about these theoretical considerations, it may appear that the regulatory sandboxes, even if they are able to command a lot of attention, might not be the most practical, the most resource efficient or even the most inclusive way of facilitating innovation by regulatory authorities. In an indicatively titled paper '*Why build a sandbox on a beach? An analysis of FinTech regulation in New Zealand*', Ingle argues, after closely investigating the local landscape and regulatory policies, that the country already has robust, yet flexible policies in place which make the establishment of a regulatory sandbox 'unnecessary', (Ingle 2018) . The real question in this case is – should you build a sandbox if you're not on a beach?

Chapter II: Research question and Approach

Aim of this thesis is to present the state of the current FinTech scene in Serbia and to survey the efforts that the NBS is undertaking to support FinTech, and within this context, the role of the regulatory sandbox. Main question that this thesis aims to respond is – what steps should the NBS take in order to support the FinTech ecosystem most effectively.

The work hopes to bring relevant international examples and compare these practices to the efforts that the NBS is undergoing. More specifically, the analysis will first look at the regulatory sandbox set-up by the UK's FCA, the first regulatory sandbox to have been established. The thesis will also look at the regulatory sandboxes established by the relevant authorities in Hungary and Poland, as these countries have higher resemblance to the Serbian FinTech scene and general economic environment than it is the case with the UK. When surveying these sandboxes, the thesis will analyze the overall strategic framework, the principle design choices the implementation and any available success indicators.

Subsequently, the analysis describes the FinTech scene in Serbia and assesses its potential. It presents several examples of FinTech that have gained customer traction, notably the establishment of the first mobile-first digital bank and the introduction of instant-payment system. Finally, the thesis outlines the initiatives that NBS is taking and compares them to the initiatives taken by regulators in other countries – mainly Poland and Hungary.

In Serbia, FinTech is a newly emerging industry, as is the practice of regulatory sandboxes. This creates substantial data availability challenges. While it is not possible to obtain a quantifiable track-record from publicly available source, this thesis approaches the topic by taking into account existing academic and business originated body of knowledge, reports of relevant institutions as well as interviews with relevant local stakeholders – regulators, scholars, entrepreneurs and policy makers.

Chapter III: Regulatory sandbox – learnings from international practice

UK FCA regulatory sandbox – set-up, objectives and track-record

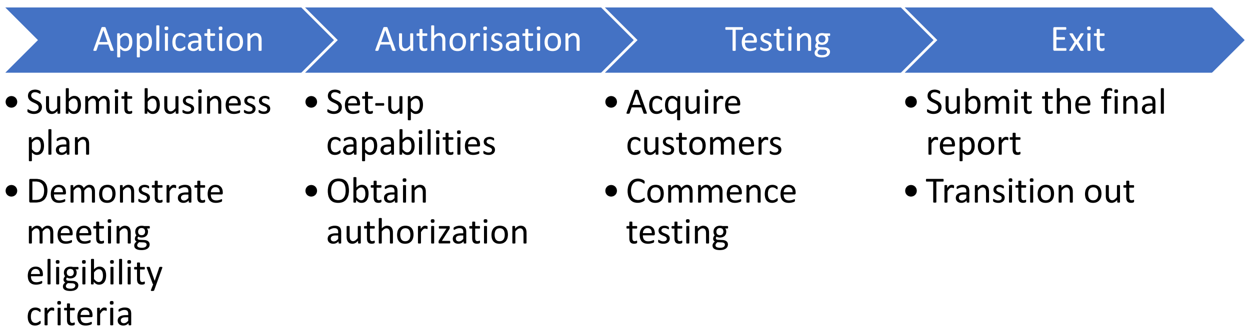
First regulatory sandbox to have been established is the one by the UK's financial regulator - Financial Conduct Authority (FCA) in 2016, (Wechsler, Perlman, and Gurung 2018). For a while now, London has not only been one of the traditional financial centers of the world, but with roughly 3000 FinTech start-ups, (Tracxn 2020) it is also a thriving entrepreneurial hub. As one global report puts it, London has '*the "Fin" of New York, the "Tech" of the US West Coast and the policymakers of Washington'*, (Deloitte 2016).

In an environment when countries are trying to attract innovators and venture capitalists through various means, (INSEAD 2019), the FCA's decision to set-up a sandbox can also be interpreted as an attempt at preserving prominence that London has and a strong signal to other participants in the FinTech ecosystem – primarily entrepreneurs and venture capitalists. In a time when talent and capital are global, such regulatory signals can be an important tool at maintaining global competitiveness.

The overarching objective for the FCA sandbox has been to test innovative value propositions ('products, services and business models') in a 'live' environment with several potential benefits – (i) cheaper and quicker time to market, (ii) greater access to finance enabled by lower regulatory uncertainty, (iii) greater diversity of products, (iv) better collaboration between FCA and financial innovators, (Financial Conducts Authority (FCA) 2017).

While early indicators show progress towards meeting the four stated objectives, (Financial Conducts Authority (FCA) 2017), a longer time-series and greater sample of cases will be needed before conclusive statements can be made.

Exhibit 5: There are four main stages a company undergoes when participating in a regulatory sandbox – (i) application, (ii) authorisation, (iii) testing and (iv) exit, (Deloitte 2018):



In the case of FCA's, an independent study implemented by Innovate Finance and Deloitte has uncovered several pain points organizations face throughout the sandbox process, (Deloitte 2018):

- Understanding all the regulatory (i.e. legal, compliance) stipulations, especially during the authorization phase;
- Acquiring customers with which the innovation will be tested;
- Allocating human resources and adjusting operations to allow for testing;

Despite some of its shortcomings, it is evident that the concept has attracted a lot of attention among innovators. Between 2016 and 2019, FCA has enlisted a total of 5 cohorts with 118 participants, it should be noted that the call for participants for the latest, fifth cohort received the highest number of applications so far – 99, of which 29 were successful, (Financial Conduct Authority | FCA 2020).

While it is impossible to delineate the impact of the sandbox initiative from general attractiveness of London to entrepreneurs and venture capitalists, London ranks highly across several important metrics. In 2019, London has overtaken New York as the hub with most VC-deals (114 and 101 respectively). London also has the highest trust and the highest number of foreign-born founders among European hubs, (Startup Heatmap Europe 2020).

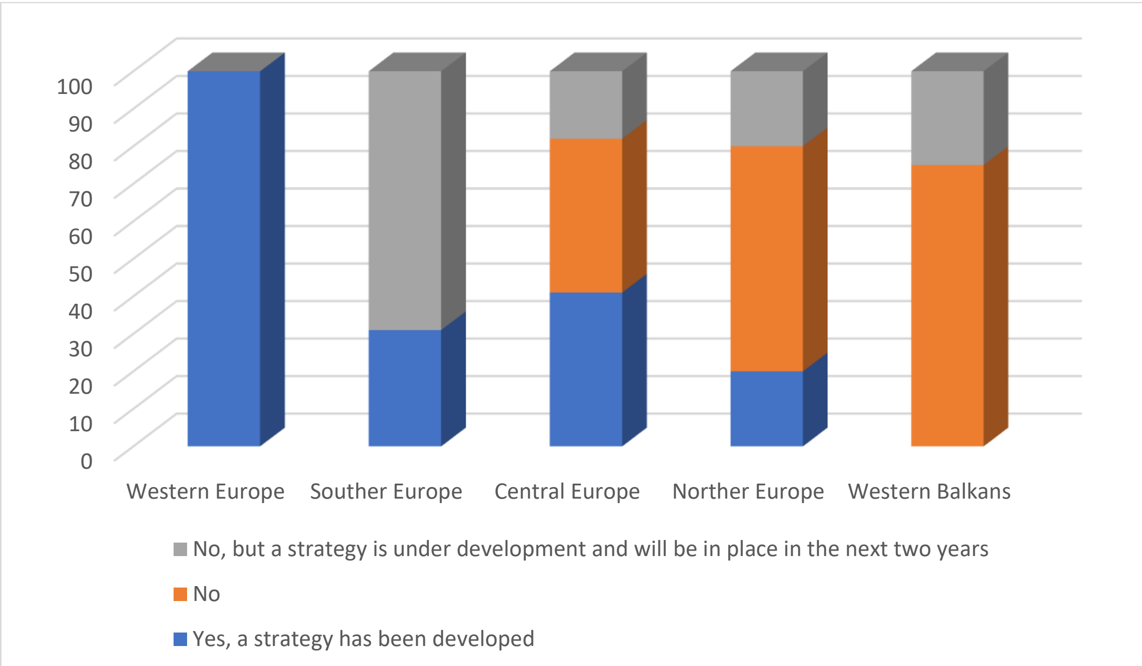
But the sandbox is just one of the novel tools that the regulators have been using lately. In the UK, the sandbox came to be as an extension of a previously established innovation hub, a platform set-up to help the regulator interact with innovative businesses and answer their queries about regulatory topics, (Bromberg, Godwin, and Ramsay 2017).

Regulatory Sandbox in CEE – experience of Hungary and Poland

Following the example of the UK, many other European countries decided to launch their own regulatory sandboxes and innovation hubs. In Central and Eastern Europe, as of January 2019, this practice was adopted, in one way or another, by Poland, Hungary, Romania, Lithuania, Latvia, Estonia, Bulgaria and Romania, (European Securities and Markets Authority 2018). This thesis will explore the examples of Poland and Hungary in more detail.

FinTech in CEE is still relatively nascent and underdeveloped and data availability remains a major issue, (Stern 2017). In addition, on average, there has been a comparably lower initiative from the governments and regulators in CEE, and in particularly in the Western Balkans sub-region, to adopt an overarching FinTech strategy. While this is true for the region as a whole, certain countries have advanced faster than the others and can serve as useful examples to showcase.

Exhibit 6: IMF-World Bank, Global FinTech Survey 2019, (The International Monetary Fund / The World Bank 2019) - Share of countries in each region with a National FinTech Strategy, in %



Warsaw and Budapest are among the leading FinTech hubs in the CEE region. A report developed by Deloitte in 2017 ranks the two centers among the top 44 global FinTech hubs, (Deloitte 2017). The report tries to rank each of the hubs across 6 verticals using the self-assessment of the local FinTech community, the 6 verticals being: government support, innovation culture, proximity to expertise, proximity to customers, openness towards foreign startups and regulatory environment. While probably intuitive, it is still interesting to note that while both Budapest and Warsaw ranked highly on "proximity to expertise" – both hubs scored 4/5 on a scale from 1 to 5 (1 being "not good", 5 being excellent), they ranked middle of the field or on the lower end of the scale on "regulation" - Budapest ranked 2/5, while Warsaw ranked 3/5. While not necessarily the outcome of this particular report, regulators in both Poland and Hungary have since doubled-down on improving the regulatory environment in the period ahead.

In Poland, the relevant regulator, Komisja Nadzoru Finansowego (KNF) have adopted a comprehensive and structured approach to supporting the local FinTech innovation. KNF has started off by establishing a special task-force in 2016 which comprised from 22 different institutions, relevant ministries, National Bank of Poland, independent agencies responsible for competition, consumer protection and data privacy, as well as industry participants, (The Polish Financial Supervision Authority (KNF) 2017). Having a wide group of stakeholders helped KNF helped the regulator map an exhaustive list of barriers that the FinTech innovators may be facing (85 barriers in total), and has subsequently managed to remove the majority of these (61 have been removed, or had the removal process being initiated), (The Polish Financial Supervision Authority (KNF) 2017).

In the aftermath of this process, KNF established an innovation hub in the beginning of 2018, (European Securities and Markets Authority 2018). The hub was set up to support both the start-ups and incumbent financial services providers who expressed intent to test new services and value propositions, (The Polish Financial Supervision Authority (KNF) 2020a), thought, at least in the first two years since launch, the majority of those interested in the hub's services (85% of the total of 130 all inquiries) was attributed to start-ups, (Fintek.pl 2020). KNF also defines certain criteria for organizations to be eligible to request support through the hub mechanism. These criteria include: i) market uniqueness (i.e. the innovation brings a completely new, previously non-existent solution to the market), ii) preliminary legal and regulatory analysis and iii) ability to benefit from the hub experience (i.e., from interacting with the regulator). These criteria were likely set-up in order to help KNF manage its limited resources in an efficient manner.

Following the establishment of the hub, KNF went one step further and had started the work on establishing the regulatory sandbox in September 2018, the initiative was set-up by using the EU structural funds and with the expert support and supervision of the European Bank for Reconstruction and Development (EBRD), (The Polish Financial Supervision Authority (KNF) 2020b). In Poland, the sandbox was set-up as an extension of the innovation hub, as the regulator stipulated that only organizations that have already participated in Innovation Hub programs may be eligible to join the sandbox, (The Polish Financial Supervision Authority (KNF) 2019). By linking the sandbox with the innovation hub concepts, and further embedding it within the work of a broader strategic process, KNF has set-out a consistent, holistic approach to supporting innovation and creating transparency in the process.

In Hungary, the regulator followed a very similar process to the one in Poland. Magyar Nemzeti Bank (MNB), the country's central bank, launched a country-wide national consultation and market research in 2017, following which an innovation hub was set-up in 2018, (The Hungarian National Bank (MNB) 2018b). Similar to most of the other countries, the innovation hub took the role of centralizing information and facilitating communication between the regulator and market participants, while also supporting international cooperation, (The Hungarian National Bank (MNB) 2018b).

In a similar way as in Poland, in Hungary, the sandbox tool was embedded within the broader innovation hub, though unlike in Poland, entities can apply directly to take part in the sandbox, without prior need for participation in the innovation hub programs, (The Hungarian National Bank (MNB) 2020). The sandbox was officially launched in 2019 based on the inputs previously gathered through the national consultation process, (The Hungarian National Bank (MNB) 2018a). The consultation process had shown a large number of organizations (49%) has intention to participate in the sandbox, of which one if four already has a product that they want to test, (Fáykiss et al. 2018b). When it comes to meeting formal requirements, MNB provides more clarity on the conditions organizations need to meet in order to participation, which resemble to a large extent FCA stipulations outlined earlier in this thesis – true and distinctive nature of innovation, readiness of the applying organization to submit testing and intention for the innovation to be used to bring benefit to local consumers, (The Hungarian National Bank (MNB) 2020).

Given the early state of both the Polish and the Hungarian regulatory sandboxes, it is still not possible to measure tangible impact of the two initiatives. What both these initiatives do have in common is that the sandbox was set-up as an extension of already functioning innovation hubs and that a wide consultative period with relevant stakeholders had preceded the establishment of the relevant sandboxes.

What these two countries also have in common is that both have developed comprehensive strategic documents which clearly and transparently articulate the direction that the regulator aims to take – MNB's FinTech strategy from October 2019, (The Hungarian National Bank (MNB) 2019) and KNF's FinTech strategy published two months later, in December 2019, (Fintek.pl 2019).

If one takes into account that many authors believe the main role of sandbox is to send a clear market signal, having a transparent process with a well-defined strategy contributes to this purpose even before the tangible results can be generated.

Chapter IV: FinTech scene in Serbia as part of the broader innovation ecosystem and the efforts of the NBS in supporting it

Serbia is a country with young democracy and equally young market economy institutions. Following the end of communism and the wars which took place in former Yugoslavia, the country embarked on the path of transformation in the early 2000s. As part of its overall transformation, and in particularly, the EU accession journey, Serbia has started to lay foundation for a functioning market economy which would be more conducive to entrepreneurship and business-led innovation.

Over the past two decades, the country has set-up several new regulatory authorities and has modernized the role of existing ones, (Radojevic 2010). Improving market conditions has been one of the top priorities for several administrations in the past period. One illustration of this effort is the progress the country has made on World Bank's 'Doing Business' list, from position number 90 in 2009 to position number 44 in 2019, (The World Bank 2020a). While the progress is noticeably visible, there are still multiple reforms underway or waiting to be implemented.

In Serbia, the reform process is typically measured as the progress towards the EU membership. As part of the EU accession process, Serbia needs to open and close 35 chapters relating to different policy areas of acquis Communautaire, EU's cumulative body of laws, (The European Commission 2020). *Closing a chapter* means that the country has fully met the EU's standards for administrative and institutional infrastructures in a specific policy area.

As of May 2020, many of the chapters affecting the digital economy have not yet been closed, among these are chapter 20 on entrepreneurship and industrial policy, chapter 7 on intellectual property rights, chapter 30 on foreign economic relations, chapter 17 on economic and monetary affairs, chapter 9 on financial services and chapter 4 on free movement of capital, (Belgrade Open School 2020).

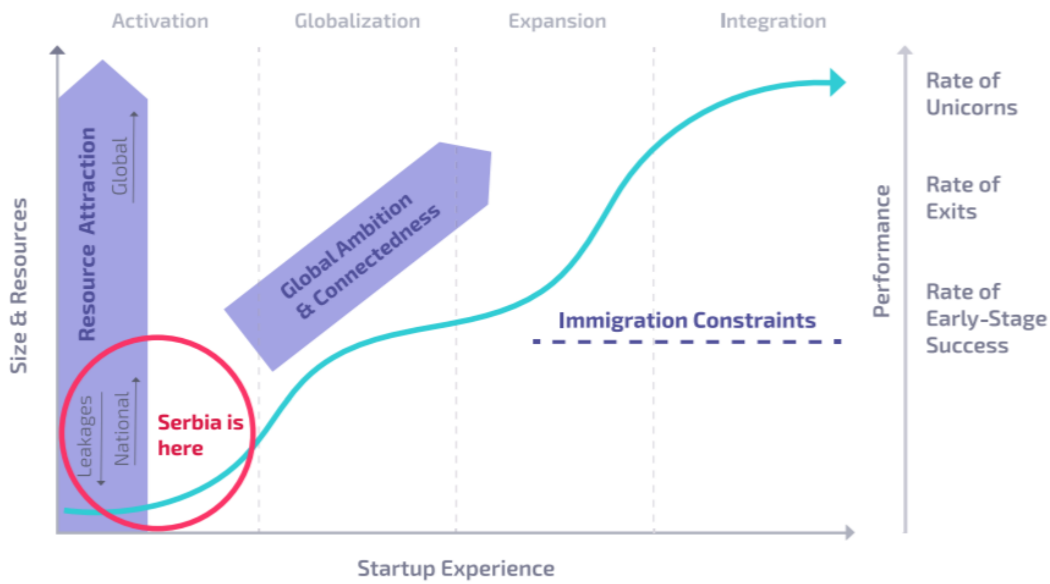
In the context of FinTech and EU accession plan, it will especially be interesting to see how Serbia will translate the relevant open banking regulation, most notably the PSD2 directive into its legislative system, though the first steps on that way have already been undertaken with the assistance of the World Bank, (The World Bank 2020b).

Not surprisingly, the broader digital economy has been one of the important growth levers, with the IT sector being the fastest growing sector of Serbia's economy, (Thomson Foundation 2018). As of 2020, technology sector accounts for 6%+ of the country's GDP and employs 45 thousand people, in addition to estimated 10 thousand freelancers, while universities churn 5 thousand tech graduates every year, (The Economist 2020). When it comes to financial technology, the largest market in 2020 is the one for digital payments - estimated at $800M, followed by personal finance market which is at $700M, both of these are expected to experience fast-paced annual growth by 2024 - 20% and 35% respectively, (Statista 2020).

While true that the digital economy has become an important engine of growth for the Serbian economy, the start-up ecosystem is still highly nascent. According to Startup Genome, an innovation-focused policy advisory firm, Serbian start-up ecosystem ranks in the initial, "activation" phase when it comes to overall start-up experience for founders, (Digital Serbia Initiative 2019). The activation phase is described as a phase in the innovation ecosystem development with up to 1,000 established start-up companies and limited market dynamics – in terms of know-how, investor sophistication, community support, etc., (Startup Genome 2020).

Furthermore, even in this nascent version, it is not a given that the positive effects of innovation will transfer to the local consumers. This is mainly due to the export-oriented nature of the digital economy, which means that large number of Serbian start-ups have their client base abroad, (Kleibrink et al. 2018).

Exhibit 7: Startup Genome / Digital Serbia Initiative - State of the Serbian innovation ecosystem



FinTech plays an important role in the Serbian innovation ecosystem. According to a survey by Digital Initiative Serbia, roughly 15% of all start-ups in Serbia focus on FinTech (incl. blockchain), (Digital Serbia Initiative 2019). Furthermore, the local market has attracted a lot of attention from incumbent players – both as a testing ground for front-facing innovation, like it has been the case with Telenor Bank, a telco-backed financial institution, and a talent hub for back- and middle-office research and development, like it has been the case with the likes of BlackRock and FIS, (Edgar Dunn & Company / Digital Serbia Initiative 2019).

Despite the role that the FinTech sector has in the country, Serbia doesn't have a national FinTech strategy. The overarching strategic framework focusing on innovation has been determined by the Strategy for the Development of Information Technology Industry for the 2017-2020 Period, however, the inadequate action plan and the lack of funds have made achieving otherwise ambitious goals a challenging feat, (Pitić, Savić, and Verbić 2018).

In addition to the overarching strategic direction, an important component in supporting the local ecosystem rests upon the overall innovation infrastructure – both in terms of the "hard" infrastructure, that initiated by the state and the "soft" infrastructure, initiated by the local community (e.g., accelerators, hubs), (Savić, Pitić, and Lazarević 2018). Under this definition, the regulatory sandboxes that this document focuses on would belong under the "hard" infrastructure category.

The general relevance of regulatory sandboxes is recognized within the AI Development Strategy 2020-2025, which was adopted by the Government of Serbia, (Nova Ekonomija 2020). Presently, there are two sandbox initiatives taking place in Serbia – the FinTech sandbox, launched by the NBS which is the focus of this thesis, and the MedTech sandbox which was set-up in coordination with Science and Technology parks, (The Government of the Republic of Serbia 2019).

The NBS as a regulator plays an important role for the FinTech Ecosystem. Through the process of surveying the NBS annual reports for 2017 and 2018, press interviews, and blogs, it appears that when it comes to innovation, the biggest focus has been put on digitally-enabled payments.

As a starting point for this transformation, once can take the adoption of the Law on Payment Services in 2015, (The National Bank of Serbia (NBS) 2018a). The Law brought several novelties, including an overarching regulatory framework which, for the first time, recognized electronic / digital money as a payment mean, alongside with digital money institutions, (The National Bank of Serbia (NBS) 2015). In addition to the overarching regulatory framework in the field of payments, the NBS has adopted an additional strategic document that aims to facilitate low ticket size payments, (The National Bank of Serbia 2019). This strategy, which covers the period between 2019 and 2024 aims to "sustain and further develop the contemporary and inclusive market for low-ticket size payments”, (The National Bank of Serbia (NBS) 2019b). Important operational part of this strategy will rest upon the flagship innovation-focused projects that the NBS undertook to establish the instant payment system at the end of 2018, which was deemed the “first of its kind” in the region of Western Balkans, that enables real-time payment execution for individuals and businesses, 24/7/365, (CorD Magazine 2019).

NBS announced the launch of its regulatory sandbox in March 2018, declaring that the sandbox is dominantly intended to help develop payments value propositions and that ‘all citizens and business entities’ should be free to reach out in case of interest, (The National Bank of Serbia (NBS) 2018b). It was not completely clear as to what would be the exact conditions for organizations to test in the sandbox, nor how the sandbox onboarding and testing process would be completed, other than that the testing will be conducted free of any charges. Year and a half later, the regulatory sandbox remains largely under a veil of mystery. To date, the NBS hasn’t published, nor has it agreed to disclose any impact numbers of the sandbox (e.g., number of companies that have conducted testing), the procedure and conditions for testing, or its future plans for the sandbox development.

Another notable initiative of the NBS when it comes to facilitating the innovation ecosystem is the push to establish a central business registry of start-ups. This registry, announced in November 2019, would not be focusing solely on FinTech companies, but rather start-up companies across all industry spheres, (The National Bank of Serbia (NBS) 2019a). Proclaimed aim of this registry would be to serve as a single point of contact for the Serbian Innovation ecosystem. As of June 2020, the start-up registry is under development and no official information of its content has been published.

Chapter V: Discussion and conclusion

Innovation ecosystem, and FinTech as one of its important components are still at a very nascent stage of growth. Among its enablers are the large talent pool and the proclaimed innovation-friendly position of the relevant public sector institutions – notably the executive branch and the NSB.

While there has been an increased focus on innovation, unlike its peers in Hungary and Poland, the Serbian regulator does not have a holistic innovation or FinTech strategy which could be a basis for the setting up of regulatory sandboxes.

The overall direction that the NBS has been taking was to focus on digital payments, with the launch of the instant payment system as its flagship project to date. In contrast to the cases of Hungary and Poland, and even in contrast to some of the other flagship innovation project by NBS, the Serbian sandbox was launched with considerably less public attention, in form of a press-release, with few details disclosed to date.

Setting up the sandbox in the first place demonstrates that the regulator is aware of the global trends and is open to act upon these trends to support the innovation ecosystem. Nonetheless, having a sandbox is only a part of the solution and there are other considerations that may affect the potency of the sandbox. It is also worth noticing that in most of the other countries, including the UK, Poland and Hungary which were referenced in this thesis, the sandbox does go hand-in-hand with a broader innovation hub. The role of the hub being to facilitate public discussion and help prepare the field for the sandbox to operate.

While establishing the sandbox is a step in the right direction, in order to extract the maximum value of its regulatory sandbox, the NBS should consider the following initiatives.:

1. Organize an inclusive, cross-sectoral consultation to map the key barriers that hinder innovation in financial services; This consultation could follow the Polish model of having different stakeholders, including the relevant government ministries, incumbent financial service providers, representatives of the start-up community and consumer and data protection watchdogs.
2. Set up an innovation hub which, as shown in previous cases, can have significant synergies with the sandbox and can significantly improve communication between the regulator and interested entities.
3. Clearly articulate the pre-requirements organizations need to meet in order to participate in the sandbox, the selection criteria and the testing conditions to bring more transparency and level the playing field.

At a time when the information is available more freely, a subsequent research is warranted to evaluate the sandbox performance and its impact on the FinTech scene in the country.

References

Arner, Douglas, Jànos Barberis, Ross Buckley, Unsw Law, Douglas W Arner, and Ross P Buckley. 2015. "The Evolution Of FinTech: A New Post-Crisis Paradigm?" *University of Hong Kong Faculty of Law Research Paper No. 2015/047*.

Arner, Douglas W., Janos Nathan Barberis, and Ross P. Buckley. 2018. "FinTech and RegTech in a Nutshell, and the Future in a Sandbox." *CFA Institute Research Foundation Vol. 3, Issue 4, Pp. 1-20, July 2017, ISBN: 978-1-944960-25-4*. Elsevier BV. https://doi.org/10.2139/ssrn.3088303.

Arner, Douglas W., Dirk Andreas Zetzsche, Ross P. Buckley, and Janos Nathan Barberis. 2017. "Fintech and Regtech: Enabling Innovation While Preserving Financial Stability." *18(3) Georgetown Journal of International Affairs 47*, August. https://doi.org/10.2139/ssrn.3211708.

ASIC. 2009. "Regulatory Guide RG 108 No-Action Letters."

Belgrade Open School. 2020. "Timeline of EU-Serbia Relations." 2020. http://eupregovori.bos.rs/hronologija-odnosa-srbije-i-eu.html.

Bromberg, Lev, Andrew Godwin, and Ian Ramsay. 2017. "Fintech Sandboxes: Achieving a Balance between Regulation and Innovation." *Journal of Banking and Finance Law and Practice*. Vol. 28. http://www.fsa.gov.uk/pubs/other/turner_review.pdf.

Buchak, Greg, Gregor Matvos, Tomasz Piskorski, and Amit Seru. 2018. "Fintech, Regulatory Arbitrage, and the Rise of Shadow Banks." *Journal of Financial Economics* 130 (3): 453–83. https://doi.org/10.1016/j.jfineco.2018.03.011.

Buckley, Ross P., Douglas W. Arner, Robin Veidt, and Dirk Andreas Zetzsche. 2019. "Building FinTech Ecosystems: Regulatory Sandboxes, Innovation Hubs and Beyond." *University of Luxembourg Law Working Paper No. 2019-010*. Elsevier BV. https://doi.org/10.2139/ssrn.3455872.

CB Insights. 2020. "Global Fintech Unicorns." https://www.cbinsights.com/research/fintech-unicorns-q1-20/.

CorD Magazine. 2019. "Region's First Instant Payment System," 2019. https://cordmagazine.com/interview/jorgovanka-tabakovic-national-bank-of-serbia-ips-regions-first-instant-payment-system/.

Deloitte. 2016. "Connecting Global FinTech: Hub Review 2016." https://www2.deloitte.com/ch/en/pages/financial-services/articles/the-connecting-global-fintech-hub-review.html.

———. 2017. "A Tale of 44 Cities | Top Global Fintech Hubs Report." https://www2.deloitte.com/uk/en/pages/innovation/articles/a-tale-of-44-cities-global-fintech-hub-federation-gfhf-connecting-global-fintech-hub-report-review.html.

———. 2018. "A Journey through the FCA Regulatory Sandbox." https://www.fca.org.uk/news/speeches/uk-fintech-regulating-innovation.

Digital Serbia Initiative. 2019. "StartUp Scanner 2019." www.dsi.rs.

Edgar Dunn & Company / Digital Serbia Initiative. 2019. “The FinTech Sector in Serbia,” 2019. https://edgardunn.com/2019/12/guest-column-the-fintech-sector-in-serbia-nebo-djurdjevic-ceo-digital-serbia-initiative/.

European Securities and Markets Authority. 2018. “FinTech: Regulatory Sandboxes and Innovation Hubs.” https://ec.europa.eu/info/publications/180308-action-plan-fintech_en.

Fáykiss, Péter, Dániel Papp, Péter Sajtos, and Ágnes Tőrös. 2018a. “Regulatory Tools to Encourage FinTech Innovations: The Innovation Hub and Regulatory Sandbox in International Practice.” *Hitelintézeti Szemle* 2017 (2): 43–67. https://doi.org/10.25201/fer.17.2.4367.

———. 2018b. “Regulatory Tools to Encourage FinTech Innovations: The Innovation Hub and Regulatory Sandbox in International Practice.” *Hitelintézeti Szemle* 2017 (2): 43–67. https://doi.org/10.25201/fer.17.2.4367.

Fenwick, Mark, Wulf A. Kaal, and Erik P. M. Vermeulen. 2016. “Regulation Tomorrow: What Happens When Technology Is Faster Than the Law?” *American University Business Law Review, Vol. 6, No. 3, 2017*. Elsevier BV. https://doi.org/10.2139/ssrn.2834531.

Financial Conduct Authority | FCA. 2020. “Financial Conduct Authority | FCA.” 2020. https://www.fca.org.uk/.

Financial Conducts Authority (FCA). 2017. “Regulatory Sandbox Lessons Learned Report.” www.fca.org.uk/publication/corporate/our-mission-2017.pdf.

Fintek.pl. 2019. “KNF Wants to Support Fintechs Even More. The Office Presents a New Strategy,” 2019. https://fintek.pl/knf-chce-jeszcze-bardziej-wspierac-fintechy-urzad-prezentuje-nowa-strategie/.

———. 2020. “FinTech 2020. KNF Plans and Summary of Innovation Hub Activities,” 2020. https://fintek.pl/fintech-2020-plany-knf-i-podsumowanie-dzialalnosci-innovation-hub/.

Frost, Jon, Leonardo Gambacorta, Yi Huang, Hyun Song Shin, and Pablo Zbinden. 2019. “BigTech and the Changing Structure of Financial Intermediation.” BIS Working Papers.

Goldstein, Itay, Wei Jiang, and G. Andrew Karolyi. 2019. “To FinTech and Beyond.” *Review of Financial Studies*.

Gomber, Peter, Jascha-Alexander Koch, and Michael Siering. 2017. “Digital Finance and FinTech: Current Research and Future Research Directions.” *Journal of Business Economics*. https://ssrn.com/abstract=2928833https://ssrn.com/abstract=2928833.

Haddad, Christian, and Lars Hornuf. 2019. “The Emergence of the Global Fintech Market: Economic and Technological Determinants.” *Small Business Economics* 53 (1): 81–105. https://doi.org/10.1007/s11187-018-9991-x.

Harvard University. 2020. “FinTech | Harvard University.” 2020. https://online-learning.harvard.edu/course/fintech.

Ingle, Laurence. 2018. “Why Build a Sandbox on a Beach? An Analysis of Fintech Regulation in New Zealand.” *Victoria University of Wellington Legal Research Paper, Student/Alumni Paper No. 27/2018*. Elsevier BV. https://doi.org/10.2139/ssrn.3156088.

INSEAD. 2019. “The World’s Most Talent Competitive Countries, 2019.” 2019. https://knowledge.insead.edu/career/the-worlds-most-talent-competitive-countries-2019-10811.

Johnson, Jeby. 2020. “Regulatory Sandbox: Milestone for Financial Technological Innovation.” *Purakala with ISSN 0971-2143 Journal*.

Kleibrink, Alexander, Nikola Radovanovic, Henning Kroll, Djerdj Horvat, Djuro Kutlaca, and Lazar Zivkovic. 2018. *The Potential of ICT in Serbia: An Emerging Industry in the European Context*. Publications Office of the EU. https://doi.org/10.2760/994464.

Koker Louis, de, Morris Nicholas, and Jaffer Sue. 2020. “Regulating Financial Services in an Era of Technological Disruption.” *Law in Context. A Socio-Legal Journal*. https://papers.ssrn.com/sol3/Papers.cfm?abstract_id=3561389.

Lee, In, and Yong Jae Shin. 2018. “Fintech: Ecosystem, Business Models, Investment Decisions, and Challenges.” *Business Horizons*, 35–46. https://doi.org/10.1016/j.bushor.2017.09.003.

McKinsey & Company. 2016. “FinTechnicolor: The New Picture in Finance.”

Monetary Authority of Singapore. 2020. “FinTech Cooperation Agreements.” 2020. https://www.mas.gov.sg/development/fintech/fintech-cooperation-agreements.

Nova Ekonomija. 2020. “The Government of Serbia Adopts an AI Strategy,” 2020. https://novaekonomija.rs/vesti-iz-zemlje/prvi-u-regionu-vlada-srbije-donela-strategiju-razvoja-ve%C5%A1ta%C4%8Dke-inteligencije.

Philippon, Thomas. 2016. “The FinTech Opportunity.” http://www.nber.org/papers/w22476.

Pitić, Goran, Nebojša Savić, and Srđan Verbić. 2018. “Digital Transformation and Serbia.” *The Ekonomika Preduzeca Journal*. https://doi.org/10.5937/EKOPRE1802107P.

Radojevic, Miodrag. 2010. “Independent (Regulatory) Authorities and Institutions in Serbia.” *Serbian Political Thought*, 2010. https://www.ceeol.com/search/article-detail?id=547645.

Reuters. 2020. “Exclusive: China’s Ant Aims for $200 Billion Price Tag in Private Share Sales,” 2020. https://www.reuters.com/article/us-ant-financial-valuation-exclusive/exclusive-chinas-ant-aims-for-200-billion-price-tag-in-private-share-sales-sources-idUSKBN1ZG1C6.

Ringe, Wolf-Georg, and Christopher Ruof. 2020. “Regulating Fintech in the EU: The Case for a Guided Sandbox.” *European Journal of Risk Regulation*. https://doi.org/10.1017/err.2020.8.

Savić, Nebojša, Goran Pitić, and Jelisaveta Lazarević. 2018. “Innovation-Driven Economy and Serbia.” *The Ekonomika Preduzeca Journal*. https://doi.org/10.5937/EKOPRE1802139S.

Schueffel, Patrick. 2017. “Taming the Beast: A Scientific Definition of Fintech.” *Journal of Innovation Management*. https://journalsojs3.fe.up.pt/index.php/jim/article/view/2183-0606_004.004_0004/262.

Startup Genome. 2020. “Startup Genome Glossary.” 2020. https://startupgenome.com/glossary.

Startup Heatmap Europe. 2020. “Homepage - Startup Heatmap Europe.” 2020. https://www.startupheatmap.eu/.

Statista. 2020. “FinTech - Serbia | Statista Market Forecast.” 2020. https://www.statista.com/outlook/295/150/fintech/serbia.

Stern, Caroline. 2017. “Fintechs and Their Emergence in Banking Services in CESEE.” *Focus on European Economic Integration - The Oesterreichische Nationalbank*, no. Q3/17: 42–58.

The Economist. 2020. “Return of the Geeks - An Unexpected Tech Boom in Serbia.” 2020. https://www.economist.com/europe/2020/02/27/an-unexpected-tech-boom-in-serbia.

The European Commission. 2020. “Chapters of the Acquis/ Negotiating Chapters | European Neighbourhood Policy And Enlargement Negotiations.” 2020. https://ec.europa.eu/neighbourhood-enlargement/policy/glossary/terms/chapters_en.

The Government of the Republic of Serbia. 2019. “Serbia-Emerging Tech Development Hub.”

The Hungarian National Bank (MNB). 2018a. “MNB to Launch a Regulatory Sandbox - Press Release.” 2018. https://www.mnb.hu/en/innovation-hub/news/the-mnb-promotes-the-innovations-of-the-financial-sector-by-a-regulatory-sandbox-among-the-first-countries-in-the-region.

———. 2018b. “New Central Bank Platform to Encourage FinTech Developments - Press Release.” 2018. https://www.mnb.hu/en/innovation-hub/news/new-central-bank-platform-to-encourage-fintech-developments.

———. 2019. “The MNB Published Its FinTech Strategy.” 2019. https://www.mnb.hu/en/innovation-hub/news/the-mnb-published-its-fintech-strategy.

———. 2020. “MNB Regulatory Sandbox - Presentation.” 2020. https://www.mnb.hu/en/innovation-hub/regulatory-sandbox.

The International Monetary Fund / The World Bank. 2019. “Global Fintech Survey, 2019.”

The National Bank of Serbia. 2019. “The National Strategy For Low-Ticket Size Payments - Press Release.” 2019. https://www.nbs.rs/internet/latinica/scripts/showContent.html?id=15127&konverzija=yes.

The National Bank of Serbia (NBS). 2015. “Law on Payment Services Comes Into Force - Press Release.” 2015. https://www.nbs.rs/internet/latinica/58/index.html.

———. 2018a. *Law on Payment Services*.

———. 2018b. “The Launch of the Regulatory Sandbox - Press Release.” 2018. https://www.nbs.rs/internet/latinica/scripts/showContent.html?id=12542&konverzija=no.

———. 2019a. “Start-up Registry - Press Release.” 2019. https://www.nbs.rs/internet/latinica/scripts/showContent.html?id=14892&konverzija=yes.

———. 2019b. “The National Strategy For Low-Ticket Size Payments - Press Release.” 2019. https://www.nbs.rs/internet/latinica/scripts/showContent.html?id=15127&konverzija=yes.

The Polish Financial Supervision Authority (KNF). 2017. “Report on the Activities of the Special Task Force for Financial Innovation (FinTech) in Poland.”

———. 2019. “KNF To Launch The Virtual Sandbox PSD2 in 2020 - Press Release.” 2019. https://fintek.pl/knf-uruchomi-piaskownice-regulacyjna-w-2020-roku/.

———. 2020a. “KNF Innovation Hub - Presentation.” 2020. https://www.knf.gov.pl/en/MARKET/Fintech/Innovation_Hub.

———. 2020b. “KNF Regulatory Sandbox - Presentation.” 2020. https://www.knf.gov.pl/en/MARKET/Fintech/Regulatory_Sandbox.

The World Bank. 2020a. “Doing Business 2009 - 2019.”

———. 2020b. “Fintech in Europe and Central Asia: Maximizing Benefits and Managing Risks.”

Thomson Foundation. 2018. “Digital Economy and Media Report.”

Tomas Helm, Alex Low, and Joshua Townson. 2019. “UK FinTech - State of the Nation.”

Tracxn. 2020. “FinTech Startups in London.” 2020. https://tracxn.com/explore/FinTech-Startups-in-London.

University of Pennsylvania. 2020. “Fintech Specialization - Wharton.” 2020. https://online.wharton.upenn.edu/fintech-specialization/.

Wechsler, Michael, Leon Perlman, and Nora Gurung. 2018. “The State of Regulatory Sandboxes in Developing Countries.” *The DFS Observatory At Columbia University*. Elsevier BV. https://doi.org/10.2139/ssrn.3285938.

WIRED. 2019. “Every Tech Company Wants to Be a Bank—Someday, At Least,” 2019. https://www.wired.com/story/tech-companies-banks/.

Zetzsche, Dirk A., Ross P. Buckley, Douglas W. Arner, and Janos Nathan Barberis. 2017. “Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation.” *23 Fordham Journal of Corporate and Financial Law 31-103 (2017)*, September. https://doi.org/10.2139/ssrn.3018534.