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A PRELIMINARY OVERVIEW OF REGTECH

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Abstract

As it happened most of the times in the history of modern financial regulation, the observation, by the regulators, of normative inefficiencies, anomalous trends and attempts of laws' circumventions, is leading to the continuous introduction of new regulations. The financial crisis started in 2007 caused an aggressive norms' proliferation, giving birth to the imperative necessity of a more stringent control. Companies operating in the different industries of the European and global economies had to deal with unprecedented bureaucratic provisions, increasingly relevant compliance costs, and process inefficiencies.

Meanwhile, thanks to the technology advancement, the latent demand coming from those companies that more than the others suffer for regulations, led to the creation of a new market, able to design solutions that aim at relieving the bureaucratic burden and making more efficient compliance and risk management processes. The bundle of these solutions forms RegTech.

This Work proposes to be a kind of "Encyclopedia" of the phenomenon, created by gathering every data and information coming from the sources at disposal on a topic that still finds it difficult to receive an objective and shared characterization. In particular, by exploiting the information available on the Net, meetings with actors operating in the sector, and inferential reflections, it will be presented a measure of the attention towards RegTech, through the analysis of investments, web-searches, and the most significant definitions of the phenomenon.

Subsequently, it follows a real hemisphere of companies operating in the sector, categorizing funding rounds, business, services offered, customers and network. Then, it is conducted an analysis of the investments in RegTech from the most important companies at a global level. All the possible sources of information and qualitative and quantitative analyses are showed to assess the current state and categorization of the phenomenon, together with its main characteristics and drivers.

Later, it will be proposed a future perspective for RegTech, and which tools could be used for an optimal development of the sector; among these tools there are *Regulatory*

Sandboxes, which are recognized as the most relevant future prospect in the short-term, according to the main experts in the matter of this Thesis.

In conclusion, it has been carried out an in-depth study on RegTech in Italy, wondering who are the existing players, the state of progress in the industry life cycle, and which could be the paths for a future dissemination.

Further elements, in the end, are two interviews conducted by us with two companies operating in the sector: the American start-up *IdentityMind Global* and the consolidated *Italian reality InfoCert*. Those interviews provide further insights on many of the topics of this Dissertation and offer a trustworthy look to the future of RegTech.

Abstract – Italian version

Come nella maggior parte dei casi è accaduto nella moderna regolamentazione finanziaria, l'osservazione, da parte dei regolatori, di inefficienze normative, di trend anomali e di tentativi di aggiramento delle molteplici disposizioni legislative, ha portato l'introduzione di nuove regolamentazioni. La crisi finanziaria iniziata nel 2007 ne ha poi causato una proliferazione più aggressiva, facendo nascere l'improrogabile necessità di un controllo più stringente e vincolante. Le aziende operanti nei vari settori delle economie Europee e mondiali si sono quindi trovate a dover affrontare oneri burocratici senza precedenti, costi di conformità sempre più rilevanti e inefficienze nei processi delle unità responsabili su questi temi.

Con il passare del tempo, grazie soprattutto all'avanzamento della tecnologia, la domanda latente da parte delle aziende più appesantite dal fardello regolativo ha portato alla creazione di un nuovo mercato, capace di ideare soluzioni in grado di alleggerire il carico burocratico e di rendere efficienti i processi di conformità normativa e di gestione del rischio operativo. L'insieme di queste soluzioni costituisce il fenomeno noto come RegTech.

Il presente elaborato si propone quindi di essere una sorta di "enciclopedia" del fenomeno, frutto di tutte le fonti ad oggi disponibili su un tema che fatica ancora a trovare una caratterizzazione condivisa ed oggettiva. Sfruttando quindi le informazioni disponibili in rete, gli incontri con attori operanti nel settore e alcune riflessioni inferenziali, si è individuata una misura dell'attenzione nei confronti del RegTech, analizzando investimenti nel settore e ricerche online, nonché le più significative definizioni del fenomeno.

Si è poi composto un vero e proprio emisfero di società operanti nel settore, categorizzandone finanziamenti, business, tipologie di servizi, clienti e network, per poi inoltrarsi in un'analisi degli investimenti RegTech delle più grandi società a livello mondiale; tutto questo per delineare lo stato attuale del fenomeno.

Successivamente si è proposta una prospettiva futura per il RegTech, e di quali strumenti saranno necessari per uno sviluppo ottimale del settore; tra questi, le *Regulatory Sandboxes*.

In conclusione si è operato un approfondimento sul RegTech in Italia domandandosi chi siano i player esistenti, lo stato di avanzamento nel consolidamento del fenomeno, e quali possono essere le strade per la diffusione futura.

Ulteriore elemento di arricchimento, infine, sono due interviste da noi condotte con società operanti nel settore: la start-up americana *IdentityMind Global* e la consolidata realtà italiana *InfoCert*.

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Introduction

The aim of this Thesis is to better outline and frame the key elements and concepts that gravitate around the word “RegTech”.

The information and data on which this Work is based were obtained by conducting researches and analyses, gathering insights and testimonies, following the evolution of start-ups, attending events and fairs, and surfing RegTech companies’ websites.

Before presenting the main parts of this Dissertation, it could be useful to start by answering to two questions, in order to provide a satisfying initial and contextual overview about the phenomenon subject of this analysis.

Why RegTech? Post-crisis financial regulations have dramatically increased challenges and costs for the financial sector related to compliance, reporting and supervisory requests. More stringent requirements within increasingly dense data landscapes and the rapidly evolving FinTech sector have led firms, technology providers and regulators to focus on new technologies to meet regulatory challenges. Especially over the past couple of years, we’ve seen RegTech arise as an entity in its own right. It’s a welcome development since financial regulation has been increasing in complexity since 2008, and so has the compliance challenge.

Moreover Digital era has come, and RegTech, in its broadest sense, fosters Digital solutions. Digital Identity Providers (as part of the RegTech movement) are, besides their business mean, cultural promoters of the Digital Revolution.

What is RegTech? We define RegTech broadly to include any technology and/or software created to address regulatory challenges and help companies understand regulatory requirements and stay compliant. RegTech companies help customers meet compliance standards, ensure risk management protocols are in place, and put in place controls that mitigate risk in a proactive way. This technology ranges from complementing existing compliance, audit, and risk workflows to replacing and wholly automating them through leveraging cutting-edge technologies like artificial intelligence, machine learning, and the blockchain.

The very first part of the Thesis is conceived to help becoming familiar with the term “RegTech”. After gathering 29 significant definitions from trustworthy sources, these are analysed to recognize the main keywords. The latter are then used to cluster the 29 definitions in different categories, which together fairly represent all the possible perspectives of the phenomenon. Then, from a qualitative analysis it is presented a quantitative one, centred on the results of researches of the word “RegTech” on the Net and on the disclosed investments in RegTech companies by various categories of players in the financial sector.

Once defined the concept of RegTech, the better profiling of the phenomenon allowed to gather those companies that could be associated to the new movement with a total or very high degree of certainty. Subsequently, a Database of companies was created and analysed in Chapter 2, allowing different considerations about the geography of the phenomenon (e.g. “Which is the central Hub at a worldwide level?”), the different kinds of business, investments and customers.

A consistent part of the Thesis is then dedicated to the level of interaction between RegTech companies and financial / non-financial counterparties, defining networks of players. As a result, the Network part is matched with investments in RegTech (i.e. companies and more in general solutions) by the most representative companies in the financial, technological and consultancy sectors. These initiatives are mapped by dividing them according to the actors involved (i.e. financial institutions, financial service providers, tech companies and consultancy firms).

Almost every project of the most relevant realities among the four aforementioned sectors is reported and analysed accordingly.

Then follows the study of the most important (using the amount of funding received as main criteria for the level of importance) RegTech companies identified during the various researches. In particular, their network is explored in detail in order to define how much weight the presented relationships have for start-ups to receive funds.

With the latter analyses, the study and description of the RegTech ecosystem is concluded. Thus, the Thesis enters in its Discussion phase where the main topics treated refer to the future prospects of the phenomenon and its situation in Italy.

First of all, starting from what was remarked in many documents, articles, and papers on RegTech, Regulatory Sandboxes were recognized as the main engine of growth for the RegTech industry, in order to let it reach its 3.0 phase of development.

As a result, the functioning of Sandboxes is exhaustively discussed, making reference to the models of the main pioneers in the field (i.e. national regulators and authorities), the main steps of the admission process, and the most relevant characteristics. In particular, The Financial Conduct Authority (UK) is taken as best practice for the whole Chapter 3, both because it is the mother of the Regulatory Sandboxes framework and because it is based in the country that is mostly advanced at the moment in the field of RegTech: the United Kingdom.

These considerations and analyses serve as the main base for the Theory of the Competitive and Collaborative RegTech Sandboxes Industry (or TCCRSI) that is presented in the following part of the discussion on Sandboxes. The Theory is presented in its assumptions, hypotheses, sources of information, characteristics, drawbacks, challenges, implications, and roles and stakeholders. The so-called TCCRSI is enriched with comparisons with the Open Innovation Paradigm and the Global Sandbox Project launched by the FCA that allow to highlight further aspects and peculiarities of the Theory.

The second half of the Discussion of this Thesis is characterized by a deep analysis of RegTech situation in Italy, where the phenomenon is almost latent at the moment. The introduction to this topic is characterized by an overview of the compliance issue at the national level, presenting some useful researches that help to outline the attitude of Italian players on the matter, as well as the interest in exploring future-oriented solution. Contemporarily, a general idea of the perception that the country has towards the phenomenon is provided, based on some contributions by expert individuals and companies in the sector.

Starting from this introduction, the discussion orients specifically to study RegTech in Italy, exploiting all the available information that was possible to retrieve. This leads to the presentation of the main Italian RegTech realities, for then assuming a long-term perspective to imagine how RegTech, considering the actual stage of this industry life cycle in Italy, could further diffuse and proliferate in the future. Thus, three steps fundamental for its structuring as an established industry are hypothesized,

analysed, and enriched presenting some means and tools that could be used to further advance: commitment by regulators (with the contributions from Consob and Bank of Italy), Sandboxes (with reference to the first half of the Discussion), TechSprints (taking again the FCA as best practice), and the National Plan “Industria 4.0”. Finally, the main conclusions and some potential challenges for the future are presented, on the basis of all the information gathered, also from the personal meetings and interviews had in the last months.

The last Chapter of this Thesis simply reports the interviews that we had with two extremely important reality in the sector: InfoCert (i.e. the most profitable Italian RegTech company) and IdentityMind Global (i.e. a US RegTech company ranked in the Top 10 worldwide for its profits in 2017). The main similarities and differences between the answers of the representatives of these two companies to the same set of questions are analysed before carrying out a comparison between the main insights coming from the two interviews and the main insights emerged throughout the Thesis in relation to many of the topics that were covered.

In conclusion, our Dissertation ends adopting again a future perspective and making some final considerations deriving from the main ideas emerged from the various Chapters and merging them with some very interesting concepts provided by the companies that were interviewed indeed on the future of RegTech.

Chapter 1

RegTech, a new industry

1.1. Definitions

When using words such as “RegTech” and “FinTech”, we are usually referring to a universe of technological innovations, applications, tools, and frameworks, which try to leverage technologies to innovate and disrupt the regulatory and financial sector.

Our definition:

“RegTech was born as the combination of the two words ‘Regulation’ and ‘Technology’. Detaching itself from the FinTech hemisphere, RegTech exploits some of the latest technological innovations to create and deliver advanced solutions that serve the purposes of reducing compliance costs, increasing the efficiency of compliance processes, mitigating operational risk, and supporting companies’ risk management functions.”

The two terms by themselves refer to two different worlds that are partially overlapped, being RegTech born as a sub-set of Fintech.

RegTech taps into FinTech’s principles and applies them at the compliance level, creating solutions for all the actors involved in the regulatory system: regulators, financial institutions, supervision authorities, start-ups, and so on. Although in the common culture these two words are often used as synonyms, in reality they have different applications and characteristics.

Many institutions, researchers and scholars, have exerted a huge effort in the last years, trying to give a definition of RegTech that fits and is approved unanimously. Many definitions were given, and each of them is similar to the others for some aspects (RegTech is a brand-new phenomenon, so many actors basically use similar applications with similar benefits), but also different for other aspects (depending on the specific actor’s interpretation, interest in the subject, industry, and occupation). All these definitions provide us commonplaces that can be seen as essential elements of an overall RegTech’s definition (like efficiency, compliance, innovation, cost-reduction, regulators, etc.); in fact, definitions provide us different interpretations of the phenomenon, from which some spots of truth emerge.

As a result of the complexity and only partial convergence among the various definitions, we have decided to report a mixed-list of definitions (trying to embed a wide range of perspectives and expertise), in order to account for all the peculiarities of the different views of RegTech.

The list includes definitions by: global associations (e.g. Institute of International Finance), specialized websites, free lancers, regulators (e.g. FCA), scholars (e.g. Arner, Buckley, Barberis), financial institutions, specialized researchers (e.g. CB Insights), specialized associations (e.g. Toronto Centre or IRTA), journalists from newspapers, and even non-related companies (e.g. Deloitte).

Using web browsers such as Google, websites' news databases such as regtechfs.com, digital platforms such as App Store, and scientific papers found on the Net, we succeed in retrieving all the most significant and comprehensive definitions. We have identified 29 of them, having ruled out all the ones that simply report the definition given by other actors that are already present in the list.

N	Definition	Source
1	<p>“Post-crisis financial regulations have dramatically increased challenges and costs for the financial sector related to compliance, reporting and supervisory requests. Traditional compliance solutions haven’t kept pace with a fast-changing regulatory environment; new innovative technologies—“RegTech”—is needed to solve regulatory and compliance burdens more effectively and efficiently. This “RegTech” stands out from other software solutions by linking advanced models and algorithms, machine learning and advanced analytics, and real-time capabilities. While the financial services industry has seen an explosion in activity around FinTech generally, the RegTech market has not kept pace with the demand. To contribute to overcoming hurdles in the RegTech market, the IIF is launching a work stream to spur innovation around RegTech solutions”.</p>	(Institute of International Finance, 2015)
2	<p>“RegTech refers to a set of companies and solutions that address regulatory challenges across industries, including financial services, through innovative technology. RegTech solutions are agile by nature due to the complexity and momentum of regulatory transitions. Traditionally, the technology was developed to be robust. However, RegTech can’t afford the luxury to deliver a solution for static requirements—it has to be a self-learning machine”.</p>	(Medici, 2016)
3	<p>“The idea behind RegTech is a simple one. In fact, Regulatory Technology sounds so obvious that it should already exist. In part, it does. But the recent shifts caused by FinTech have helped push it</p>	(Augur H. , 2016)

	<p>to the forefront. Since late 2015, Google searches for “RegTech” have skyrocketed, and it should come as no surprise. In a world where new disruptive technologies are almost the norm, regulatory measures need to be easy to grasp and to implement. FinTech is not the only reason for the shift, but it is a big reason. The financial services market is being upset around the globe. Start-ups are undermining, and also partnering with, big banks. Cryptocurrency has amassed a huge, evangelical following as well as skeptical detractors. The speed with which the market is changing is monumental, and regulations are beginning to catch up”.</p>	
4	<p>More stringent requirements within increasingly dense data landscapes and the rapidly evolving FinTech sector have led firms, technology providers and regulators to focus on new technologies to meet regulatory challenges. The objective is to drive down costs, yield efficiencies and disrupt the norm of conventional regulatory compliance. RegTech is at the centre of this movement. The FCA describes RegTech as the adoption of new technologies to facilitate the delivery of regulatory requirements. Both the FCA and Prudential Regulations Authority (PRA) emphasise the importance of using ‘tools and systems’ to identify, establish and monitor mandatory controls that should be inherent in the future. In its 2016–17 Business Plan, the FCA stated that RegTech will be crucial to enable more efficient and effective regulation and compliance.</p>	(Ernst & Young, 2016)
5	<p>RegTech refers to technological solutions that streamline and improve regulatory processes. Like FinTech, RegTech has unfolded in three stages. The first stage, RegTech 1.0, was led by large financial institutions that integrated technology into their internal processes to combat rising compliance costs and complexity, as epitomized in the Basel II Capital Accord. The second stage, RegTech 2.0, has been driven by new post-GFC regulatory requirements and the costs to the financial industry of their implementation. At the same time, regulators are seeking to mirror the increasingly digitized nature of the markets they monitor and to enhance their capacity to analyse the rising volumes of data generated by post-GFC reporting obligations. In the future, RegTech will exhibit its greatest potential in the third stage of its development, RegTech 3.0, in which technology will help us reconceptualise finance and its regulation: to build a better financial system. Ultimately, we argue that the increasingly data-centric nature of both FinTech and RegTech has the potential to prompt a shift from KYC paradigm to KYD mind-set.</p>	(FinTech and RegTech in a Nutshell, and the Future in a Sandbox, 2017)
6	<p>"Regtech solutions also allow banks to boost their responsiveness to regulatory changes, because they are, in theory, designed to adapt dynamically to new requirements in an almost immediate manner".</p> <p>"The term RegTech refers to a set of companies and solutions that marry innovative technology and regulation to address regulatory requirements across industries, including financial services.</p>	(BBVA, 2016)

	<p>RegTech companies focus on the automation of manual processes and the links between steps in analytical/reporting processes, the improvement of data quality, the creation of a holistic view of data, the automated analysis of data with applications that are able to learn during the process, and the generation of meaningful reports that can be sent to regulators and used internally to improve key business decision making."</p> <p>"Regtech solutions also allow banks to boost their responsiveness to regulatory changes, because they are, in theory, designed to adapt dynamically to new requirements in an almost immediate manner".</p>	
7	<p>"We define regtech broadly to include any technology and/or software created to address regulatory challenges and help companies understand regulatory requirements and stay compliant. Companies in this space help customers meet compliance standards, ensure risk management protocols are in place, and put in place controls that actively mitigate risk. This technology ranges from complementing existing compliance, audit, and risk workflows to replacing and wholly automating them through leveraging cutting-edge technologies like artificial intelligence, machine learning, and the blockchain".</p>	(CB Insights, 2017)
8	<p>"I wanted to turn the focus onto the emergence of RegTech—technologies that address the challenge and cost of regulatory compliance. Over the past couple of years, we've seen RegTech arise as an entity in its own right. It's a welcome development: financial regulation's been increasing in complexity since 2008...and so has the compliance challenge. RegTech has two aims: increasing the effectiveness and the efficiency of compliance. Both are critical. RegTech solutions can be introduced at different points of compliance. They can be used to anticipate potential issues, e.g. real-time tracking of risk issues, to detect and deter non-compliant conduct, and to retroactively investigate/create audit trails. They can also be applied across different areas of the business".</p>	(Graham, 2017)
9	<p>In much the same way technology is changing the financial industry, it is also changing how the industry and financial authorities implement and enforce regulations. Regulatory Technology (RegTech), defined as a sub-set of FinTech, has been growing strongly in the last couple of years and has attracted numerous start-ups as well as giants like IBM and global consultancy firms. RegTech holds to overhaul not only regulatory compliance and risk management by regulated financial institutions, but also the nature of regulation and supervision. RegTech focuses on technology-based solutions to attenuate or solve regulatory and supervisory challenges, including the challenges posed by the expansion of FinTech. It leverages digital data and computer networks to substitute old-style processes, organizational and IT structures, analytical tools and improve the decision-making process. The technologies used in RegTech are the same ones used in broader FinTech. A combination of technologies and innovative processes are deployed to modernize data gathering and data analytics, with the purpose to generate more refined and/or timely intelligence to feed the regulatory compliance and risk management functions at financial</p>	(Toronto Centre, 2017)

	institutions, or to benefit the regulatory and supervisory processes at financial and supervisory authorities.	
10	The RegTech definition in the UK Chief Scientific Advisor's 2015 report, is "Technology that encompasses any technological innovation that can be applied to, or used in, regulation, typically to improve efficiency and transparency". Essentially, RegTech provides a means for overburdened firms to provide regulators with the data they require in a way that is better, faster, cheaper and safer for all.	(Simpson, 2017)
11	"RegTech (regulatory technology) is a class of software applications for managing regulatory compliance. Companies invest in RegTech as a way to save time and money, allowing resources that were once devoted to regulatory compliance to be diverted elsewhere, once RegTech takes over those functionalities".	(Rouse, 2016)
12	The term 'regtech' was coined in 2015 by the Financial Conduct Authority, which described it as "a sub-set of FinTech that focuses on technologies that may facilitate the delivery of regulatory requirements more efficiently and effectively than existing capabilities". Now, regtech takes on a variety of meanings depending on the person defining it. Generally, the portmanteau refers to any company developing agile technology that can help financial companies to better comply with regulations.	(Beall, 2017)
13	Bob Garrison, CIO at the Depository Trust and Clearing Corporation (DTCC) "If you define regtech as technology companies that provide services to financial market participants to assist in regulatory compliance, then it is not a new concept and one that has been operating for many years. However, regtech is undergoing a revival, spurred by new regulations and increased pressure to reduce costs, requiring greater collaboration between technology vendors and financial market participants."	(FinTech Futures, 2017)
14	"RegTech is an amalgamation of "regulatory" and "technology". RegTech companies use new technologies to support efficient regulatory management from an IT perspective within the entire (IT) banking architecture. RegTech services enable the agility and speed that is required for implementing the flood of regulations in an efficient way and use standardized approaches to address the specifics of different data sets. In doing so, RegTech companies make use of innovative technologies such as big data and data visualization techniques, cloud based services, block chain technologies, as well as artificial intelligence elements".	(Bankinghub, 2016)
15	"I define RegTech solutions as being those that either solves challenges associated with a particular highly regulated activity, or those that improve the management and implementation of compliance within businesses. In its broadest sense, the term covers everything from identity management and reconciliations software through to advice process management and risk and control framework software. Importantly, understanding what the regulator requires is at the heart of all these areas".	(Jones, 2017)

16	<p>“The increased complexity brought in the marketplace by Fin-Tech as well as the wave of scandals involving global financial markets over the past twenty years urged regulators to equip themselves with a set of novel and more effective regulatory tools. Moreover, a change within the composition of the market players’ class (Fin-Tech is bringing the dis-intermediation of financial transactions, allowing any company or individual to act as a lender, e.g. peer to peer lending) required the adoption of a generalized, rather than financial institution specific, compliance system. In addition, remarkable advancements achieved by the tech industry (cloud, big data analysis) enticed regulators to embrace new technologies and make them spouse their cause. The combination of the above mentioned factors has recently determined the rise of a new phenomenon: Reg-Tech, new technologies deployed as regulatory enforcement means”.</p>	(Panza, 2017)
17	<p>While regulation is trying to prevent the next financial crisis, it has no implementation guide. As such, RegTech will be needed to give effect to the regulation.</p> <p>“RegTech should really be around new tech. Fundamentally, new tech is bringing better practices and transparency to enterprise software in the financial industry. RegTech should be thought of as an ‘end to reality’ with which there is the opportunity to make the front to back office conversation much smoother. With better technology tools, the front and back office will be able to ‘speak the same language’”.</p>	(Paredes, 2017)
18	<p>“RegTech signifies de-complexing and de-risking our current risk and regulatory environment, to bring in or adapt to a new, alternative and more open ways of demonstrating residual regulatory compliance, more so by risk themes than by regulations, thereby helping to reducing cost and complexities, improving effectiveness of the Financial Services, and most crucially, achieving trust of its’ consumers”.</p>	(Roy, 2017)
19	<p>“Unlike the UK’s Financial Conduct Authority (‘FCA’), we argue that RegTech cannot be simplified as a category of FinTech. According to the FCA: ‘RegTech is a sub-set of FinTech that focuses on technologies that may facilitate the delivery of regulatory requirements more efficiently and effectively than existing capabilities.’ This is a pragmatic assessment of where RegTech is today, but is made from an overly narrow perspective.</p> <p>In our view, this definition lacks vision as to the true potential of RegTech. In other words, RegTech represents more than just an efficiency tool and rather is a pivotal change leading to a paradigm shift in regulation. Viewed holistically, RegTech represents the next logical evolution of financial services regulation and should develop into a foundational base underpinning the entire financial services sector.</p> <p>In the near future, the application of technology to monitoring and compliance offers massive cost savings to established financial companies and potentially massive opportunities to emerging</p>	(Arner, Barberis, & Ross, FinTech, RegTech and the reconceptualization of financial regulation, 2016)

	<p>FinTech start-ups, IT and advisory firms. From a regulator’s perspective, RegTech enables the prospect of continuous monitoring that would improve efficiency by both liberating excess regulatory capital, and decreasing the time it takes to investigate a firm following a compliance breach. RegTech however offers more: the potential of continuous monitoring capacity, providing close to real-time insights, through deep learning and artificial intelligence filters, into the functioning of the markets nationally and globally, looking forward to identify problems in advance rather than simply taking enforcement action after the fact”.</p>	
20	<p>“Like FinTech, PayTech, and many other combinations of XXXTech, RegTech is another example of an industry that is being changed rapidly by software. There has been technology used at various levels in the Regulatory space for over 20 years. However, what the new RegTech label recognises is that the gap between software and non-software enabled services has widened significantly”.</p>	(Deloitte, 2015)
21	<p>At a governmental level, the FCA was the first governmental body to establish and promote the term RegTech, defining this as: "RegTech is a sub-set of FinTech that focuses on technologies that may facilitate the delivery of regulatory requirements more efficiently and effectively than existing capabilities".</p>	(FCA, 2015)
22	<p>“I would define it as technological advancement that assists those focused on compliance and regulatory-related activities in their professions, so making it easier, swifter, more complete, more efficient to monitor compliance and regulatory obligations.”</p>	(Larsen, 2016)
23	<p>“RegTech is a subgroup of FinTech, described as technology that is providing solutions to companies across all sectors of financial activity to ensure that they are able to comply with regulatory requirements.”</p>	(Larsen, 2017)
24	<p>“RegTech is one of the very few answers to the risks and challenges existing in the financial industry, and has a crucial role in our technology-driven era. RegTech also certainly accelerates the evolution towards a cooperative supervisory model, in which the supervisor guides financial institutions in their search for satisfactory compliance and in which financial companies in turn deliver necessary input for the development of efficient guidelines, best practices and RegTech solutions.”</p>	(Chicago-Kent Law Review, 2017)
25	<p>Regtech a blend word for regulatory technology is a new FinTech area emerged to enhance the regulatory and compliance processes for the financial services industry with the use of innovative technology.</p>	(VIAINVEST, 2017)
26	<p>According to John Humphries, the CEO of RegTech company, Risk Priorities, “some have defined RegTech as a tool to improve efficiency and effectiveness, [while] others describe RegTech as a phenomenon, a global paradigm shift and a strategic opportunity that will help companies successfully execute their business models in the context of a safe and sound global financial system.”</p>	(prooV Team, 2017)

27	<p>In essence, it is technology used to provide regulatory solutions, but it can be used to describe any technology that covers even a single element of a multitude of regulations. If you look at automobile production, for example, you might say that a manufacturer of ball bearings is stretching the truth a little to claim that it is part of the ‘motoring industry’, yet in the RegTech world, everybody wants to wear the badge – with or without credibility. Regulatory reporting and compliance are two of the most popular areas where firms are looking to utilise technology to ease the regulatory burden. By using technology to digitalise the whole process, regulatory reports can be managed on an exception basis, and be produced in a timely and efficient manner. The truth is that automated processes should produce more accurate results in a shorter timeframe, and this can only be to the benefit of all stakeholders – from regulators through to consumers.</p>	(Young, 2017)
28	<p>ASIC has defined regtech as “the use of new technologies to solve regulatory and compliance requirements more effectively and efficiently. These technologies could include use of artificial intelligence, natural language processing, data reporting, regulatory codification and big data analysis technologies.”</p>	(Ariel & Associates, 2017)
29	<p>Regtech encompasses many different solutions, but in essence transforms legacy systems to provide agility, speed, integration, and intelligent analytics. Regtech solutions such as online identity verification, opens up a global gateway into billions of identities and data sources to allow financial institutions to perform frictionless, on-demand instant ID Verification to comply with AML and KYC identity verification needs. Financial institutions can leverage technologies with vital features and functionalities needed to effectively evaluate new and existing users for risks against financial crimes related to money laundering, terrorism, arms proliferation or Politically Exposed Persons (PEPs).</p>	(Ufford, 2016)

Table 1.1: List of RegTech definitions

Sources: reported in the table

Considering that, in the end, the objective of listing such definitions is the one of finding common grounds (key words or concepts) that could help us to frame the RegTech phenomenon, we wanted to challenge ourselves by identifying a large number of definitions coming from totally different actors, to provide statistical relevance to the sample. With many definitions is more difficult to find concepts that are common to all of them, but there is the advantage of mapping all the possible characteristics and traits of RegTech. This will help us for the continuation of the Thesis.

Traditional compliance solutions haven't kept pace with a fast-changing regulatory environment; new innovative technologies—"RegTech"—is needed to solve regulatory and compliance burdens more effectively and efficiently. This "RegTech" stands out from other software solutions by linking models and algorithms, machine learning and advanced analytics, and real-time capabilities. While the financial services industry has seen an explosion in activity around FinTech generally, the RegTech market has not kept pace with the demand. To contribute to overcoming hurdles in the RegTech market, the IIF is launching a work stream to spur innovation around RegTech solutions.

1.1.1 Pillars of definitions and views

After having skimmed all the previously identified definitions about RegTech we agreed to point out 10 key factors that could be considered as representative Pillars of this new phenomenon that is spreading out in the finance field.

The criterion we used to outline the below Pillars is their widespread presence in the definitions as descriptive terms of the RegTech hemisphere.

Starting from those Pillars we decided to proceed by grouping them into four different views: Operational, Strategic, Technological, and External.

This was done by simply looking at the Pillars and figuring out to what kind of view/dimension they were related to, since RegTech is a phenomenon that can be analysed and discuss from an operational, strategic, technological and external/environmental point of views.

Of course, some Pillars are common to more than one definition and also to more than one category/view; as a result, we tried to distribute in the most homogeneous way all the Pillars among the different categories of definitions in order to end up with groups having more or less the same number of Pillars, referring to a similar number of definitions.

Term (Pillar)	Appearance in the definitions¹	View	Why that view?
Compliance	14	External	Compliance issues come from external regulatory directives.
Efficiency (and Effectiveness)	13	Strategic	Efficiency is the core objective of RegTech companies' strategy.
Monitoring and Control / Supervision	9	Operational	The monitoring and control practice is related to Operational risk.
Technological Innovation	9	Technological	Semantic.
Solutions	11	Strategic	Given the proliferation of RegTech start-ups, the quality of the solution determines the competitive position of the company.
Data Gathering and Analysis	9	Technological	They are carried out by using advanced technologies.
Processes	7	Operational	Inefficient processes bring to high operational risk.
Business Strategy	6	Strategic	Semantic.
Costs	7	Operational	RegTech solutions aim at reducing operational costs.
Challenges	9	External	Challenges due to exogenous factors.

Table 1.2: RegTech's definitions elaboration

Source: Own elaboration

External View

This view comprises the following definitions (according to the numbers assigned in Table 1.1): 1, 4, 7, 16, 18, 20, 24, and 29.

This view aims at grouping together all the definitions that present RegTech as a phenomenon that is raised due to external factors like challenges related to compliance, the increasingly dense data landscape, the need to know customers deeply, the rapidly evolving Fintech sector, and the fast-changing regulatory environment that often makes it difficult for companies to understand regulatory requirements properly.

¹ Number of definitions in which the Pillar (e.g. "Compliance", "Efficiency", "Monitoring and Control / Supervision") appears (among the 29 identified in Table 1.1)

Other external factors that pushed towards the adoption of RegTech solutions are the increased complexity brought in the marketplace by Fintech, the wave of scandals involving global financial markets, changes brought by new software, and the change within the composition of market players' class. So RegTech was born to de-complex and de-risk the challenges related to the new regulatory environment and the adoption by financial institutions.

Operational View

This view comprises the following definitions (according to the numbers assigned in Table 1.1): 5, 6, 8, 9, 15, 17, and 25.

This view aims at grouping together all the definitions that present RegTech as a phenomenon that is raised due to the desire to improve and automate internal processes (like regulatory processes, compliance processes, supervisory processes, decision-making processes, risk & control software, back-office processes, manual processes, reporting processes, and data analysis processes), reduce costs (like regulation costs, compliance costs, implementation costs, and monitoring costs) and improve the effectiveness of control/monitoring functions (as a result of the process improvement and cost reduction in these fields as reported in the two previous parentheses).

Strategic View

This view comprises the following definitions (according to the numbers assigned in Table 1.1): 2, 10, 11, 12, 21, 23, 26, and 28.

This view aims at grouping together all the definitions that present RegTech as a set of new solutions and a strategic opportunity that allows to reach compliance goals and that is raised due to the need to change the business strategy (i.e. business model and business plan) to align and respond to the external factors and challenges presented in the External view.

In particular, RegTech implies reorienting the business model towards new strategic objectives such as efficiency and effectiveness, transparency, time and money

reduction, with the aim of helping companies to successfully execute their business models in the context of a safe and sound global financial system.

Technological (Disruptive View)

This view comprises the following definitions (according to the numbers assigned in Table 1.1): 3, 13, 14, 19, 22, and 27.

It aims at grouping together all the definitions that present RegTech as a disruptive technological innovation and a pivotal change leading to a paradigm shift in regulation through the exploitation of the new digital technologies such as big data and data visualization techniques, block chain technologies and artificial intelligence elements.

This view covers transversally all the previous ones since the fact of considering RegTech as a disruptive technological innovation is the main reason why RegTech could allow reaching all the previously mentioned objectives related to the first three views:

- Faster and more efficient regulatory management.
- Produce regulatory reports more timely.
- Bring benefits to stakeholders.
- Monitor more easily, efficiently, continuously and quickly compliance and regulatory obligations.
- Cut costs.
- Create strategic opportunities.
- Identify problems in advance.
- Improve efficiency and speed of internal processes.
- Agility and speed in implementing the flood of regulations.
- Cope with the high speed of changing in the financial market.
- Apply technology to significant business challenges.

A different point of view in defining the RegTech environment is given by Accenture (Boccellato, 2018) that classifies the phenomenon according to the actors involved:

- **RegTech start-ups**, that implement new digital technologies to provide innovative solutions in the sector.

- **Regulators**, that encourage interactions among different players in the market, evaluate new regulatory needs and create infrastructure for a sustainable competition.
- **Tech Firms and Professionals**, that analyse market needs and proactively identify new solutions, supporting start-ups in their growth.
- **Financial Institutions**, that can contribute to the environment's growth by defining strategies and paths for the RegTech solutions' spread and fostering the experimentation.

1.2 Investments in RegTech

To assess the degree of attention/care to the RegTech phenomenon during recent years we have decided to focus on two perspectives: a quantitative-financial one and a quantitative-web one.

In order to have a first picture of the phenomenon, it is mandatory to have a look to investments' intensity in the field (in terms of amount and number of deals). It's important to point out that the analysis of investments is carried out by considering three different sources of data: FinTech Global (RegTech investment saw a strong end to year as funding more than doubled QoQ, 2018), CB Insight (CB Insight, 2017) and a self-developed Database.

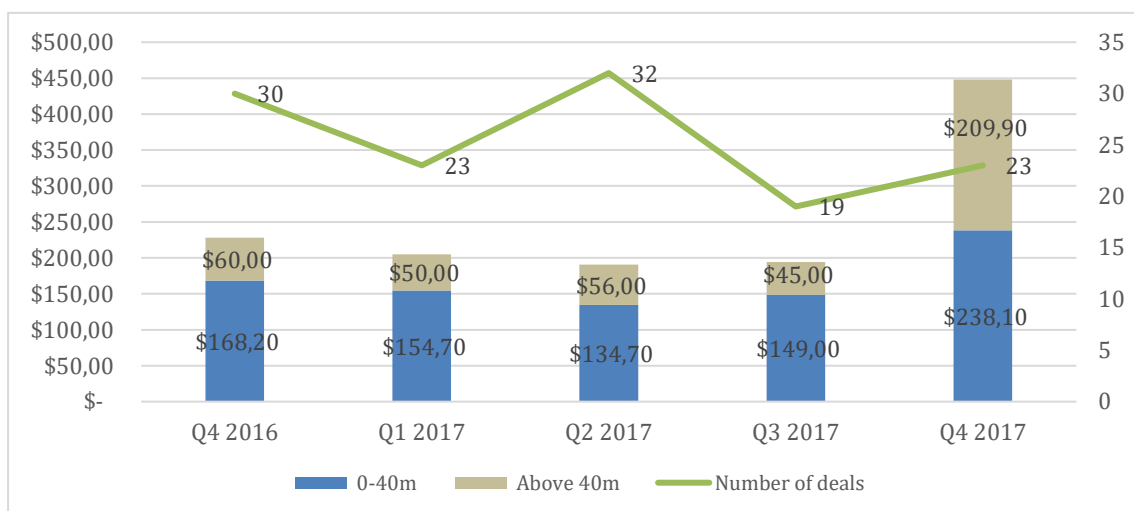


Figure 1.1: Global RegTech investments, Q4 2016 – Q4 2017 (data in million)

Source: FinTech Global

While in 2017 the number of deals has been quite stable (Figure 1.1), it is significant to highlight the increase in money invested both in larger (above 40 million) and smaller deals in the last quarter of 2017. The Q4 2017 accounts for almost 43% of the total amount invested of the whole year. As we can see the number of deals from Q4 2016 to Q4 2017 has decreased, but there has been a sharp increase in larger deals.

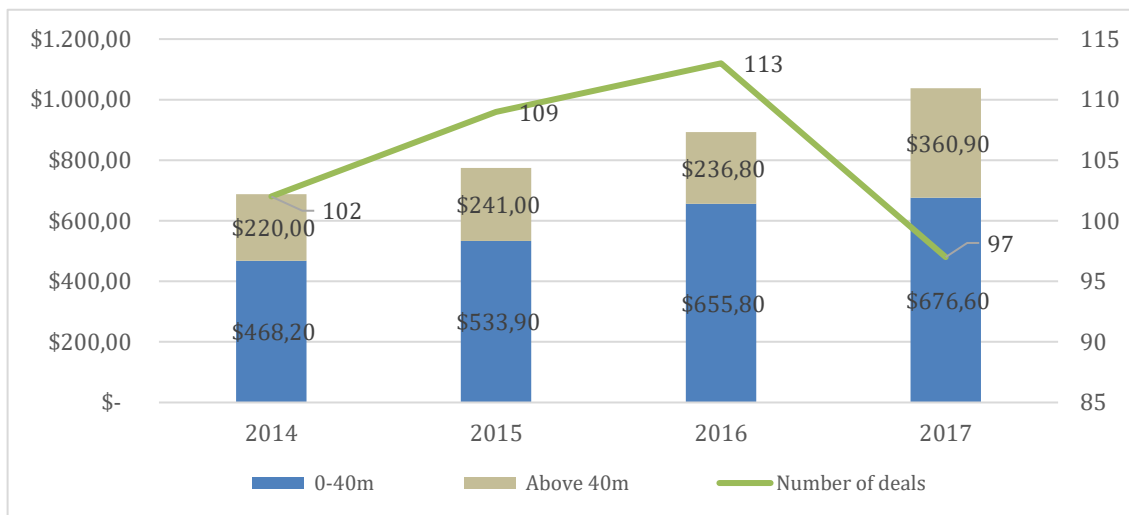


Figure 1.2: Global RegTech investments, 2014 - 2017 (data in million)

Source: FinTech Global

A further evidence of the trend we have just pointed out is given by the analysis of the investments in a wider time horizon (Figure 1.2). The path is confirmed: the size of the average deal has increased since 2014. The multiple at which RegTech companies have been traded has changed in last four years, confirming the increasing attention towards the phenomenon. In 2017 the total amount invested broke the 1B threshold.

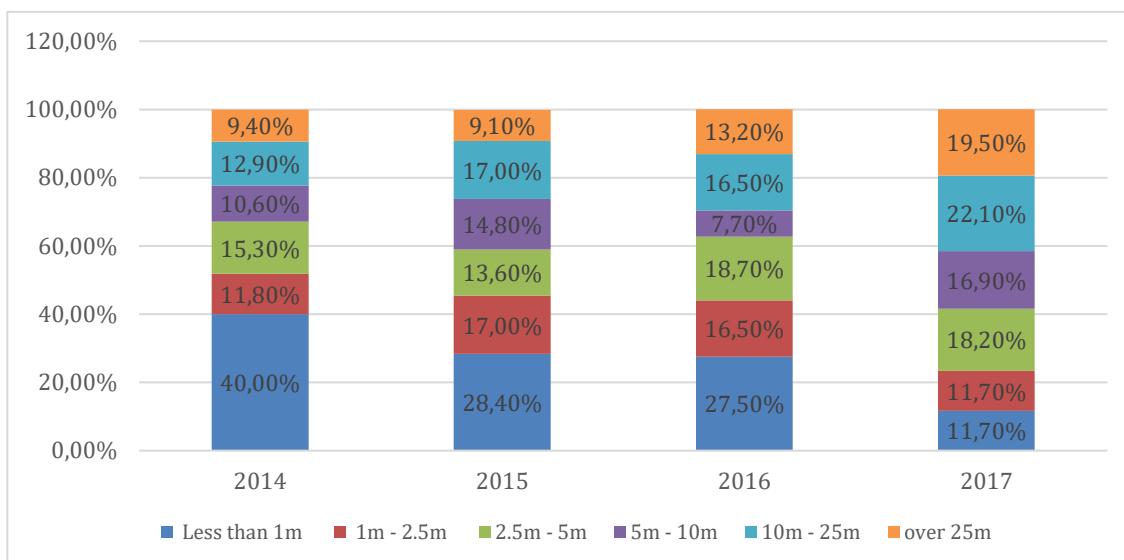


Figure 1.3: Global RegTech investments by size

Source: FinTech Global

Going deeper with investments' analysis, size helps us to better understand the phenomenon. Simply focusing on the two extremes of the graph (Figure 1.3), we note a huge decrease in the lower-size investments (less than 1 million), and an increase in the last two years of the largest one (over 25 million); these two insights confirm what we have previously pointed out about multiples.

During the FinTechStage festival, expertise assessed that compliance investments are going to sharply increase in the next two years (2019-2020), in particular the 89% of the compliance officers of the financial services strongly believe that the continuous acceleration of investments in the first quarter of 2018 could mean a doubling in the amount invested compared to 2017.

These figures can bring to a scenario in which the European investments in RegTech would represent the 30% of the worldwide investment in the field, almost the double of the EU quota in the FinTech field; this is a first indication about the importance of the European world in RegTech. (Boccellato, 2018)

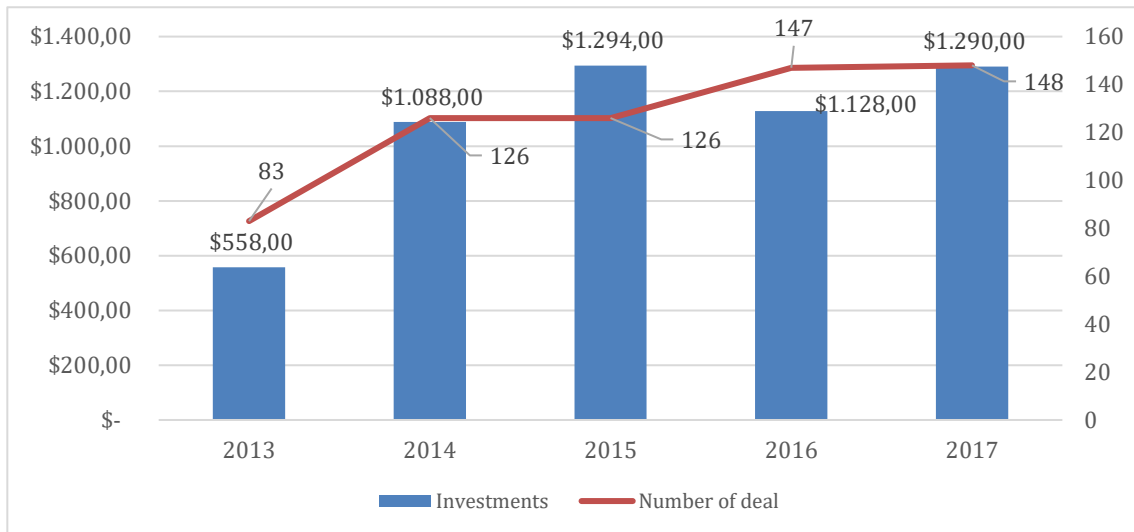


Figure 1.4: Global RegTech investments, 2013 - 2017 (data in million)

Source: CB Insight

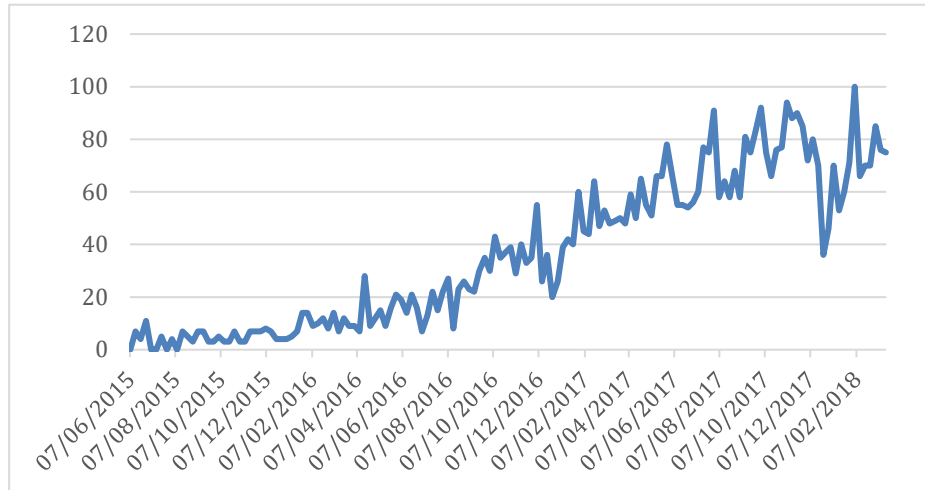
Analyzing the second source mentioned (Figure 1.4), results are even more generous: The 1B treshold was reached in 2014, and the total amount of funding between 2013 and 2014 has reached 5B\$. Here the insight is different: it seems that the number of deals has increased following a linear pattern, and the amount invested has been quite stable, varying from 1.1B\$ to 1.3B\$ in last four years.

1.3 Fintech VS RegTech

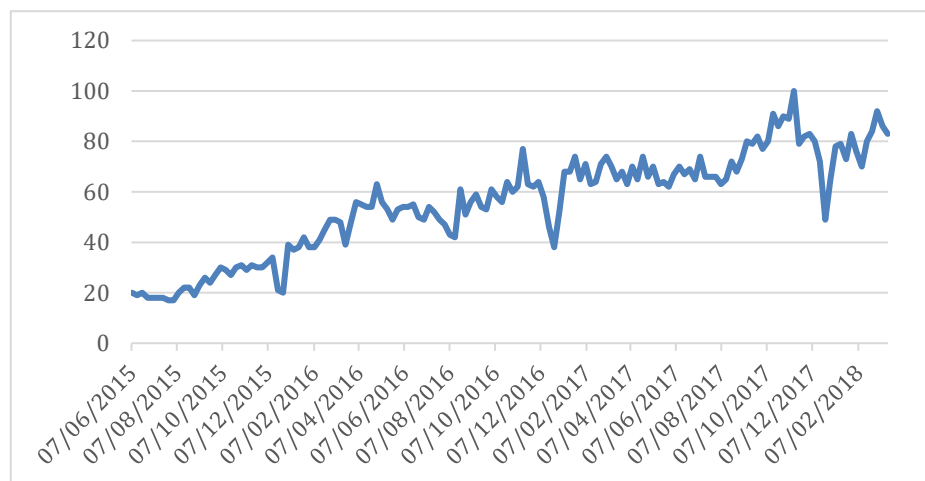
The second perspective according to which we measured the degree of attention is the amount of researches on the Net.

Quite obviously, it is tough to talk about RegTech without talking about FinTech, keeping in mind that they are two distinct phenomena with many synergies and complementarity. (Bolt, 2017)

Our Work aims at exploring and framing the RegTech movement. Despite our specific focus, we should start by clarifying what kind or relationship exists among this two phenomena, which are obviously highly correlated.

Figure 1.5: “RegTech” researches on Google²

Source: Google Trends

Figure 1.6: FinTech researches on Google³

Source: Google Trends

² The highest point of the graph (100) indicates the period in which there has been the highest number of “RegTech” researches, the other numbers represent the interest compared to the highest value. (e.g. 50 is a period in which there has been half of the “maximum volume of researches”)

³ The highest point of the graph (100) indicates the period in which there has been the highest number of “FinTech” researches, the other numbers represent the interest compared to the highest value. (e.g. 50 is a period in which there has been half of the “maximum volume of researches”)

Google researches history of the word “RegTech” is easy to be read (Figure 1.5), the worldwide trend has been increasing since the first half of 2016; from 2017 we are able to retrieve quantitative evidence about the rate of increase of associated queries as “Regtech companies” (increased by 170%), “Reg tech” (increased by 70%), “what is RegTech” (increased by 70%) and “RegTech definition” (increased by 50%).⁴

What we want to further analyze is how much the “RegTech” researches trend is linked with “FinTech”; even if the volumes of researches of the two are not comparable (being RegTech a sub-phenomenon of FinTech), FinTech researches path (Figure 1.6) is quite similar to the RegTech one.

Are these two patterns related? Is RegTech increasing trend due to FinTech increasing trend?

	coefficient	std. error	t-ratio	p-value	
const	42097.9	26.9107	1564	1.37e-304	***
FinTech	6.75909	0.743571	9.090	7.51e-16	***
RegTech	5.42447	0.532461	10.19	1.16e-18	***
Mean dependent var	42669.50	S.D. dependent var		296.0346	
Sum squared resid	1094290	S.E. of regression		87.47788	
R-squared	0.913885	Adjusted R-squared		0.912680	
F(2, 143)	758.7837	P-value(F)		7.21e-77	

Table 1.2: RegTech and FinTech correlation

Source: Own elaboration on Google Trends’ data

To answer these questions we have analyzed the two paths together⁵, and we have ended up with the following results (Table 1.2):

There is evidence of high correlation between the two variables that follow the same trend vis-à-vis the time. Heading on over a fixed time period we almost obtain a similar raise of RegTech researches and FinTech ones.

The level of correlation can be assessed by looking at the level of the Adjusted R-squared (0.91), while the robustness of the model is given by the high meaningfulness of the two coefficients RegTech and FinTech (thanks to their low level of p-value). Through

⁴ Users that search the principal query (the word “RegTech” in this case) have also searched the above mentioned queries.

⁵ We have selected the period of time from 07/06/2015 to 23/03/2018 because we think it’s a sufficiently relevant interval to show the increasing attention towards the RegTech phenomenon.

this quick analysis we don't want to say something revolutionary, we are just assessing that there is the statistical evidence that the FinTech trend analysis should not be excluded from the study of the RegTech trend. Moreover, setting aside statistics, it's reasonable to assume that the increasing trend of RegTech researches is due to the FinTech increase, as they are close relative.

Chapter 2

The Ecosystem

2.1 Introduction

The first step in the ecosystem definition is the collection of a relevant sample of companies, that according to our view, belong to the RegTech world. The following paragraphs are based on the information derived from the bundle of companies selected and analyzed.

2.2. Methodology

Most of the analyses proposed in this Thesis are based on a sample: 325 RegTech companies that are either already competing on the market or that have just landed.

Now that is 2018, the number of RegTech start-ups operating all around the world has become huge, together with the overall funds received by such companies, as it is proper of the growth phase of an industry's life-cycle.

So how is it possible to select a meaningful sample in a world where brand-new companies compete in a new industry and pop up massively, especially in the last year and a half? Which companies to include? Which ones to neglect? And how is it possible to select such meaningful companies when almost all the literature about RegTech is spread around the Net (no books yet)?

The answers to these questions are fundamental. In fact, all the following analyses are based on the results of this sample-selection process, which is extremely important since the significance of the sample affects the meaningfulness of the results of the analyses.

2.2.1 Actors of reference and relevance

To include a company in the sample, the most important characteristic to assess is its compliance with our RegTech concept. According to the experience we have collected, RegTech hemisphere is composed by three macro-areas: Compliance, KYC AML & Risk Management, Reporting.

Only a company having one (or more) of these three macro-businesses as core one, deserves to be part of the sample and to be the object of the analyses conducted in

this Thesis. Making a screening of the above cited businesses is an hard job, and having the presumption to gather all the companies that rely on those business could be inappropriate, however the sample created for the analytic part contains at least all the relevant actors of the RegTech world (in terms of companies). How to assess a company's relevance in such a brand-new ecosystem?

Since the only literature, data and information about the RegTech phenomenon are available on the Internet, it is reasonable to assume that the most relevant companies are those that:

- Have the most meaningful and positive presence in the materials found online (i.e. appear often or are quoted very by RegTech's actors of reference in the research field as example of good practices).
- Are more economically successful based on the disclosed data.
- Are present in at least one list ranking the best RegTech start-ups and provided by a trustworthy actor of reference in the RegTech ecosystem.

As a result, in order to assess the relevance of a company, there is the need to assess before the relevance of the actors who quote, celebrate (e.g. a successful funding round), or rank the company, that are the actors who make the researches, who provide insights and data, who dedicate websites or online newspapers/magazines to the study of the phenomenon, who establish rankings, etc.

It is possible to define as "relevant", thus selecting it as an actor of reference for the researches in the RegTech field, all those actors who are quoted or mentioned more often and who have the most widespread presence around the RegTech-area of the Net (i.e. realize the mostly downloaded papers, who receive the largest number of website visits, who disclose the most relevant data, who are present widespread as suggested links, who have the most sound sponsors, etc.).

In fact, the assumption underlying this process of identifying the relevant actors of reference in the RegTech hemisphere for then identifying relevant RegTech companies to create the sample, is the following:

In the current digital era, the only way to identify reference points for a phenomenon like RegTech (i.e. still growing and with only digital literature and data available) is by looking at the actors/entities who are most commonly quoted by the mass

of researchers in terms of a particular phenomenon or whose websites and studies are more often taken into consideration by the RegTech community and outsiders (maybe because sponsored by huge financial institutions).

Therefore, resorting to weekly analyses (through traditional web browsers like Google and Google News) of the most important News & Articles and Scientific Papers about RegTech, it could be noticed that many of articles, studies, papers, researchers and websites, either are written or make reference to studies and researches by a specific group of actors/entities, which could thus reasonably be considered as the main pillars and references in online researches on RegTech. The aforementioned relevant actors of reference in the RegTech ecosystem were identified as the following ones: FCA and IIF (Authorities), Techworld, Consultancy.uk, RegChange, GoMedici, Medium, TheFinTechTimes, Regtechfs.com (websites or online magazines/newspapers), IRTA (International RegTech Association), CB Insights, Toronto Centre, Moody's Analytics (associations or observatories), Arner, Barberis, and Buckely (scholars), and the Global RegTech Summit (the main RegTech event all around the world).

It is interesting to notice that some of them are websites, other authorities, then voluntary associations, scholars, regulators, companies and even an event; this seems to suggest that it is not yet clear who will play the role model for the researches and studies in the RegTech ecosystem. It is not clear if associations will be the ones who will provide framework and knowledge, or authorities and regulators, or again websites exploiting the advantages offered by a digital era, and so on.

However, all these can be considered as the most influent and trustworthy providers of insights, data, numbers, rankings, and technical findings on the RegTech phenomenon.

Due to their pervasive presence all around the Internet, these actors can be considered as the reference points to create a meaningful sample of companies.

2.2.2 Sample creation

Once identified the relevant reference points in the studies and researches on RegTech, it is quite simple to define a significant sample of relevant companies. It can be done in three phases: initial sample, enlarged sample, and adjusted sample.

Initial sample: it considers all the companies that were ever mentioned in a research, study, paper or statement by the actors chosen as “of reference”.

Enlarged sample: after selecting the first lot of companies based on the actors of reference, the initial sample must be crossed with all the firms ranked in any reliable list as top 100-150 RegTech start-ups in a given year (Fintech Global, 2018). Once identified all the players that were not in the initial sample but that are present in a list, they must simply be added to the initial sample, enlarging it significantly.

Adjusted sample: the enlarged sample must be further adjusted to consider all the newcomers in the RegTech industry but that were not included in the previously-considered papers, articles, and ranking lists, because emerged in the last year or months. As a result, relying on the list of the exhibitors at the last Global RegTech Summit in London has been very useful to add some interesting realities to the sample.

2.2.3 Significant qualitative assessment

Since the RegTech phenomenon is still in definition, different agencies provide different numbers in terms of companies belonging to the environment, hence numbers regarding investments in the field are different sample by sample. The sample-selection process used for this work gives an output of 325 companies. This number is relevant to analyse the phenomenon as it includes all the most representative enterprises of the field and the most innovative one, the potential lack in numbers (again, compared with other agencies’ bundle whose criteria of selection are unknown) could be due to different views of the phenomenon.

2.3 RegTech Companies

Although RegTech is nowadays a global phenomenon, it has its roots in USA; it is there that investments started in 2009. In last five years UK world has increased its focus towards regulation and consequently RegTech start-ups has identified their natural positioning there. Today UK is the most important RegTech Hub worldwide.

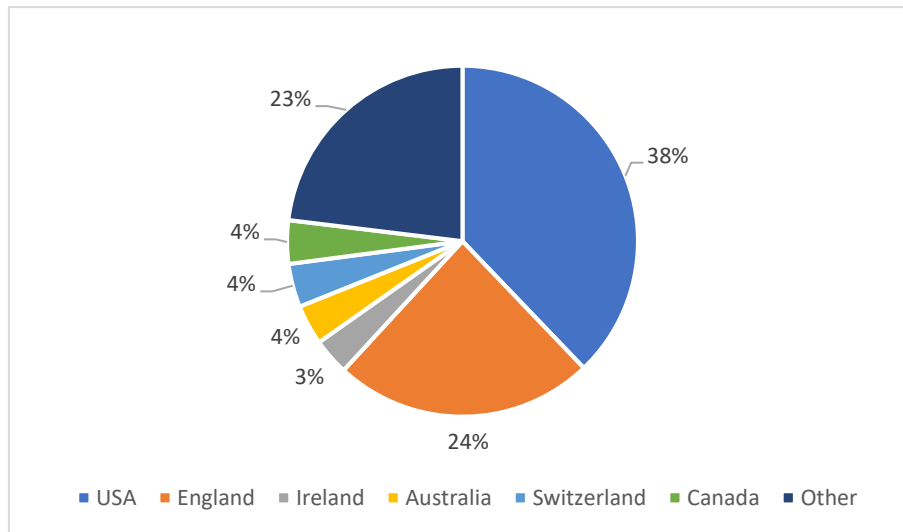


Figure 2.1: Geographical distribution of RegTech companies

Source: Own elaboration

Even if USA still remains the country in which there are more RegTech companies in the world (Figure 2.1), we have not to consider the absolute number but numbers in relation to many other factors. Considering that USA has always been the most innovative environment for start-ups because of the presence on the territory of the most important tech players of the world (e.g. Google, Facebook, Apple, Microsoft), considering Silicon Valley facilities (most important and significant Start-ups Hub at a worldwide level) and considering economic, legal and political importance of the country, the results of the UK vis-à-vis the US assess the centrality of the European zone. UK importance is driven by the Financial Conduct Authority, that has sponsored many RegTech projects, and has tried to create as good as possible environments for start-ups' creation and growth. (Sheen, 2018) (Terekhova, 2017) (Financial Conduct Authority, 2018)

Moreover, England is not the uncontested leader of this Hub, Ireland, as for the FinTech industry, is a consolidated and important reality. (Williams, 2017)

Australia is another important Hub for the movement, with many initiatives promoted by the Government that seems to have caught the importance of the phenomenon (Chanthadavong, 2018). Figure 2.1 suggests another statement: Common law countries have totally taken the scene.

A further but more aggregated geographical insight is given by the comparison of three macro-areas (Figure 2.2)

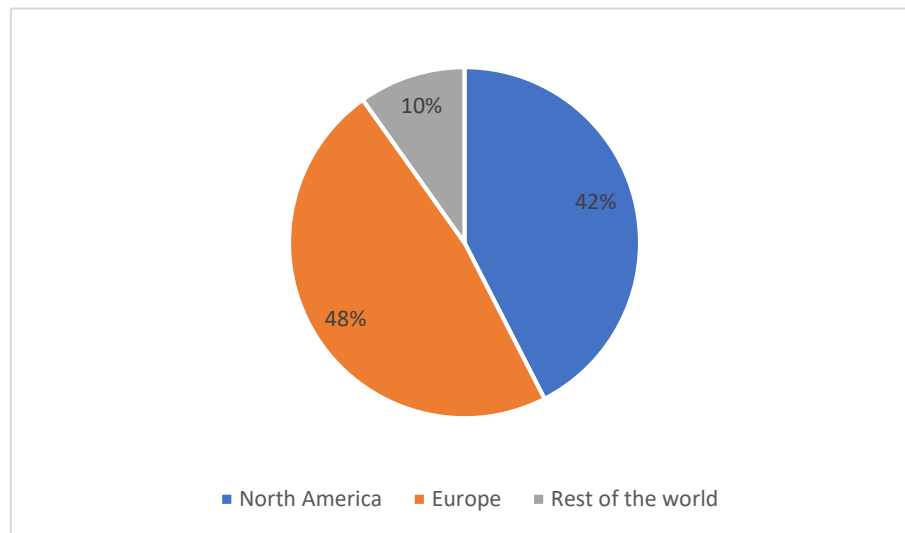


Figure 2.2: Geographical distribution (Macro-Areas) of RegTech companies

Source: Own elaboration

Looking at these results, Europe clearly overcomes (even in absolute terms) North America (Canada as we have seen is another important reality of the phenomenon, so the aggregation with the USA makes sense for a wiser analysis). Results are in counter-tendency with the more general analysis of investments in innovation and start-ups, where USA clearly dominates.

Europe is a more fragmented reality compared with the USA one, there are many different national regulations (even if this phenomenon has been step by step mitigated by the introduction of European norms, GDPR is one), and a lot of differences in taxation policies that lead European market to be less integrated compared to the Northern America one. For these reasons the European growth is remarkable, and the higher presence of RegTech start-ups in the region gives the Old Continent (and more precisely UK) the title of Most Important RegTech Hub in the world.

2.3.1 Investments in RegTech

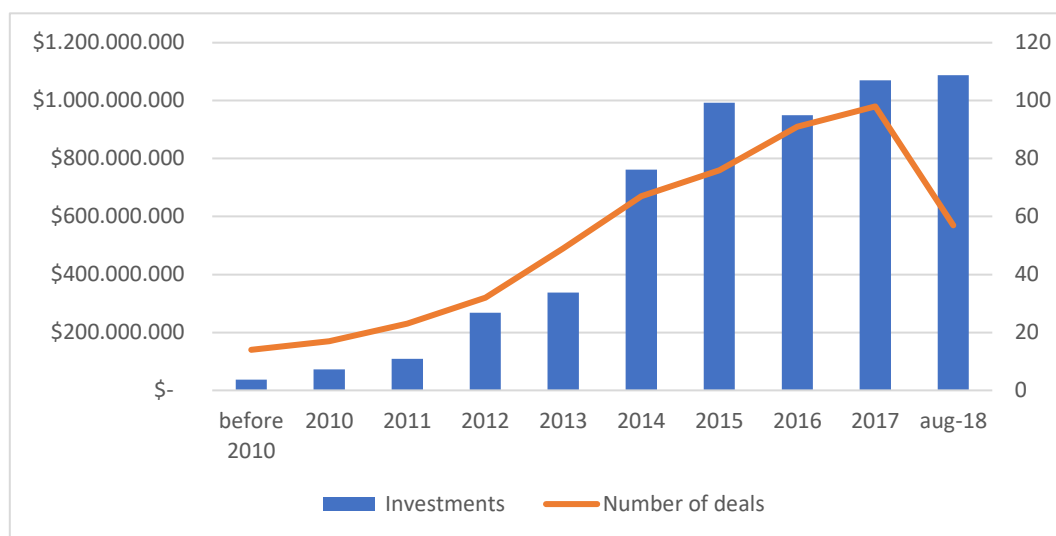


Figure 2.3: Investments in RegTech companies

Source: Own elaboration

Investments in the field (based on the above described Database) are dissimilar in terms of number from the ones provided by CB Insight and FinTech Global (again, the Thesis is about a phenomenon that hasn't been already completely bounded, diversity in numbers depends on whether or not Datasets utilized for the analysis comprise some players).

As shown in Figure 2.3 investments are almost null until 2010, these data highlight that the interest towards the phenomenon started after the financial crisis of 2008/2009, when regulators and FIs understood that the regulatory framework must be consistently reviewed. The growth phase started in 2012/2013 where investments became consistent and number of deals increased. Then the amount invested doubled between 2013 and 2014, and the phenomenon entered in a deeper growth, whereupon there was a slower growth in both amount invested and number of deals (there even was a decrease in investments between 2015 and 2016) that could bring the audience think that the maturity has been reached, however the first eight months of the 2018 have been sufficient to reach the level of the investments of 2017, allowing us to think that the phenomenon is still growing, and maybe it is entering in a new phase.

1\$B threshold was almost reached in 2015 and 2016, and then formally broke in 2017. 2018 has overcome this result and probably goes for the 2\$B, doubling the result of 2017. What is even more interesting is that number of deals seems be constant (projection for the 2018 indicates an amount of deal near 90, as in 2017), this means (as already highlighted in the paragraph 1.2) that multiples at which RegTech companies have been traded is increasing. Higher multiples means higher consideration of the phenomenon, confirming the theory according to which RegTech has not reached maturity yet.

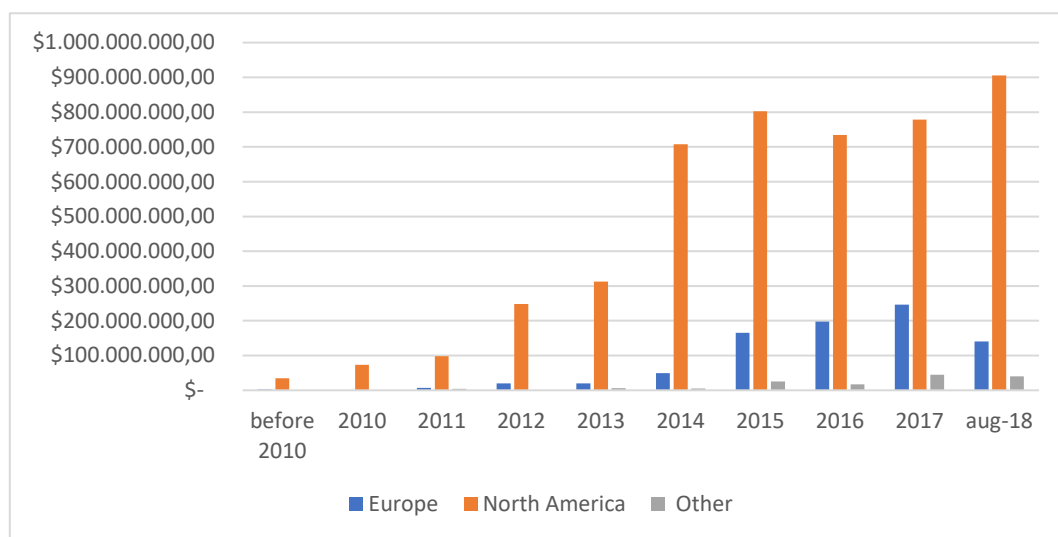


Figure 2.4: Investments by geographic macro-area⁶

Source: Own elaboration

As previously highlighted the phenomenon was born in USA almost in 2009, and before it started its maturity phase it was unknown in the rest of the world.

Before 2014 investments in non-North American companies were null. Only from 2015 on European companies started to be significantly financed, reaching important ratios in 2016 and 2017.

In last 5 years there has been a meaningful growth in funding for European based companies both in absolute terms and compared to American based ones. 2018 results

⁶ We suffer a consistent lack of data for Asian-based companies

seem countercyclical to the European growth, and on the other side North-American numbers are growing again.

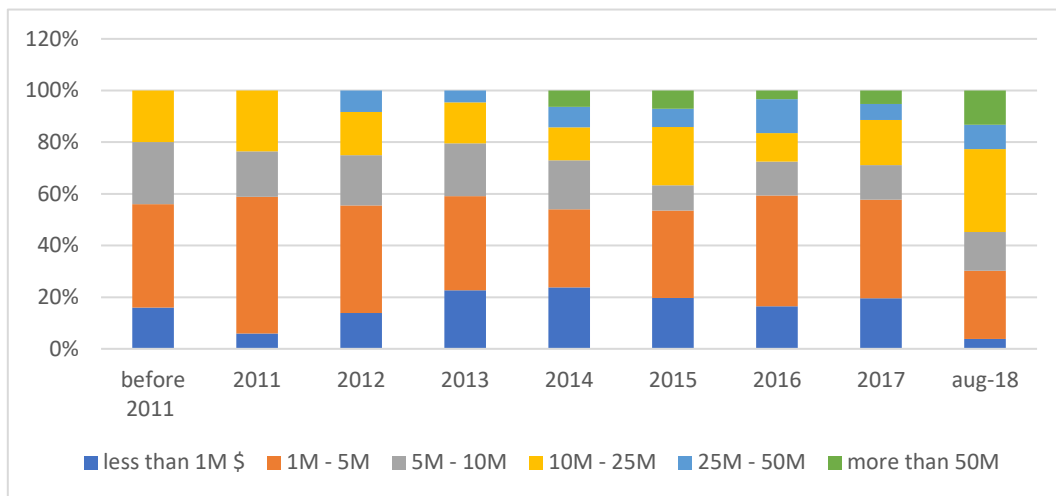


Figure 2.5: Investments by amount

Source: Own elaboration

Analyzing investments by amount (Figure 2.5), there is a decreasing trend of the number of lower amount investments from “before 2011” to 2018, they pass from representing the 80% of the total amount invested to less than 50% in 2018. In particular, low size investments (less than 1M, 1M – 5M) have fallen in 2018, and what is even more impressive is that this year “more than 50M” investments represent almost 20% of the total deals of the year; this can be considered a further sign of the opening of a new RegTech phase.

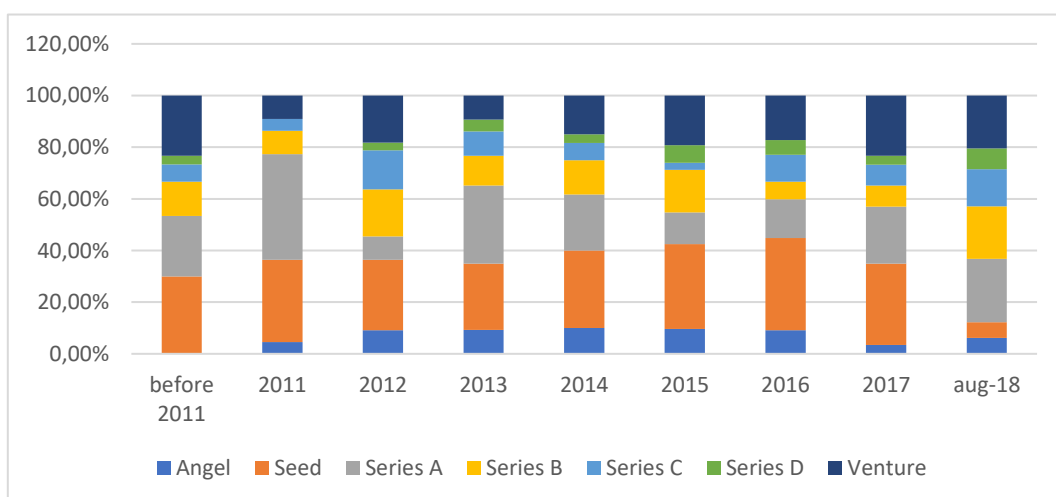


Figure 2.6: Investments by round

Source: Own elaboration

Even considering investments by round, there is an anomaly started in 2018, Seed Round seems to disappear (representing the 5% of the deal, compared with 25%/30% of the previous 8 years). This can be due to start-ups created between 2016-2018 that has not accessed yet to a first round of funding (Angel Round / Seed Round), however it is shown in Figure 2.10 that time laps between foundation and first round of funding has dramatically reduced, in last two years it needed less than 12 months (average data). Once excluded quantitative justifications related to funding timing, either there is the need to introduce a reasoning about the quality of start-ups (it is not the case) or to apply the same evidence from figure 2.5 remembering that lower size investments have almost disappeared in 2018 (considering that in the majority of the cases the denomination of the round is given by the amount, it's evident that the lower-amount rounds have reduced too).

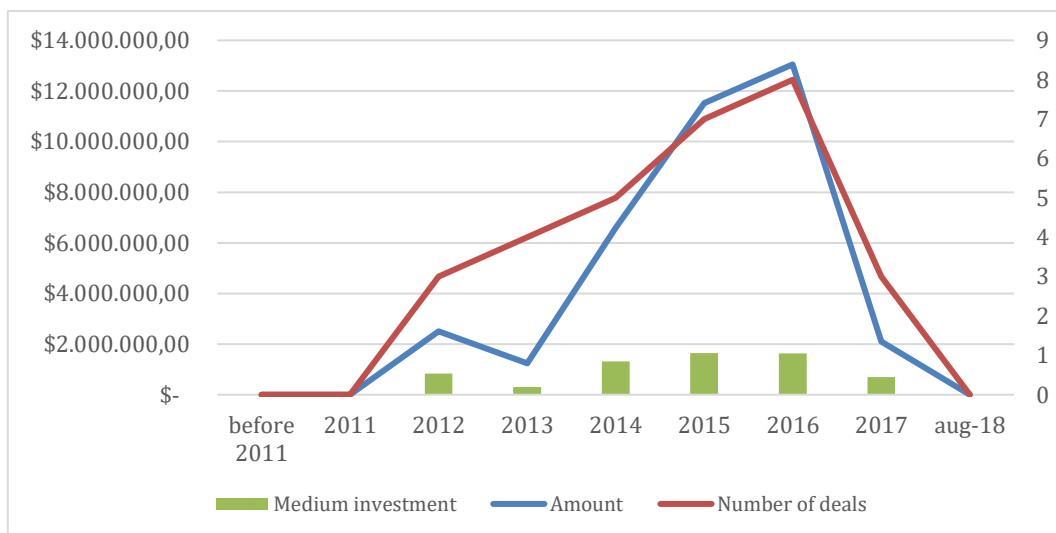


Figure 2.7: Angel Round investments

Source: Own elaboration

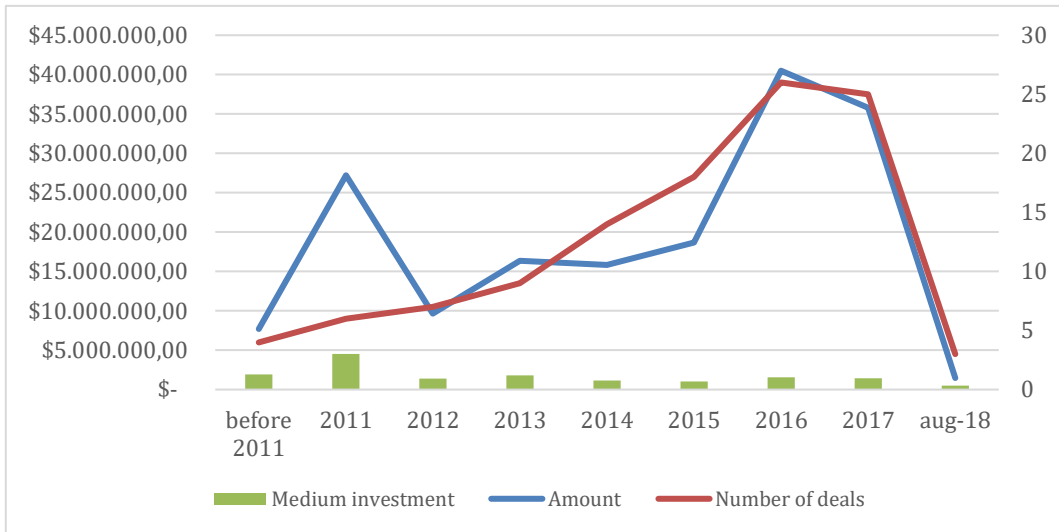


Figure 2.8: Seed Round investments

Source: Own elaboration

Figures 2.7 and 2.8 help understanding the sharp decrease in both round typologies. After many years of growth, what is intriguing is the sudden decrease in 2018 (2017 for Angel Round); before that drop, Angel Round investments' amount was 13M and there were 8 deals, so the reduction is impressive but not shocking, instead Seed Round had a fall from 35M to 1.4M, and from 25 deals to 3.

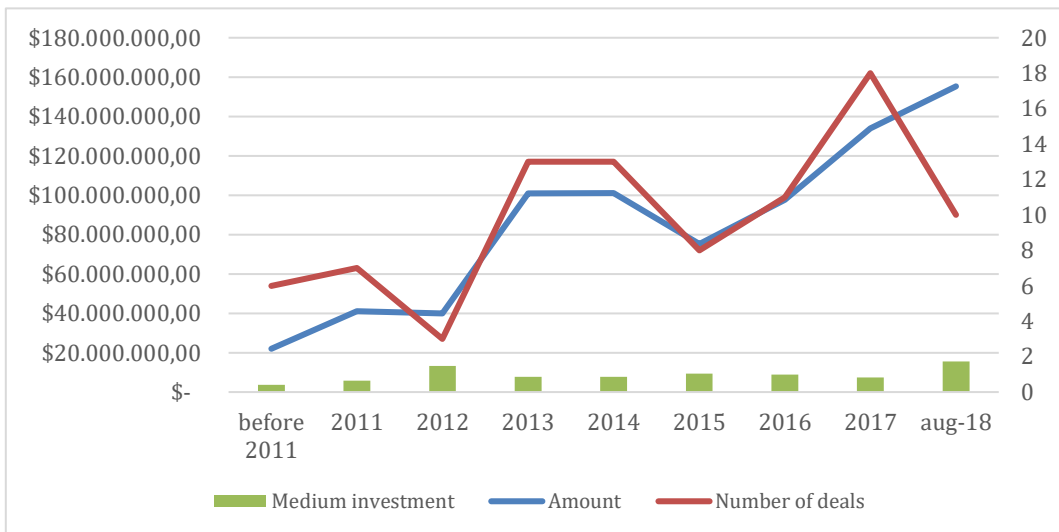


Figure 2.9: Series A investments

Source: Own elaboration

If from one side there is a decrease in low size rounds (i.e. Angel Round and Seed Round), on the other hand there is a rise of medium and medium-high investments. Figure 2.9 points out the increase of Series A investments since 2015, that have reached more than 150M in 2018, doubling the data for the 2015. Moreover, as already highlighted in previous observations, medium investments have deeply increased in 2018, doubling the result of 2017.

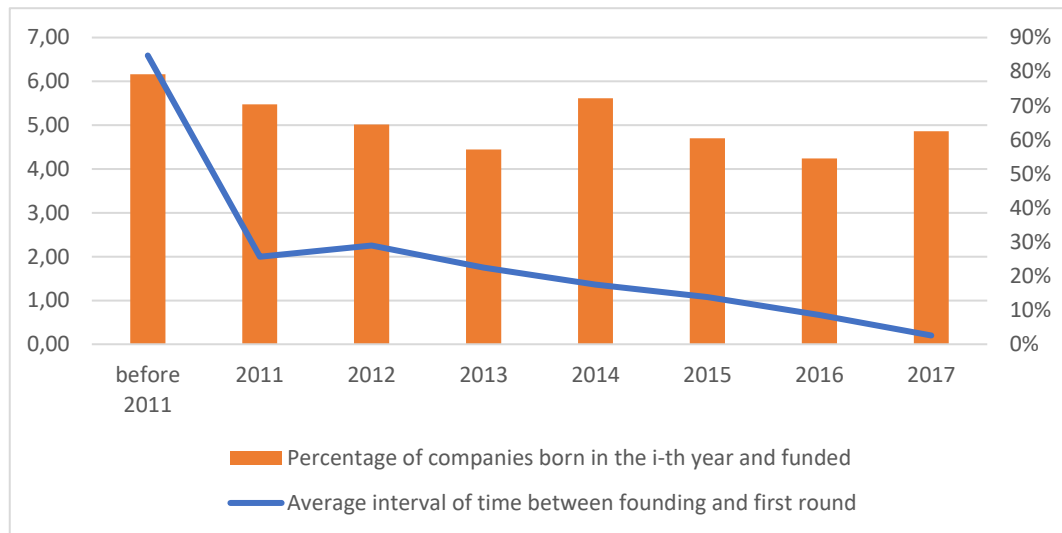


Figure 2.10: Funding rounds' timing

Source: Own elaboration

Another measure of the degree of attention towards RegTech is given by Figure 2.10. The interval of time between the foundation of a company and its first funding round has been decreasing from the beginning of the phenomenon, passing from 6 years needed before 2011, to few months in 2017. The impressive data is that in 2017 more than 60% of the company founded, received a first funding round in almost 3 months (average data).

2.3.2 Businesses

As highlighted in the paragraph 2.2.1, there are three main components that define RegTech business: Compliance, KYC AML & Risk Management, Reporting.

In the bundle of RegTech companies identified, the division is the one provided in Figure 2.11

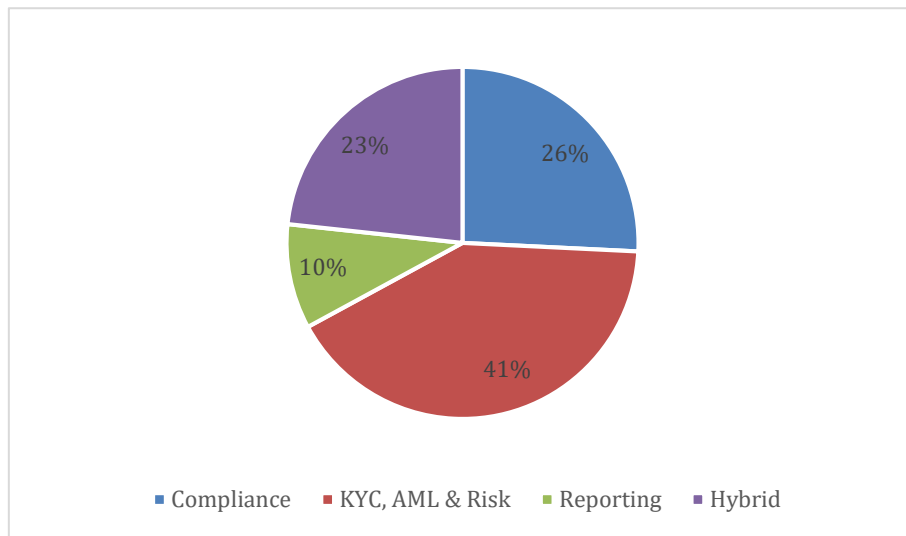


Figure 2.11: Business percentage

Source: Own elaboration

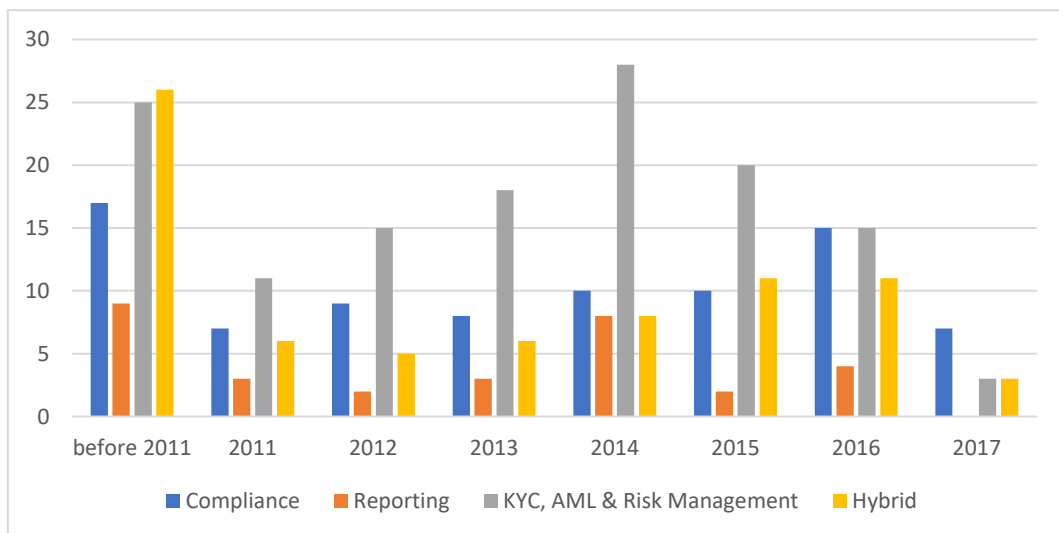


Figure 2.12: Number of companies founded divided by business

Source: Own elaboration

Going deeper with the analysis it is possible to better define the three categories, providing example of companies belonging to such categories and explaining diversity and interactions among them.

2.3.2.1 Compliance

Compliance category embraces those kind of businesses that use technology in order to make corporate processes more efficient in regulation and compliance.

The economic world has been facing a lot of changing in terms of regulation, this process has not affected just financial institutions or financial service provider, but the whole economic environment. There is the need to better manage compliance processes, that will result in a huge cost saving, both in terms of personnel and not to incur in fines. A report provided by CB Insight gives some useful data about these topics:

- Since 2008 banks have paid \$321B⁷ in fines
- In 2016 Securities and Exchange Commission (SEC) issued 868 enforcements (amounting to \$4B in penalties ordered)⁸
- In 2016 there was 52506 regulatory alerts⁹
- There are more than 750 Global Regulatory Bodies
- \$100B financial services projected regulatory compliance spend in 2017 for mainly six regulations: Markets in Financial Instruments Directive II (MiFID II), Revised Payment Services Directive (PSD2), General Data Protection Regulation (GDPR), Fiduciary Rule United States, Dodd-Frank Act, Consolidated Audit Trail (CAT).

These data reveal only a side of the challenge: financial institutions' compliance needs to be reviewed and improved. However it's true that the concept of RegTech was born to solve these problems (after the financial crisis), but then the phenomenon spread, today RegTech companies that provide compliance services does not deliver just "compliance for financial institutions", but even industry-specific compliance. There are lot of industry-specific regulations hard to be managed (e.g. Healthcare, Insurance, Energy,

⁷ Source: Bloomberg

⁸ Source: SEC

⁹ Source: Thomson Reuters

Tax, Cryptocurrencies, Air Traffic control, Food). In this landscape there are basically two kinds of enterprises: the one that focuses just on one Regulation/Industry and the other that operates in more than one (still talking just about compliance).

Here there is a list of RegTech companies within the most important industry and their regulation (the companies reported do not represent the whole Compliance companies' ecosystem but they are just examples):

- Data Protection (GDPR): Exterro, ObserveIT, Onapsis, Privitar
- Financial Regulation: Fiscal Note (MiFID II, Basel III), FundSquare (MiFID II, FATCA), Funds-Axis (focused on Asset Management regulations: AIFMD / UCITS), iComplyco (focused on ICO and Token regulations), ObserveIT (PCI-DSS), Onapsis (SOX), OpenGamma (MiFID II, regulation on derivatives), SkyHigh (GLBA, FISMA)
- Healthcare (HIPAA, HITECH): Audit Comply, ClearDATA, Cipher Cloud, CloudPassage, ObserveIT
- Insurance (Solvency II): Bcube, Fiscal Note, FundSquare, SecondFloor
- Taxation: Avalara, BIGcontrols, TALEO Reporting, Trackbill
- Cryptocurrencies monitoring: BitAML, ChainAnalysis, Investglass
- Energy (REMIT): DeltaconX
- Air Traffic Control (LAANC): Drone Complier, Skyward
- Restaurant Compliance: Swiftcomply

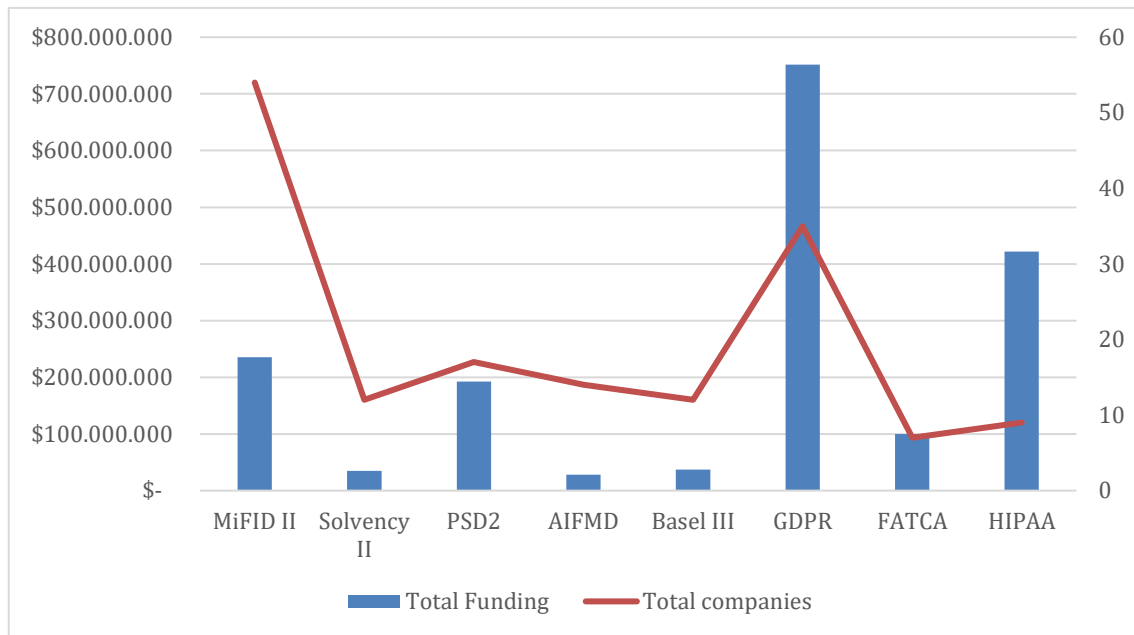


Figure 2.13: Funding by regulation

Source: Own elaboration

Figure 2.13 reports the most important regulation towards which RegTech's effort is addressed. It is not just a matter of compliance (there aren't just compliance companies in the graph), but it is a matter of «which regulation framework» the RegTech company is solving, sticking or dealing with. Once clear the concept behind the regulations' distinction and aggregation, is not difficult to imagine why «GDPR-Firms» are the one on the top of the list, it is sufficient to imagine all the cloud-based technology companies that do not offer GDPR compliance but provide software for data sharing that must be GDPR compliant.

The most interesting result is about HIPAA (healthcare regulation), that reaches more than 400M of funding, and it is first if we consider the medium funding per company, that amounts to 47M (GDPR is 21M). MiFID II funding is just addressed to compliance companies, here the total amount is 235M but the medium investment is very low: 4.35M.

2.3.2.2 KYC, AML & Risk Management

KYC, AML & Risk Management are three categories that collapse into a single one. The reason for the aggregation is the similar objective that the three categories pursue: risk reduction. It's ambitious to precisely assess whether a company is more oriented towards KYC rather than Risk Management, or to divide KYC business from AML ones.

Again there is a list of different examples, not including every KYC, AML & Risk Management companies of the Database (among the category, there is not a distinction according to the kind of risk mitigated, but there is a tailormade distinction based on the main features of the different companies):

- Internal control (mail / phone calls / message checker): Avaamo, Behavox, Check recipient
- AML accelerate (KYC core processes and AML in every sector as art, casino, hotel, pubs and clubs, gaming machine venue, precious metal and stone dealer)
- Elliptic (AML for cryptocurrencies)
- Jumio (Trusted Identity as a Service T1aaS)
- norbloc (KYC services based on distributed ledger technologies)
- Verafin (behavior pattern-based technology, it offers also services for AML in sectors as Human Trafficking, Terrorist Financing).

2.3.2.3 Reporting

Reporting companies can be considered the closest to the FinTech universe. They are mainly based on data gathering and analysis, providing their studies about economic trends, and anomalies to regulators. However there is also a different purpose of this data-centric firms, something that is probably one of the most innovative component of RegTech: it is the will of developing a proactive approach to regulation, and not a reactive one. It's one of the most ambitious aspect of this phase of RegTech. Historically dealing with regulation means adapting to something implemented by regulators, the revolution that these companies are trying to pursue is anticipating regulators' decisions by offering to their client analysis based on repositories of data, and make them ready to face new potential up-coming regulations.

Considering that regulation must be aligned with the needs coming from markets observations, the job that Reporting RegTech companies are trying to carry out is actually the one of the regulators themselves. It's a totally disruptive view of regulation's paradigms.

The company belonging to this category are the one that focuses 100% on Reporting without the Compliance component (there are lot of RegTechs that combine the two services). The most important (considering financing round) Reporting companies: Captricity, Core View, AYASDI.

2.3.2.4 Hybrid

There are also companies that difficultly can be assigned to one of the three groups because they offer services belonging to different categories, these kind of companies are identified as hybrid solutions, examples are: Coinfirm (KYC & Compliance), Commcise (Reporting & Compliance), Compliance.ai (Reporting & Compliance), Fenargo (AML/KYC & Compliance), FundApps (Reporting & Compliance), NEX regulatory reporting (Reporting & Compliance).

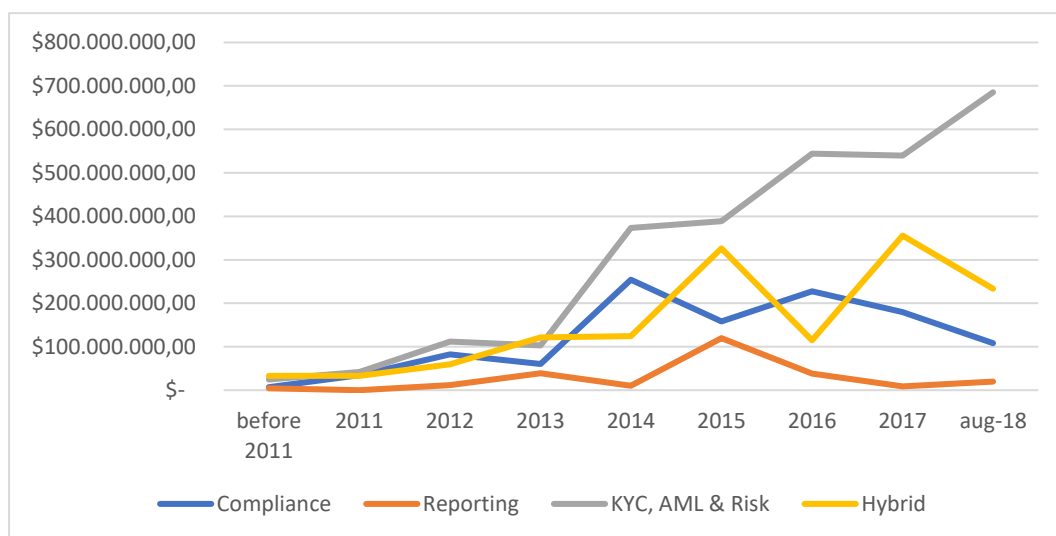


Figure 2.14: Investments by business typology

Source: Own elaboration

Looking at the amount invested in each category (Figure 2.14), the first insight is that the business with the highest level of funding is the KYC, AML & Risk Management. The result can be easily explained by the highest number of companies identified in this sector,

and even by the wider boundaries of the category compared with the other three. However, there can be also an economic factor that has brought to this primacy: the digitalization that the economy has been facing since 2013/2014; with the identity and business digitalization there has been an increasing need of KYC companies and anti-fraud systems that has led to important investments. The unique regularity (compared with the other categories) of the investments' path in KYC, AML & Risk Management justifies a rational explanation, instead investments' trends in companies belonging to the other three business seem more linked to particular situations and opportunities rather than a macroeconomic trend.

2.3.3 Customers

RegTech companies' customers are mainly business. According to our websites' analysis, we identify 5 main categories of clients: Financial Institutions, Corporates, Financial Service Providers, Regulators and Service Providers.

Given the solutions that RegTech companies offer to the market, is common that a single firm has different kind of customers, since a Compliance software processing different regulations can be useful for every customer category. The companies' category (according to the classification provided before) that, more than the others, serves just one customer typology is Reporting.

Reporting RegTech companies generally sell their product / service to Regulators, offering them the possibility to facilitate data analysis, and experts' opinions on next financial trends, but as highlighted before, this kind of companies has started selling their solution also to other customers, in particular to FIs with which they have the highest level of interaction (both among the four kind of business, and the four kind of companies' interactions identified in Table 2.6).

Financial institutions and financial service providers generally look for compliance software, they particularly interact with Compliance companies, furthermore they also need KYC, AML and Risk Management solutions, in order to better take under control operational risk, and to enhance customers onboarding. Corporates generally need tailor-made solutions for their compliance issues, moreover, depending on the company

there will be the need for KYC services, this concern is for instance typical for digital intensive companies.

Service Providers mainly refers to the Healthcare industry, they are interested in Compliance solution for HIPAA and HITECH regulations. This is a significant component for the compliance industry as highlighted in Figure 2.12

These five customers categories are all under the B2B umbrella, B2C solutions are not so widespread, basically because the definition and the concept behind RegTech services. However there are exceptions, RegTech retail exists in a small extent. Digital Identity Providers are B2C solutions, there is a minimum percentage of companies that provide this kind of services, but maybe, as the B2B RegTech market has dealing with a real boom, B2C market has still to be explored and exploited, and in an ever-developing digital world every step forward could result in a future critical competitive advantage.

2.4. Network

It's mandatory to have a look at the Network behind the RegTech world in order to have a further glance on the environment. The information gathered in order to paint this network are mostly collected on companies' websites by directly looking at the nature of their customer and partners (where possible). Then the most relevant relationships have been taken into consideration for the network's drawing. The overall result in term of relationships is the one reported in Figure 2.15 (only relevant relationships are taken in consideration in this network).

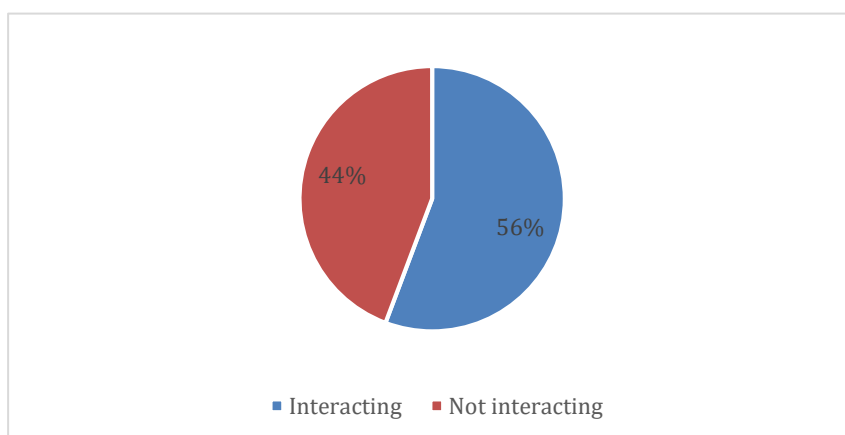


Figure 2.15: RegTech companies having at least one relationship

Source: Own elaboration

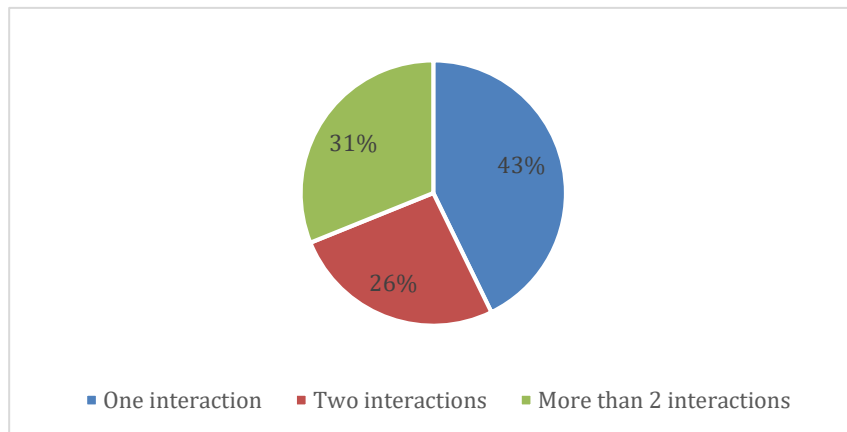


Figure 2.16: How many relevant interactions have RegTech companies built?

Source: Own elaboration

What is evident from this analysis is that behind the RegTech world there is a huge attention from four main kind of actors: Financial Institutions, Financial Service Providers, Tech Companies and Consultancy Firms. The results are widespread among many different players, most of them represent a pivotal role in their specific industry.

2.4.1 Financial Institutions

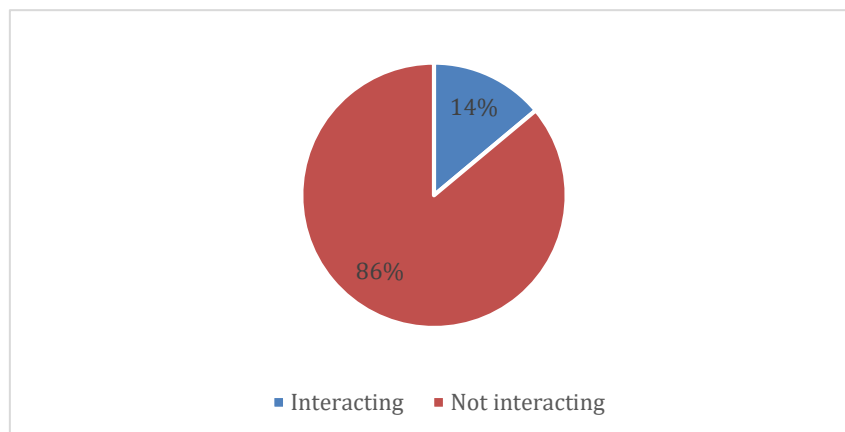


Figure 2.17: RegTech companies having at least one relationship with a FI¹⁰

Source: Own elaboration

¹⁰ It is an absolute data, calculated among all the 323 firms and not just among the 56% of companies that interact with at least a relevant counterparty.

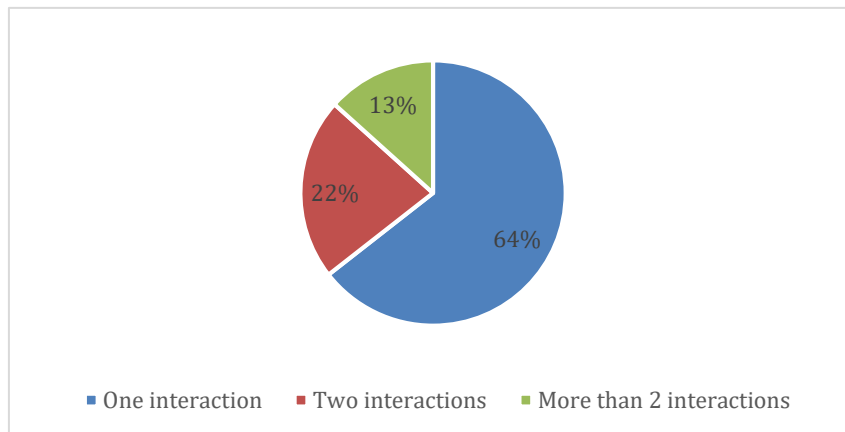


Figure 2.18: How many interactions have RegTech companies built with FIs?

Source: Own elaboration

For what concern financial institutions there is not the evidence to establish an advantaged player since lot of FIs have more or less a similar level of interaction (partnership or more commercial one) with RegTechs. Assessing a preference could be difficult, moreover if we base conclusions just on absolute numbers, we will end up with a couple of “winners”: Barclays and BNP Paribas, that have, as today, wider networks if compared with other FIs.

Setting aside absolute numbers that could bring to a rough analysis, it’s evident that there is not a clear dominance among the financial institutions in terms of relationships, numbers go from 2 to 8 relationships per FI; this means basically two things: first, if we exclude from the list the Asian G-SIBs (because of lack of data for the Asian startups’ world), the majority of the Global Systemic Important Banks of the world have understood the importance of the phenomenon and are trying to keep the pace of the innovation not only through home-made solutions but also by building bridges with the RegTech ecosystem.

Second, there wasn’t a clear first mover, more or less every bank has caught the opportunity with the same timing, this factor has been a boost for the competition, allowing also laggards to enter the ecosystem without particular drawbacks. However there is a clear problem with laggards, that is highlighted by many experts in the field:

“We need to dispel the notion that a RegTech solution can yield a bank immediate cost savings of 30% on day one of its implementation. RegTech’s successes are hard

fought. No one can sit down over the weekend, do some programming, and then churn out the work of 800 employees come Monday”. (Krishna, 2018)

This enforces the concept that laggards can still join the innovation but they would sustain further costs compared with their competitors, given the fact that so far it is difficult to come up with a RegTech solution immediately implementable.

Having a look at the empirical results collected on companies’ website, it is possible to have a quantitative glance of the connection between RegTech companies and financial institutions. Results are the one reported in Table 2.1

	Partnerships	Commercial Relationships
BNP Paribas	0	7 (ACL Services, Droit, Fenargo, KYC 3, Lore AI, Neuroprofiler, Pickcio Chain)
Barclays	4 (AlgoSave, Cloud9, Helm Solutions, Oathello)	4 (Alyne, Certent, Fix Nix, Clause Match)
Citi	1 (Vat Box)	3 (Appzen, AYASDI, Smart Trade)
BBVA	1 (Cognito)	3 (Certent, Fenargo, Fonetic)
UBS	0	5 (Certent, Droit, Fenargo, Metric Stream, RegTek Solutions)
JP Morgan	2 (Cloud9, Kount)	0
FCA	3 (Corlytics, Tradle, AML Accelerate)	1 (Covi Analytics)
Wells Fargo	0	3 (ACL Services, Droit, Provenir)
Santander	2 (Electronic Identification, Signaturit)	1 (Fenargo)
HSBC	0	4 (Exterro, Jumio, Provenir, Smart Trade)
Societe Generale	0	3 (FixNix, Metric Stream, Neuroprofiler)
N26	1 (Touchtech Payments)	1 (Idnow)

Table 2.1: Relationships between FIs and RegTech companies

Source: Own elaboration

The most active financial institutions in the sector in terms of partnership and commercial relationship (e.g. being customer of a RegTech) are: BNP Paribas, Barclays, UBS, HSBC, BBVA and Citi. Looking at the phenomenon from this perspective, we receive another confirm of the “European centric” propensity of the RegTech world.

American financial institutions enter the scene when we move from the “relationship” between FIs and RegTechs to the investment side, here we find new important actors. A direct investment in the field has been seen by some of the FIs as the best form of monitoring of the phenomenon; by investing in a RegTech company banks can start a significant relationship and have certain benefits in exploiting the baked-RegTech solution. The most important investments in the field so far:

In response to the need to be compliant with the new European Directives known as MiFID II and MIFIR, **Goldman Sachs, CitiGroup, UBS, Bank of America/Merrill Lynch, Jeffries and Morgan Stanley**, invested in the company Visible Alpha (which in turn had previously acquired the RegTech reporting software company OneAccess). This investment, equal to 38M\$, is aimed at helping Visible Alpha to develop a compliance platform to track and value research products and services.

Goldman Sachs, DRW and Wells Fargo, through a 16M\$ Series A funding, provided capital to the RegTech company Droit with the aim of helping the innovative player providing pre-trade decision making and post-trade reporting for OTC derivatives under the new solutions. Droit’s solutions are currently used by players such as: **Goldman Sachs, UBS, Credit Agricole, Lloyds Bank, BNP Paribas**. (CB Insights, 2017)

An interesting player in the RegTech environment is definitely AcadiaSoft. It is a RegTech software born by the collaboration among banks (such as **Barclays, Morgan Stanley, Bank of America/ Merrill Lynch, BNP Paribas, Credit Suisse, HSBC, Societe Generale, UBS, Deutsche Bank, JPMorgan Chase & Co, Citi, and State Street**) and market utilities (such as DTCC, Euroclear and Nex). The company’s last founding round was of 30M\$. The goal of this company is basically to create solutions that support the full implementation of International Swaps and Derivatives Association (ISDA) Collateral Requirements. (CB Insights, 2017)

ABN-Amro has been one of the main investors in the series B funding of 17.5M\$ received by BehavioSec, RegTech startup is specialized in behavior tracking. From the bank they declare they will exploit BehavioSec technology to add further passive layer of security control to benefit the bank’s client. (Finextra, 2018)

Commonwealth Bank of Australia (CBA) and ING have completed a pilot that simplify processing of information and implementation of regulation, the test case has been carried out using MiFID II. The supervisor of the project was FCA, that through the observation, concretely realized the potential impact that tools as Natural Language Processing and Artificial Intelligence can have on regulatory compliance for organizations. The project has been done in partnership with Ascent Technologies, they use their tools to convert 1.5 million paragraphs of regulation into a series of “bitesize, actionable tasks appropriate for the banks”. The head of CBA’s London Innovation Lab said: *“The technology was able to crunch regulation documents into actionable compliance with a genuinely surprising 95 per cent accuracy.”* (Note, 2018)

BBVA has invested 50M \$ into a Chinese Artificial Intelligence-focused investment fund. The move is also oriented at accessing to the latest innovation in terms of Artificial Intelligence in the Chinese market. BBVA has already made an investment (100M \$) to launch its fintech fund in 2013, but they want to change strategy by replacing it with an independently managed outfit called Propel Venture Partners. (Finextra, 2018)

Wells Fargo participated in March 2018 in a Series C funding of 30M\$ to Canopy, a RegTech startup whose business is focused on tax compliance. The bank believes that the suite of products offered by Canopy increases transparency and productivity, improve the organization and reduce time/cost related to fiscal practices. (Hurst, 2018)

A bundle of investor, among which we find **Goldman Sachs, BNP Paribas** (who was responsible for leading the round), **Square Capital, Nasdaq,** and **Barclays,** have financed Digital Reasoning (a RegTech startup that work on data risk management) with a 30M\$ investment. The main goal of this investment is to allow Digital Reasoning to implement and use its new and patented AI technology that transforms all the types of communication data (like voice and video ones) into understandable and utilizable insights that can help accelerate the customer-centric strategies in all the major companies worldwide. In particular, BNP Paribas declared that this investment is aligned with their digital transformation plan, which is about a strategy of increasing the use of analytics

and data, reinventing customer experience and improving operating efficiency. (Kulkarni, 2018)

Credit Suisse joined the forces together with Palantir Technologies (an artificial intelligence firm, already backed by the CIA's venture capital arm) to use data-driven behavioral analysis to better monitor markets and avoid rogue traders and insider dealing. "The venture will track traders' activities and try to identify aberrations both from their own norms and from those of their colleagues. The new product will analyze those outliers and marry the data on them with behavior analysis, such as cell phone usage and door key-card swipes." (Voegeli, 2016)

HSBC invested 3.3M \$ in Quantexa in March 2017; in April 2018 Quantexa announced that they have successfully developed a pilot to combat money laundering. HSBC will integrate Quantexa technology into its system this year. The software will help the bank in detecting potential money laundering cases by analyzing internal, publicly available, and transactional data within a customer's wider network. (Global Banking & Finance review, 2018)

Analyzing the investments of the financial institutions there is not a dominance of target type (according to the classification in the 2.2.3), but investments are widespread all over the hemisphere. Moreover what it is mandatory to precise is that the objective of the FIs is mainly one: reducing cost. The dispersion in the solutions chosen does not come from objectives' misalignment but from the different way through which banks want to reach the same goal.

2.4.2. Financial Service Providers

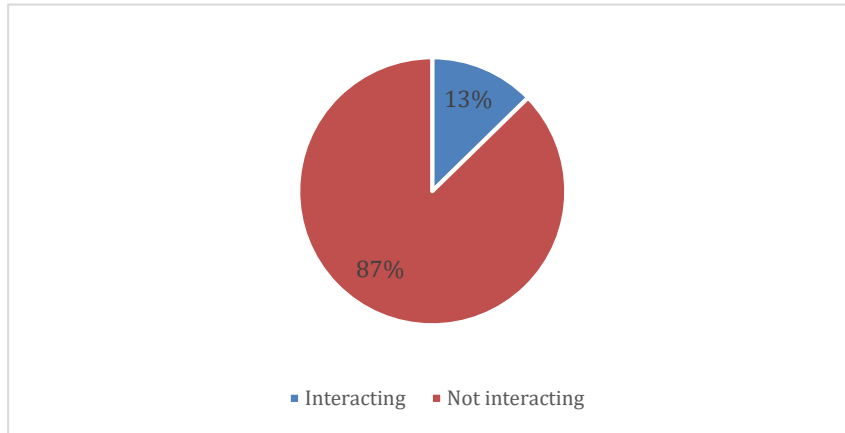


Figure 2.19: RegTech companies having at least one relationship with a FS Provider

Source: Own elaboration

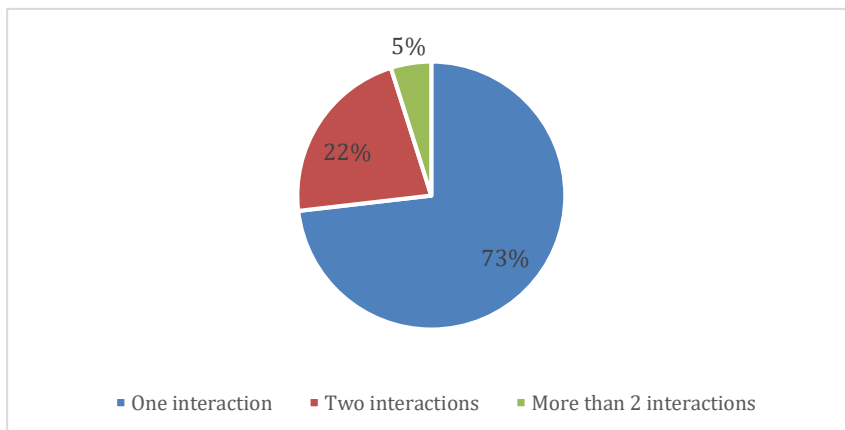


Figure 2.20: How many interactions have RegTech companies built with FS Providers?

Source: Own elaboration

The second category analyzed is Financial Service Provider. According to the information gathered (Table 2.2), there are a lot of players interested in the phenomenon, most active are: Visa, Allianz, American Express and Dow Jones. Furthermore there is a distinction, between incumbent and new entrants, in terms of RegTech invested in.

	Partnerships	Commercial Relationships	Acquisition
American Express	2 (360 Kompany, Payfone)	2 (Enigma, Exterro)	0
PayPal	1 (360 Kompany)	1 (DueDil)	0
Dow Jones	5 (AlgoReg, AQmetrics, Cynopsis Solutions, smarKYC, Symphony Communication)	1 (Zignsec)	0
Bloomberg	3 (Acadiasoft, AQmetrics, Visual Risk)	0	0
Nasdaq	1 (Cloud Margin)	1 (Recorded Future)	1 (Sybenetix)
VISA	3 (Digital Control Room, Featurespace, Touchtech Payments)	2 (Exterro, Paymentscompliance)	
Mastercard	2 (Featurespace, Touchtech Payments)	1 (Paymentscompliance)	0
Allianz	0	5 (Alyne, Neuroprofiler, Secondfloor, TALEO Reporting, Visual Risk)	5
London Stock Exchange	2 (Kaizen Reporting, TRADEcho)	0	0

Table 2.2: Relationships between FS Providers and RegTech companies

Source: Own elaboration

Incumbent like American Express or Nasdaq have invested in solution in order to improve their business, for example the former has backed AML & KYC companies, while the latter has focused its attention and effort towards market surveillance and compliance monitoring software solutions. More precisely:

American Express has recently invested (the amount has remained undisclosed) in a RegTech startup named EverCompliant that is mainly focused on AML. American Express believes that the technology EverCompliant is developing will help payment system providers, and will avoid bad actors could access companies' systems (allowing this way the processing of regular transactions only). (Cision, 2018)

Nasdaq acquired Sybenetix on July 2017. Sybenetix is an enterprise behavioral analytics company that is focused on the development of market surveillance and compliance monitoring software solutions for banks, asset managers, hedge funds, exchanges, and regulators. (Nasdaq, 2017)

On the other side new entrants invest both for improving their business but also to find new opportunities in terms of regulation to address their future strategies. Apple Bank belongs to the second category, by focusing on Reporting solutions they try to determine which of the upcoming regulation will affect their business and the magnitude of the change.

Apple Bank choses Continuity's RegAdvisor Pro, RegControls and ControlsBuilder to help its regulatory compliance process. "Continuity offered Apple a centralized platform with the ability to determine what regulations updates affect them and a better way to track compliance efforts, monitor compliance activity and report data". (Continuity, 2018)

Amazon Pay is trying to improving its business by increasing its presence in a precise region of the world: India.

Why India? (Duggan, 2018) Because of two related factors: first, India is one of the most important economy in the world and it has been faster growing than any other region. Second, Indian citizens have much less access to financial services compared to United States ones, there is a huge percentage of Indian that does not have a bank account. Amazon has identified these two factors that could bring to a boom of the financial market in that region, e for this reason has decided to heavily invested in financial services there, focusing also on RegTech solutions. "In March, Amazon announced it was providing \$30 million in additional funding to its digital payments subsidiary Amazon Pay. The latest funding comes after Amazon designated \$40 million in funding for Amazon Pay's India operation in late 2017. Amazon has said it would increase its investment in the digital payments subsidiary fivefold in the next several years."

Late in May, Indian online insurance startup Acko announced that Amazon was the leading investor in the company's \$12-million fundraising round. Acko aims to bring a technology-centric approach to the insurance business and recently received in-principle

regulatory clearance to launch its business in India. According to Inc42, only about 3 percent of the transactions in the \$80-billion Indian insurance market take place online.

2.4.3. Tech Companies

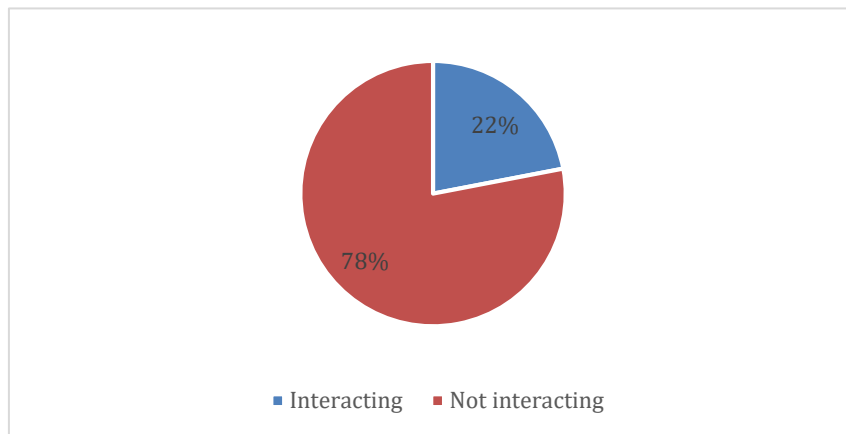


Figure 2.21: RegTech companies having at least one relationship with a Tech Company

Source: Own elaboration

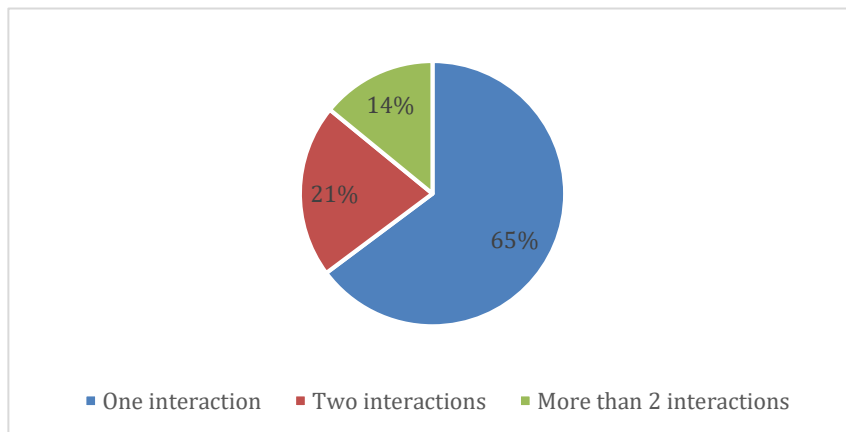


Figure 2.22: How many interaction have RegTech companies built with FS Providers?

Source: Own elaboration

	Partnerships	Commercial Relationships	Integration
Amazon (web service)	8 (AQmetrics, Captricity, Helm Solutions, Intelliment Security, Neota Logic, Privitar, Tick Smith, Trace Link)	1 (Appzen)	1 (Druva, Feedstock)
Microsoft	15 (Avedos, Cavin System, Dome 9, Hexa Nika, Hytrust, LockPath, Quick Safety, Reportin, rfxcel Corporation, RiskIQ, Symfact, Theta Lake, Trusona, Trust Stamp)	5 (Convercent, Coreview, Exterro, Fiscal Note, Onapsis)	3 (Feedstock, Gecko Governance)
Google	5 (Cavin System, Dome9, Intelliment Security, Onfido, RiskIQ)	0	1 (Feedstock)
IBM	10 (Avaamo, Fix Nix, Hexa Nika, Hytrust, LockPath, RiskIQ, Securekey Technologies, Symetrics, Trust Stamp, Trustweaver)	1 (Averon)	0
Oracle	4 (Appzen, Checkr, InfoCert, VATBox)	1 (Exterro)	1 (Avaamo)
Intel	3 (Hytrust, Onapsis, Securekey Technologies)	0	0
Siemens	2 (Darktrace, GAN Integrity)	2 (ACL Services, Ayasdi)	0
Vodafone	0	3 (Fonetic, Idmission, RiskIdent)	0
SAP	5 (Feedzai, InfoCert, Onapsis, rfxcel Corporation, VATbox)	0	1 (Avaamo)

Table 2.3: Relationships between Tech Companies and RegTech companies

Source: Own elaboration

The third category under analysis is Tech Companies.

Tech companies interact with the RegTech world in two different ways:

- A pure technological contribution that aims at finding new solutions in terms of Machine Learning, Artificial Intelligence, APIs, IoT and Cloud-based solutions.
- Initiatives similar to the creation of Hubs in order to foster collaboration between the companies participating.

The list of this kind of player interested in RegTech is quite long, the most relevant one are: Microsoft, Google, Intel, SAP, Siemens, Samsung, IBM and Oracle. In particular Microsoft has an impressive number of relationship with RegTech companies if compared with the other players, that gives Microsoft an undisputed primary role in the RegTech hemisphere. Under the concept of “pure technological contribution” there are some of the most important tech companies in the world. Their effort is aimed at both internally developing new solutions in terms of machine learning, artificial intelligence

etc. but also in acquiring startups in order to integrate their services, and finding new solutions together. Going into details:

IBM has launched a new software based on Watson (Artificial Intelligence, Cognitive RegTech), that helps financial institutions in carrying out different tasks: understanding regulatory requirements, providing a wider consciousness about potential financial crimes, new way of risk management. Why the investment? They have esteemed that compliance and risk management accounts for 15% of FIs' budget, with an overall cost of 270B dollars per year, and the trend will increase.

SAP also launched in October 2017 the SAP S/4HANA for advanced compliance reporting, it helps organization in sticking with local and worldwide regulations, it also reduce the need of human intervention resulting in higher productivity and a reduced total cost of ownership, the risk of noncompliance and its associated costs are also significantly reduced. (SAP, 2018)

Perpetual Corporate Trust worked with **Microsoft** to develop a new platform in order to give organizations a tool that is able to stress their residential mortgage portfolio using macroeconomic factors such as house price indexes, GDP, unemployment and the cash rate. Microsoft Azure boosted Perpetual's development, allowing it to test, learn and spin up sandboxes. (Microsoft, 2018)

Adobe has had six sessions on GDPR called "Adobe is GDPR ready. Are you?". More precisely Adobe has provided a new GDPR API to enable its customer (business, not individual) to retrieve, modify or delete their personal data; the interesting aspect of the interface is that the decision on what constitutes personal data is not taken by Adobe, but by its customer. (Anderson, 2018)

Thierry Breton, **Atos** Chairman and CEO said: "We continue to significantly invest in technology either on our own or through partnerships. In this context, I am extremely pleased to announce the first strategic collaboration with Google that I see as another validation and reinforcement of our worldwide leadership in Orchestrated Hybrid Cloud. By leveraging Atos and Google Cloud strengths, we will create global secure solutions

including Google Cloud as a preferred public cloud platform in our Orchestrated Hybrid Cloud solution. In addition, running specific Google Machine Learning algorithms under our control in our Data Centers will enable faster and smoother adoption of AI [...] Atos becomes the "trusted last mile" of the digital information chain, fully addressing customer concerns like secure access to data, critical data localization, and compliance with regulation such as GDPR." (Atos, 2018)

Facebook after recent scandals, have promised to focus more on users' privacy, and according to this thought they have answered with a first initiative "Clear History", a newly feature so users can opt out of Facebook using their browsing history. (Yurieff, 2018)

Nokia has acquired SpaceTime Insight, a US-based company that provides machine learning powered analytics and Internet of Things solutions for large businesses. Within the many application of the services provided by SpaceTime, one of the most important is to ensure regulatory compliance. The project will become part of the Nokia software portfolio, enhancing the importance of the IoT package provided by the Finnish company. (Corner, 2018)

HP counts on its portfolio a company that is basically a software provider, called FlowHub. HP said they sold hardware to FlowHub, which is starting a new package (hardware + software) tailor-made for the marijuana industry. This solution doesn't provide just business management tools, but also workflow focused on the ever-changing compliance, regulatory and reporting rules that challenge the owner of marijuana dispensaries. (Pymnts, 2018)

McAfee acquired SkyHigh Network on November 2017. With Skyhigh Security Cloud, enterprises can accelerate their business by leveraging technology and services to confidently identify, control and protect data and user activities across any cloud, on any device. (Crunchbase, 2017)

Intel Capital leads an investment of 14.2M \$ in an Artificial Intelligence startup (Avaamo). The Intel Capital interest towards the business is shown by the fact that Intel Capital director Arun Chetty will join Avaamo's board. (Anupam, 2018)

On the other side there are some important Techs that decided to launch programs in order to foster a collaborative environment, by making the whole community aware of new upcoming regulations, and by creating hubs and spaces in which startups can confront each other and can improve their solutions:

Microsoft has worked over the last years to GDPR implications, it wants to help organizations to get across the GDPR compliance finish line offering on demand videos and in-person events at its Microsoft Technology Center; these helping sessions will make you aware about key challenges affecting personal privacy, controls, notifications and transparent policies. (Microsoft, 2018)

SAP has launched its 5th Leonardo Center in Singapore (May 2018). Leonardo projects integrate new technologies and services in one intelligent system on the SAP Cloud Platform, offering design thinking services and expertise to help fast-track your companies' digital transformation by exploiting Internet of Things (IoT), machine learning, blockchain, analytics and big data. The SAP Leonardo Center Singapore aims to foster a collaborative environment for business, start-ups, small and medium enterprise to experiment and innovate. (SAP, 2018)

Lenovo has recently launched two new projects "ThinkSystem" and "ThinkAgile" aimed at increasing customer satisfaction and reliability by leveraging on data analytics, high performance computing, hybrid cloud, artificial intelligence and machine learning. Lenovo participated at the Next Revolution Roadshow 2018 in Milan to show the evolution of Lenovo's architectures for an agile, scalable and safe Data Center. (Data Manager Online, 2018)

Nvidia launched in 2016 a program called "Inception Program" which basically works as a startups hub. They want to help the most revolutionary startups in terms of

artificial intelligence and data science. An example of a startup backed by this program is MinerEye, a leader in artificial intelligence-powered information governance and data protection. (Nvidia, 2018)

Synechron has just (April 2018) launched a program called RegTech Accelerator Program aimed at improving efficiency in process relating to regulatory compliance. The project consists in many Accelerators all with the same objective: giving to financial organizations the benefit of increased control through technology, which allow for greater transparency, more efficiency, better data quality, and better overall management of risk and regulatory compliance. Synechron has opened six different Accelerators, each designed for a specific regulatory challenge, including solutions for the following regulations: Anti-Money Laundering (AML), Know Your Customer (KYC), Basel III, International Financial Reporting Standards (IFRS) 9, the Generally Accepted Accounting Principles (GAAP) and Fundamental Review of the Trading Book (FRTB). (Synechron, 2018)

2.4.4. Consultancy Firms

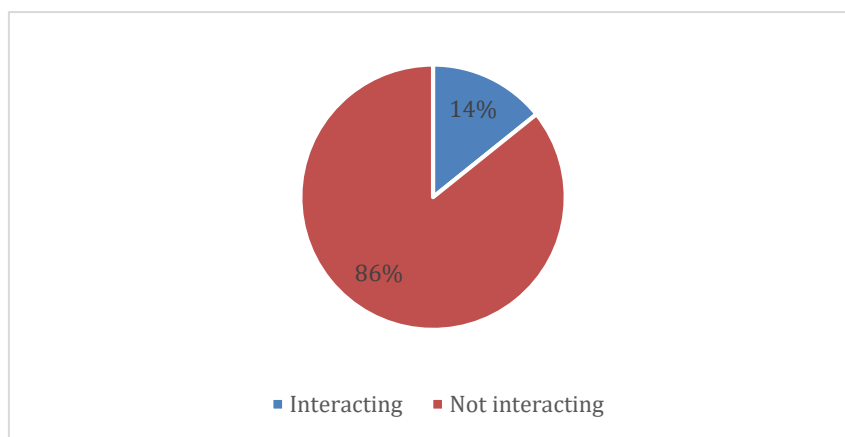


Figure 2.23: RegTech companies having at least one relationship with a Consultancy Firm

Source: Own elaboration

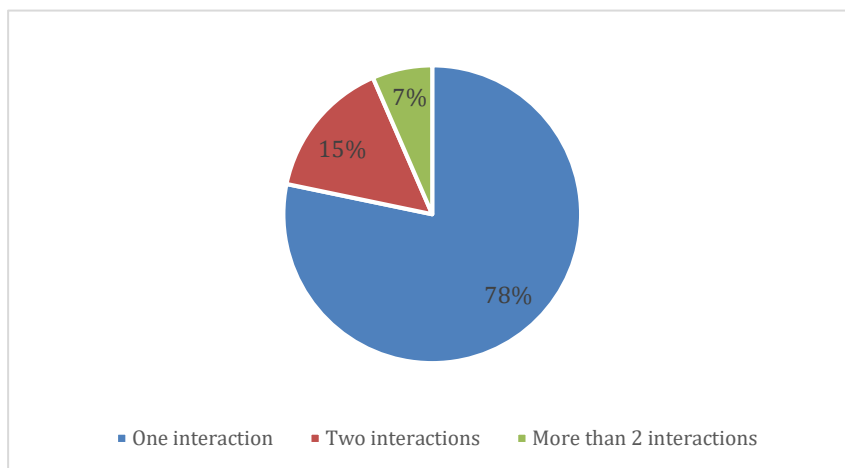


Figure 2.24: How many interactions have RegTech companies built with Consultancy Firms?

Source: Own elaboration

	Partnerships	Commercial Relationships
Deloitte	9 (AML Accelerate, Arctic Intelligence, Capnovum, Dtex System, Feedzai, Finform, Quantexa, Rsam, smartKYC)	3 (ACL Service, Alyne, Law Geex)
PWC	6 (Featurespace, Legito, Onapsis, Quantexa, Rsam, Viclarity)	2 (Covi Analytics, Dathena)
Accenture	7 (Captricity, Fenargo, Fix Nix, Hexa Nika, Onapsis, Rsam, Yoti)	1 (Recorded Future)
Capgemini	6 (Fenargo, Fix Nix, Identity Mind Global, Pickcio Chain, Trustweaver)	2 (Convercent, Documaster)
EY	4 (Avedos, Net Guardians, Onapsis, Pickcio Chain)	1 (Covi Analytics)
Thomson Reuters	7 (Beagle, Fiscal Note, Helm Solutions, Neota Logic, Symfact, Tick Smith, Visual Risk)	0
KPMG	5 (Electronic Identification, Onapsis, Symetrics, Trace Link, Trunomi)	3 (Druva, Due Dil, Visual Risk)

Table 2.4: Relationships between Consultancy Firms and RegTech companies

Source: Own elaboration

Last category analyzed is Consultancy Firms. At this stage there are mainly seven players that have bet on many different realities of the RegTech ecosystem: Deloitte, PWC, Accenture, KPMG, Thomson Reuters, Capgemini and EY.

These seven enterprises represent the bulk of relationship between consultancy firms and RegTech companies. Setting aside partnerships and commercial relationships, the focus is on the most interesting studies found:

KPMG has developed a proprietary compliance risk management framework that consists of eight components, with culture and accountability at the core. “The importance of culture and tone from both the top and middle management should not be underestimated. Leading compliance programs that are plagued by cultural issues will still have problems. Similarly, a good culture can help organizations minimize misconduct while reducing the impact of compliance issues.” (KPMG, 2017)

Deloitte is probably one of the most active realities in studying the phenomenon. It has provided RegTech reports since late 2015, among which there is also a first attempt of RegTech world classification.

Accenture has provided some studies in the field, by quantifying investments, describing the main actors of the phenomenon and giving a taxonomy of the business. One of the most meaningful result they have provided is that the 89% of the Compliance Officer in the financial services has assessed that investments in RegTech solutions are going to sharply increase in next two years. (CorCom, 2018)

This last data has been also confirmed by the data we have gathered and the investment graph (Figure 2.1) that highlights the increase of the investment for the 2018 compared to the previous years.

Consultancy firms mainly contribute to the cause by providing report and studies on the phenomenon, however they are also active in establishing partnerships with RegTech companies.

2.4.5. RegTech companies’ interactions

Among the 325 companies of the RegTech world there are 49 that interact each other, some of them have a wider network (interacting with more than one company). The most common form of interaction is the partnership, but still there are cases of integration between the two services provided by the two companies interacting.

RegTech solutions are highly integrable each other since they are based on a high level of technology.

Another form of interaction is the commercial one, among the RegTech companies there are some of them that sell their own product to other RegTech companies.

What is important to highlight is that the majority of the companies does not interact with a counterparty in the ecosystem. The situation is the following:

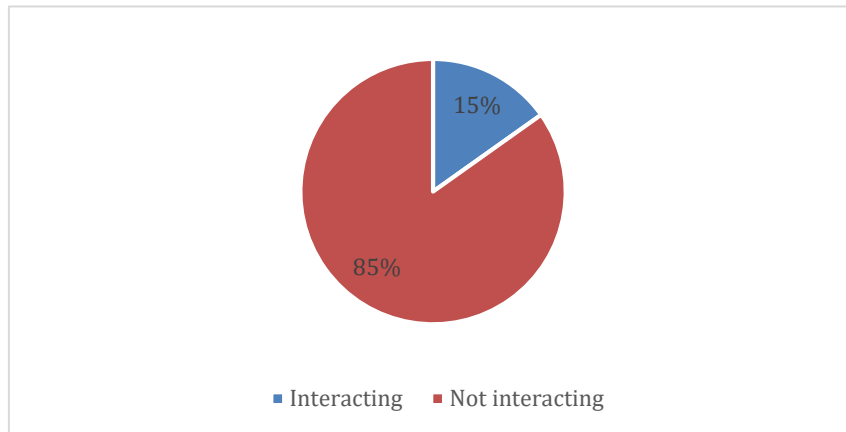


Figure 2.25: RegTech companies having at least one interaction with another RegTech company

Source: Own elaboration

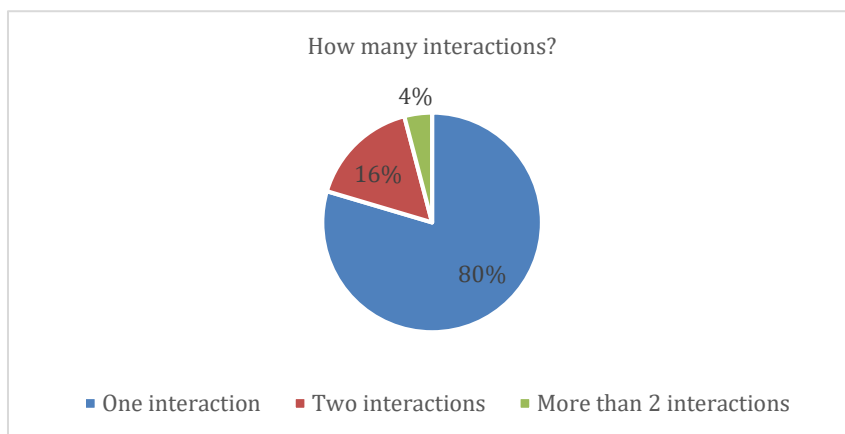


Figure 2.26: How many interactions have RegTech companies built with other RegTech companies?

Source: Own elaboration

The network has still to be consolidated, but having 49 companies within 325 that interacts is a consistent result considering the youth of the phenomenon, moreover the high integrability of the solution, the usage of the cloud technology and the increasing development of high quality collaborative environments should lead the ecosystem to interact more.

2.4.6. Network and Funding

In this paragraph there are analysis related to the network: how it is important for the best RegTech companies (in terms of funding received) and how it is widespread according the business of the companies. First there is a table (Table 2.5) that provides all the relevant relationships for RegTech companies that have received important funding rounds (at least 50M\$)

	Funding Amount	Partnership	Commercial Relationship	Integration
Avalara	100M, 96M	0	0	0
Ayasdi	55M	0	3 (Credit Suisse, Citi, Siemens)	0
Checkr	100M	1 (Oracle)	0	0
Chrome River Technologies	100M	0	0	0
Cipher Cloud	50M	0	0	0
Dark Trace	64M, 75M	1 (Siemens)	0	0
Druva	51M, 80M	1 (McAfee)	2 (NASA, KPMG)	1 (Amazon)
Exiger	80M	0	0	0
Exterro	100M	0	5 (VISA, HSBC, American Express, Microsoft, Oracle)	0
Feedzai	50M	3 (SAP, Deloitte, another RegTech: Socure)	0	0
Fenergo	75M	2 (Accenture, Capgemini)	6 (BNP Paribas, BBVA, Scotiabank, UBS, Santander, Royal Bank of Scotland)	0
Kount	80M	2 (JP Morgan, another RegTech: BehavioSec)	0	0
Metric Stream	60M, 65M	0	4 (UBS, Societe Generale, Zurich, Philips)	0
Sift Science	53M	0	1 (Twitter)	0

Signifyd	56M, 100M	1 (another RegTech: Threat Metrix)	0	0
Symphony Communication	66M, 100M, 63M, 67M	2 (Dow Jones, another RegTech: RSRCHxchange)	0	0
Trace Link	51.5M, 60M	2 (KPMG, Amazon)	0	0
Verafin	60M	0	0	0

Table 2.5: Which are the relationships of the most important RegTech companies (considering funding amount)

Source: Own elaboration

As it is possible to notice, the most important players in the RegTech ecosystem do not necessarily have a wide network behind (remembering that only relevant relationships are collected in order to build network considerations). Fenergo seems the only company having an important number of relationships. What can be argued is that Network is important but not fundamental in order to achieve relevant funding rounds, companies like Avalara, Cipher Cloud, Chrome River Technologies, Exiger and Verafin, that represent almost the 30% of the considered sample, do not have any relevant relationship. Second, there is an analysis between network and business typology:

	General Interaction	Interacting with a RegTech	Interacting with a FIs or a FS Provider	Interacting with a Tech Company	Interacting with a Consultancy Firm
Compliance	50.6% (42/83)	28.5% (12/42)	42.8% (18/42)	30.9% (13/42)	28.5% (12/42)
KYC, AML & Risk	58.6% (78/133)	34.6% (27/78)	39.7% (31/78)	35.89% (28/78)	19.2% (15/78)
Reporting	64.5% (20/31)	20% (4/20)	50% (10/20)	35% (7/20)	30% (6/20)
Hybrid	53% (40/75)	12.5 % (5/40)	35% (14/40)	50% (20/40)	32.5% (13/40)

Table 2.6: Interaction for each business category

Source: Own elaboration

Compliance: The 50.6% of Compliance RegTech companies have at least one relevant relationship. Among this 42 companies, 42.8% has a relationship with a financial institution or a financial service provider, the most active player in building relationship with compliance companies is Barclays, with 4 companies within its range, we find also other important European players as N26, UBS, Deutsche Bank, ING, FCA, London Stock Exchange, Societe Generale and BNP Paribas.

The 28.5% of compliance companies taken into consideration, has within its network another RegTech company, the same percentage has in its network a Consultancy firm, and the 30.9% has a Tech company.

It is not a surprising result that the highest percentage is the one related to financial institutions, since most of the regulation to be compliant with, are related to the financial world.

KYC, AML and Risk Management: the 58.6% (78/133) of KYC, AML and Risk Management RegTech companies have at least one relevant relationship. Among this 78 companies 40% has a relationship with a financial institution or a financial service provider. One of the most active player in building relationship with this kind of companies is Dow Jones, that has the majority of its relationship with RegTech belonging to this category, moreover in this particular network we find a lot of players in the payment industry: American Express, PayPal, Visa and Mastercard.

Another interesting number is the one related to the relationship with other RegTech, among the 78 companies selected the 34.6% interacts with another company in the ecosystem (it's the highest percentage among the four business identified), furthermore we also find in this category the English start-up Passport, that has the highest number of relationships with other RegTechs (6).

Reporting: This kind of companies has the highest percentage in terms of relationships, 64.5% of them have at least one relevant relationship. This extent of the network is due to the high demand for reporting solutions, that are not requested just by regulators but also from financial institutions and financial service providers, in fact the percentage of Reporting companies interacting with FIs and FS providers is the highest among all the categories.

Reporting companies have a very low percentage in RegTech relationships, that can be explained by considering that this kind of solutions tend to have technological start-up partners rather than RegTech one, that enable them to process huge quantity of data.

Hybrid: A meaningful data is the 12.5% (Table 2.6) of relationship with other RegTech (the lowest among the four categories), is reasonable to justify it by thinking to the nature of the category, hybrid companies are the ones that comprises more than one solution, so they are the less interested in embracing other services from other RegTechs.

At the same time this category has the lowest percentage in interaction with FIs and FS Providers, probably because these players need more specific solutions.

Chapter 3

Discussion

3.1. RegTech's first moves

One of the most interesting aspect of RegTech is strictly linked to the timing of the phenomenon. It's difficult to assess a precise timing, the proposed esteems are based on the foundation year of RegTech start-ups, and on researches and articles.

Before getting to data it is important to take a semantic glance to the word "RegTech". The composition of the word addresses our focus to companies that are both "Reg" and "Tech"; yet, technology has been used to foster compliance since 2008, does this mean that RegTech is a 10 years old phenomenon? If so, why did the phenomenon come up just in last 3/4 years? The answer to the first question is yes. More precisely, the phenomenon came up after Lehman Brothers, AIG, Fannie Mae, Freddie Mac, and other financial institutions' meltdowns. It is after those events that the financial world understood the need for stricter regulation and monitoring, and consequently the entire environment started to think about how technology would have improved these aspects. (Davison, 2018)

Basel I just showed its fragility. Accounting monitoring turned out inefficient, so there was the need to follow other paths in order to better address regulation. It's possible to define the post-crisis momentum as the RegTech 1.0, during which mainly regulators, started to think about how technologies could have improved their job. What gave an important incentive to the development of the phenomenon were those companies that understood the possibility of building a new business on the application of technology to foster better regulation and compliance, making themselves the first sponsors of the motto "Regulation is not just another sheet of paper to be filled".

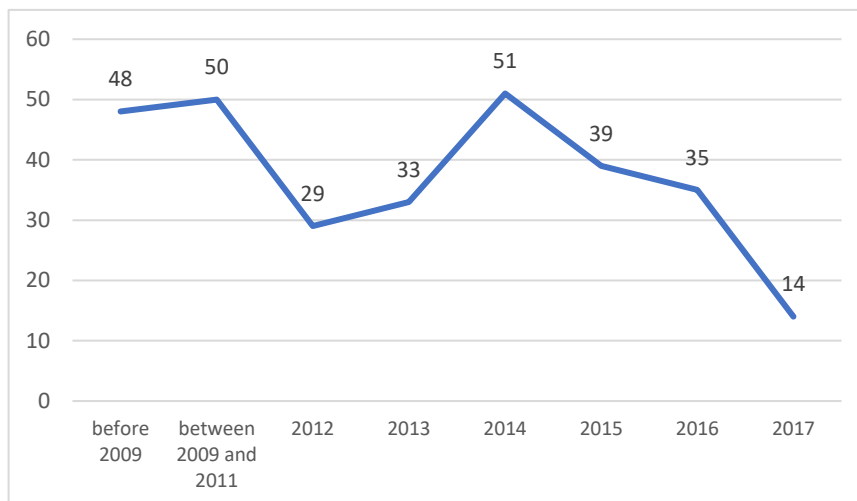


Figure 3.1: Number of companies founded

Source: Own elaboration

These RegTech companies were born between 2009 and 2011, and together with the ones launched before 2009, they still represent almost one third of the ecosystem (Figure 3.1) Subsequently, the phenomenon has advanced with a wave-shaped path, with a peak in 2014 (the graph is totally based on the companies included in our dataset). It's in 2012/2013 that the phenomenon entered in the growth phase, identified as RegTech 2.0 (i.e. its current phase); this step has been mainly pushed by two logics (i.e. the answers to the second question posed at the beginning of this paragraph):

- 1) The increasing needs for compliance and the beginning of regulatory processes such as MiFID II, Basel III, Solvency II, GDPR, PSD2, together with the increasing fines, both in term of amount and number, that financial institutions have paid through these years for lacks in compliance, accountability and reporting, have fed the “Reg” component. (Financial Times Adviser, 2018) (Bolton, 2018) (Cocking, 2017) (Groenfeldt, 2018)
- 2) The rising of technologies such as machine learning, artificial intelligence and blockchain that gave a boost to the “Tech” component of the phenomenon, and created appeal on the VC market because of the disr (Arner, Barberis, & Ross, 2016)uptive technologies, and their usage in a totally new and unexplored field. (TechBullion, 2018) (Sloane, 2018)

As previously showed in paragraph 2.3.1 investments consistently started in 2012, this proves that 1/3 of the companies were born before that year, but the attention to the phenomenon raised in 2012, legitimating that year as the one of the growth.

Today RegTech is still in a growing phase, the increasing number of regulation highlighted above are now being applied; thus, there is the need for one side (i.e. financial institutions and corporates) to comply with the new regulations, and for the other side (i.e. regulators) to follow the application of the rules and to catch every possible insight for a further improvement. We expect to enter, in next 3/5 years, in another phase (RegTech 3.0). In that phase we will see the introduction of a new tool in the ecosystem: the so-called “Regulatory Sandboxes”.

3.2. Sandboxes

3.2.1 Introduction

According to the UK FCA’s Project Innovate Unit:

“Sandboxes are a safe space in which businesses can test innovative products, services, business models and delivery mechanisms without immediately incurring all the normal regulatory consequences on engaging in the activity of question”

For RegTech start-ups in this space, the **Regulatory Sandbox** offers a unique opportunity to test innovations more efficiently by operating (for a limited period of time) without the complete ordinary licensing and regulatory obligations.

Empirical evidence shows little of the potential of the Sandbox solution for RegTech. So far, most of them have offered a productive environment to FinTech companies in general, but experts and representatives of the phenomenon believe that Regulatory Sandboxes represent a great opportunity for the future, especially of RegTech. It is reasonable to imagine regulators hosting Sandboxes where RegTech start-ups are subject to stress tests (e.g. see if their solutions still grant compliance when some terms of a regulation like MiFID II are altered), war-games (Sandboxes’ start-ups competing among each other on the time and money that their solutions could allow to save or the

time needed to gather all customer data for a product launch). Also, RegTech start-ups can test if their KYC framework, AML system, or fraud-detection systems are working respecting all the regulations (apart from the exemptions agreed in the admission process). Thus, they could be allowed to violate some measures of the GDPR in pursuit of wider/more efficient solutions, for then re-adjusting them to fit the current regulatory duties.

RegTech actors such as the Financial Conduct Authority propose to start-ups during the admission process a No Enforcement Action Letter (NAL), according to which the FCA will not take actions against the testing activities where it is agreed that the firm is immune to the requirements or objectives of the FCA. RegTech start-ups receive also an Individual Guidance Letter: the firm's actions are considered as within the guidance issued by the FCA; thus, no enforcement actions will be undertaken. However, the Sandbox's members need to support the regulators' mandates, in particular customer protection.

3.2.2 Pioneers

Apart from the Financial Conduct Authority, which will be taken as reference for the body of the whole Chapter, there are nowadays several institutions and regulators that started up their own Regulatory Sandboxes.

The most important ones to mention are:

- 1) **The FinTech Supervisory Sandbox (FSS) of the Hong Kong Monetary Authority:** it allows banks and their partnering technology firms (tech firms) to conduct pilot trials of their fintech initiatives involving a limited number of participating customers without the need to achieve full compliance with the HKMA's supervisory requirements. This arrangement enables banks and tech firms to expedite the launch of new technology products, and reduce the development cost. (Hong Kong Monetary Authority, 2018)
- 2) **The Dubai International Financial Centre (DIFC) of the Dubai Financial Services Authority:** It welcomes early management from FinTech firms, including existing authorised firms. It proposes a number of qualifying criteria to ensure the suitability of a FinTech firm to use the regime for the testing of products

and services. The Innovation Testing Licence (ITL) is issued to allow testing and as a step towards obtaining an unrestricted Financial Services Licence. (Dubai Financial Services Authority, 2017)

- 3) **The Working Group by the Reserve Bank of India:** this inter-regulatory Working Group was set to study the entire gamut of regulatory issues relating to Fin Tech and Digital Banking in India. Its main goals are: to undertake a scoping exercise to gain a general understanding of the major Fin Tech innovations, entities, technology platforms involved and how markets, and the financial sector in particular, are adopting new delivery channels, products and technologies; to assess opportunities and risks arising for the financial system from digitisation and use of technology; to examine cross country practices in the matter, to study models of successful regulatory responses to disruption across the globe. (Reserve Bank of India, 2016)
- 4) **The Regulatory Sandbox of the Monetary Authority of Singapore:** FIs or any interested firm (the “applicant”) can apply to enter a Regulatory Sandbox (the “Sandbox”) to experiment with innovative financial services in the production environment but within a well-defined space and duration. The Sandbox shall include appropriate safeguards to contain the consequences of failure and maintain the overall safety and soundness of the financial system. Depending on the financial service to be experimented, the applicant involved, and the application made, MAS will determine the specific legal and regulatory requirements which it is prepared to relax for each case. (Monetary Authority of Singapore, 2016)
- 5) **The Regulatory Sandbox of the Australian Securities & Investments Commission (ASIC):** ASIC has identified some barriers faced by new financial technology (fintech) businesses seeking to enter the financial services market. These barriers include speed to market and meeting the organisational competence requirements of a licensee. In seeking to address these specific barriers to innovation in financial services, ASIC proposes to implement a limited industry-wide licensing exemption to allow start-ups to test certain financial services for six months (the 'Regulatory Sandbox' exemption). (Australian Securities & Investments Commission, 2016)

However, for the various hypotheses and considerations presented later on in this Chapter, the main reference point/role model that has been considered is the Regulatory Sandbox launched by the Financial Conduct Authority, UK. The significance of the reference is given by the fact that the FCA's Sandbox is considered the first and most relevant pioneer in this industry; also, the FCA is the most advanced regulator when it comes to RegTech initiatives, and operates in what is considered as the world's RegTech hub at the moment: the United Kingdom.

As a result, the following descriptions and argumentations mainly refer to the FCA's Sandbox model. In paragraph 3.2.5 there will be a recall of the main Sandboxes launched around the world in order to present the main theory of this Chapter.

3.2.3 Process Flow

The Sandbox Industry is yet in the introduction phase of its life cycle. Regulatory Sandboxes around the world have still different rules, visions, goals, and structure; thus, it is hard to find some best practices/guidelines that can be generalized to all those actors that already created or are going to create in the short-term a Regulatory Sandbox.

However, taking into considerations the most relevant pioneers in the industry that already created a structured Sandbox, it is possible to gain some insights that are useful to build a general overview of how Sandboxes work in practice. As a consequence, although it is the Financial Conduct Authority's (UK) Sandbox that will be considered in this Chapter as the "optimal" model, in order to provide an idea of the process that a certain start-up follows when approaching a Regulatory Sandbox, a useful framework is the one proposed by the Monetary Authority of Singapore in its report "FinTech Regulatory Sandbox Guidelines".

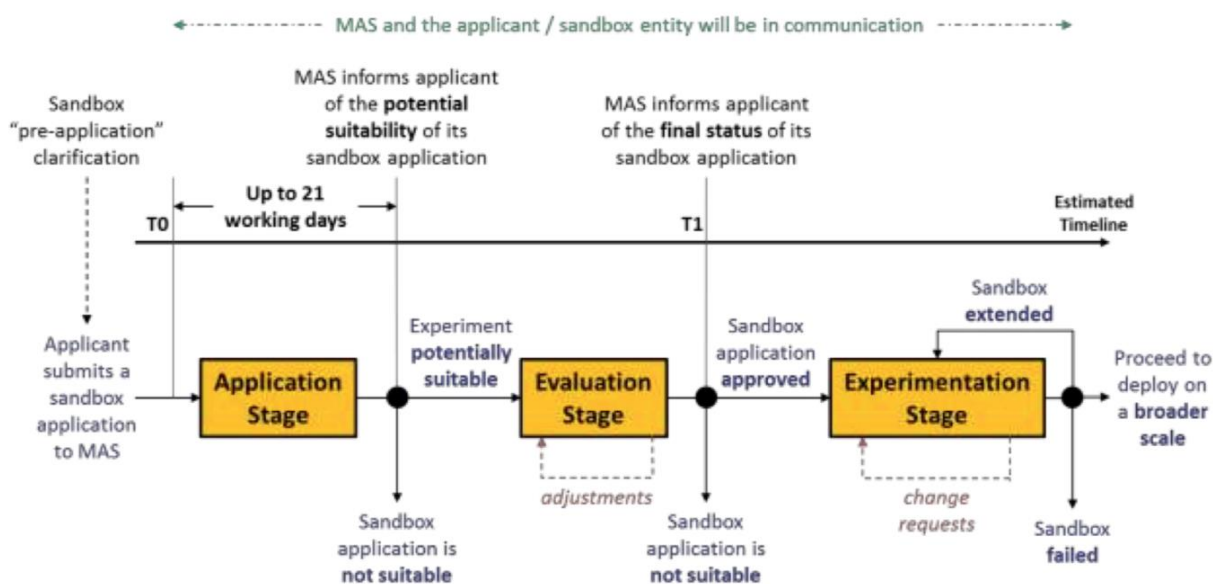


Figure 3.2: Approaching process to a Regulatory Sandbox

Source: Monetary Authority of Singapore

As it can be noticed from Figure 3.2, at the “**Application Stage**”, the MAS shall review the application and inform the applicant of its potential suitability for a Sandbox within 21 working days after MAS receives a complete set of information necessary for the assessment (T0).

At the “**Evaluation Stage**”, the time required to fully assess the application (T1) is dependent on its completeness and complexity, and the specific legal and regulatory requirements involved. Due to the exploratory nature of the Sandbox approach, the applicant is allowed to make adjustments to the application for resubmission after discussing with MAS.

The applicant will be informed if the application is rejected. The reasons for rejection could include failure to meet the objective and principles of the sandbox or any of the evaluation criteria. Upon approval of the application, the Sandbox is launched into the “**Experimentation Stage**”. The Sandbox entity shall notify its customers that the financial service is operating in a Sandbox and disclose the key risks associated with the financial service. In the event that the Sandbox entity intends to make material changes to the financial service under experimentation during the “Experimentation Stage”, it

should apply to MAS at least 1 month in advance and provide details of the changes with reasons (the “change requests”).

On the basis of the empirical evidence that is currently present on Regulatory Sandboxes, the above-reported process flow that occurs within the Monetary Authority of Singapore can definitely be considered as the most significant and explanatory evidence of how the life cycle of a FinTech firm takes place within the Sandbox of a financial authority. From now on, the FCA’s Sandbox will be the reference for the description of all the other elements, concepts, and logics of a Regulatory Sandbox.

3.2.4 Admission Process and Terms & Conditions for Sandboxes’ Members

The Regulatory Sandbox creates a safe space where a FinTech and a limited number of real consumers can engage in an “on-market” trial. Some of the regulatory requirements can be amended to create a tailor made framework for the duration of the trial where the normal regulatory consequences do not apply.

The most representative empirical evidence comes from the FCA, which made it clear that in the case that customers (as opposed to anonymized data) are engaged in activities conducted within the Sandbox, four different terms & conditions/approaches could be followed (Table 3.1).

	Approach 1	Approach 2	Approach 3	Approach 4
Functioning	Sandbox firms can only test their new solutions on customers who have given fully informed consent to be included in testing. Customers have to be notified of potential risks and the available compensation.	FCA agrees on a case-by-case basis the disclosure, protection and compensation approach for the testing activity.	Customers should have the same rights as customers who engage with other authorised firms (e.g. to complain to the firm and then to the Financial Ombudsman Service (FOS), and have access to the financial services compensation scheme).	Businesses undertaking Sandbox trials are required to compensate any losses (including investment losses) to customers and must demonstrate that they have the resources (capital) to do that.
Customers’ Protection	Medium	High	Medium	Very High

Table 3.1: Different approach for customers engagement in a Sandbox

Source: Own elaboration on FCA paper

Furthermore, the FCA has made clear that its ability to allow a firm to operate without the traditional licensing regime is subject to EU law limitations. However, not all start-ups are eligible to be admitted.

First of all, in the current situation, Sandboxes are opened in phases (thus the number of available places is limited time by time). Furthermore, participants have to pass the admission process by fulfilling 4 requirements. (Figure 3.3)

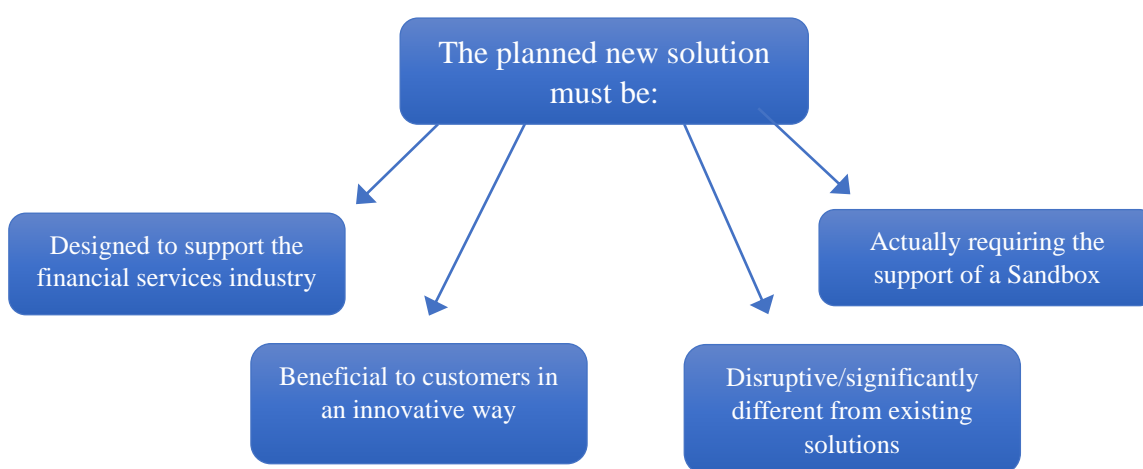


Figure 3.3: Requirements for the admission process

Source: FCA

Finally, the applicant start-ups must present a detailed testing plan and demonstrate to have an innovative solution that effectively requires testing, aims at supporting the financial services industry, and offers to customers a tangible benefit.

As it was remarked in the introduction to this Chapter, although Regulatory Sandboxes are currently mostly employed for FinTech solutions (not RegTech ones), they embody a great promise in supporting the future development of RegTech (as it is remarked in all the documents and papers that discuss the RegTech 3.0 future evolution phase in which the phenomenon is going to enter). For example, economic analysis and agent-based modelling techniques could be used to simulate the impact of new regulations and policies in practice.

At the same time, the use of stress tests and war games has become more and more common among financial regulators and the market (same techniques were also used by the Basel Committee and the Bank for International Settlements). These are only basic examples of a small portion of all the Sandbox activities related to the RegTech hemisphere that can be conducted.

Many experts, scholars, and CEOs believe that Regulatory Sandboxes will become essential to develop new regulatory approaches and this is why they must be considered as a great opportunity for the future. Yet, with specific reference to RegTech and the financial services industry as a whole, why Sandboxes represent a strategic opportunity?

In order to provide an answer, there is the need to start from the consideration that the current situation and context of the RegTech's development path is characterized by an unstoppable wave of regulatory and customer data. The process has just begun and will strongly influence the future of the financial services industry. This process is known as **datacentricity**.

In fact, due to the data-centred nature that the regulatory framework is progressively assuming, the attention from the various actors is moving from customers to regulatory data. Why is that? Companies, regulators, and financial institutions have to deal everyday with many checks and compliance duties; in the current digital era these requirements are presented in the form of data (e.g. regulations are disclosed in the form of programmable codes that are integrated in the companies' operational systems to start the compliance process).

Furthermore, the strongly increasing amount of regulations and policies (especially after the Global Financial Crisis) also concurs to the proliferation of regulatory data (it has to be considered that companies, regulators, and financial institutions have to manage and process also many other types of data, like customer ones, which are the most dangerous and critical to manage). This transition phase towards a data-driven regulatory industry can be seen both as a challenge and an opportunity.

Challenge: The most relevant barrier to RegTech's development at the moment is not technological limitations, but the capability of regulators to process the large volumes of data that are generated by technologies and innovations themselves. In this

very moment, financial players have not yet developed or implemented a solution that runs the pace of regulatory activities and customer engagement processes.

Opportunity: As a result of the datacentricity explained above, it is extremely challenging for companies, regulators, and financial institutions to gather, analyse, process, apply, and deliver the amount of data circulating nowadays.

This provides an opportunity for Regulatory Sandboxes to proliferate and diffuse. In fact, companies, regulators and financial institutions need solutions to manage efficiently and effectively the enormous amount of data that they have to process daily. Thus, start-ups and RegTech companies accepted in Sandboxes may find alternative solutions or innovate/improve the existing products and services to let themselves and other players meet the strong demand.

The current trend of increasing attention towards the world of Regulatory Sandboxes and the belief of their usefulness is also supported by the evidence that the regulatory authorities of numerous jurisdictions (Abu Dhabi, Australia, Honk Kong, Singapore, Switzerland, Ireland, etc.) have expressed a willingness to introduce Sandboxes to respond to the numerous and demanding regulatory requirements. In addition, such evidence further remarks that this opportunity (i.e. surfing the wave of datacentricity) is beginning to be exploited by regulators, like the FCA showcases. In particular, the British authority embodies a Sandbox aiming at: reducing time-to-market; easing access to capital; encouraging innovation from interesting FinTech realities.

In exchange, the regulator benefits from the Sandbox because of the knowledge and solutions spill-overs that occur during the period a start-up is hosted. However, it is important to remind that start-ups are neither selling their solutions nor using the Sandbox to engineer and design them. They are using the facility only as a testing and launching pad to enter the market with a working and certified solution.

The shift from customer-centric to data-centric focus of the FinTech and RegTech sectors stimulates regulators to heavily invest in data-driven regulation and strictly follow this growing path that regulation is experiencing through innovation.

Thus, it is reasonable to expect in the future (according to experts and authors' opinions) a widespread emergence of Regulatory Sandboxes that will allow also RegTech, and the financial services industry in general, to head towards the proliferation

of innovative solutions exploiting the opportunities created by the data revolution and bringing more and more efficiency to companies.

3.2.5 Hypotheses: RegTech Regulatory Sandboxes and Collaborative Environment

Since the advantages (in a RegTech perspective) of a pervasive and widespread presence of Regulatory Sandboxes around the globe could be many (e.g. the possibility to offer testing areas to more RegTech start-ups, the acceleration of the process to get to optimal solutions, etc.), the following section will present a Theory that takes origin from the documentations and literature available on the topic plus our subjective inferences, and describes a potential future scenario for the RegTech ecosystem's growth focusing on Regulatory Sandboxes, whose functionalities and opportunities have been exhaustively explained in the previous paragraphs.

To introduce our Theory let's start from an overview of the current situation of Sandboxes all over the world.

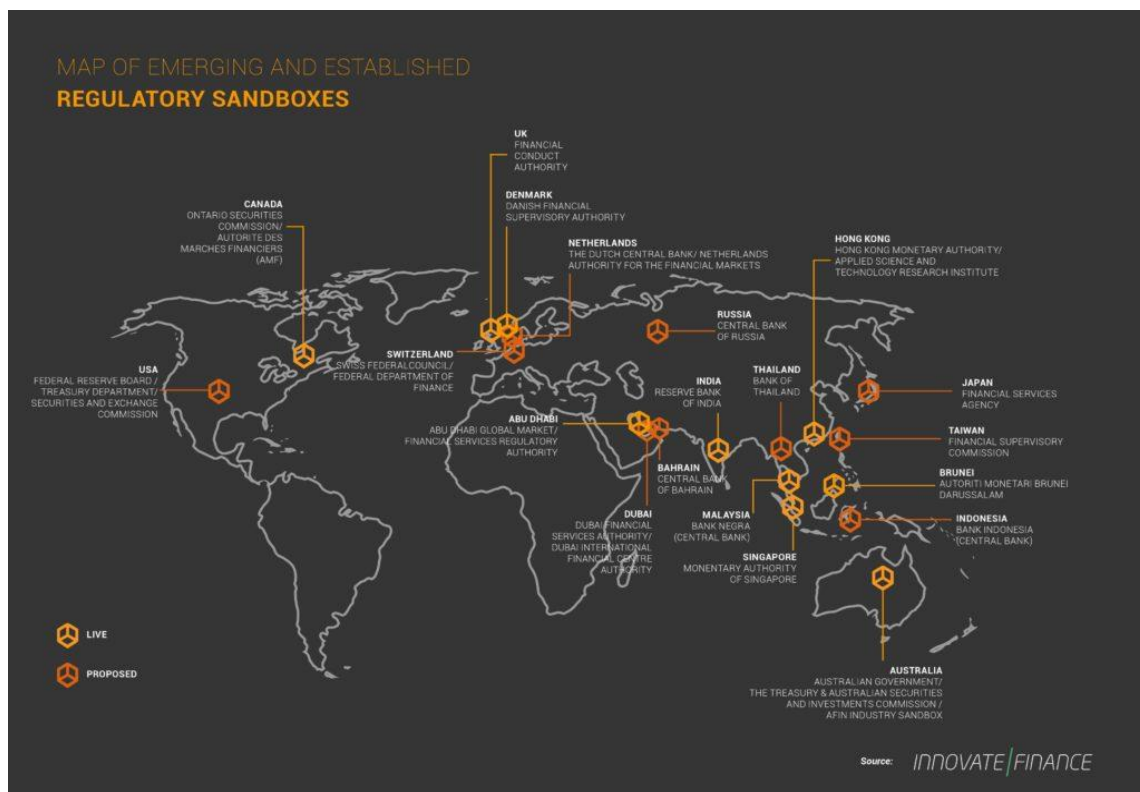


Figure 3.4 Regulatory Sandboxes all over the world

Source: Innovate Finance

There are 18 Regulatory Sandboxes all over the world (Figure 3.4) in different stages of development. Among the countries that have created them, UK, Singapore, and Australia appear to be the most advanced (according to the various articles and studies conducted on this topic). However, the number of countries that have already adopted these innovative solutions and the number of those that have already prepared a plan to implement them is quite encouraging.

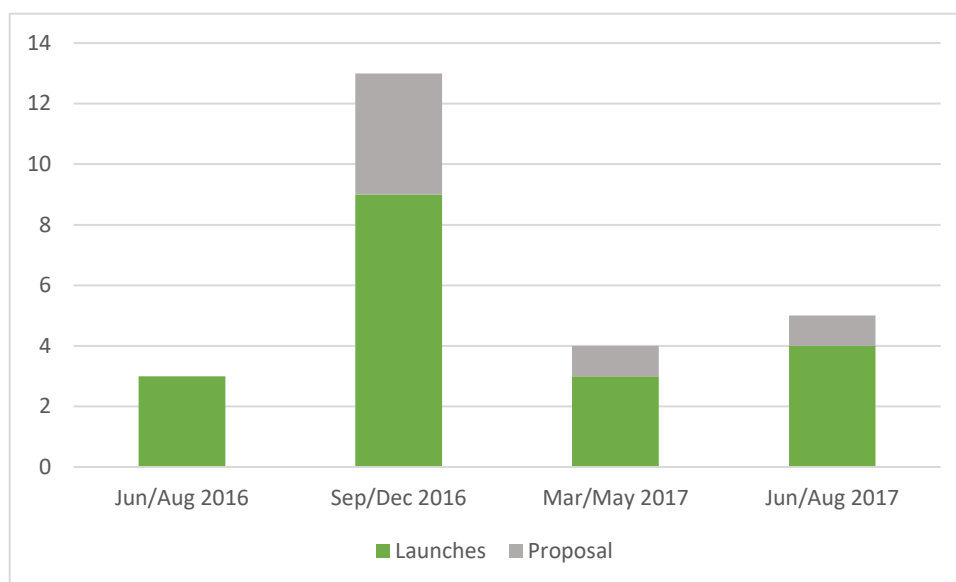


Figure 3.5: Number of Sandboxes launches / proposal

Source: Innovate Finance

Starting from Figure 3.5, for then conducting researches on various websites and looking for reports and guidelines from the players that are shown on the map, it is possible to make a history of when all the most relevant Sandboxes were launched or proposed.

Paying attention to the map (Figure 3.4), it is possible to notice that all the 18 Regulatory Sandboxes are owned by actors who are coincident or strictly related to the correspondent local governments (authorities, commissions, agencies, supervisors, treasuries, etc.), except from Malaysia, Indonesia, Thailand, Russia, India, and Netherlands' Central Banks, which are the only financial institutions in play (even if comparable to governments for the impact of their role at a national and international

level). Even the Applied Science and Technology Institute of Hong Kong was founded by the government in 2000.

On the other hand, Figure 3.5 highlights in the first place that the Sandbox phenomenon is extremely new (first launch on June 2016). Furthermore, the chart seems to suggest that, after a period of great proliferation in 2016, the phenomenon has begun to slow down, despite being geographically distributed and thus promoted by many areas of the globe. Furthermore, the number of Sandboxes proposed to be launched sums up to only two in the whole 2017 (i.e. one in Japan and one in Bahrain).

This discontinuity in numbers, both of proposals and launches, reflects the image of an ecosystem that is still too unstructured and unregulated, thus causing difficulties to spread and demanding a clear framework that drives the formation of such new entities in the regulatory and financial industries.

The main conclusion that could be inferred from the previous analyses, is that the proliferation of Regulatory Sandboxes is slowed down by the lack of the so-often decanted “**collaborative environment**”, which is considered as the most important engine to figure out optimal RegTech solutions. In many of the articles and scientific papers that were consulted for the composition of this Dissertation, one of the main idea that is presented by the players of the RegTech industry is that the collaboration among the various actors is essential to reach optimal solutions, beneficial to everyone, yet preserving competition.

Dr. Subas Roy, chairman of the International RegTech Association, wrote: “We will need collaborative ways of working for RegTech to expand in the U.S. and to provide the desired benefits to the financial sector, initially. Collaboration refers to open ways of working, most often industry-led working groups where users and experts from various fields come together to create something new or change something already being used. RegTech collaboration, at the minimum, will require the banks and the financial institutions, the regulators, the RegTech technologists and the professional experts including the researchers and academics to get together”. (International RegTech Association, 2017)

The centrality of the concept of a collaborative environment that helps to overcome the challenges of the regulatory ecosystem is an extremely diffused and shared idea in the new world of RegTech.

In fact, Mark Sutton, for ITP.net, asserts:

“There are many scientific researches, articles and report, celebrating the need to have a collaborative environment among all the actors in the regulatory ecosystem. Regulators should exploit data and insights to innovate and make compliance affordable with a model that is more data-driven rather than rules-based. The main goal is to create a collaborative ecosystem between regulators and regulated (like businesses and government entities) to let regulators invest in digital technologies and play a catalytic role in the development and adoption of RegTech solutions. The long-term goal is to make regulation a collaborative and digital Platform”. (Sutton, 2018)

As a consequence of the widespread awareness that a collaborative relationship among all the actors of the regulatory ecosystem would help finding innovative solutions and overcome the difficulties presented by the data-driven revolution, and in response to the absence of an application of the collaborative-environment principle in the field of Regulatory Sandboxes, we have identified the following opportunity, which will be presented in the form of a Theory named: the **Theory of the Collaborative and Competitive RegTech Sandboxes Industry, or TCCRSI**.

As it will be remarked many times in the exposition, this Theory has no purpose of being scientific; it is the result of subjective considerations and inferences, yet stemming from real and certified information and insights collected on the RegTech phenomenon from many sources on the Internet. Furthermore, the main tool presented as functional to the creation of the proposed framework (i.e. Regulatory Sandboxes) is considered as the main pillar only because of the importance given to it by the many experts and players in the field. However, in the following parts of the Dissertation, it will be remarked both that other tools could be used for the same purpose (e.g. TechSprints) and that these latter tools could even be more effective than the proposed Sandboxes.

Therefore, starting from all the hypotheses and from the description of the actual context that were presented so far (with the contributions of very important actors in the industry), the TCCRSI follows in the next paragraphs.

3.2.6 Theory of the Collaborative and Competitive RegTech Sandboxes Industry

The potential of Regulatory Sandboxes in terms of the advancement that they could bring to regulators, RegTech companies and start-ups, financial institutions and service providers, is relevant, as remarked in the previous analyses. However, it is not possible to expect this trend to become widespread unless more players are involved in the diffusion process and a spirit of collaboration is not established worldwide.

A possible future scenario (merging the RegTech and the Sandboxes viewpoints) consists in governmental actors (e.g. authorities, agencies, supervisors and institutes) **granting the right to other players** (that are part of the regulatory ecosystem/subject to strong regulatory pressures and/or that operate in the financial service industry - like banks and other financial institutions, big tech companies, insurance companies, private equity and venture capital funds, etc.) **to create their own Sandboxes** in which hosting RegTech and Fintech companies to test their solutions and generate knowledge spill-overs.

Then, all these players in the market (i.e. regulators/authorities plus all those companies, funds and institutions that are legally allowed to create a Sandbox) would engage RegTech startups that operate in the same country (but lack the resources needed to improve their products/services or find effective ways to reach the market), in order to allow testing their KYC/AML solutions with lighter regulatory constraints. The resulting scenario would bring to an ecosystem like the following, taking UK as reference for the example:

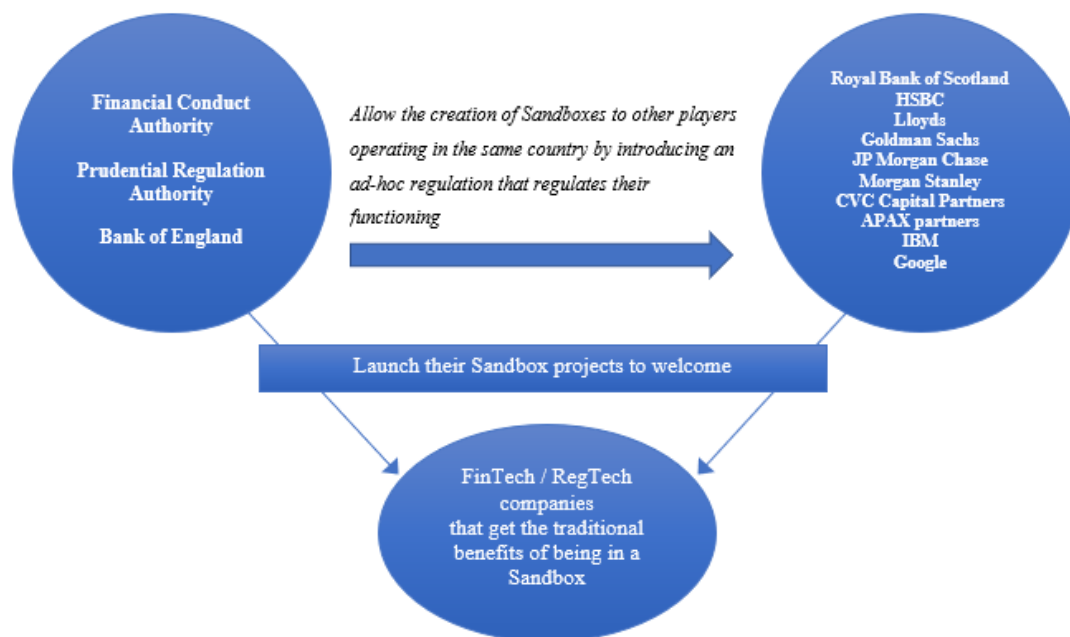


Figure 3.6: Enlarging the Sandboxes Ecosystem

Source: Own Elaboration

After the launch, RegTech start-ups would compete on the market with all the other companies of the RegTech industry (which will be composed by both Sandbox-launched and independently-launched companies), while the regulators and firms that own the Sandbox would benefit from the knowledge generated by every successful launch and, for some players, such benefits could also include partnerships with the launched companies or the free implementation of the launched solution to more efficiently deal with regulatory duties and compliance costs.

As a result, the collaboration among RegTech start-ups and Sandboxes' owners could foster innovation, allowing more companies to "make it", creating new forms of competition, speeding up the diffusion of RegTech, and sponsoring knowledge and resource sharing among players that can have very different business models and also operate in different industries with respect from each other. Of course, this development is far from being simple to achieve and it is intended to be possible only in developed countries where enough important institutions and corporations operate. What are the challenges for the accomplishment of this scenario?

First of all, it would be needed a transversal and cross-sectorial regulation on Sandboxes, regulating the terms and conditions under which specific players (like banks, funds, and tech-companies) can create a personal Sandbox and welcome start-ups, which

would benefit from the same privileges of firms currently operating in the Sandboxes created by regulators and national authorities (e.g. partial regulation exemption, infrastructures, etc.). For instance, Systematically Important financial institutions (such as Bank of America, Bank of China, Banco Santander, BBVA, BNP Paribas, HSBC, Goldman Sachs, Citi Group, Credit Agricole, etc.), big tech players (such as Facebook, Alibaba, Google, etc.), more Central Banks, big corporations that offer also e-commerce platforms (such as IBM, Amazon, etc.), and insurance companies (Assicurazioni Generali, Allianz, AXA, Berkshire Hathaway, Lloyds, etc.), are actors who could be given the aforementioned right by regulators. However, this is a change that would require time and effort in order to reach an agreement among various actors with different goals and business models and to find a solution that is commonly accepted by the various countries in play. Moreover, it would require indeed new regulations, which are exactly what RegTech aims at fighting. This huge criticality of creating a worldwide-agreed legislation that regulates the conditions that allow to free start-ups from some regulatory constraints while testing their products/services in order to develop more innovative and efficient solutions could represent a too tough hurdle to overcome. In fact, the regulation should be agreed by regulators coming from different jurisdictions and cultures; furthermore, it also has to be cross-sectorial due to the possibility of entrusting also big non-financial companies (e.g. IBM) to create their own Regulatory Sandbox to more efficiently deal with regulatory and customers issues. As it is clear, it is not an easy plan.

The second challenge is that some of the aforementioned actors (apart from regulators and Central Banks) could be unwilling to create such Sandboxes within their organization because of the efforts required, especially if their core business is not related to the financial sector (like Google and IBM in the previous example). In fact, despite the competitive and efficiency advantages from supporting RegTech companies to test and improve their solutions, the creation of the proper infrastructure, the management of it (perhaps with ad hoc business units) and the creation of a more complex system of partnerships (requiring time and money) could discourage firms from starting up a Sandbox.

Judging from the latter challenges, what presented by TCCRSI could seem so tough to realize to make the Theory itself not much reasonable. However, two facts must be considered:

1. The trend of the increasing regulatory pressure and compliance costs is something that is truly existing nowadays and its importance and relevance is continuously growing and raising concerns (as demonstrated by the exit from the financial market of many players, e.g. General Electrics Capital, and the strong trend of consolidation in the banking system with thousands of M&As: all responses to raising compliance costs).
2. As many of the personal meetings had at the Global RegTech Summit have highlighted, the players operating in/related to the financial services industry have showcased a strong interest to cooperate with RegTech companies, acquire them or simply learning from them to develop their own solutions.

These facts logically imply a global wish for the proliferation of RegTech companies, which in turn could be favoured by Sandboxes, as many of the articles and scientific papers retrieved have remarked. As a further logic consequence, an increase in the number of Sandboxes could be even more beneficial under the previous assumptions.

Therefore, this is the chain of correlated concepts from which the TCCRSI took origin. Then, in addition to the latter logic remarks, the fact that Sandboxes could be created also from other players (e.g. insurance companies, big tech companies, and funds), is a totally subjective consideration resulting from the fact that it seemed to us reasonable to include in the proposed potential scenario all those players who are strongly affected by regulatory pressures and who can benefit more from partnerships with RegTech companies and/or from the development of their own RegTech solutions.

However, the proposed ecosystem could even be impossible to be created as it is presented in this Dissertation due, for instance, to the challenges presented above. To evaluate the possibility of such ecosystem to be created, a “benefits and costs” analysis should be conducted; yet, due to the impossibility to retrieve the necessary data and the lack of competences and knowledge required, it is too complex to assess the real feasibility of such ecosystem. As a result, the chain of correlated facts presented before serves only to underline that the proposed Theory is not the result of imagination but it comes from several inferences based on empirical evidence, real meetings, and our personal (although limited) knowledge.

To carry on the argumentation of the TCCRSI, another important factor that pushes in favour of such development (together with the view of Sandboxes as the enablers of RegTech 3.0 phase) is the collaborative environment that the players in the RegTech ecosystem advocate (but that has not been applied yet within the field of Regulatory Sandboxes).

Jean-Marc Guiteau, Global Head of RegTech Innovation & Development at BNP Paribas, told us at the 22nd May 2018 Global RegTech Summit in London, that BNP Paribas is not necessarily interested in acquiring (in the future) the RegTech companies and start-ups working with BNP. The huge financial player wishes to face the future regulatory challenges by both realizing their own RegTech solutions for certain compliance duties and by relying on the outsourcing (or partnerships/alliances) to external RegTech players of other processes and operations.

This vision of coexistence of the actors operating in the RegTech ecosystem is exactly the condition that Sandboxes aim at creating by nature. In fact, the main mission of Regulatory Sandboxes is to offer RegTech firms the chance to ultimate their products and sponsor the launch on the market of competitive solutions, as well as the chance to create knowledge spill-overs beneficial to the owner of the Sandbox (all concepts remarked several times in this Chapter).

As a result, the best way to help both Sandboxes' members and owners to find innovative and optimal compliance/RegTech solutions, is to create a Collaborative and Competitive RegTech Sandbox Industry composed by collaborative networks, worldwide spread, of interdependencies among regulators, financial institutions, RegTech/non-RegTech realities, start-ups, and Central Banks, belonging to the same country and culture, and that share ideas, solutions, approaches and frameworks within the network to which they belong.

The RegTech companies launched by these networks will then compete with all the other RegTech players (i.e. already existing or launched otherwise) and those launched by other networks, both at a national and international level.

3.2.7 Main implication of the proposed ecosystem

The biggest consequence resulting from the creation of national collaborative networks among the main actors involved in/affected by the regulatory system is a change in the competitive landscape. In fact, since the owner of the Sandbox, for instance IBM, benefits from knowledge spill-overs and potential partnerships with the RegTech firms' that successfully complete the product testing within the Sandbox, IBM would very likely either develop its own solutions thanks to the knowledge acquired from the Sandbox and/or partner with the RegTech start-ups eventually launched through the Sandbox. Accordingly, it could be not much likely that IBM partners with a RegTech start-up launched by the Goldman Sachs's Sandbox. Comparing to the case base (i.e. the current situation of the Regulatory Sandboxes system, in which only regulators and national institutions are operating), this seems an inefficiency for the competitive landscape. Therefore, let's summarize the two perspectives, positive and negative, of this main implication of the proposed scenario.

Cons: this new Sandbox framework would probably narrow down the range of possible business opportunities of a, for example, non-IBM Sandbox-launched start-up, once tested and improved its product. As a consequence, the collaborative network of interdependencies could weaken the competition and lead towards the structuring of the RegTech ecosystem into strategic groups (or hubs) of financial institutions, RegTech and non-RegTech companies, start-ups, and regulators operating in partly closed environments.

Pros: On the other hand, it must always be remembered that Sandboxes are thought to give opportunities either to those start-ups that lack resources and that find it more difficult to come up with a successful product/service, or to those that have the sufficient funds but simply find it useful to further improve their solution exploiting the typical advantages offered by Regulatory Sandboxes. Therefore, in some cases, if it were not for Sandboxes, either there could even not be the chance to compete at all or the solutions on the market would not fully realize their potential!

Furthermore, creating strategic hubs spread worldwide in order to let regulators and large institutions/corporations support and sponsor start-ups that lack the necessary

resources and that operate within their geographical coverage is a process that allows to create a system that values and nurtures businesses at the national level. Thus, the resulting environment will let every country grow more its RegTech national talents without neglecting potential successes (this is something that is particularly important for countries like Italy, as it will be discussed later on in this Chapter). As a result, even if globalization tends to spread around the world the best solutions (despite the fact that they could all come, for example, from the US), in the proposed ecosystem there is the possibility to create national excellences so that competitive RegTech companies come from all the places in the world.

The conclusion is the following: although competition could be somehow weakened, it is possible to increase the number of actors in play and their geographical diversity, fostering the industry development and creating more spaces for competition. In fact, the proposed framework suggests structuring the Sandbox industry into innovative RegTech networks spread around in every developed country of the world.

3.2.8. Fundamental remarks on the TCCRSI

Sandboxes should not become the only way through which it is possible for a RegTech start-up that lacks the necessary resources to improve and certify its solutions in order to reach the market. And it is very important to remark it. In fact, in the proposed ecosystem of “RegTech hubs” composed of actors collaborating through Sandboxes, the goal is to help those start-ups that are at the same time attractive but lack either the funds needed or the key resources/infrastructure to make a product ready for the kick-off (thus leading a potentially good business to fail). Therefore, it is not a matter of disrupting and changing the competitive rules of the current RegTech and financial services industry. It is only a matter of creating strategic hubs working as testers and nurturers of attractive and needy start-ups at a national level.

But why the proposed ecosystem aims at supporting RegTech start-ups only in the testing phase, which is a very small portion of the product development process? Usually, when a certain company lacks financial and/or technical resources, it needs help also from other viewpoints than the “testing phase”.

The answer is that this specific Chapter focuses on Sandboxes! And Sandboxes by nature are not labs or incubators. They provide a convenient environment for testing products, but not for designing, engineering, or selling them.

So why in the composition of this Dissertation and of this Chapter we have decided to present Sandboxes as the most useful mean for the proliferation of RegTech companies as exposed in the TCCRSI while, perhaps, incubators, co-working spaces or innovation hubs may be more functional to help the proliferation of companies, especially needy ones? The fundamental answer to this question is that we took as main assumption the fact that Sandboxes are considered one of the most important instruments that will favour in the future the growth of RegTech, which will enter in the 3.0 phase of its life cycle. And, in turn, this assumption was explicitly suggested by many of the most representative and reliable documents and evidence retrieved during the composition of this Thesis. In conclusion, although the Theory itself is the result of subjective inferences, the main assumption on which it was constructed comes from the most expert and trustworthy voices in the field.

As a consequence of the previous clarification, the proposed Theory has no purpose of being scientific, and it is neither what we think is the best solution for RegTech to grow and diffuse. It is simply a potential result of all the empirical evidence collected so far, mixed with some personal long-term oriented considerations.

In the following Chapter, TechSprints will be also presented, and it will be remarked that, from a logical and external point of view, they seem to have a greater potential in helping RegTech companies to succeed and spread, with respect to Sandboxes. However, TechSprints (as well as incubators, accelerators, innovation hubs, etc.) were not taken into account in the TCCRSI as possible means to help the growth of RegTech during the RegTech 3.0 phase only because, at this moment, they are not much taken into account by the most expert scholars and players in the industry. Thus, we have decided to follow the footprints of the sources of information currently available and of the representatives met at the Global RegTech Summit.

However, to make the proposed scenario even more likely to be accomplished, it would be enough to consider also the previously-mentioned “traditional” means and sponsors and add them to Sandboxes so that, in case (for instance) Morgan Stanley would not find it convenient or possible to create its own Sandbox, it may wish to create a

TechSprints or a lab or a co-working space instead, which would likewise improve its efficiency and support the proliferation of RegTech start-ups, although in a different way and with different efforts.

Coming back to the final remarks about the proposed TCCRSI, what about those RegTech companies / start-ups that will not pass through a Sandbox before getting to market?

It must be specified that RegTech start-ups that already possess/succeed in obtaining the funds required to realize their visions and test their product, would compete on the market as “independent” (i.e. non-Sandbox launched) companies, which would reasonably afford to obtain higher margins from the engagement with companies and institutions, with respect to the case in which the start-up has been launched through Sandboxes (since Sandbox owners could either own equity capital of the launched firms or simply have greater bargaining power). Therefore, the “non-Sandbox” start-ups could represent the outsourcing solutions for Sandbox owners and, perhaps, the potential primary solution for any other actor on the market who needs a RegTech solution.

This was only to show that, although competition could seem to be weakened (especially for RegTech companies that do not benefit from the support of a Sandbox), the resulting system could be potentially more efficient (because more solutions will be tested and supervised, and more knowledge will be created), and more socially beneficial (because the proposed Regulatory Sandboxes ecosystem would allow more start-ups to “make it”, creating more jobs and equilibrating the industry), while preserving market opportunities for every player in the industry who seek to establish standards.

3.2.8.1 TCCRSI Vs. Open Innovation

Dea Markova, Head of Programmes at Innovate Finance and leader of the Industry Sandbox Consultation, affirms “Regulatory Sandboxes may be one of the biggest global trends in financial services and possibly in the history of regulation”.

She goes on saying “There are a number of resources globally which look like some form of an industry Sandbox or its constituents, even when they are not labelled that way. Together these resources help form a landscape of Open Innovation - the practice of sourcing new technologies from outside the four walls of your organization”. (Markova, 2017)

Actually, the proposed idea of a Collaborative and Competitive Sandboxes Industry explained before in this Chapter, differs from Mrs Markova's proposal of an Open Innovation paradigm (although the shared idea of the high importance on Sandboxes for the future).

The idea of Open Innovation only partially suits the logic behind the Collaborative Sandboxes Framework. Although in both cases there are the ideas of collaboration among actors, sharing of knowledge and ideas, involvement of customers, and spin-offs, the networks proposed in the previous paragraphs are based on the idea of having hubs of partners spread around the globe and characterized by traditional business interactions with the "independent" RegTech companies (i.e. those that were not launched by a regulator's Sandbox) and normal competitive relations with other hubs to establish standards in the RegTech industry.

On the other hand, the Open Innovation Paradigm would bring to more drastic changes implying a transformation of the industry to let all the actors in play cooperate in order to become a unique entity (according to the traditional principles of Open Innovation). This would favour innovation, yet limiting competition.

A Collaborative and Competitive environment leaves more spaces for competition (i.e. among companies and among geographically dispersed hubs) and it is reasonably simpler to apply with respect to the Open Innovation one. The latter would aim at establishing a collaborative worldwide partnership in the financial sector (yet characterized by conflicts of interests, frauds, gambling, insider trading, cyber-attacks, crashes, bubbles, pursuit of power and prestige, etc.), which sounds like an unrealizable dream, especially due to the regulatory and cultural differences among the various countries in the world.

Contrarily, it is more likely to see hundreds of national hubs composed of partnered companies and institutions competing among each other/targeting different market segments, establishing standards, licensing their solutions, and creating partnerships with independent companies. This is a world that would fit better, according to a subjective opinion, the traditional structure and logic of the RegTech and financial sectors.

3.2.8.2 Current and Potential “Roles and Stakeholders” Configuration

Coming back to the insights provided by Mrs Markova in the article, it is possible to make another comparison between the Open Innovation Paradigm and the Collaborative and Competitive Sandboxes one proposed in this Chapter. Keeping reference to Sandboxes, if roles and stakeholders are taken into account, the current Sandbox Industry’s structure suggests the following table (as in March 2017, recognized by Mrs Markova as the end of the input phase of the Sandbox Industry):

May 2017	User	Contributor	Sponsor	Observer
Financial Institutions	X	X	X	X
Tech & Data Vendors	X	X	X	
Start-ups	X	X		
VCs				X
Professional Services		X	X	
Regulators				X

Table 3.2: Current Stakeholders’ role in Sandboxes’ framework

Source: Markova (2017)

But what would change in the case of a Collaborative and Competitive Sandboxes Framework?

It can be inferred from what shown in the table (Table 3.2) that the Regulatory Sandboxes environment, as in March 2017, could be a great launching pad for a collaborative industry. With respect to the table and the current situation, four interventions are needed to implement the desired framework proposed in the TCCRSI:

- 1) Regulators become Contributors and Sponsors: regulators need to find, sponsor, and aide those RegTech start-ups that lack the funds and resources to kick-off.
- 2) Professional Services become Users and Observers: RegTech solutions are interesting also for professional services like legal firms, as already are for

consultancy ones. Therefore, in the future, also the latter companies could be attracted to Regulatory Sandboxes.

- 3) VCs become Sponsors and Contributors: since VCs' financing is often provided by governmental institutions, it could be possible to create alliances between VCs' and regulators or financial institutions to localize, sponsor or even create Sandboxes for potentially successful RegTech start-ups who lack funds and resources.
- 4) Scale up: even if the table reports a full involvement of financial institutions in terms of roles, empirical evidence shows the existence of only Central Banks's Sandboxes. At the moment, FIs other than Central Banks, e.g. investment banks, own Sandboxes only working with other kinds of FinTech firms (like digital factoring and Peer-2-Peer Lending ones) or do not even own one. However, more FIs and tech companies should create own Sandboxes or simply add to the existing ones more RegTech start-ups, under the supervision of a designed regulator (e.g. a national one), which may also become a partner (again, this plan of action is suggested assuming the perspective of the proposed Collaborative and Competitive Sandboxes environment).

As a result of all the considerations made so far, it is possible to imagine a new potential scenario (assume May 2021: the longest part of the hypothesized overhauling of the Regulatory Sandboxes industry would be indeed the time required to design and agree on a transversal cross-sectorial regulation that regulates those actors other than regulators and governmental institutions when creating Sandboxes offering similar benefits to regulators' ones, together with the Sandboxes implementation time. Again, due to the impossibility to consider the scenario as scientific and feasible, the timeline estimation could be strongly flawed. May 2021 was hypothesized based on the strong interest by developed countries for this phenomenon and the pressing need for compliance costs reduction), in which the same article by Forbes (Markova, 2017) will display the following table:

May 2021	User	Contributor	Sponsor	Observer
Financial Institutions	X	X	X	X
Tech & Data Vendors	X	X	X	
Start-ups	X	X		
VCs		X	X	X
Professional Services	X	X	X	
Regulators		X	X	X
Insurance, Wealth Management, Health Care, etc.

Table 3.3: Potential Stakeholders' role on Sandboxes' framework

Source: Own elaboration on Markova (2017)

However, again, it is not only a matter of roles, it is also a matter of scale.

Such collaborative networks would require many actors of different kind and belonging to different industries. Central Banks could not represent the totality of RegTech Sandboxes providers around the globe. Furthermore, it is potentially extremely large the number of rows (i.e. actors) that could and should be added in the ecosystem: insurance companies, health care, all companies that have an e-commerce platform apart from the “physical” business, wealth management companies, etc. Many of them could act as Contributors, other just as Sponsors or Observers to gather information to improve internal proprietary processes.

There is the need to transform a sporadic and unstructured initiative into a widespread and regulated framework.

3.2.9. Is it a Global Sandbox possible? Empirical Evidence

Is the proposed Theory suggesting networks of Sandboxes across different jurisdictions a realistic way to spur innovation in RegTech and FinTech fields in general?

It is not necessary to make absurd assumptions and hypotheses to realize if the regulatory and financial sectors would be open to this possibility and willing to foster it.

In fact, the Financial Conduct Authority published on the 14th of February, 2018, a presentation of what should be, according to FCA, the future development of its Sandbox, and the phenomenon in general, around the globe.

“Since it was launched in 2016, our Regulatory Sandbox has supported 60 firms to test their innovation with real customers in the live market under controlled conditions. Our Sandbox currently only allows firms to conduct tests in the UK but many aspects of FinTech are global. Some firms value being able to work with other regulators to conduct tests in more than one jurisdiction. We have also observed, supported and learned from the work of many other jurisdictions in how they promote innovation in financial services. We undertake a significant amount of international engagement and cooperation in connection with innovation, and have signed 9 bilateral cooperation agreements with other jurisdictions, which encourage greater dialogue between regulators. We do not currently offer firms the opportunity to participate in a joint Sandbox programme with other regulators.

We therefore want to canvass views on the merits of creating a Global Sandbox. This could potentially allow firms to conduct tests in different jurisdictions at the same time and allow regulators to work together and identify and solve common cross-border regulatory problems, through tests. Under such a model, testing could span two or more jurisdictions”.

The FCA goes on proposing some guidelines of how a Global Multilateral Sandbox should work, considering the diverse regulatory structures and features of existing Sandboxes, in order to allow concurrent testing and launch across multiple jurisdictions, acknowledging it as an ambitious goal. According to the British Authority, the Global Sandbox could focus on the following activities:

1. **Invite applicants to address pre-identified challenges:** Firms face certain regulatory problems that cross-jurisdictional boundaries emphasize, for example when developing innovative solutions to Anti-Money Laundering (AML) compliance and Know Your Customer (KYC) on-boarding processes, and payments services that seek to transfer money cross-border. The Global Sandbox could help regulators and firms work together to define where these common problems exist, and collaborate to find solutions. Under this approach, participating regulators could set out areas where cross-border testing would be

most beneficial, and invite firms to participate in the Global Sandbox to propose tests to explore these. Firms would benefit from having access to support from multiple regulators in the design and supervision of their test.

2. **Support specific firms with cross-border ambitions across any sector:** The Global Sandbox could allow firms who have ambitions to grow at scale in different markets to bring their idea to market more quickly and easily, creating more effective competition. Empirical evidence shows firms who may benefit from this, and firms could see value in testing their ideas in multiple markets.
3. **Seek to address policy and regulatory challenges:** The Global Sandbox could convene joint events and/or papers on emerging trends and challenges to leverage the diverse experience of participating regulators and firms, and work toward consistent approaches.

The overall approach would be to better understand and solve common regulatory problems, as well as being more helpful to firms who have aspirations to grow at scale in multiple markets.

One option is to have a Global Sandbox initially set up as an international college of regulators who have their own innovation or Sandbox models. Firms already working with those regulators would get access to multiple regulators. It also means that regulators could collectively share and learn from each other on new innovative business models. Given the challenges of bringing together a large group of global regulators, longer-term consideration will need to be given to creating a more flexible and practical framework for the Sandbox.

3.2.9.1 Commonalities between FCA's Global Sandbox Framework and the TCCRSI

It is really stimulating to notice how the FCA's (i.e. the most important regulatory authority of the UK, which is considered the global headquarter of the RegTech ecosystem), therefore a very reliable institution, has proposed a framework for the development of the Sandbox industry that has a lot of similarities with the model proposed in this Thesis.

In particular, the vision is basically the same: spur collaboration and partnerships among regulators and firms by creating a global framework for the Sandbox industry with a cross-sectors-and-countries regulation to achieve the superior goal of continuous innovation and improvement in the field of RegTech.

Furthermore, according to the FCA, “one option is to have a Global Sandbox initially set up as an international college of regulators who have their own innovation or Sandbox models”, pushing towards a system that consists of regulators with their own Sandboxes, each one with its own vision and mission. Exactly as it was explained in paragraph 3.2.6, what this Thesis theorizes is a global framework of regulators creating, nurturing and sponsoring their own Sandboxes (although with a widespread accepted model/framework) and collaborating with other regulators (in order to agree on a worldwide Sandboxes regulation) to let FinTech firms speed the go-to-market process and find innovative solutions beneficial to the whole industry.

Other key points of the FCA’s Global Sandbox are:

- Regulatory efficiency
- Firms’ growth
- Increase competition efficiency
- AML and KYC solutions innovation
- Scale up the Sandbox model

All these potential benefits are shared also by the Competitive and Collaborative Sandbox Industry proposed in the Thesis, being basically pulled by the same vision.

However, the FCA’s Global Sandbox shows characteristics/principles that either differ or are complementary to the main ideas proposed in this Chapter. It is important to discuss them because the model proposed by the Thesis is the result of: researches of articles and scientific documents, insights from the Global RegTech Summit, and business models found on the various companies’ websites. For this reason, the proposed Sandbox industry was theorized almost entirely without the possibility of relying on insights coming directly from within the regulatory and Sandbox ecosystem. Thus, it would not be consistent to oppose the Thesis’s suggested framework with FCA’s one, due to the **information asymmetry** between the resources and knowledge available to us and the ones possessed by direct players like the FCA. Contrarily, it is wiser to see the two models as two parallel theories whose differences and commonalities are the result

of two distinct perspectives: an **external** one (i.e. ours as students) and an **internal** one (i.e. players like the FCA). The non-conflict between the two frameworks allows to point out interesting insights that could also be merged and adjusted to theorize a hybrid solution; however, the objective of this Chapter and of this Thesis in general is not the one of arrogantly correcting the FCA's considerations or pretending to find an optimal industry ready to be launched. The objective is simply to contrast the Collaborative and Competitive framework (that was generated from almost all the knowledge and information that junior researchers can collect nowadays) with empirical evidence (in this case the perspective of the FCA) in order to produce some, more or less, objective insights (relying also on some useful take-aways directly from the Global RegTech Summit). In fact, the common points between the framework proposed in this Chapter and the FCA's model reasonably make the TCCRSI more likely to realize. The FCA is yet one of the most active, innovative, and sound player as far as the main argument of this Chapter and Thesis (i.e. RegTech and Sandboxes) is concerned.

However, it is now time to see what are the main differences between the Global Sandbox proposed by the FCA and the Collaborative and Competitive Sandbox Industry presented before, in order to provide the possibility to the audience to understand what are the divergences arising from the different information available (both in terms of quantity and quality) to researchers and direct players.

As explained before (but it is very important to remark it a further time considering the purpose of this Work), it is neither a matter of conflict nor of right and wrong. It is only a matter of presenting two different perspectives acknowledging the fact that there are other regulatory players in other geographical regions that could have different opinions. Yet, due to the impossibility of considering all the points of view and due to the scarcity of information on the Sandbox matter, it is reasonable to assume as main reference for comparison a player like the Financial Conduct Authority.

3.2.9.2 Differences between FCA's Global Sandbox Framework and the TCCRSI

It is possible to recognize two main differences between the two frameworks. These divergences will be categorized as: **RegTech focus** and **Competition**.

1) **RegTech Focus**

What is important to highlight, is that the FCA's proposed framework focuses on creating a Sandbox industry to provide FinTech start-ups the possibility to test their products and produce innovations. However, as reported on the FCA's website, among the 60 start-ups that have so far been launched by the British Authority's Sandbox, only three of them are RegTech companies (according to the sample selection criteria of the Internal Database).

As already described in most parts of the Thesis, the RegTech ecosystem is characterized by an extremely high degree of complexity due to the datacentricity and the passage from Know-Your-Customers to Know-Your-Data paradigm that phenomena like Big Data are fostering. As a consequence, the framework proposed by the Thesis pushes towards the creation of RegTech-centred Sandboxes by various regulators (and other players) around the globe in order to spur the innovation and efficiency that are nowadays needed to face the many and harsh regulatory and data collection/processing challenges. The resulting Sandboxes would be dedicated to the launch of RegTech start-ups, in particular those promising but lacking the resources needed to reach the final market, or those that simply wish to enjoy the benefit of Sandboxes. Furthermore, in order not to create a centralized industry, all the RegTech start-ups that are self-sufficient/autonomous would still rely on a development and launch that is independent from Sandboxes, thus benefiting from the full margin of their activity and gaining a major bargaining power with respect to start-ups that received the support of a regulatory authority. This modus operandi would allow:

- To speed up the growth of RegTech in an era when the regulatory environment is continuously changing and posing challenges;
- To engineer innovative/efficient solutions that would otherwise be lost due to the impossibility of some start-ups to reach the market independently or in the desired way;

- To keep the RegTech industry unchanged except from the emergence of strategic networks of regulators and their Sandbox-launched companies (plus all the other RegTech players) competing among each other. This makes the transition to a new paradigm less shocking
- To create networks that are internally homogeneous in terms of the geographical provenience of start-ups, thus giving the possibility to every country to nurture national RegTech talents and impeding to globalization to spread around the best practices of few countries like UK or Singapore. Of course, this stands only for RegTech start-ups that work on solutions to worldwide or international regulations like Basel III and MiFID II, otherwise they would be limited to operate at a national level.

For all the reasons aforementioned (i.e. implied in the framework proposed by the Thesis but not in the FCA's one) it would be possible, following the Competitive and Collaborative RegTech Sandbox framework, to nurture and expand the RegTech industry whose solutions are nowadays more and more essential to both regulators and financial players, keeping the pace of such a dynamic environment.

2) Competition

The Global Sandbox proposed by the FCA has three consequences in terms of competition among FinTech firms:

- The first is that competition is facilitated. In fact, creating a unique and worldwide regulatory framework in which all the actors play following the same rules and having the same business opportunities is definitely an efficient mechanism to favour competition.
- The second implication is that introducing a Global Sandbox where all the start-ups resort to the same framework, follow the same competitive rules, and have potentially the same benefits, is very similar to the concept of an Open Innovation. This is functional to innovation because there are synergies of knowledge and resources but, at the same time, it potentially makes all the solutions available to all the actors who would have access to the same knowledge and information making it difficult to differentiate and achieve extra-profits from “thinking out-

of-the-box” (i.e. **industry standardization**). This means that innovation could be strong but homogeneous among FinTech players that would all have similar visions and skills, and would grow in a specific direction.

- The third consequence is the **institutionalization** of the FinTech competitive ecosystem. In fact, creating such a Global Sandbox risks to make too many companies of the FinTech industry coming from that hemisphere without the differentiation resulting from coming from a specific Sandbox in a specific country; in fact, a global institution framework would be responsible for the launch of a large portion of the industry (i.e. institutionalization).

For what concerns the implications in terms of “competition” of the TCCRSI, the main insights are provided in paragraphs 3.3.5/3.3.6 and are comparable to the first implication of the FCA’s proposed Global Sandbox.

As far as the industry’s standardization and institutionalization are concerned, the framework proposed in this Chapter does not suffer much from these issues. Of course, in the FCA case the reference is more to the FinTech industry, while the framework proposed by the Thesis is conceptualized to support RegTech firms. However, it is still useful to make a comparison.

First of all, the risk of standardization in the TCCRSI is lower, since having hundreds of strategic networks spread all around the world instead of having a unique Global Sandbox allows much more differentiation and diversification (in fact there is a lower probability to be homogenised in an industry where much of the companies go in the same direction because of the inevitable knowledge spill-overs within the Sandbox), thus leading to more variety in the RegTech ecosystem and more out-of-the-box ideas.

Furthermore, although also in the proposed framework there are national institutions, there is lower institutionalization/centralization because the Collaborative and Competitive Sandbox Industry does not imply a drastic change of the FinTech environment. Regulators and other allowed players would only have Sandboxes with the aim of launching some national RegTech start-ups and creating collaborative networks, without the purpose of initiating a worldwide Sandbox framework that could strongly change the structure of the FinTech industry by the typical means of an Open Innovation (in fact, such change would be led by national institutions, centralizing the way many

FinTech start-ups are launched on the market). The FCA itself admits that such development would be extremely harsh to accomplish.

3.2.11 Final Recap on the Collaborative and Competitive RegTech-Sandboxes Industry Framework

After presenting the main assumptions, characteristics, strengths, weaknesses, and commonalities/divergences with the proposal of a sound authority such as the FCA, it is now time to conclude the argumentation of the TCCRSI. In particular, it is possible to summarize all the main implications and features of the proposed Sandboxes ecosystem through the following statements:

- Theory of a Sandbox industry made up of strategic networks of regulators/companies/financial institutions collaborating with RegTech companies from the same country and competing with the other hubs and non-Sandbox startups throughout the country and all around the world
- The potential industry:
 - ✓ Consists of regulators and companies that create Sandboxes and engage RegTech startups, which can then operate with a lighter regulatory burden;
 - ✓ Fosters innovation at a national level and, subsequently, at a global one;
 - ✓ Favours the creation of strategic groups where positive externalities are generated from the collaboration and the launching activities;
 - ✓ Allows RegTech to spread faster and in a more pervasive way;
 - ✓ Helps valuable RegTech companies that lack resources to reach the B2B market otherwise;
 - ✓ Requires a cross-sectorial and worldwide regulation that prescribes the guidelines for the testing phase in terms of regulatory permissions, especially in Sandboxes owned by player other than regulators;
 - ✓ Spurs local innovations and RegTech growth while creating competition among different networks' companies and non-Sandbox ones;
 - ✓ It promotes variety and brings to opportunities exploitation

- The TCCRSI does not imply shocking any industry. It simply suggests the creation of a new RegTech area represented by Sandboxes for those RegTech start-ups that need them. This would imply the addition of a further player in the market: the strategic networks of regulators and Sandboxes-launched RegTech companies from the various countries worldwide
- The Theory avoids industry standardization and, in part, centralization (regulators only provide support to a limited number of start-ups, there is no control over the RegTech industry as a whole)

3.2.11 Sandboxes, an opposite point of view

The debate around the topic is still open, the financial community is divided; within the US operator there are some who believe that Sandboxes are not the natural and optimal solution for financial start-ups and their products' development. Among different causes and arguments we identified four main critics carried out by the US financial world:

- According to Kushboo Agarwal (NY Journal of Law & Business) designing the “right” Sandbox, in terms of which regulation to suspend, which are the admission criteria and which is the extent of the solution would need to much time to be considered efficient. These problems could bring the sandbox-baked companies to meet difficulties in accessing funding.

FCA answer to that position arguing that “regulatory uncertainty at a crucial growth stage means that FinTech firms find it harder to raise funds and achieve lower valuations as investors try to factor in risks that they are not well placed to assess” (Agarwal, 2018) Surfing on FCA Sandboxes program¹¹, and combining those information with the ones collected and analyzed in our database, we were able to prove that FCA’s argumentations were supported by empirical results.

Company	Joining FCA’s Sandbox	Funding Round before joining the program	Funding Round after have joined the program
Clause Match	2016	150k	1.6M and 5M
Billon	2016	1.9M and 4.5M	4M, 1M and 1M

¹¹ <https://www.fca.org.uk/firms/regulatory-sandbox/cohort-1>

Tradle	2017	15k	0
Yoti	2017	0	8M
Nuggets	2017	0	0

Table 3.4 FCA's Sandbox-baked companies' funding history

Sources: Own Elaboration on FCA website

As Table 3.4 suggests, the participation to the FCA's Sandbox program (every RegTech company that has participated to such a program has been reported in Table 3.....) does not mean a difficulty in achieving new funding rounds.

- According to Maria T. Vullo (Superintendent of the Department of Financial Services “The idea that innovation will flourish only by allowing companies to evade laws that protect consumers, and which also safeguard markets and mitigate risk for the financial services industry, is preposterous” (Vilar, 2018)
- The closeness between regulators and companies is seen in a negative way by Hester Pierce, a Republican Sec Commissioner. Probably this position is mainly addressed to pure FinTech solutions. If we think to a RegTech solution, the closeness to who makes the rules is a boost to the businesses, and also to the efficiency of the regulators.
- Last sandboxes' criticism is mostly felt by the US environment, since first approaches to the Sandboxes have been carried out by single State (e.g. Arizona State has developed its State Regulatory Sandbox). These fragmentary solutions concern the regulation framework because they could mine the national competition (being regulations different form State to State). The situation is different in other countries where there is not this fragmentation problem, FCA developed its Sandboxes embracing the whole UK ecosystem, and MAS made the same in Singapore.

On the contrary the State Regulatory Sandboxes' proliferation could led regulators to expedite the creation of national Sandboxes.

3.2.12 Sandboxes: Conclusion

The main insight that can be gained from this Chapter, beyond specific theories and empirical evidence, is that Regulatory Sandboxes could serve as an **engine of growth** for the RegTech industry in order to properly address the extreme **complexity** (i.e. challenges and opportunities) raised by the huge amount of **data and regulations** that characterize the financial sector.

To anticipate one of the main outcomes of the following Chapter, the advantages of such an engine of growth become particularly important and strategic for countries (e.g. Italy) where RegTech has a very limited space in the marketplace (although being equally needed).

3.3. RegTech in Italy

A general consideration before starting: Since most of the partnerships of nowadays' RegTech start-ups are with banks and FIs, it is always wise to address in the first place the banking system. Furthermore, especially in the phase of very initial development of an industry (e.g. RegTech's situation in Italy), it is useful to start with the first categories of customers who are targeted by the same or similar solutions from RegTech companies in other countries (i.e. banks and FIs).

The fact that the majority of RegTech start-ups in the world offers solutions to banks and FIs, explains why in this Thesis and in this Chapter, banks and FIs are chosen to represent all the RegTech customers' environment, either it is a matter of presenting a general overview on Compliance or a possible future development of RegTech in Italy or, referring to Chapter 2, a matter of creating a database with all the most relevant players in the RegTech industry worldwide, etc. As a result, banks and FIs will always be the main focus, together of course with RegTech companies, authorities, regulators, and governments (i.e. the main players in the subjects of this Thesis). In other paragraphs, also tech companies (and other non-financial companies) are taken into account for

analysis, but only to assume also a long-term potential point of view, when RegTech will be mature and widely diffused.

With specific reference to this Chapter, being based on a latent market (i.e. Italy), banks, FIs, and authorities represent the core pillars to analyse the RegTech phenomenon in Italy and the concept of “Compliance”, but also to hypothesize future developments for the Italian RegTech market.

3.3.1 Regulatory Compliance in general and in Italy

With reference to a document on Compliance written on the 23rd of October 2017 by the Italian company MyGovernance (My Governance, 2017), it is possible to collect some useful insights to make an overview on the concept of Compliance, but, most importantly, to understand its strategic importance and to build an idea of what is the regulatory compliance situation in Italy.

Generally speaking, the term “Compliance” refers to the regulatory conformity to specific norms, rules, and standards. Within companies, regulatory compliance indicates the fulfilment of specific dispositions presented by the authority, the regulator, or certified entities, even creating regulations for the internal context of an organization. If banks are taken as reference, the Compliance business unit aims at verifying that the internal procedures are consistent with the purpose of preventing regulations/norms violations as well as ethical and conduct codes. All this is necessary to avoid sanctions, financial losses, reputation damages, which would result from a lack of compliance to legislations, regulations and self-regulation.

To complete the introduction of what Compliance is in practice, it is useful to recall an international and regulatory paper. In fact, as part of its on-going efforts to address bank supervisory issues and enhance sound practices in banking organisations, the Basel Committee on Banking Supervision (the Committee) is issuing a high level paper on compliance risk and the compliance function in banks. In this paper, the Committee states:

“Compliance starts at the top. It will be most effective in a corporate culture that emphasises standards of honesty and integrity and in which the board of directors and

senior management lead by example. Failure to consider the impact of Compliance actions on a company's shareholders, customers, employees and the markets, may result in significant adverse publicity and reputational damage, even if no law has been broken. Compliance laws, rules and standards generally cover matters such as observing proper standards of market conduct, managing conflicts of interest, treating customers fairly, etc. They typically include specific areas such as the prevention of money laundering and terrorist financing, and may extend to tax laws that are relevant to the structuring of banking products or customer advice". (Basel Committee, 2005)

Once having clarified the concept of Compliance and provided some general definitions, it is now time to understand more in practice what is the Compliance risk, what are/from whom come the main guidelines on Compliance risk and the Compliance function in the banking system (that is a good point of reference as explained right before this paragraph; also, the banking and FIs industry is the mostly subject to regulations in the globe).

After the various scandals and meltdowns that occurred in the financial sector (especially in recent years), companies have started to move towards the reinforcement of those organizational aspects that are thought to ensure the full respect of the regulations concerning the activities included in the various companies' business models (and this issue is particularly critical for banks and financial institutions). Transparent and fair behaviour towards customers is crucial.

While we have an increasing number of authorities and regulations, the risk of not being compliant can increase. Banks have to be compliant with the general regulation, e.g. the Civil Code, but they also have peculiar regulations (e.g. directives from the ECB). A bank that knowingly participates in transactions intended to be used by customers to avoid regulatory or financial reporting requirements, evade tax liabilities or facilitate illegal conduct will be exposing itself to significant Compliance risk. Nowadays, banks and FIs have to regain reputation and trust, and this passes from a clearer reputation towards customers. To provide an example: the CCO of a Spanish bank stated that its employees perceived him as a policeman. The modern role of the CCO in a bank is quite different from the policemen, it has to *work with* other functions to propose the best solution to the market. He is an expert in regulation that has to support other functions in finding the best solution through which go on the market. This latter example sheds the

light on a topic that is central in the guiding principles that were established in 2005 by the Basel Committee: the majority of companies belonging to Multinational Enterprises, especially if listed, should implement a Compliance function within the organization. So what is the situation in Italy?

“Banks, intermediaries who offer investment services, and insurance companies are obliged to implement a Compliance function” (Banca d'Italia, 2007) (Consob, 2007) (ISVAP, 2008)

The aforementioned directives take origin from the guidelines imposed by the Basel Committee with the purpose of commanding customer transparency, crisis deterrence, fair competition, system efficiency and development, and social welfare. More in practice, the 2005 Directive on Banking Supervision by the Basel Committee proposes 10 guiding principles for “Compliance Risk and the Compliance Function in banks” that must be followed (Basel Committee, 2005). To have a general view of the purpose of this Directive, the main areas of intervention of the Basel Committee’s guidelines are presented below:

- Responsibilities of the BoDs for Compliance
- Responsibilities of Senior Management for Compliance
- All the principles related to the Compliance function that must be present in **some** banks and FIs (e.g. independence, responsibilities, relationship with Internal Audit, etc.). Why not all of them? Because the principles assume a governance structure composed of a Board of Directors and senior management. The legislative and regulatory frameworks differ across countries and types of entities as regards the functions of the Board of Directors and senior management. Therefore, the principles set out in this paper should be applied in accordance with the corporate governance structure of each country and type of entity.
- Cross-border issues
- Outsourcing

In Italy, the regulatory approach to Compliance by the three Control Authorities is characterized by a limited prescriptivism. At the same time, it is founded on the definition of general principles and, where necessary, by functional guidelines and dispositions for acceptable practices (i.e. **principle-based regulation**).

This paragraph, apart from providing a general idea of what is Compliance's situation in Italy, aimed at remarking its relevance in the financial sector, especially due to the strong raise in Compliance costs that has followed the Global Financial Crisis. At the same time, the financial sector is extremely important also for the stability of Italy that is home of many banks, FIs, and financial companies that have a great impact on international markets. These players suffer from the floods of regulations just as other countries' ones. Thus, it should be expected that also Italy is evolving from a regulatory compliance perspective. However, it has not happened so far.

3.3.2 Perception of RegTech in Italy

Is the Italian market aware of the existence of RegTech? Are big players, regulators, and innovative startups in Italy moving towards the development of efficient Compliance and operational solutions like it is happening since long time in foreign countries? To answer these questions, a good starting point is considering the reflections and insights from some of the most important industry experts and information providers in Italy. In particular, three opinions deserve to be taken into account as basis to develop the following analysis of the RegTech phenomenon in Italy:

1. Dr. Sacco is considered an Italian excellence in terms of innovation. He reminded that, according to the ranking "Doing Business" made by the World Bank, Italy occupied the 45th place in 2016 in the Innovation field, and this is because other countries move more rapidly, not because they invest more. The main problem of Italy is that it is still a less-developed country in terms of law enforcement and norms complexity. In this environment, RegTech would be a great solution and the main pioneers should be banks because they are among the mostly subject to regulations and directives. In other parts of the world, they are developing platforms that help to be compliant freeing human resources from this task, avoiding human errors, and efficiently responding to the requirements of the ECB or other regulators. (CorCom, 2016)

It is time also for Italian public administrations to build the necessary infrastructures and platforms to create new spaces in the market that aim at offering citizens and firms some useful and facilitating services. Perhaps Italy

could never be a leader in social networks, but when it comes to services, there is the opportunity to differentiate and become a best practice.

2. According to Accenture's research (BitMAT, 2018), in Italy it was registered a positive tendency in terms of investments in FinTech, which are still accelerating and could bring to a 30% increment in value in the next 5 years. Italy is trying to fill the gap that stands with the major players in Europe and the FinTechStage Festival that was held the last 7th of May in Rome was a great chance for Accenture to propose a brainstorming on RegTech, technology, and Ecosystem. Accenture's researchers state that investments in Compliance are expected to increase in the next two years. In fact, the 89% of the Compliance Officers in the financial services agree on the importance that RegTech is gaining with the continuous investments. If they will keep on increasing also in the second semester of 2018, then it would be possible to reach a level of investments that is doubled with respect to 2017. Mauro Macchi, Senior Managing Director of Accenture Financial Services, believes that private wealth, propensity to savings, PMI diffusion and links with the banking industry, are only a portion of the elements that explain why it is fundamental for Italy to speed up innovation and exploit the strategic importance of the financial sector to compete with European leaders.
3. A third relevant point of view to consider in order to draw an accurate overview of the RegTech situation in Italy is provided by Infodata (Infodata, 2017). They make the example of Lexdo.it, an Italian start-up founded in 2015, to state that interesting start-ups with innovative solutions that operate in Italy often manage to get only one or few thousands euros of financing, while abroad they would be more successful. Furthermore, the author asserts that out-of-Italy RegTech start-ups obtain more financing despite offering less or equally innovative products with respect to the Compliance/legal companies in Italy. While, according to CB Insights, RegTech and LegalTech sectors are developing rapidly in the rest of the world with Venture Capital investments trespassing the 5 B\$ threshold, in Italy the environment is less structured (even the definition of "LegalTech" is difficult to notice within the Italian start-ups industry). Actually there are many interesting realities in Italy that deal with this new market, with nothing to envy to foreign

solutions. However, Marco Bellezza and Antonio Verna (lawyers in a legal office in Milan that experimented AI technologies) affirm that the Italian-market paradox is that regulatory technologies are slowed down by the inability of Italian Authorities to choose a common vision and aim at the same purpose. The financial services are characterized by many norms that make it difficult to understand where boundaries are or how much solutions could be pushed forward. And this is important since Compliance is a duty that affects the drafting of a balance sheet, market analyses, conflicts resolutions, etc. On the other hand, if looking outside Italy, it is possible to see well-define jurisdictional boundaries that let the adoption of robo-advisors, accounting software, etc., which are nowadays already target of VC investments.

These three perspectives served to provide a general idea of the perception that the Italian market has towards RegTech and the level of preparation to welcome it. Before coming to a general conclusion based on these sources of information, it could be useful to add further elements in this introduction, to make the development of this Chapter more scientific. Therefore, it is now time to move on and point out the situation of RegTech in Italy in terms of numbers and percentages, presenting also the main and only Italian realities that have been retrieved during the various works of this Thesis.

3.3.3 Italian RegTech Players

The purpose is to answer to the following questions: “Are there Italian companies actually operating in the RegTech industry? Or are they simply FinTech companies with some similarities with rest-of-the-world RegTech companies?”



Figure 3.7 Italian FinTech start-ups situation

Source: NetConsulting cube 2017

Figure 3.7 demonstrates that despite the recent growth in Italy of FinTech, the RegTech industry has just entered the introduction phase of its life cycle. PwC (that has elaborated NetConsulting cube data) reports an almost irrelevant 1% of FinTech companies focusing on regulatory issues. In other words, according to the reporting company, there was only one Italian RegTech start-up until 2017 (i.e. **Trakti**). Fortunately, thanks to the experience accumulated so far through the empirical evidence of reports, articles, meetings, conferences, and scientific documents, it is now possible to affirm that there are more Italian companies other than Trakti operating in the RegTech market.

This is not to say that the data provided by PwC are not reliable. Perhaps, due to the fact that the boundaries of the RegTech industry are not clear yet, different sources provide different opinions about whether a company should be classified as “RegTech”. However, all the details provided in this Thesis come from certified sources of information or real face-to-face meetings. Therefore, it is reasonable to widen PwC’s findings including at least three very important companies/start-ups that compete in the RegTech industry, thus to provide a view including also the post-PwC’s research time period:

1. The first one is **InfoCert**. The team met at the Global RegTech Summit InfoCert, which is the largest Certification Authority in Europe and the leading Qualified Trust Service Provider. It has generated 70€ M revenues in 2017, registered 14 patents, and it has offices in Italy, United Kingdom, Spain and South America. InfoCert provides interesting solutions such as KYC ones (i.e. Trusted Onboarding Platform: a patented solution for customer identification and digital subscription of contracts) but also digital signature certification systems (adopted for instance by Cattolica Assicurazioni, Allianz, Barilla, Enel, etc.) and geo-localization solutions. Everything is oriented to face the challenges of trust/transparency that the recent regulations in Europe are bringing. In Chapter 4, it will be also presented a telephonic interview that we personally had with InfoCert, thanks to the good ties we have succeeded in establishing at the Global RegTech Summit with the company. The call was held by the InfoCert’s Marketing and Compliance Team, and provided very important insights useful to many parts of this Thesis. (InfoCert, 2017)
2. Another extremely relevant Italian RegTech reality is the **NIKE Group**. The Group’s vision is to provide clients with the instruments useful to face the hurdles that cyber and ICT risks are creating. According to NIKE, reduction in revenues, new entrants, and demanding customers who look carefully at the financial soundness of the various institutions, will require innovative solutions to significantly reduce the costs of Compliance processes. After 20 years of experience in Internal Governance systems, the NIKE Group invested 5 M € in RegTech transformation and covers more than 100 regulations/directives with its products and services. NIKE offers a modular and integrated approach to clients through three different business lines: Regulatory Services, Consulting &

Solutions, Security & Innovation, which combine their regulatory, functional and technological competences to satisfy all the customer needs. The solutions offered are typical of the RegTech industry: BoDs's support to elaborate control policies and integrated reporting; adaptation of business and compliance processes to regulatory changes like MiFID II and GDPR; digitalization of internal compliance and monitoring systems; a regulatory hub; etc. (NIKE Group, 2017)

3. The third Italian company that can be classified as RegTech, that is important at an international level, and that is not present in PWC's classification, is **CoreView**. The company is the global leader in Office 365 (i.e. a Microsoft Office tool) management, reporting, monitoring and security auditing solutions. It provides organizations and Microsoft partners the ability to monitor, report, and audit strategic information. This allows organizations to improve security, achieve compliance, optimize licensing, and gain operational efficiency. (Crunchbase, 2018) (Coreview, 2018)
4. The fourth one is indeed **Trakti**, the RegTech company recognized by PwC as the only one purely belonging to the definition of this new phenomenon, at least until 2017. Trakti is the first contract negotiation and management platform integrated in the blockchain. It automates companies' templating, negotiation and obligation management processes by supporting the entire life-cycle of a contract with a unique and compliant platform. In simple terms, Trakti offers a full set of tools and procedures to digitalise and streamline deals, saving time and reducing errors with fully automated and secured procedures.
5. The last one is **Spidchain**, its service aims at decentralize digital identity through blockchain technology. It can be considered the most innovative between the 5, being the only Italian RegTech company exploiting blockchain technology for its business.

As already remarked, the five RegTech Italian realities presented so far are not the only Italian companies offering solutions that are compatible with at least a part of the business model of an ideal RegTech start-up. At the same time, the solutions offered differ a lot one from another, thus further remarking the still unclear boundaries of a RegTech definition. However, they represent the only empirical evidence existing at the moment,

which can though be considered very reliable since it comes from a wide range of diversified and certified sources of information (as presented in Chapter 2). These five Italian actors are certainly a poor statistics with respect to the number of RegTech companies and initiatives in the majority of developed countries all over the world. However, later on it will be discussed how RegTech could proliferate in the country and reach foreign countries' innovativeness.

In conclusion: the scarcity of RegTech solutions in Italy, the perception that RegTech could play an important role in the future, the need to face the same Compliance issues of other countries, and the obligation to keep the pace of change, make the launch and boost of the RegTech industry a strong strategic need also for the Italian Peninsula. In fact, customers require transparency while companies, banks, FIs, and regulators require efficiency gains. RegTech exploits innovative technologies to create solutions that simultaneously fulfil the needs of all these actors. And this trend is exactly what is now knocking at Italy's door, where the same players face the same needs of all the countries in the world. However, not to fall into utopia, it is necessary to discuss as more objectively as possible (including all the most relevant and useful information) through which steps and collaborations the RegTech phenomenon could proliferate in our country.

3.3.4 How could Italy structure and nurture the RegTech industry?

First of all, it is not possible to change and advance without perceiving the necessity to change and advance. One of the most popular John Fitzgerald Kennedy's quotations is: *"Change is the law of life, and those who look only to the past or present are certain to miss the future"*. J. F. K.

Does Italy actually perceive the need to change and adapt to the international trend already present in this sense outlined by the RegTech realities in other parts of the world? To address the problem, it comes to help a very recent contribution by Massimo Morici, (Morici, 2018) stating that RegTech could effectively help Italian companies and some guidelines already exist.

The author remarks that the main factors (worldwide) that pushed regulators to become tech-Regulators are: DLT, Bitcoin, AML norms and those to prevent cyber frauds, the new forms of financing like Crowdfunding, Smart Contracts, and Robo-Advisors (AI in general).

These are all trends that sooner or later, according to the author, will proliferate also in the Italian market; they represent the future of financial services and some of them already concern realities that were born in Italy and offer RegTech or ICT innovative solutions like those of the 5 companies presented before in this Chapter. Furthermore, Italy is affected in the same way of the other European countries by regulations such as MiFID II, Basel, ECB's directives, GDPR, PSD2, etc. As a result, Italy shares the similar (or even same) external environment and technology evolutions of other countries (e.g. England, Ireland, Spain, Denmark, etc.) where RegTech solutions have already been developed to cover precisely the needs stemming from these factors.

Therefore, it is time for the Italian Control Authorities to keep the pace of the global financial services industry, despite the fact that it is only four years since they have been involved in the FinTech world. However, there is no choice.

"FinTech is at banks like RegTech is at regulators", declares Matteo Rizzi, Co-Founder and CEO of Gellify Fintech (i.e. an Italian platform that creates connections between digital start-ups and traditional businesses).

The best practice in this subject is always the forward-looking FCA (i.e. correspondent to the Britannic Consob), which activated a Sandbox program as exhaustively explained in this Thesis, together with a TechSprints programme (that will be presented at the end of this Chapter), and many other innovative and RegTech-related initiatives.

To sum up what discussed so far in this paragraph, the main conclusion that can be drawn is that every factor, whether exogenous or endogenous, suggests a short-term scenario in which Italy pushes for significant progresses in the RegTech industry. Not only because it aims, but also because it needs it, exactly like all the other countries that are yet active in this field.

It is then useful to outline what are (according to the subjective opinion of the authors of this Thesis) the three main steps that could trigger the introduction and growth of the RegTech industry in the Italy: **awareness, commitment, and diffusion**.

The following paragraphs will present the steps in detail and compare them to Italy's situation to date in terms of each of them.

3.3.4.1 Awareness/Interest for RegTech

Actually Italy is well positioned in terms of “awareness” of the RegTech phenomenon. In fact, the empirical evidence that was presented before in this Chapter suggests the following key factors: presence of some RegTech Italian realities, articles on Italian newspapers and websites on RegTech, consideration by the three Italian Control Authorities, researches, studies and events/conferences/fairs organized and sponsored by important actors in the Italian financial services to speak about RegTech. These are all evidences that in Italy something is moving. RegTech is not anymore a latent need but a perceived urgency. Thus, it is possible to affirm that in Italy there is certainly a good awareness of the existence and importance of RegTech as well as an interest in developing the phenomenon. Furthermore, making researches on Google and typing sentences like “aziende Compliance Italia”, “KYC e AML Italy”, “Compliance Italia”, among the first 3-4 results most were links for job opportunities in the Compliance field, that seems to be a reasonable indicator of the high level of awareness by companies that need innovations also in Compliance and regulatory processes. This is very important because, introducing the fundamental take-aways of all the themes that will be discussed later on in this Chapter, **it is not possible to develop a RegTech mentality without being first proactively involved in Compliance issues.**

Coming back to the previous arguments, it can be asserted that Italy is certainly on its way towards the diffusion of RegTech, as demonstrated by the initial awareness and interest in the phenomenon.

The only issue is that these awareness and interest have emerged late. Italy is one of the least advanced countries in terms of RegTech, at least among the developed ones. And looking at the fact that countries like Australia, Malaysia, and Denmark, that are not more sound or innovative than Italy, have already developed their own Regulatory Sandboxes and created their innovative hubs, it is a signal that something should have moved long time ago (especially because Italy, like the rest of EU countries, is fully

immersed in the wave of regulatory directives that have revolutionized the financial services).

However, not to seem unfairly cynical, in Italy there is not only a simple awareness/interest for regulatory technologies. On the contrary, there have been also some **practical changes and reforms** adopted by Italian companies to sensitize themselves to Compliance issues (even if still with limited adoption of RegTech solutions). In fact, the major changes operated so far by Italian businesses are, for example, the introduction of a Compliance function as ordered by the ECB's directives, compliance-risk identification and evaluation systems, reporting processes planning, design of ad hoc compliance policies and procedures, and so on. On the other hand, there is little empirical evidence (apart from the facts summarized so far in this paragraph) of the enlargement of Italian companies' key business objectives to include Compliance efficiency, allowed by RegTech solutions. However, the aforementioned higher commitment in terms of Compliance (even if not directly in RegTech for the most) is the fundamental and sufficient condition to trigger the development of RegTech. In fact, only starting to explore the world of Compliance solutions aiming at increasing efficiency Italian businesses can enter the world of regulatory technologies. Therefore, given the importance in the first place of the awareness/interest in Compliance, it is propaedeutic to the continuation of this Chapter to present some data and scientific evidence to show in practice how Italian businesses' mentality has recently focused deeply on Compliance issues.

To better clarify what is actually moving in Italy in terms of Compliance, the Thesis relies on a valuable overview that was realized by Protiviti Srl, i.e. a well-known multinational organization specialized in consulting and value creation through risk management and Governance solutions. (protiviti, 2016)

Protiviti has conducted a survey addressing a representative sample of Italian businesses, both listed and not, also active at an international level (except from banks and insurance companies), with the purpose of identifying:

- Compliance issues with the higher impact on companies and processes;
- Models and characteristics of the current Compliance management programs;
- Perimeter and operation of the Compliance Function, where existing;

It is important to remark that the survey addressed not only financial operators, but also businesses belonging to the Industrial/Manufacturing, Consumer Goods, Oil & Gas/Energy & Utilities industries. This proves that Compliance, especially in recent years, has become a critical issue in several industries because of the cross-sectorial regulations that are continuously being issued by European and foreign authorities. In fact, non-financial industries' companies do not suffer from compliance issues only because they have business units dedicated to financial trading and activities, but also because nowadays regulatory directives cover many business fields and impact diverse business models. As it will be remarked also later on, this is obviously good news for RegTech, because enlarging the potential market also to many non-financial players is the best way to boost the market demand.

Coming back to Protiviti's research, another remarkable aspect is the international coverage (i.e. both in EU and non-EU countries) of the sample, together with the fact that the firms targeted varied in a range from few hundreds of Millions to few Billions of Euros in terms of Net Profit (i.e. another signal that the players involved in the survey are not only small financial businesses with too few resources to bear the burden of regulations, but also large industrial companies that are losing likewise great shares of profits because of the high compliance costs, and thus equally interested in RegTech solutions). The survey has confirmed, according to Protiviti, an increase in the regulatory complexity in those countries where the sample's elements operate, due to the progressive proliferation and restriction of rules and norms impacting on the various businesses.

As a result of this situation and of the intensification of international authorities' checks and sanctions, Italian businesses have matured a higher awareness of the relevance of Compliance management. This implies that the awareness now is "like never before", both in terms of numbers and sector heterogeneity of the companies subject to these issues.

Protiviti affirms that, in the last five years, almost a half (46%) of the sectors involved in the analysis has been shocked by non-conformity events that have caused economic and financial damages and/or reputational ones. The business processes that are more heavily affected by norms are: sourcing of materials, production, operations management, and sales. However, at the moment of the research (2016), emerging themes like **AML, Antitrust and International sanctions**, had yet a **limited impact** and were

managed in a **mixed and decentralized way** (limited extension in terms of number of firms in Italy). This latter fact fulfils the purpose of recalling Protiviti's survey in this Thesis (in the References it is also provided the web link to read the full survey that provides other further and interesting insights on the managerial side).

In fact, the goal was only to have a general overview of how the attitude of Italian businesses towards compliance have changed in recent years, for then connecting this scenario with the current one presented in the first half of this paragraph of initial attention/interest in the RegTech phenomenon, again by Italian businesses. As a matter of fact, as stated before, **the interest in Compliance is the prerequisite for the interest in RegTech**. Therefore, to conclude, the two main outcomes resulting from the survey's insights provided by Protiviti and discussed so far are summarized below:

1. Passage from a **negligent approach** to a **proactive approach** to Compliance.
In the past: reactive and unstructured approach, lack of a vision and a centralized responsibility on Compliance issues, unclear roles, lack of internal competences and ambiguous Governance systems, inefficient coordination, inability to adapt to system complexity, etc.
Since 2016: greater tendency and interest in establishing Compliance Management programs (with the purpose of being proactive, not reactive, towards regulatory issues), mapping of regulatory requirements, risks analysis, creation of clear reporting processes and responsibilities, formation programs, auditing, diffusion of regulatory procedures and policies, etc.
2. The second inferable outcome (strictly correlated to the first) is that, up to 2016, there was only an initial attention in Italy towards the Compliance world in general, and not even a general awareness of RegTech (except from the few realities presented before), while many countries were already active since years. However, in the last year there has been an important boost in Italy (as demonstrated in the first half of this paragraph). The current interest was triggered by the higher commitment from a Compliance perspective that Italian businesses have showed in the previous two years. Nevertheless, a simple interest and few realities is not enough.

The final consideration concerning the awareness/interest that Italian businesses and Authorities have recently developed first in terms of Compliance and then in terms of RegTech, is that both these trends emerged very late. Compliance is a critical issue since way before 2005 and RegTech is worldwide developed since way before 2017/2008 (those time references are recognized as the moments before which those issues already had caught attention in other countries in a significant way). **Thus, there is the need for an actual and intense commitment by Authorities and more/various businesses, as well as the introduction and proliferation of regulatory technologies through production, import and export, in order to make RegTech a consolidated reality also in the Italian market.**

These latter issues will be widely discussed in the following paragraphs, together with possible solutions.

3.3.4.2 Commitment by Regulators / Authorities / Supervisors (i.e. RAS) and FIs and FS providers (i.e. FIFS)

RAS

Just like the level of awareness/interest in RegTech, also in terms of “Commitment by the Italian Control Authorities”, the country is beginning to show vital signs, or at least signs of a preparation of the field on which RegTech diffusion could be based. Italy is still late with respect to many developed countries in the world. However, the interest by authorities and regulators (despite just emerged) represents the most important milestone in the introduction phase of an industry like RegTech, on the way for its diffusion and growth. In fact, it is fundamental for the emergence and consolidation of RegTech to be considered not only by some bold pioneers like the few Italian companies mentioned before in the Chapter (despite how successful they are), but also by authorities that promote the phenomenon using their sound institutional reputation and, at the same time, that could play a strategic role due to their obvious involvement in regulatory issues, just like the FCA is doing in UK.

The other main determinants of the strategic importance for RegTech to be initiated by authorities/regulators have been frequently presented in this Thesis, like the fact that RegTech is now an industry where regulators hold the responsibility to spur innovation, because the flood of regulations generated by most of them implies inefficiencies to businesses and retail customers, but even to themselves. Another exhaustively discussed reason has been the importance of Regulatory Sandboxes, created so far indeed by regulators and authorities, with the purpose of obtaining advancements in the current FinTech solutions and promote the diffusion of new phenomena, among which also RegTech.

All these determinants of supervisors' strategic role are remarked also in a report (Bofondi & Gobbi, 2017) where, among many contributions, it is included a chapter titled "The Big Promise of Fintech". The work by the two authors says "what Regulators may reasonably do is to adopt a pragmatic approach that should be flexible, coordinated across jurisdictions and based on a continuous dialogue with the industry. In this spirit a number of national authorities set up innovation hubs, regulatory sandboxes or innovation incubators.

Finally, regulators and supervisors need to invest resources and build skills also to understand how new technologies may be used to pursue their objectives. Moreover, supervisors should consider investigating and exploring the potential of new technologies to improve their methods and processes."

However, the most noteworthy insight that emerges from the contribution of the Heads of two important departments from the Bank of Italy is that the scenario implying the international and national collaboration of authorities and supervisors proposed by the two authors is remarkably similar to the Collaborative and Competitive Regulatory Sandbox Paradigm proposed in Chapter 3 of this Thesis. The concepts of a pragmatic approach by regulators, coordination across international jurisdictions, continuous interactions, regulatory sandboxes, investments by authorities to spur innovation and operational efficiency, and the collaboration resulting from a new spirit of national authorities, are the same ideas proposed as the fundamental elements of a new hypothetical (yet realistic given actual conditions and opportunities) scenario of the (RegTech and) financial services industries. This fact, apart from being an indirect support to the TCCRSI explained in the previous Chapter, will be also functional and helpful for what

it will be discussed in the following paragraph concerning the ways RegTech's diffusion could be sparked.

It is then clear that the retrieval of such important and institutional contributions represented a key event along the writing of this Work. It has been an unintended certification of validity of the main pillars and principles of the TCCRSI, but it has also been an additional encouragement to develop the following paragraph, which connects the main ideas of Chapter 3 and 4 and draws a reasonable conclusion on the basis of the personal and professional perspectives considered for the idealization of these two Chapters.

However, coming now back to the reasons why authorities and regulators are fundamental for Italy if the country aims at introducing RegTech on a large scale, it is now time to see what happened in practice so far. To this aim, it is extremely functional to recall a report of the Consob (Scheda, Tanda, Arlotta, & Potenza, 2018), in particular, within Chapter 4 there is a paragraph dedicated precisely to the Vigilance Authorities' actions in the National context (i.e. Italy), which can be considered as the most reliable source of information available on the Net about the commitment that Italian Control Authorities are beginning to have or prospect towards FinTech solutions and, in the most recent times, RegTech.

The Consob, in 2016, had arranged a round-table with a significant number of Italian universities aimed at promoting joint research activities, which have then been enriched by the contributions of Fintech firms and incumbents. Among the findings of these researches, there is the acknowledgment of the trends of National authorities to establish innovation hubs, accelerators/incubators, and **Sandboxes**. Fintech start-ups (among which also RegTech) might need more advice or help from supervisors to navigate the applicable legal framework. In that sense, innovation hubs (or other dedicated structures recently created in some national competent authorities and that are aimed at guiding and advising Fintech start-ups) are interesting and should be encouraged. However, the Basel Committee reminds that these initiatives have just started up and thus cannot be assessed yet, due to lack of references and best practices. As far as the specific stances held by the Italian Control Authorities are concerned, the Consob has asserted that, while waiting for a regulatory regime homogeneous at European level, it would be preferable to have a less pervasive regulation, especially for

FinTech start-ups. Therefore, it is advisable to allow companies to test and experiment, under the supervision of Italian authorities, the gradual application of specific norms (which get stricter the more a company grows). To this aim, the Consob has recently widened its organization with the hire of people with strong competences especially in the digital field.

However, what displayed so far is mainly just an intention/orientation that authorities (among which also Italian ones) are beginning to showcase. In reality, there is also an actual commitment that has recently started, although until few months ago (at least in the Fintech and, even more, in RegTech field) only foreign authorities exerted a real effort in this sense.

As a matter of fact, at the present, there are finally some vital signs of commitment that shed light on a path that is similar to the one of many other countries and that seems to be potentially consistent (as it will be discussed in the next paragraph) with the TCCRSI that was presented in Chapter 3.

Before presenting how the recent trends and commitment by the Control Authorities in Italy can be functional also for the RegTech proliferation and diffusion, it is now time to see in practice, as reported in the Consob report, what actions have been taken so far and by which actors:

1. The first and unique **Sandbox project** launched so far in Italy is the one in the insurance field initiated by the Vigilance Authority IVASS in collaboration with the sectorial association ANIA. As declared by the latter, the project aims at promoting innovation in the financial services to ensure that the regulatory framework increases its digital-friendliness (i.e. becomes technologically neutral and sufficiently flexible in order to adapt to the current digital era. More importantly, in the designed framework, it is encouraged the destruction of all the possible entry barriers for **InsureTech start-ups** with the purpose of creating tools to support customer-beneficial innovations at disposals of both InsureTech newcomers and incumbents (as suggested also in the TCCRSI, with RegTech companies instead of InsureTech ones).
2. Bank of Italy has recently deployed an **Innovation Hub** through the launch of its own website of the FinTech Channel (Banca d'Italia, 2018) that allows operators to keep up with updates about FinTech and interact with the authorities, even

asking questions. Such tool has been judged as the most adequate to promote relations with FinTech players and stimulate the financial sector, without altering its safety and stability (exactly as suggested in the TCCRSI), and keeping customers at the center. The Bank of Italy advocates that the proposed solution could be extremely beneficial to both authorities (to better understand the current market/latent needs) and firms (to get trustworthy information). Furthermore, it provides companies with insights on Compliance issues and norms interpretation, and it enables a proactive role towards changes in the regulatory framework. It is crucial to add that Bank of Italy has also remarked the likelihood of a regulatory intervention aimed at disciplining these forms of interaction and support for FinTech, in order to permit exchanges among firms in a clear and neat normative landscape, also in case of services that do not fit the current regulatory directives.

3. The ex-Vice CEO of Bank of Italy announces the launch of a **RegTech Lab** by the end of summer 2018 (ANSA, 2018). The Lab has the objective to promote this new trend and serve both as catalyser of technological research and engine for the proliferation of FinTech solutions by 2019. Such project must involve not only Italian Authorities but also the city of Milan and universities.

The most important remark that must be made is that, except from the proposal by Paolo Ciocca (that concerns specifically a RegTech Lab), many of the insights reported in this Chapter and provided by external actors (e.g. the considerations by the two Heads in Bank of Italy, as well as a part of the vigilance authorities' initiatives presented in the Consob's report) do not refer specifically to RegTech but to FinTech in general. This fact leads to two inferences: the first is that, apart from an initial and practical commitment by Italian Authorities in the promotion of FinTech solutions (and also InsureTech), the effort in terms of RegTech is still more theoretical than real. The second consequence is that the effort by the Italian Control Authorities is yet relevant also from a RegTech perspective. In fact, although some of the previously-described initiatives are only addressing FinTech at a general level, it is clear that in order to foster commitment in facilitating RegTech's proliferation, there should be first a commitment towards FinTech, compliance issues and regulatory hurdles. The latter commitments were proved by all the empirical evidence and contributions included in this paragraph.

Furthermore, for the aim of this Chapter and the following one, it is enough to have demonstrated an initial awareness/interest for RegTech and an initial commitment by regulators towards Fintech (yet only from a general point of view) in order to present some proposals and ideas of how RegTech could proliferate and advance in Italy. Indeed, innovation hubs, Regulatory Sandboxes, labs, incubators/accelerators, and the innovativeness of Italian Control Authorities, represent the most effective means that are nowadays at disposal to enable the diffusion of any FinTech solution, regardless of the InsureTech, RegTech, or other FinTech's subsets origin.

FIFS

Another evidence that Italy is far behind its close geographic relatives in the contribution to the bulk of RegTech solutions throughout the European market, is obtained from the analysis of the Internal Database, which shows the total lack of commitment by Italian financial institutions and financial service providers to develop RegTech products/services.

As already pointed out, Europe has had a significant role in the growth phase of the phenomenon, and even if also US seems to be gaining a co-pioneering role, the Old Continent is still at the center, and if we look at European FIs and FS providers interacting in the RegTech industry, the Italian absence is evident.

England, Switzerland, Spain, Germany, and France have given a remarkable contribution to the cause; indeed, financial institutions coming from the latter countries have already caught the importance of the RegTech movement and have started building wide networks. As stated in Table 2.1 players like Barclays, BBVA, Santander, Deutsche Bank, BNP, and UBS are the most active in the scene, with many different partnerships and commercial relationships.

Coming back to Italy, there are few relevant initiatives from the most important FIs (e.g. Unicredit, Intesa San Paolo). The only exception is the commercial relationship between Intesa San Paolo and the UK-based startup Clause Match. This delay could result in a crucial loss of competitive advantage on the long term. If matching the list of Global Systemically Important Banks (G-SIBs) and the network analysis from Chapter 2, it can be inferred that, among the 14 European G-SIBs, only 3 have not had yet a direct relationship with a RegTech company (Unicredit Group is among these 3 players).

The Unicredit’s Integrated Sustainability Report published in 2017¹² (in the “Risk Management and Compliance paragraph”) stresses the importance of compliance, underlining the impact of the new European regulations (GDPR, MiFID II, PSD2, MAR) on the financial economy. Furthermore, at the end of the section, there is a promise of commitment towards RegTech solutions, assessing that in 2018, the Compliance Office will continue its job in norms’ interpretation and will focus on digital activities in order to simplify processes thanks to RegTech solutions. This intention (limited to the adoption of RegTech solutions) seems, as today, unrealized.

Taking these latter evidences of commitment by the main actors of the RegTech industry as reference point, and considering as a stylized fact the (at least general) interest that the Italian market has towards RegTech, it is now time to present some of the most realistic opportunities that could allow the diffusion of RegTech, following the footsteps of many other developed countries in the world.

3.3.4.3 Support start-ups’ proliferation / diffusion

To remain consistent with the main purpose of the current and previous Chapter, this Thesis aims at focusing on Regulatory Sandboxes as tool to support RegTech’s diffusion. As already discussed, there are also other collaborations and sponsors available at the moment (labs, co-working spaces, incubators, innovation hubs, etc.) that are supporting/could support the purpose (plus TechSprints, that will be presented later in this Chapter). However, the innovativeness of Regulatory Sandboxes, their direct involvement of regulators/supervisors, and the widespread presence of this issue in many recent articles, papers, interviews and events, are great incentives to take them as representatives of all the tools strategically functional to RegTech’s proliferation in Italy (as in the rest of the world). Recalling the paper “The Fintech Development: Risks and Opportunities for the financial industry in the Digital Era” from the previous paragraph,

¹² https://www.unicreditgroup.eu/content/dam/unicreditgroup-eu/documents/it/sustainability/sustainability-reporting/2017/UC_IR_ITA2017_Dinamico_Link.pdf

Consob reports a table from a BCBS-FSB's (Basel Committee on Banking Supervision and the Financial Stability Board) survey that shows what are the actions carried out so far by the main control authorities in the world in terms of "innovation facilitators".

	Innovation facilitators		
	Innovation hub	Accelerator	Regulatory sandbox
	A place to meet and exchange ideas	"Boot-camp" for start-ups, culminating in a pitch presentation	Testing in a controlled environment, with tailored policy options
Australia	ASIC	ASIC	ASIC
Belgium	NBB/FSMA		
ECB	SSM ³³		
France	ACPR/AMF	BDF	
Germany	BaFin		
Italy	BOI		
Hong Kong SAR	HKMA	HKMA	HKMA/SFC/IA
Japan	BoJ/FSA		
Korea	FSC		FSC
Luxembourg	CSSF		
Netherlands	DNB/AFM		DNB/AFM
Poland	FSA		
Singapore	MAS	MAS	MAS
Switzerland	Finma		Finma
United Kingdom	BoE/FCA	BOE	FCA ³⁴

Table 3.5: Innovation facilitators

Source: BCBS-FSB survey

Table 3.5 is useful to further remark that Italy is still non-positioned in the field of Regulatory Sandboxes. Nevertheless, the evidence reported in the previous paragraph suggests that some initial steps are being made by Italian authorities, although most of them are in the FinTech sector in general.

As a result, **simply following the path outlined by other countries and resorting to some of the concepts in the TCCRSI, it is possible to imagine all the interventions that could be used to spread the aforementioned initial commitment in order to trigger RegTech's diffusion and proliferation making it a structured and established industry also in Italy, with defined boundaries and recognized players.**

Future Scenario:

- Adoption of Regulatory Sandboxes by control authorities, thus sensitizing the Italian market to RegTech solutions;
- Creation of Sandboxes also by some Italian Blue Chips in the field of tech, insurance, but also banks and financial institutions in general;
- Convergence on rules and norms governing Regulatory Sandboxes in institutions and enterprises that differ from supervisors;
- Creation of regulatory hubs (as the ones described in paragraph 3.2) composed by all the actors aforementioned (i.e. institutions, big corporations and supervisors), RegTech companies they helped to launch, the ones they partner with, and the ones they acquire;
- Regulating competition among RegTech companies, both the ones involved in regulatory hubs and the ones that were launched independently;
- Support to Regulatory Sandboxes by labs, incubators, accelerators, innovation hubs, co-working spaces, etc;
- Use of TechSprints (will be presented later on);
- Once diffused, the means to get bigger and achieve economies of scales could be the traditional ones adopted by most players in the financial services industry: external sources of finance, M&As, internationalization, IPOs, etc.;

It should be remarked that this inferred development path is the result of subjective considerations based on all the information that was collected to realize this Dissertation. However, as proved by all the empirical evidence presented in the various Chapters, most of these interventions are actually happening or strongly suggested by many relevant players in the RegTech industry as well as financial services/regulatory ones.

As far as the remaining considerations are concerned, these come from the TCCRSI exposed in paragraph 3.2.6, where they have been explained in detail and justified by some assumptions.

However, the need to coordinate (also from a regulatory perspective) all the main actors who are competing in the RegTech industry or that are at least clients of RegTech companies, is effortful, time consuming, and very costly. Therefore, assessing in advance

the potential efficiency and competitiveness of such environment is impossible given the very early stage of the RegTech industry, especially in Italy.

The purpose of this paragraph is just to hypothesize a future scenario based on the evidence collected, professional opinions, and personal inferences. There is no purpose of being scientific. In the following paragraphs also TechSprints and Industry 4.0 are presented as potential contributors, together with Regulatory Sandboxes, to the diffusion of RegTech in Italy.

3.3.5. TechSprints

First of all, why TechSprints were introduced only at this point of the Thesis? Two reasons: on the one hand, they are an extremely new phenomenon just launched by the FCA, thus with little evidence of their effectiveness and functioning. Therefore it was not wise to consider them as equally important as Sandboxes for RegTech's diffusion at the moment (in fact, they are not even mentioned in articles and scientific documents, while Sandboxes are). Furthermore, being TechSprints designed specifically for RegTech companies (and not FinTech in general) they need more time to become widespread. On the other hand, since this Chapter treated how RegTech could proliferate in a less-developed country like Italy, innovative means that have not been tried yet should be presented, given also the scarce results obtained so far through traditional means.

For all these reasons, TechSprints deserve to be discussed and introduced, especially because they are proposed again by the FCA, which is extremely reliable in terms of innovations in this field.

But what are TechSprints? They are basically **2-7 days meetings between regulators and start-ups in order to explore and design innovative solutions in the RegTech field with the purpose of brainstorming ideas together and creating a sort of co-working space.**

This activity differs significantly from Regulatory Sandboxes in terms of the type of collaboration that exist between the regulator and the unregulated entity, as it will be discussed later.

TechSprints play a very important role also as far as the TCCRSI from paragraph 3.2.6 is concerned, because they offer remarkable insights that are overlapped to most

contents of the TRCCSI (despite being different from Sandboxes as facilitators/innovators). Furthermore, they also add some further considerations and purposes that deserve to be analysed carefully.

3.3.5.1 The Financial Conduct Authority's Project

TechSprints represent an innovative tool, launched by the FCA, which aims at fostering the development and diffusion of disruptive solutions, especially in the RegTech field.

Thus, the FCA is the global pioneer also in terms of TechSprints (after Regulatory Sandboxes) and pushes for the creation of a totally new environment:

“The industry sees a role for the regulator to participate in initiatives that encourage the adoption of RegTech, whether at idea, development or exploration phase. We get many requests to endorse particular approaches or RegTech solutions. Firms also ask us to participate in initiatives that are aimed at adopting technology by regulated firms. We are generally happy to receive demonstrations on particular RegTech solutions, as this helps us understand what's being developed. Likewise, we talk openly about our work and plans.

However, due to our competition remit we are limited in how we can offer help and we will not endorse proprietary technology or solutions. To adopt consistent practice, we use these working principles:

1. The solution or approach should **enhance a firm's regulatory compliance outcomes**, or promote enhanced outcomes for consumers.
2. The initiative is led by industry, characterised by **multi-firm collaboration and participation**.
3. The solution is developed in an open and **transparent** manner.
4. The initiative can be made public, ensuring that other participants with genuine **interest and contributions** to make can be involved.
5. We can participate in the discussion, but are not being asked to endorse the approach.
6. **As with all innovation, participation and learning is more important than the initiative being a success.**

Alternatively, the **regulatory sandbox allows businesses to test innovative products, services, business models and delivery mechanisms in the real market, with real consumers.**

Reaching beyond how TechSprints work from a theoretical perspective and their main purpose, it could be useful to explain what specific issues they could address, since their organization and content vary according to what particular “RegTech” area they are concerned with.

Obviously, the only empirical evidence to date are the TechSprints organized by the Financial Conduct Authority; among these are (FCA, 2018):

1. **Consumer Access TechSprints:** first TechSprints event, April 2016. The aim was to identify potential solutions to access issues in financial services. Hosted by KPMG, the event focused on developing practical outcomes using API-accessible data to help overcome consumer access issues to appropriate financial services. Participants had access to the largest anonymized customer data test bed in Europe. Ten organisations participated, six of whom took part in the development of the event itself and others performed supporting (hosting and technology) and judging roles. **Three of the ideas generated are now being explored commercially as products to bring to market. This event showed the benefits of collaboration between traditional financial services providers and the FinTech and RegTech communities.**
2. **Unlocking Regulatory Reporting TechSprints:** In November 2016, PA Consulting hosted the second TechSprints. The aim of the event was to identify potential solutions to help improve the efficiency of regulatory reporting. **Around 100 developers from across 30 organisations took part. The ideas generated spanned the whole process of regulatory reporting.** Other teams re-interpreted how regulatory reporting could be undertaken – moving from firms ‘pushing’ reports into the FCA, with the regulator storing all this data, to a possible scenario of the FCA ‘pulling’ the agreed data instantaneously from firms as required.
3. **AML and Financial Crime International TechSprints:** In May the FCA held a three-day International Anti-Money Laundering and Financial Crime TechSprints. The purpose of the TechSprints was to investigate how new technologies and greater international collaboration could help to improve

prevention and detection rates to more effectively combat money laundering and financial crime. TechSprints participants were welcomed by Megan Butler, Executive Director of Supervision - Investment, Wholesale and Specialist, who highlighted how data and technology can help detect and disrupt criminal activity, as well as the importance of greater international collaboration in fighting financial crime. **Over the three days, 260 participants from 105 firms spanning 16 countries – together with regulators and law enforcement agencies from the United States, Europe, Middle East and Asia Pacific - worked in teams to develop solutions to various problem statements. The teams then demonstrated their solutions to a cross-industry judging panel and a sizeable audience of senior executives from regulated firms, technology providers, start-ups and academic institutions.**

To conclude, the FCA declares:

“Our ambition is that the TechSprint will serve as a catalyst for further international efforts by deepening international and cross industry dialogue around the role of modern technology. We are working with international regulatory colleagues on supporting follow-up events to further investigate and develop the ideas that were generated at the TechSprint. We are also acting as an observer for several consortia who are developing anti-money laundering related proofs of concept resulting from the TechSprint. We are also keen to work with relevant parties to better understand the specific opportunities that homomorphic encryption and zero-knowledge proof technologies may offer”.

3.3.5.2 Key Implications from FCA’s TechSprints

The previous sub-paragraph describing TechSprints (as they were thought by the FCA) has the primary aim to provide some key implications/takes away that subsequently serve two purposes: **comparison with Regulatory Sandboxes and the TCCRSI to highlight divergences; potentially provide a further tool to foster the development and diffusion of RegTech in Italy.**

Therefore, in the beginning, it is all a matter of pointing out the aforementioned **guidelines** that can be inferred or simply remarked as a result of the TechSprints' description made before:

- Bring together the regulators, agencies, and companies to develop innovative solutions to enhance compliance outcomes
- Increase connections to increase opportunities for innovation (Greg Soulsby, Director of Model Drivers)
- Foster collaboration between traditional financial services providers and the FinTech and RegTech communities, across industries and countries.
- Problem addressing and solving through platforms exploration and dreaming impossible
- Engagement in one place to exploit complementary competences
- Pull technology and develop shared and cross-industry (i.e. financial services) solutions
- Deliver solutions/ bring ideas to market (Joanna Hill, Director Market Intelligence & Data at FCA)
- Bring together the ecosystem of regulators / start-ups / banks (Sigga Sigurdardottir, Chief Customers & Innovation Officer at Santander, UK) at an international level
- Leverage communities (e.g. universities)
- Preserve competition

Given these conclusions drawn from the world of TechSprints, it is now time to insert them in the context of this Thesis and of this Chapter, talking about the links between TechSprints, Regulatory Sandboxes, TCCRSI, and the diffusion of RegTech in Italy. In fact, many commonalities/overlaps between these innovations exist, but there are also several differences/divergences that came to light during the exploration of scientific documents and articles.

3.3.5.3 FCA's TechSprints vis-à-vis Regulatory Sandboxes and the Principles of the TCCRSI

Comparing TechSprints and Regulatory Sandboxes some fundamental differences need to be remarked.

1. First of all, Regulatory Sandboxes are cooperative relationships between the regulator and start-ups aiming at allowing the latter to test and launch their products/services in a less constraining regulatory environment and without the participation/intervention of the authority. However, although also Sandboxes are based on ideals fostering RegTech solutions' proliferation like cooperation, engagement in one place, problem solving, and innovation, their main scope and rules are much different from TechSprints. It could be said that in the latter case there are more complete relations since parties engage from the very first phases of a product development, making plans on the future engineering and feasibility, sharing ideas and resources & competences. Sandboxes are used only to support test & launch providing efficient technical/technological infrastructures, and also a sound sponsor for start-ups (in addition to the main peculiarity of Sandboxes related to the temporary softening of the regulatory burden for hosted companies).
2. Even the duration is much different between the two innovative tools: TechSprints are simply events/fairs lasting few days, although they are greatly productive due to the collaboration in brainstorming RegTech solutions. Regulatory Sandboxes usually host start-ups for weeks or even months.
3. Another differentiating element are the clients of such instruments: TechSprints, at least so far, seem to be organized with the specific purpose of boosting RegTech (even if other sub-sets of FinTech could benefit from this innovation), thus involving the regulator, RegTech start-ups, and experts. On the other hand, Regulatory Sandboxes are still more concentrated on FinTech start-ups in general, with little commitment on the RegTech side (despite the FCA, many financial institutions, and experts, believe that they could represent the future of RegTech- i.e. RegTech 3.0).

The most immediate question that arises from this comparison highlighting the main differences between Regulatory Sandboxes and TechSprints is: “ Which one works best?” Analysing the purposes of the FCA, the leading expert in the field, it could be inferred that these tools are actually complementary. In fact, the FCA itself uses both of them and simply suggests companies to make a request for the one that best fits their needs. Sandboxes and TechSprints are simply different tools with different purposes and can either be used to support the diffusion and development of RegTech.

The only statement that can be made is that Regulatory Sandboxes enjoy a better popularity at the moment. They are beginning to be adopted worldwide by many different institutions following the footprints of the FCA and there is much literature on this phenomenon. However, just like the British Authority was able to promote Sandboxes and spread their utility all over the world, the same could happen in the future with TechSprints, being them a further tool that could definitely spur innovation in an alternative way.

Coming now to the comparison between TechSprints and the TCCRSI_exposed in this Thesis, it is possible to outline several commonalities that in part represent a proof that TechSprints could be used as further mean to spur the development of the proposed ecosystem (and of RegTech in general). However, this issue deserves a deeper analysis in order to express properly the divergence between the initiatives carried out by the FCA (which are supported by feasibility analyses and carried out by a certified and qualified institution) and the ones proposed in this Dissertation (which are subjective and inferred by the data and information collected throughout the various researches, yet not supported by scientific analyses despite based on real sources of information).

Among the various guidelines of the FCA’s TechSprints are **the aim to preserve competition, international and cross-sectorial collaboration, sharing of resources and competences, collaboration between regulators and start-ups, open communication, engagement in one place to solve problem, innovate, and bring solutions to the market**. All these aspects are shared also by the main principles expressed in the TCCRSI according to which the main idea is to bring together regulators, financial institutions, big tech companies, and start-ups, with the aim of working together (in a less regulated environment) in order to test and launch innovative RegTech

solutions, thus creating strategic hubs across different countries and industries competing among each other.

These commonalities are evident to the extent of potentially considering TechSprints more fit for the hypothesized competitive and collaborative environment with respect to Regulatory Sandboxes. This is basically because Sandboxes only aim at offering a comfortable and less constraining environment for start-ups to test and launch their solutions, not a full support in all the product development phases. On the other hand, TechSprints, despite being only few-days events, involve a proactive and comprehensive relationship between the regulator and start-ups (i.e. implying brainstorming, designing, assessing, engineering, and delivering solutions to the market as a result of a pragmatic interaction). Therefore, why Regulatory Sandboxes were chosen as main tool to foster RegTech's diffusion in the TCCRSI instead of TechSprints, which seem more consistent and easier to be used to create the proposed environment? There are basically three answers to this question (that in part recall what already discussed before):

1. Regulatory Sandboxes are nowadays more diffused and conceptualized with respect to TechSprints (organized only by the FCA); thus, they seem a more powerful tool that can be used to let RegTech proliferate.
2. In many of the articles and scientific documents analyzed, it is stated that Sandboxes are considered a very promising mean to make RegTech enter its next development phase, RegTech 3.0.
3. As it was said many times in this Dissertation, all the concepts expressed in Chapters 3 are inferences coming from subjective considerations, with no purpose of being scientific and thus could be subject to adjustments and criticisms.

Despite the inclusion of Sandboxes in the TCCRSI instead of TechSprints, as it was remarked few lines above these tools are basically complementary. For this reason, everything that was asserted for Sandboxes in the sense of helping creating a new RegTech-boosting scenario is valid also for TechSprints, which can even strengthen the possibility of creating the proposed new environment. It is simply enough to add to the previous argumentations that all regulators, financial institutions, and big tech companies could organize also TechSprints (or similarly conceptualized events) to foster innovations

in the FinTech and RegTech field, instead of using only Regulatory Sandboxes. Actually, TechSprints do not even require the need for an international regulation that would allow also banks and big enterprises to create their own Regulatory Sandboxes, with rules similar to those used by regulators and authorities for their own ones, since TechSprints are simply organized partnerships in a physical space (i.e. requiring basically no changes to the competitive rules of financial services).

However, the purpose of this paragraph is just to present another effective way through which RegTech could be fostered in Italy, and not to enrich the Theory presented in the previous Chapter enlarging the discussion in an intuitive way (since, as stated, TechSprints could be easily included in a future scenario without implying any drastic change neither to the TCCRSI nor to the competitive environment).

3.3.6 Final considerations and challenges for the future

This paragraph aims at drawing the main conclusions from all what was presented in this Chapter, presenting some considerations about the feasibility of fostering RegTech's diffusion by the means presented in the last two paragraphs, for then displaying what could be the main challenges and obstacles to this dream, and finishing by summarizing all the stages of RegTech's lifecycle as far as Italy is concerned, including the potential future ones that could occur in the next years following the hypothesized path.

From a feasibility perspective, the proposals made in paragraph 3.3.4.3 to trigger RegTech companies' emergence and proliferation in Italy could be assessed only from a financial and economic viewpoint (i.e. consistent with the "Finance" background of this Dissertation), given the impossibility of dealing with legislative and anti-trust issues, especially due to our external and inexperienced perspective, to the lack of a common view on RegTech, and to the theoretical nature of all the topics presented in this Thesis. Actually, it is even impossible to make a real feasibility analysis even from financial and economic viewpoints, because it is impossible to retrieve all the necessary data that would serve to make an estimation of how much would cost to the various actors in the Italian market to launch Sandboxes, TechSprints, and any other initiative that would serve to ease the

diffusion of RegTech, including cross-sectorial collaborations. The only consideration that could be made on this topic is related to the commitment that the Italian government has shown in last months (Ministero dello sviluppo economico, 2017), aiming at launching and nurturing a new ecosystem that, as one of the main purposes, favours the emergence and growth of innovative start-ups, especially in the digital and technological sectors, hoping to realign Italy to many other more advanced countries in the rest of the world in terms of innovation. This promise of commitment is not enough to make feasible what described so far, especially because Industria 4.0 targets start-ups and companies in general (not in FinTech/RegTech fields specifically). However, it could represent a good chance to push towards the support of RegTech companies since they fit with the perspectives of innovation, digital, technology, start-ups (all keywords of the national plan), in addition to being necessary for many sectors to face the increasing regulatory needs and compliance costs.

Coming to the actual plan Industria 4.0, let's see some of the main points that can be considered functional to the fuelling of the RegTech industry, as of the 2018 version, distinguishing among two different groups of firms: start-ups / SMEs (on the one hand) and all the enterprises, thus including the first category of firms + already established companies. Of course, this paragraph will focus only on those provisions that could be beneficial to RegTech companies in the first place and also to all the banks, FIs, and other big corporations that are interested in investing in the field (either in the form of Sandboxes, TechSprints, lab and similar tools, or in the form of internal business units creation).

Provisions for start-ups / SMEs (Ministero dello sviluppo economico, 2017):

- **Start-up e PMI innovative (i.e. Innovative start-ups and SMEs):** with Industria 4.0, Italy aims at offering more hospitality for innovative realities, whatever sector they belong in the economy, in order to push young initiatives that could provide speed and dynamism to the country. To better understand what are the companies targeted by this provision and its purposes, on the website of the Ministero per lo Sviluppo Economico it is published a detailed report that displays useful information on the topic. Following in the next lines some interesting insights from the report “The Italian legislation in support of innovative start-ups”: the general objective of the

policy measures outlined in this document is to promote sustainable growth, technological advancement and, in particular, to create favorable conditions for the development of a new business culture inclined towards innovation. The legislation in support of innovative startups does not apply to all newly-established enterprises, but only to those that present a clear character of technological innovation, together with other specific requirements like no profits distribution, headquarter or a production site branch in Italy, have as exclusive or prevalent company object the production, development and commercialization of innovative goods or services of high technological value, and other characteristics related to the team and patents. To continue, the document presented in the National Plan “Industria 4.0” showcases the benefits that would be available to innovative startups immediately after registration and for a maximum of 5 years. Here are some of those benefits: cuts to red tape and fees incurred due to the obligation of entering the Business Register as well as the annual fee usually owed to the Chambers of Commerce; 12-month extension of terms for covering losses (capital can be reduced proportionally to losses); exemptions from regulations on dummy companies (e.g. no fiscal penalties in case of inappropriate revenues); tax incentives for corporate and private investments in startups, both by individuals and by legal entities; possibility to collect capital through equity crowdfunding authorized online portals; ad hoc services by the Italian Trade Agency to support innovative startups in international markets; conversion to innovative SME (with further benefits) in case of successful startups; Smart&Start Italia program, a subsidized financing scheme for innovative startups based in Italy that can benefit also from tutoring on technical and management issues. Actually, many more interventions are proposed in the document; yet, only the ones that could be beneficial, at a theoretical and intuitive level, to RegTech start-ups were mentioned.

- **Centri di competenza ad alta specializzazione (i.e. Highly-specialized Centres of competences)** = This measure aims at promoting special centers focused on the themes treated by the National Plan, in the form of public-private partnerships. The main objective of these centers is to carry out orientation and training activities, as well as supporting activities in the fields of innovation processes, industrial research, and experimental development of final products/services through advanced technologies to all companies, especially new ones and SMEs.

Provisions for every enterprise (Ministero dello sviluppo economico, 2017):

- **Centri di trasferimento tecnologico (i.e. Technology transfer Centers)** = These centers carry out formation and technological consultancy activities, together with technology transfer services towards companies operating in specific fields, among which cloud services, cybersecurity, and Big Data analyses (thus typical fields covered also by RegTech companies).
- **Credito d'imposta R&S (i.e. Tax credit for R&D activities)** = The tax credit proposed by the National Plan is attributed to all the companies that invest in R&D activities until the fiscal window that ends on the 31st December 2020 without any restrictions in terms of juridical nature, sector, size, and accountability regime. The tax credit is directed also to consortia, no-profit organizations, and research centres. Among activities considered as belonging to the R&D domain could be find: planned researches/critical inquiries aimed at acquiring new competences to realize new products, services, processes, or simply improvements of already existing ones; acquisition, combination, structuring, and exploitation of knowledge and competences (of scientific, technological and commercial nature), in order to realize plans, projects or templates for new products, processes, or services, improved or modified.
- **Patent Box (i.e. Tax credit from intangible assets)** = This tax credit correspond to a fiscal benefit on income deriving from the use of intellectual property. The so called "Patent Box", applicable as of 2015, grants to companies an option to exclude from taxation 50% of the income deriving from commercial use of intangible assets (copyrights, industrial patents, commercial brands).

All the provisions described so far are presented as possible means to stimulate the financing of the various initiatives proposed in this Chapter, thus aimed at favouring RegTech's emergence and diffusion in Italy. In particular, the provisions for start-ups and SMEs extracted from the National Plan "Industria 4.0" are the ones that could be useful in supporting and nurturing the RegTech ecosystem (thus we excluded all the provisions for start-ups and SMEs that are present in the Plan but that do not seem to be applicable to such an emergent industry). Same reasoning for the provisions directed at all the

enterprises in general; thus, we presented only the ones that could be used by Italian Blue Chips or by the (few) already existing RegTech companies to improve their solutions, develop new ones, or start off their own Sandbox, lab, incubator, or TechSprints.

These provisions, together with all the other traditional sources of funds as (for example) family-friends-fools for start-ups and equity, debt, and profits for established companies, could be considered as potentially strong fuels to foster the development and diffusion of RegTech solutions in the Italian market, as well as for the structuring of the industry itself.

Is all this feasible? Is it enough? Are the aforementioned proposals the only ways? These questions can not be answered with a high degree of certainty. Of course, what explained so far is not a law or a magic receipt. It is only a possible scenario for the development of a phenomenon that implies itself many question marks. What is sure is that Italy needs to catch up quickly with the rest of the world (or Europe at least). Not only in order to avoid the worsening of the current disadvantageous position, but also to seize the benefits coming from the National Plan “Industria 4.0”, which will all cease by the end of the year 2020.

Intesa Sanpaolo is already moving in the sense of exploiting in the best possible way the benefits deriving from the National Plan. Marco Allois, Head of Innovation Center of Intesa, said in a video-interview for Internet4Things: “As far as the relationships with our customers and firms interested in Industry 4.0 initiatives are concerned, we have planned a structured support to this matter in two ways: on the one hand, the creation of an ecosystem consisting of those players necessary to start up the innovation path required to accomplish the main goals of the Industry 4.0 National plan; on the other hand, the integration of customer information and financial information to deliver high-quality products. We have succeeded in offering financing to highly innovative startups that were not considered so far by the Italian equity market.”

The starting point of Intesa’s plan is the identification of the main potential technological trends, for then recognizing the most promising realities that operate within (EconomyUP, 2017) these trends (and that could bring value-added to clients) and deserve to be supported.

This initiative and philosophy adopted by Intesa Sanpaolo seems to be forward-looking enough to welcome also RegTech initiatives, despite it represents a stance that

should be adopted by many other players and that should look specifically to this new phenomenon to allow the diffusion of the awareness that RegTech solutions are required in the Italian market just as they are in many other countries. Furthermore, RegTech is not considered part of the technologies targeted by the National Plan, at least not yet. Therefore, most of the considerations in this Chapter are only theoretical, although possible in a future perspective, and were provided only to present the most interesting opportunities that exist nowadays for RegTech to proliferate.

To summarize all the insights and facts discussed in this Chapter, a scheme is provided below (Table 3.6) presenting: **the stages** that RegTech needs to cross in order to become a structured and recognized industry (i.e. those presented in paragraphs 3.3.4.1, 3.3.4.2, 3.3.4.3), **a score** to evaluate what is the progress that RegTech has accomplished so far in those stages (1 = null, 5 = total), and some of the **initiatives and tools** already mentioned in this Chapter and that could lead to the completion of the various stages.

STAGE	SCORE	INITIATIVES/TOOLS
Awareness/interest	4	Events, fairs, and conferences (especially by already established RegTech companies); further cultivation of a digital culture in the country; collaboration among all the actors in play.
Commitment by regulators and FIs and FS providers	2	Actual implementation of the proposed projects such as Sandboxes; involvement of other actors to nurture the industry; investments by FIs and FS providers.
Diffusion/proliferation	1	Introduction of Sandboxes and TechSprints; launch of labs, incubators, accelerators, innovation hubs, and co-working spaces by companies, universities, and other players; exploitation of the governmental provisions launched through the National Plan “Industry 4.0”; other traditional governmental interventions.

Table 3.6: RegTech industry state in Italy

Source: Own elaboration

To conclude the Chapter, assuming a future perspective, it is interesting to present some of the potential **challenges** that RegTech could face in its path to become a diffused and actual reality in the Italian market. In particular, two different categories of obstacles have been identified thanks to the contribution to this Thesis provided by the telephonic interview with InfoCert (i.e. the most important Italian RegTech authority) and by the

meetings had at the Global RegTech Summit to which we have participated on the 22nd of May 2018 in London, UK.

The first category of challenges refers to a **bureaucratic** dimension. According to the InfoCert's representatives who participated to the interview, the complexity of the regulatory and legislative framework used by Italian authorities (added to the complexity of European ones) is definitely one of the main issues that make it difficult to realize solutions that can be efficient on a global scale and that are shared by all the parts of an organization that are committed to these topics (due for example to unclear language and complicated terms). In fact, RegTech solutions should aim at softening the regulatory burden bear by companies operating in various sectors, with the purpose of reducing compliance costs and simplifying the processing of rules and norms that are often introduced by regulatory authorities. However, finding solutions that fit properly the needs of players in diversified industries such as financial services, health care, insurance, etc. requires a shared and clear interpretation of the various norms.

The second category of challenges relates to a **cultural** dimension. During a conversation had at the Global RegTech Summit with Victor Vegas Serrano, Head of International Business Development at Electronic Identification, we have discovered that the main reason why the promising RegTech start-up is not considering yet the expansion in the Italian peninsula is because their proposed solution requires customers to provide identity verification in a digital format. However, most of the Italian market still relies on identity cards in paper format, resulting inappropriate for Electronic Identification's solutions. Still at the Summit, InfoCert, told us that, in his opinion, Electronic Identification was one of the most interesting companies that were present at the event in a future perspective. As a result, it is a pity that its solutions are not marketable in Italy. Although this fact implies the opportunity for Italian pioneers to come up with a similar solution that could be adopted at a national level, it signals how the country is still not prepared to welcome solutions that are digitally advanced (despite they are quite common in most countries around the world). Subsequently, it is possible to affirm that opportunities for RegTech to spread in the Italian market are numerous; however, without a multilateral commitment, sustained investments, a proper culture oriented to digital innovation, the simplification of the legislative framework, and a long-term oriented

mind-set, it will not be possible to equalize the progress that is happening worldwide in terms of RegTech.

Chapter 4

Interviews and conclusion

4.1 Interviews

The following interviews were conducted with two very different realities of the RegTech ecosystem.

1. From one side we have IdentityMind Global, an American based start-up that provides compliance, KYC and AML services.
2. On the other hand we have an Italian based company, leader in its country and in Europe for providing digital identity and one of the most important Qualified Trust Service Provider: InfoCert (Tecnoinvestimenti Group)

4.1.2 IdentityMind Global

While RegTech is well established in US, UK, Asia, Australia, Ireland, and Singapore, in countries like Italy, France, Canada it is still very/moderately latent although the latter are equally subject to thousands of regulations in Financial Services and are the home of very important Financial institutions and funds. Why do you think RegTech finds difficulties to be adopted in those countries?

IdentityMind Global: RegTech firms are usually started by Entrepreneurial Tech people trying to solve a problem with the technology they already have or can build. The countries you named don't have a large entrepreneurial tech scene and even if they have tech people, they lack the infrastructure, by that I mean the VCs who can introduce them to banks and fund them, the small companies who will trust them to be client #1, a culture that accepts if their company fails, etc...

Through which means RegTech could diffuse and proliferate in less “developed” countries?

IdentityMind Global: Two things are required:

- 1) Offering a better product for less
- 2) Getting regulator buy-in. This is actually harder than the first. FI's don't want to upset regulators so it takes time to make them feel comfortable. Most RegTech is from US and UK, it will diffuse from there to other places, some faster than other because of the language barriers.

What have been the toughest challenges for IdentityMind/InfoCert to make its way through the market? Do you think the same obstacles could be found also by all other countries where RegTech aims at establishing?

Identity Mind Global: The hardest things is getting known and convincing extremely large FI's to try smaller regtech companies, ensuring and explaining the technology. Yes, these obstacles will exist in all countries to some extent. It's easier in certain countries like Israel where there's a spirit of entrepreneurship and harder in older more established companies such as Japan.

Where do you see RegTech in 10 Years? I mean, once you developed extremely efficient and technologically-advanced solutions, how could you still find market opportunities? Even if new regulations come in, most RegTech solutions are scalable so they could be simply enlarged to new regulations, potentially destroying margins. Is this a possible scenario?

IdentityMind Global: I expect RegTech firms like us to continue to expand both globally and up the value chain. We often work with SMBs, but as we grow we'll target the large enterprise banks and reduce margins for the incumbents. Looking at Porter's Five Forces, it's actually a good business to be in:

- 1) Threat of Substitutes is minimal. You can't swap out your KYC system easily.
- 2) Bargaining power of buyers. This is required by our customers, it's just a question of where they get it from.
- 3) Bargaining power of suppliers. This is software which means margins are strong.
- 4) New entrants can enter, but it will take time to scale. You have to be known by industry and regulators. Look at IBM and Watson. They developed an AI solution for Transaction Monitoring and it's not going anywhere.

5) *Industry Rivalry, right now this is a small industry and not cut-throat.*

Do you think RegTech companies in general are more likely to remain private, go public, search for partnerships with regulators/financial institutions/big tech companies, or they should try to become targets for M&As? Therefore, can these companies, with proper innovations, remain as standalone entities competing in the Financial Services or they will always need someone else?

IdentityMind Global: RegTech companies aren't going to likely be as large as FinTech firms in regards to exposure, # of customers, and likely profitability... It's a B2B business. RegTech is less likely to go public. However, they often receive funding from VC's who want home runs. As a result, RegTech firms face pressure to produce which is why we've seen them be acquired via M&A. Very few RegTech firms will be standalone in 10 years, there will be a few who make it, but most likely they will look to be acquired.

Is cross-industry application the best way to make RegTech a powerful and profitable sector? Thus creating solutions not only for financial companies, but also for insurance, health-care, e-commerce and whatever sector that fits?

IdentityMind Global: No, each of those sectors is extremely difficult to enter w/ its own incumbents and regulations. Better to expand slowly and enter into adjacent areas, for instance LexisNexis purchased ThreatMetrix, moving from KYC to Fraud, because their clients needed both, so there were natural synergies. For a RegTech firm to move into healthcare would be extremely challenging.

Do you think that supporting the FinTech sector would automatically imply a support in the RegTech one? Or there is now clear separation that requires the two sectors to be treated independently one from another?

IdentityMind Global: Fintech beget RegTech. A lot of RegTech came out of people who faced a problem at a Fintech company and decided to pivot and solve that problem instead.

Do you believe enough events, conferences, fairs, and advertising in general are made for RegTech in your country/all over the world? If not, how more awareness could be created?

IdentityMind Global: There are many conferences. Often they're a waste of time, but some time they're not. It's good in that it's how you get in front of people you would never see otherwise. Big FI's go to see what's new, RegTech firms go to make sales, etc...

4.1.2 InfoCert Interview

InfoCert: RegTech is a varied industry with blurred boundaries. Some years ago, before the term "RegTech" arose, we put together technology in order to foster innovation. The categorization of what we were doing into the RegTech hemisphere came later. We already were RegTech, we just found out it later. Our clients were starting join the revolution and began thinking as FinTech, so we started define ourself as RegTech.

Italy is facing many difficulties in embracing the phenomenon because rules are badly written, this makes the software automation difficult to be implemented. Indeed InfoCert managed to enter the business by gathering lawyers, IT personnel, experts of the sector that directly interact with customer in order to understand its needs and trying to figure out a feasible solution.

While RegTech is well established in US, UK, Asia, Australia, Ireland, and Singapore, in countries like Italy, France, Canada it is still very/moderately latent although the latter are equally subject to thousands of regulations in Financial Services and are the home of very important Financial institutions and funds. Why do you think RegTech finds difficulties to be adopted in those countries?

InfoCert: It's mainly due to different regulation frameworks. Common law situation for instance is much less invasive than civil law, it is not a coincidence that Commonwealth countries are more RegTech addicted than others underlying the civil law.

Through which means RegTech could diffuse and proliferate in less “developed” countries?

InfoCert: In Est-Europe the phenomenon is almost unknown because of regulation’s criticism. That countries can join the RegTech movement in the moment in which they will fix their normative landscape.

In countries that suffer less lack in regulation, the obstacle is mainly a cultural one, it would need a technological cultural revolution aimed at understand economic and daily benefit of digital solutions. For example GDPR introduction focused the attention towards the processing of personal data, and put the topic at the center of the public debate. It has been a first step towards a cultural and mediatic understanding.

What have been the toughest challenges for IdentityMind/InfoCert to make its way through the market? Do you think the same obstacles could be found also by all other countries where RegTech aims at establishing?

InfoCert: In our case it was a strategic problem. Eight years ago, our founder passed away, the company was just detached from a public one through a spin off, and the strategy was not well defined yet. How did we deal with this? A new management coming from a private company implemented a pure restructuring, and it fostered the development of a well-defined company’s culture.

Where do you see RegTech in 10 Years? I mean, once you developed extremely efficient and technologically-advanced solutions, how could you still find market opportunities? Even if new regulations come in, most RegTech solutions are scalable so they could be simply enlarged to new regulations, potentially destroying margins. Is this a possible scenario?

InfoCert: We imagine an essential need for consolidation, except for our digital identity business. We believe that start-ups will not “save the world”, but only big companies can bring true innovation, except for unicorns. RegTech will go towards consolidation.

Do you think RegTech companies in general are more likely to remain private, go public, search for partnerships with regulators/financial institutions/big tech companies, or they should try to become targets for M&As? Therefore, can these companies, with proper innovations, remain as standalone entities competing in the Financial Services or they will always need someone else?

InfoCert: Consolidation is the answer. So they will look for M&As in particular. RegTech is not as profitable as FinTech, remaining stand-alone will not be an efficient solution for most of the companies in the ecosystem.

Lot of RegTech companies in order to be efficient focus their effort just on some elements of the compliance chain, but a customer needs the whole compliance service. The solution could be creating a network of RegTech companies providing different services but it would be too costly, so consolidation seems a reliable result in the long term.

Is cross-industry application the best way to make RegTech a powerful and profitable sector? Thus creating solutions not only for financial companies, but also for insurance, health-care, e-commerce and whatever sector that fits?

Infocert: It is difficult to assess the best way to make RegTech as powerful as possible, what InfoCert is trying to do is leveraging on B2C solutions as Digital Identity in order to spread the digital culture that will enhance the entire RegTech world. The concept is: using B2C as a boost for the B2B.

For what concerns non-financial industries, healthcare is one of those that is adopting RegTech solutions in communications, digital signature, personal data processing, and GDPR compliance; the digitalization of medical data is becoming core. In the Energy industry, companies are leveraging on IoT solutions. Blockchain instead is increasingly becoming a way to manage digital identity.

4.2 Key findings from interviews

The questions that were posed in both interviews aimed at providing some useful insights for many of the topics treated in this Dissertation. Therefore, the following lines will recall the most meaningful considerations emerged from the two interviews and how they relate with the contents of the various Chapters.

In particular, IdentityMind Global's interview, has remarked that the main reasons underlying the scarce diffusion of RegTech in countries like Italy are both the lack of proper infrastructures and the absence of entrepreneurial tech initiatives. As it was discussed in Chapter 3, those issues are evident in Italy and are representing a tough obstacle to overcome. However, the suggested initiatives in terms of Industry 4.0, commitment by regulators, further development of a digital culture, and involvement of big players like banks and VCs, could represent the best ways to win these difficulties in a way that seems to be consistent with what was asserted by IdentityMind Global.

In addition, the InfoCert's Marketing and Compliance Team, suggested that the regulatory complexity is another reason why countries like Italy are less-developed from a RegTech perspective. Yet, also from this point of view, the commitment by regulators seems to be an ideal solution, because the simplification of norms and the support to the various players in their understanding of rules are both tasks that could be accomplished by authorities, as long as they feel involved in a path towards a future growth.

They also stated that the lack of a common regulatory framework could be the main driver of the misalignment between Italy and the other advanced countries. In this sense, the TCCRSI proposed in Chapter 3 pushes on some ideal principles of collaboration, dialogue, and establishment of a common framework which (although being referred specifically to Sandboxes ecosystem) are the pillars for RegTech's proliferation, as remarked also by the Financial Conduct Authority and many other regulators' initiatives all around the world.

Furthermore, the Team affirms that the GDPR is the only regulation that is showing some positive signs in this sense, being it clear, shared without divergences, equal, and encouraging for the future of the regulatory ecosystem in Europe. And also the Director at IdentityMind Global has affirmed that one of the most important means to support the diffusion of RegTech is the direct involvement of regulators, for then

attracting financial institutions and other relevant players. This idea has been exhaustively discussed in Chapter 3: first when Sandboxes were presented, remarking how initiatives by authorities are considered as the most promising way to structure the RegTech industry and conduct it to the following phase, and later, when the discussion led to present the situation of RegTech in Italy, explaining that indeed from the initiatives that have been hypothesized by the Italian Control Authorities could emerge the best prospects for the future of this new industry also in the Italian market, passing either through the contribution of banks and big companies.

Therefore, the main idea arising from the two interviews, as well as from many of the sources of information used to accomplish this Thesis, is that **collaboration is the key for the success of RegTech companies and for the benefits of all the players subject to the massive bureaucratic burden**; and the same exact idea stems also from the discussion about Sandboxes, TechSprints, and from the insights obtained at the Global RegTech Summit. There is the need to create an environment stimulating partnerships among the various players and characterized by a common and shared regulatory language, although cultural barriers and inadequate technological infrastructure could still deny the emergence and diffusion of RegTech in many countries.

IdentityMind Global has identified as further challenge for RegTech companies to “make it”: the difficulties in being well considered by the market (i.e. explaining that the proposed solutions are effectively necessary and better than the others). This issue can be particularly enhanced in countries where RegTech is not yet present, and it can be even tougher if a country does not own a proper entrepreneurial spirit in digital and technological fields. Consistently, all the tools identified in Chapter 3 still seem to represent the best solutions. In fact, the support by authorities and the creation of a diffused framework could serve to provide credibility to the system, as well as the financial and infrastructural support to start-ups and SMEs. In particular, as far as Italy is concerned, the National Plan “Industria 4.0” may succeed in nurturing the entrepreneurial spirit of the country, favoring the emergence of many new technologically-advanced companies, and sensitizing the market also to RegTech solutions.

Also, the Director at IdentityMind recognizes how conferences and fairs could represent useful opportunities. They could be used to gather the various players mostly affected by the regulatory burden in order to discuss how innovative solutions could be

promoted. In this way, it could be fostered an increase in the degree of attention and interest towards RegTech by the main players operating in the Italian market.

As far as the cross-industry application (as a mean to further spur the proliferation of RegTech solutions) is concerned, the two interlocutors have contrasting views. According to InfoCert's representatives, the diffusion of RegTech solutions in diverse industries, like the health care market, is indeed a probable and desirable prospect for the scaling-up process of RegTech (although the difficulty of imagining a clear path for the industry growth at the moment, due to the yet unclear structure of RegTech, especially in Italy).

The multiple-industry application is a very important concept expressed indeed in this Thesis: the involvement of those companies operating also outside the financial services industry is what would allow many of the future scenarios hypothesized in Chapter 3 to occur (i.e. the creation of Sandboxes hubs across the various countries, the increase of investments in the sector, the diffusion of RegTech in lesser-developed countries like Italy, the creation of TechSprints, labs, and co-working spaces by big corporations, etc.).

Results provided in Chapter 2 are in contrast with IdentityMind Global's point of view about cross-industry application for RegTech solutions. Multiple-sector application is, today, already established for RegTech realities, as reported in paragraph 2.3.2.1, in particular Healthcare RegTech companies are the ones with the highest "funding per company ratio" (Figure 2.13). Indeed, it seems that cross-sector application is enhancing the RegTech movement. However Healthcare remains a high-barriers-to-entry sector, with many difficulties for new entrants to approach it.

Non-financial industries are a huge possibility for RegTech actors, and GDPR compliant solutions, given the resonance of the norm for both practical and mediatic point of view, will become the standard for every sectors, including Healthcare, Energy and Taxation.

In this sense, InfoCert's contribution is more aligned with the contents of Chapter 2; the difference between the two points of view (i.e. IdentityMind Global and InfoCert) is mainly due to their different nature, being IdentityMind Global an American start-up and InfoCert an European consolidated reality, that of course is more GDPR sensible.

4.3 Conclusions

After having surfed the world of possible categorizations of the RegTech ecosystem, it seems consistent to end this Dissertation presenting a future perspective for RegTech, this time provided by the two interviewed companies, in Italy and in the global market.

Sandboxes (Chapter 3) are an intriguing and valuable tool for the FinTech world and for RegTech companies: the concept behind the collaborative environment and the closeness between firms and regulators will foster the proliferation of increasingly tailored and efficient solutions. However Sandboxes are only a tool, they do not represent a direction for the whole ecosystem.

Future RegTech perspectives offered in this Thesis (Chapter 3) are based on own elaboration on the basis of all the material gathered, and even if sources cited are coming from financial regulators all over the world and some of the projects taken as reference have been actually implemented (i.e. the Global Sandbox project by the FCA was launched on the 7th of August), the Elaborate did not rely, until Chapter 4, on peculiar and detailed information that is possible to obtain only by means of direct interviews. In fact, interviews were very useful to add other points of view to the Work and their contribute was enriched by the diversity of the two actors in terms of geographic origin, business and age.

One of the most important insights caught from the two interviews is about the future of RegTech.

Before analyzing IdentityMind and InfoCert's outlook for the future, it is important to better investigate the competitiveness of the industry, which is a complicated task to carry out in an industry like RegTech: boundaries are not well defined yet and the dynamism of the sector makes relationships between the actors continuously evolving, frequently changing the power relations among the operators. IdentityMind Global's intervention is the starting point for competitiveness designing of RegTech industry. Above these difficulties, the interviewed described the industry by applying the Porter's Five Forces.

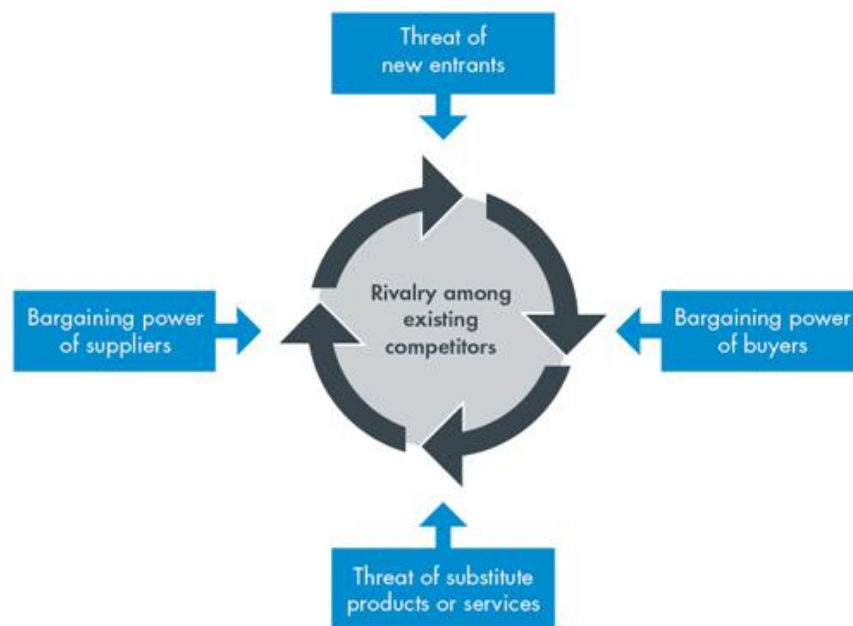


Figure 4.1: Porter's Five Forces model

Source: Porter (1987) "Competitive advantage"

- **Rivalry among existing competitors:** According to the American start-up the rivalry is not high, since the industry is new it is not a "cut throat" one. Additionally, we know that RegTech is still in its growth phase, so there is still space for other actors; maturity and the rise of rivalry seems , as today, difficult to predict.
- **New entrants:** as stated in the previous point, there are still possibilities for new entrants to come into the business. The problem is that RegTech companies need time to scale-up: technologies behind a RegTech solution are very complex and machine learning algorithms are not so easy to be managed and implemented for a compliance / KYC / AML solution. Moreover, it can also happen that reputed firms find difficulties in entering the business (IdentityMind Global provided the example of IBM) because of business adaptation issues.
- **Bargaining power of buyers:** bargaining power of buyers is law. RegTech solutions cannot be self-developed and implemented, so risk for vertical integration is quite null. The extreme solution is the M&As market.

- **Bargaining power of suppliers:** RegTech is almost totally a software business where margins are high, meaning that if suppliers charge you higher costs, you can easily absorb the increase.
- **Threat of substitutes:** threat of substitutes is minimal. For instance, you cannot change your KYC or AML software so easily, indeed switching costs are very high. However, what can foster this threat is the need for companies for tailor made solutions, in order to solve as better as possible their peculiar compliance / operational risk problems.

The result of the Porter's Five Forces analysis is that RegTech is a good industry to be in, since basically it is still in a growth face, internal rivalry is low, and bargaining power of buyers is minimal.

Besides these consideration, RegTech's future seems not expansive as the situation analyzed for the medium term by the Porter's model, in fact both companies (i.e. IdentityMind Global and InfoCert) believe that the industry will go through a massive **consolidation** in the future. The reasons underlying this scenario are mainly three:

1. First, RegTech business is mainly a B2B one, as already described in Chapter 2 and confirmed by IdentityMind Global interview; thus, according to its customer typology, it is not as profitable as FinTech (that strongly pushes on B2C component). In particular, the American-based start-up affirms: "RegTech companies aren't going to likely be as large as FinTech firms in regards to exposure, # of customers, and likely profitability... It's a B2B business. RegTech is less likely to go public. However, they often receive funding from VC's who want home runs. As a result, RegTech firms face pressure to produce, which is why they are often acquired via M&As. Very few RegTech firms will be standalone in 10 years". So the first factor that pushes towards a consolidation trend is the lack of profitability in the long term.
2. InfoCert instead assesses that, especially for Compliance RegTech companies, there is the need for consolidation because every single firm provides software not for the entire compliance process but just for a part of it. In this way buyers

need to adopt many different RegTech solutions in order to cover the whole compliance chain. This situation in the future is not anymore sustainable, and will push companies towards vertical integration by acquiring RegTech companies.

3. Last factor identified by InfoCert is the following: the first objective of RegTech companies' strategy is providing solutions for costs reduction. Taking compliance costs as example, it is possible to imagine in a 10/15 years perspective the most efficient RegTech solutions that will reduce at the minimum these costs. Furthermore, being these solutions scalable, as new regulations emerge they will be simply adapted to fit the new needs. Yet, beyond this hypothetical scenario there is nothing. It is impossible to totally cancel compliance costs. So it will arrive a certain point in which RegTech firms can either merge in order to exploit synergies and technological development or they will be acquired by conglomerates that look for integrate compliance and risk management solutions.

These three factors will move RegTech industry to an inevitable consolidation. Recalling the considerations made in Chapter 2 and in Paragraph 3.1 concerning the lifecycle of the phenomenon, the growth phase of the RegTech movement has been running since 2012/2013. The new RegTech phase discussed in paragraph 2.3.1 is not representative of the maturity phase of the industry, but it seems a very intensive phase in which the phenomenon is moving at the center of the financial debate, multiples are increasing by consequences, and big deals are coming. Instead the so-called maturity phase seems to be the one identified by IdentityMind Global and InfoCert, and it coincides with the consolidation pattern.

In this scenario, Sandboxes have the role of engines of growth to let RegTech companies reaching the maximum efficiency.

In conclusion of this Dissertation, after having considered all the potential future scenarios (more or less likely) that RegTech could undertake, it is important to remind what is the most relevant challenge that RegTech companies and all those entities that are sensitive to the regulatory burden face at the moment: the complexity of the regulatory language. The InfoCert's Marketing and Compliance Team remarks how the difficulty of correctly interpreting the contents of new regulations not only causes internal inefficiencies (e.g. waste of times and divergent opinions among employees), but it also

creates problems in international affairs and communication (due to the diversity of the languages used by other countries and again the diverse interpretation that can be given by actors coming from different cultural and linguistic backgrounds).

However, despite these tough challenges, good signs in this sense are beginning to be perceived, at least in Europe. InfoCert believes that the new GDPR regulation perfectly embodies the structure that all the new norms are required to assume. In fact, the new directive seems to be clearly understood by all the subject actors, and also its contents are shared and fulfilled with a fair effort by the various players in the targeted sectors.

The need for a homogeneous regulatory framework that helps countries to be compliant (instead of creating obstacles and making internal processes and analyses critical) with the purpose of limiting the probability of occurrence of crisis and misbehaviors, is the most compelling issue that needs to be addressed for the wellness of global markets and individuals.

Bibliography

ARNER W., BARBERIS N. J., and BUCKLEY P. R. (2017). “FinTech and RegTech in a Nutshell, and the Future in a Sandbox” (pp. 30-31).

ARNER W., BARBERIS N. J., and BUCKLEY P. R. (2016). “FinTech, RegTech and the reconceptualization of financial regulation”.

AGARWAL K. (2018). “Playing in the Regulatory Sandbox”. *NYU Journal of Law & Business*. URL: <https://www.nyuylb.org/single-post/2018/01/08/Playing-in-the-Regulatory-Sandbox>

ANDERSON T. (2018). “Adobe, ‘hyper personalization’ and your privacy”. *The Register*. URL: https://www.theregister.co.uk/2018/05/08/adobe_hyper_personalisation_and_your_privacy/

ANSA. (2018). “Consob: Ciocca, entro estate parte laboratorio RegTech”. URL: http://www.ansa.it/sito/notizie/economia/criptovalute/2018/06/11/consob-ciocca-entro-estate-parte-laboratorio-regtech-2_a4f025da-b618-46f7-8f5a-39f12c3a555e.html

AUPAM S. (2018). “AI Startup Avaamo Raises \$14.2Mn Series A Funding Led By Intel Capital”. *Inc42*. URL: <https://inc42.com/buzz/ai-startup-avaamo-raises-14-2-mn-series-a-funding-led-by-intel-capital/>

ARIEL & ASSOCIATES. (2017). “ASIC’s approach to regulatory technology”. URL: <https://www.ariel.associates/new-blog/2017/5/29/asics-approach-to-regulatory-technology>

ATOS. (2018). “Atos: first quarter of 2018”. URL: <https://globenewswire.com/news-release/2018/04/25/1486790/0/en/ATOS-First-quarter-of-2018.html>

AUGUR H. (2016). “RegTech: The 2016 Buzzword is Turning Heads”. *Dataconomy.com*. URL: <http://dataconomy.com/2016/05/regtech-the-2016-buzzword-is-turning-heads/>

- AUSTRALIAN SECURITIES & INVESTMENTS COMMISSION. (2016).
Asic.gov.eu
- BANCA D'ITALIA. (2007). "Disposizioni di Vigilanza – La funzione di conformità (compliance)". *bancaditalia.it*.
- BANCA D'ITALIA. (2007). "Canale FinTech". URL:
<https://www.bancaditalia.it/compiti/sispaga-mercati/fintech/index.html>
- BANKINGHUB. (2016). *Bankinghub.eu*
- BASEL COMMITTEE. (2005). "Compliance and the compliance function in banks".
- BBVA. (2016). "Banking Outlook".
- BEALL, A. (2017). "What is RegTech? The latest wave of start-ups hitting the FinTech industry". *Wired*. URL: https://www.wired.co.uk/article/regtech-next-fintech?mc_cid=a6dab0c1ca&mc_eid=1a9638ac4c
- BITMAT. (2018). "FinTech e RegTech: l'Italia colma il gap con il resto d'Europa" URL: <https://www.bitmat.it/blog/news/74827/fintech-litalia-colma-gap-europa>
- BOBELDIJK Y. (2017). "FCA to banks: regtech risks are your responsibility". URL: <https://www.fnlonon.com/articles/fca-tells-banks-regtech-risks-are-your-responsibility-20170411>
- BOCCELLATO P. (2018). "Accenture, il boom del settore Fintech trascina le aziende. Aumento del 30% del valore per chi innova". *key4biz.it*. URL: <https://www.key4biz.it/accenture-il-boom-del-settore-fintech-trascina-le-aziende-aumento-del-30-del-valore-per-chi-innova/220478/>
- BOFONDI M. & GOBBI G. (2017). "The Big Promise of Fintech". URL: <http://european-economy.eu/2017-2/the-big-promise-of-fintech/>
- BOLT U. (2017). "How Can Regtech Make Bank Clients Happy Again? (Regtech is more than just the New Fintech)". URL: <https://internationalbanker.com/technology/can-regtech-make-bank-clients-happy-regtech-just-new-fintech/>
- BOLT L. (2018). "New regulatory fines to penalize bad culture?". URL: <https://jwg-it.eu/new-regulatory-fines-to-penalise-bad-culture>

CB INSIGHTS. (2017). “The state of Regtech”.

CHANTHADAVONG A. (2018). “ASIC seeks new RegTech resources”. URL:
<https://www.innovationaus.com/2018/05/ASIC-seeks-new-RegTech-resources>

CISION. (2018). “EverCompliant secures strategic investment from American Express ventures to help fight electronic money laundering”. URL:
<https://www.prnewswire.com/news-releases/evercompliant-secures-strategic-investment-from-american-express-ventures-to-help-fight-electronic-money-laundering-676598793.html>

COCKING S. (2017). “Insights from the regtech directory”. URL:
<https://irishtechnews.ie/insights-from-the-regtech-directory/>

CONSOB. (2007). “Regolamento in materia di organizzazione e procedure degli intermediari che prestano servizi di investimento o di gestione di collettiva del risparmio”.

CONTINUITY. (2018). *Continuity.net*

CORCOM. (2016). “Sacco: La PA come Uber. L’Italia si gioca tutto sul Regtech”. *corrierecomunicazioni.it*. URL: <https://www.corrierecomunicazioni.it/digital-economy/sacco-la-pa-come-uber-l-italia-si-gioca-tutto-sul-regtech/>

CORCOM. (2018). “Ecosistema RegTech al raddoppio, l’Europa spinge sulle tecnologie per la compliance”. *corrierecomunicazioni.it*. URL:
<https://www.corrierecomunicazioni.it/digital-economy/cloud/proverbio-accenture-industry-bancaria-ha-bisogno-di-nuove-skill-per-sfida-digitale/>

COREVIEW. (2018). “Control your cloud with Coreview”. *coreview.com*

CORNER S. (2018). “Nokia reveals plan for its IoT analytics acquisition”. URL:
<https://www.iothub.com.au/news/nokia-reveals-plan-for-its-iot-analytics-acquisition-490632>

CRUNCHBASE. (2018). *crunchbase.com*

DATA MANAGER ONLINE. (2018). “Lenovo al Next Revolution Roadshow 2018 con ThinkSystem e Think Agile”. URL: <http://www.datamanager.it/2018/01/lenovo-al-next-revolution-roadshow-2018-thinksystem-thinkagile/>

DAVISON M. (2018). “The art of interpretation: RegTech and intrinsic complexity”. URL: <https://www.finextra.com/blogposting/15079/the-art-of-interpretation-regtech-and-intrinsic-complexity>

DELOITTE. (2015). “RegTech is the new FinTech: How agile regulatory technology firms better understand and manage their risk”.

DUBAI FINANCIAL SERVICES AUTHORITY. (2017). *Dfsa.ae*.

DUGGAN W. (2018). “Where is Amazon investing in Fintech?”. *benzinga.com*. URL: <https://www.benzinga.com/markets/cryptocurrency/18/06/11814883/where-is-amazon-investing-in-fintech>

ECONOMYUP. (2017). “Industria 4.0, il percorso di una banca verso la fabbrica digitale”. URL: <https://www.economyup.it/fintech/industria-4-0-il-percorso-di-una-banca-verso-la-fabbrica-digitale/>

ERNST & YOUNG. (2016). “Innovating with RegTech: Turning Regulatory Compliance into a Competitive Advantage”

FCA. (2018). “TechSprints”. *Fca.org*

FINANCIAL TIMES ADVISER. (2018). “Why regulators need to do more to tackle fraud”. URL: <https://www.ftadviser.com/opinion/2018/03/29/why-regulators-need-to-do-more-to-tackle-fraud/?page=1>

FINEXTRA. (2018). “ABN Amro venture arm invests in BehavioSec”. URL: <https://www.finextra.com/newsarticle/31594/abn-amro-venture-arm-invests-in-behaviosec>

FINEXTRA. (2018). “BBVA invests \$50m in Chinese AI-focused fund”. URL: <https://www.finextra.com/newsarticle/31959/bbva-invests-50m-in-chinese-ai-focused-fund/retail>

FINTECH FUTURES. (2017). “RegTech to the rescue”.

- FINTECH GLOBAL. (2018). “RegTech 100”. URL: <http://fintech.global/regtech100/>
- FINTECH GLOBAL. (2017). “RegTech investments saw a strong end to the year as funding more than doubled QoQ”. URL: <http://fintech.global/regtech-investment-saw-a-strong-end-to-the-year-as-funding-more-than-doubled-qoq/>
- GLOBAL BANKING & FINANCE REVIEW. (2018). “Quantexa Technology helps HSBC in fight against financial crime”. URL: <https://www.globalbankingandfinance.com/quantexa-technology-helps-hsbc-in-fight-against-financial-crime/>
- GROENFELDT T. (2018). “Understanding MiFID II’s 30,000 pages of regulation requires RegTech”. *Forbes*. URL: <https://www.forbes.com/sites/tomgroenfeldt/2018/04/04/understanding-mifid-iis-30000-pages-of-regulation-requires-regtech/#3a3d23b15291>
- HONG KONG MONETARY AUTHORITY. (2018). URL: <http://www.hkma.gov.hk/eng/key-functions/international-financial-centre/fintech-supervisory-sandbox.shtml>
- HURST S. (2018). “Fintech startup Canopy secures \$30 Million through latest funding round led by new enterprise associates”. URL: <https://www.crowdfundinsider.com/2018/03/131076-fintech-startup-canopy-secures-30-million-through-latest-funding-round-led-by-new-enterprise-associates/>
- INFOCERT. (2017). “InfoCert – Company Presentation”.
- INFODATA. (2017). “Le startup del regtech valgono davvero cinque miliardi? L’anomalia italiana”. *Il Sole 24 ore*. URL: <http://www.infodata.ilsole24ore.com/>
- INSTITUTE OF INTERNATIONAL FINANCE. (2015). “RegTech: Exploring solutions for regulatory challenges”.
- INTERNATIONAL REGTECH ASSOCIATION. (2017). “RegTech in the USA: the state we are in”.
- ISVAP. (2008). “Regolamento N. 20 recante disposizioni in materia di controlli interni, gestione dei rischi, compliance”.

- JONES A. (2017). “Working with RegTech firms”. *Financial Times Adviser*. URL: <https://www.ftadviser.com/regulation/2017/09/13/working-with-regtech-firms/>
- KEMP R. (2018). “What has AI ever done for us?”. URL: <https://jwg-it.eu/what-has-ai-ever-done-for-us>
- KOCIANSKI, S. (2018). “Here’s how the regtech landscape is evolving to address increasing compliance needs”. *Business Insider*. URL: <https://www.businessinsider.com/regtech-revisited-report-2018-4?IR=T>
- KPMG. (2017). “The compliance investment”.
- KRISHNA D. (2018). “Cost savings from RegTech won’t come overnight”. *American Banker*. URL: <https://www.americanbanker.com/opinion/cost-savings-from-regtech-wont-come-overnight>
- KULKARMI T. (2018). “BNP Paribas, Barclays and Goldman Sachs invest in AI startup Digital Reasoning”. *Bankinnovation*. URL: <https://bankinnovation.net/2018/03/bnp-paribas-barclays-and-goldman-sachs-invest-in-ai-startup-digital-reasoning/>
- LARSEN K. (2016). “RegTech is the New Black – The growth of RegTech demand and investment”. *Reedsmith.com*. URL: <https://www.reedsmith.com/en/perspectives/2017/04/regtech-is-the-new-black>
- MARKOVA D. (2017). “Sandboxes: Noise or News?”. *Forbes*. URL: <https://www.forbes.com/sites/lawrencewintermeyer/2017/05/19/sandboxes-noise-or-news/#2af4591f7105>
- MEDICI. (2018). “MEDICI top 21: Scouting for top RegTech startups building the future of regulatory compliance”. URL: <https://gomedici.com/medici-top-21-scouting-for-top-regtech-startups-building-future-of-regulatory-compliance/>
- MICROSOFT. (2018). “Regtech meets Fintech; Perpetual and Microsoft transform the finance sector”. URL: <https://news.microsoft.com/en-au/features/regtech-meets-fintech-perpetual-microsoft-transform-finance-sector/>

- MICROSOFT. (2018). “Regulatory compliance countdown: is your organization GDPR-ready?”. URL: <https://cloudblogs.microsoft.com/industry-blog/industry/government/regulatory-compliance-countdown-is-your-organization-gdpr-ready/>
- MINISTERO DELLO SVILUPPO ECONOMICO. (2017). “Piano Nazionale Industria 4.0”.
- MONETARY AUTHORITY OF SINGAPORE. (2016). “FinTech Regulatory Sandbox Guidelines”.
- MORICI M. (2018). “Regtech: cos’è e perché potrebbe aiutare le imprese”. URL: <https://www.panorama.it/economia/tech-social/regtech-cose-e-perche-potrebbe-aiutare-le-imprese/>
- MY GOVERNANCE. (2017). “Compliance”. URL: <https://www.mygovernance.it/2017/10/23/compliance/>
- NASDAQ. (2017). *Nasdaq.com*
- NIKE GROUP. (2017). “Regulatory Hub”. URL: <https://nikegroup.it/it/servizi/regulatory-services/regulatory-hub/>
- NIZAN GESLEVICH PACKIN. (2017). “Regtech, compliance and technology judgement rule”. *Chicago-Kent Law Review*.
- NOTE G. (2018). “CBA reveals promising regtech AI results, proceeds with caution”. *Computerworld*. URL: <https://www.computerworld.com.au/article/640828/cba-reveals-promising-regtech-ai-results-proceeds-caution/>
- NVIDIA. (2018). “Il futuro dell’AI e del Deep Learning”. URL: <https://www.nvidia.it/deep-learning-ai/startups/>
- OKELL K. (2018). “RegTech: the savior of financial services?”. *Itproportal*. URL: <https://www.itproportal.com/features/regtech-the-saviour-of-financial-services/>
- PANZA D. (2017). “What is RegTech”. *CyberLaws*. URL: <https://www.cyberlaws.it/2017/what-is-reg-tech/>

- PAREDES D. (2017). “RegTech insights from Suade CEO, Diana Paredes”. *Hollandfintech*. URL: <https://hollandfintech.com/2017/12/regtech-insights-suade-ceo-diana-parades/>
- PATEL K. (2018). “RegTech: Driving the Future of Financial Services”. *Finextra*. URL: <https://www.finextra.com/blogposting/15260/regtech-driving-the-future-of-financial-services>
- PATEL Y. (2018). “Breaking down barriers: the new holistic surveillance paradigm”. URL: <https://jwg-it.eu/breaking-down-barriers-the-new-holistic-surveillance-paradigm>
- PISANU G. (2018). “Deriving public value for money”. *Forbes*. URL: <https://www.forbesmiddleeast.com/en/deriving-public-value-money/>
- PORTER M. (1985). “Competitive Advantage”
- PROOV TEAM. (2017). “Why RegTech is the next best thing”. URL: <https://proov.io/blog/regtech/>
- PROTIVITI. (2016). “Governare la Compliance in aziende Complesse (Indagine sui sistemi di Compliance nei gruppi italiani multinazionali)”.
- PYMNTS. (2018). “HP enters cannabis enterprise software market with flowhub”. URL: <https://www.pymnts.com/news/b2b-payments/2018/hp-flowhub-cannabis-saas/>
- RESERVE BANK OF INDIA. (2016). *Rbi.org.in*
- ROUSE M. (2016). *Searchcompliance.techtarget.com*. URL: <https://searchcompliance.techtarget.com/definition/RegTech>.
- SAP. (2018). *Sap.com*
- SCHENA C., TANDA A., ARLOTTA C. & POTENZA G. (2018). “The Fintech Development: Risks and Opportunities for the Financial Industry in the Digital Era”.
- SHEEN M. (2018). “FCA calls for help embracing regtech”. *Investmentweek.co.uk*. URL: <https://www.investmentweek.co.uk/investment-week/news/3027030/fca-calls-for-help-embracing-regtech>

- SIMPSON D. (2017). “RegTech: the seeds of revolution are sewn”. URL: <https://jwg-it.eu/regtech-the-seeds-of-revolution-are-sewn>
- SLOANE T. (2018). “Teaching AI to speak the language of Regulations”. *Paymentsjournal.com*. URL: <http://paymentsjournal.com/ai-natural-language-processing-regulations/>
- SUTTON M. (2018). “Regulators turn to teach to improve regulatory landscape”. *ITP.net*. URL: <http://www.itp.net/616979-regulators-turn-to-tech-to-improve-regulatory-landscape>
- SYNECHRON. (2018). “Synechron launches RegTech Accelerator program for Financial Services”. URL: <https://www.synechron.com/news/synechron-launches-regtech-accelerator-program-financial-services>
- TECHBULLION. (2018). “5 popular technologies from the World of RegTech”. URL: <https://www.techbullion.com/5-popular-technologies-from-the-world-of-regtech/>
- TECH FINANCIALS. (2018). “RegTech, the new FinTech, driven by complex financial regulations”. URL: <https://techfinancials.co.za/2018/04/10/regtech-the-new-fintech-driven-by-complex-financial-regulations/>
- TEREKHOVA M. (2017). “FCA and R3 develop blockchain-based regtech solution”. *Businessinsider.com*. URL: <https://www.businessinsider.com/fca-and-r3-develop-blockchain-based-regtech-solution-2017-9?IR=T>
- TORONTO CENTRE. (2017). “FinTech, RegTech and SupTech: what they mean for financial supervision”.
- UFFORD S. (2016). “Financial crime and the rise of RegTech”. *Huffingtonpost.com*. URL: https://www.huffingtonpost.ca/stephen-ufford/financial-crime-regtech_b_12623608.html
- VIAINVEST. (2017). “Peer-to-peer lending in a nutshell”. URL: <https://viainvest.com/blog/>

- VILAR H (2018). “New York state stands against fintech sandboxes”. *Bankingtech.com*. URL: <https://www.bankingtech.com/2018/08/new-york-state-stands-against-fintech-sandboxes/>
- VITTORI P. (2018). “RegTech: legge, aziende e clienti trovano un alleato nelle tecnologie vocali”. *Cmimagazine*. URL: <http://www.cmimagazine.it/13484-regtech-legge-aziende-e-clienti-trovano-un-alleato-nelle-tecnologie-vocali/>
- VOEGELI V. (2016). “Credit Suisse, CIA-Funded Palantir to target Rogue Bankers”. *Bloomberg*. URL: <https://www.bloomberg.com/news/articles/2016-03-22/credit-suisse-cia-funded-palantir-build-joint-compliance-firm>
- WASS S. (2018). “Could regtech bridge the trade finance gap in emerging economies?”. *Gtreview*. URL: <https://www.gtreview.com/news/fintech/could-regtech-bridge-the-trade-finance-gap-in-emerging-economies/>
- WILLIAMS J. (2017). “Ireland: Positioning to be the European RegTech leader”. *Hedgeweek.com*. URL: <https://www.hedgeweek.com/2017/02/06/248338/ireland-positioning-be-european-regtech-leader>
- WOOD S. (2018). “Understanding RegTech opportunities and risks for Legal Services”. *Bloomberg Law*. URL: <https://biglawbusiness.com/understanding-regtech-opportunities-and-risks-for-legal-services/>
- YOUNG S. (2017). “Riding the RegTech wave”. *Ftse global market*. URL: <http://www.ftseglobalmarkets.com/blog/the-technology-blog/riding-the-regtech-wave.html>
- YURIEFF K. (2018). “Facebook adds ‘Clear History’ option amid privacy scandal”. *CNN Tech*. URL: <https://money.cnn.com/2018/05/01/technology/clear-history-facebook/index.html>

