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Digital Economy Outlook

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InsurTech is reshaping the insurance market with new players, enabling new products, services and processes. The InsurTech ecosystem is formed by startups developing disruptive business models; technological giants, that are leveraging their technological leadership, and big insurance companies. Other sectors of the economy, such as automotive, are becoming new players in the insurance market. As a reaction, traditional insurers are adapting their strategies, also playing a key role in the new ecosystem.

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1 Cloud computing in the EU: a fragmented regulatory framework

Towards an agile cloud adoption by financial institutions

Cloud computing is a technology enabler. It allows cost reduction, flexibility, scalability and a better use of IT. However, it is only being gradually adopted by banks. There is no regulatory harmonisation, neither globally nor at EU level, and there is a need to bring agility to cloud adoption by financial institutions.

Financial supervisory criteria on the use of cloud computing

Cloud is typically delivered in the form of IaaS (infrastructure as a service), PaaS (platform as a service) or SaaS (software as a service), through public, private or hybrid clouds. This technology is gradually being adopted by financial institutions (FIs), although its use is not yet widespread, as most FIs still rely on in-house infrastructure or use cloud services only for the non-core part of the business[1]. In its Digital Single Market Strategy[2], the European Commission (EC) considers cloud as an economic game changer, recently publishing a Cloud Computing Initiative[3]. As regards the Financial Stability Board (FSB), it has published several documents with an explicit reference to outsourcing as an important element to take into account for an effective risk appetite framework or referring to operational continuity as a going concern supervisory consideration, also present in the context of outsourcing[4].

From the National Financial Supervisory Authorities (NFSAs) standpoint, cloud is considered a form of outsourcing and therefore the same rules apply. NFSAs perform evaluations and cloud adoption is subject to requirements that prevent FIs from streamlining cloud workloads. Despite the fact that many NFSAs in Europe (Spain, Netherlands, Greece, Finland, among others) have published opinions on this matter, with both recommendations and obligations related to outsourcing or cloud based services, the financial industry is dealing with a lack of clear and formal guidance that is consistent across all NFSAs. As for the most recent guidance on outsourcing published by financial authorities, the FCA in the UK and the MAS in Singapore (July 2016) stand out. There is a need for harmonisation across EU financial supervisory regulation and a need to speed up and bring more agility to the cloud adoption process in order to improve cost efficiency and scalability, as essential elements for a digital transformation of the financial sector.

Moreover, there is a need for a better understanding of cloud technology by the supervisory authorities, particularly in relation to security and risks. NFSAs are assessing the implications of migrating workflows to the cloud before allowing a wide adoption of these technologies. Security and privacy are considered two of the main reasons preventing a wider adoption of Cloud, according to the European Union Agency for Network and Information Security (ENISA)[5].

Compliance with Data Protection Law

Financial institutions need to comply with data protection regulations. A cloud computing contract with a cloud service provider (CSP) usually implies an international data transfer, where typically the bank acts as a

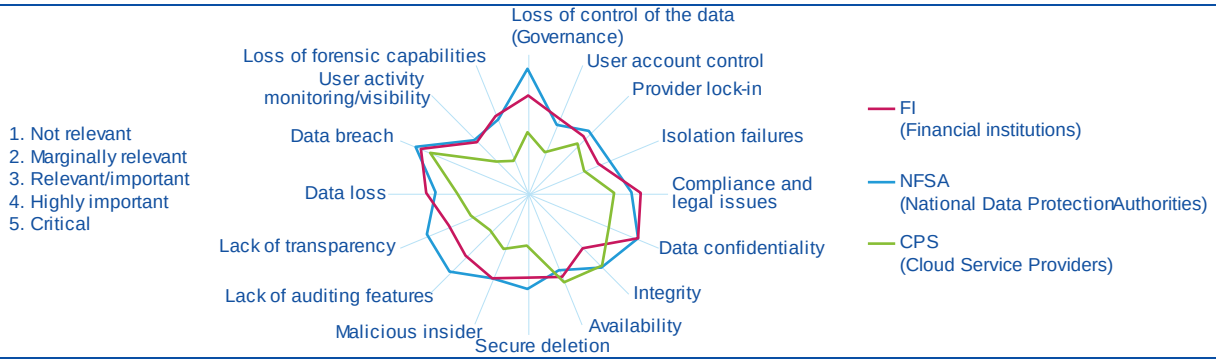
1: Blazheski, Filip: *"Cloud banking or banking in the clouds?",* US Economic Watch, BBVA Research, April 2016.
2: European Commission, "*A Digital Single Market Strategy for Europe*, COM (2015) 192 final, May, 2015. http://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52015DC0192&from=EN
3: European Commission, "*European Cloud Initiative-Building a competitive data and knowledge economy in Europe*", COM (2016) 178 final, April 2016. https://ec.europa.eu/digital-single-market/en/news/communication-european-cloud-initiative-building-competitive-data-and-knowledge-economy-europe.
4: Financial Stability Board: "*Principles for an effective risk appetite framework",* Nov. 18th 2013. See also the FSB document "*Guidance on Arrangements to support operational continuity in resolution*", Consultative document, Nov. 3rd 2015.
5: "*Secure use of Cloud Computing in the Finance sector: good practices and recommendations*", ENISA, 2015. https://www.enisa.europa.eu/publications/cloud-in-finance

data controller and the CSP as a data processor[6]. For this reason, compliance with Directive EC/95/46 on Data Protection (which will be replaced by the General Data Protection Regulation 2016/679 from 2018) must be ensured, particularly as regards the general need of approval by the National Data Protection Authorities (NDPAs) when transferring data outside the European Economic Area (the EU, Iceland, Liechtenstein and Norway) and compliance with articles related to international data transfers. Moreover, some NDPAs have also published guidance for Data Protection compliance in the cloud computing context, as it is the case of the Spanish authority, which published guidelines (2013) targeted at both cloud computing users and CSPs[7]. As for the European Commission, it is currently working on a Data Protection Code of Conduct for CSPs[8].

Managing Cyber Security

Governance, security and privacy are still considered key challenges. In relation to information security measures, these are dispersed across many European and national legislations. There is a large body of related work on the security and governance aspects of cloud computing, including the work by ENISA. Some of the main obstacles constraining a mature cloud adoption are the lack of harmonised internationally recognised standards, certification, data protection issues and interoperability (difficulties when switching providers and lock-in effects).

Figure 1.1
Cloud Computing Challenges (Source: "Secure use of cloud computing in finance sector", ENISA 2015)



Source: BBVA Research

Conclusion

EU institutions in cooperation with NFSAs should continue their work to harmonise the legal and regulatory environment within the EU. It is clear that a better understanding by NFSAs of information security and cyber security risks related to the adoption of cloud computing would greatly help the market mature and improve. Gaining agility and, thus, reducing time-to-market in migrating workloads to the cloud by financial institutions is essential. From a data protection perspective, European NDPAs should follow the same criteria when approving processors from outside the EEA. Since the cloud is a global and cross-border technology, **there is a need to set common grounds and a baseline for cloud computing regulation across the globe with a risk-based approach.** Nowadays, the end user is thinking and acting globally, demanding banks to also act in a global manner and regulators and supervisors should also be aware of this challenge.

6: According to Art.4 of the GDPR 2016/679, a data controller means "*the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data…[…]".* A data processor means "*a natural or legal person, public authority, agency or other body which processes personal data on behalf of the controller*".
7: "*Guía para clientes que contraten servicios de cloud computing*", Agencia Española de Protección ed Datos (AEPD), 2013. http://www.agpd.es/portalwebAGPD/canaldocumentacion/publicaciones/index-ides-idphp.php.
8: https://ec.europa.eu/digital-single-market/en/news/data-protection-code-conduct-cloud-service-providers

2 The impact of technological advances on the labour market

Are we approaching a jobless future?

An increasing range of jobs will be at risk of automation due to ever-increasing computing power, improvements in artificial intelligence and the full-scale development of the "Internet of Things". Yet technological advances also introduce new and more complex tasks for humans and create indirect jobs.

Automation of increasingly complex jobs

The concerns of technology causing mass unemployment, due to machines replacing human labour, are hardly new in history. In fact, the idea of "technological unemployment" as a new disease was already highlighted by John Maynard Keynes in 1930[9]. Some years later, Wassily Leontief was also pessimistic and predicted more and more workers being replaced by machines and new industries not being able to employ all the labour supply. Although previous fears of technological unemployment had not been realised, Leontief thought that, with the advent of solid-state electronics, the relation between man and machine was being radically transformed. "Computers are now taking on the jobs of white-collar workers, performing first simple and then increasingly complex mental tasks", he argued in 1982, to conclude that human labour would not retain in the future its role of principal factor of production[10].

Nowadays, ever-increasing computing power, artificial intelligence and the "Internet of Things" threaten to further extend the scope of job automation to non-routine and cognitive tasks that were deemed non-automatable only a few years ago. These include, for example, driving a car or writing reports on stock market changes. Estimates by Frey and Osborne (2013) suggest that around 47% of total US employment is potentially automatable over the next decades[11]. A wide range of occupations would be affected, in transportation and logistics, office and administrative support tasks, production, construction, sales and services. A similar study by the World Bank (2016) finds an even higher share of the workforce at risk of automation in developing countries — 57% in members of the Organization for Economic Cooperation and Development (OECD)[12].

However, all these alarming figures are based on the average task content of each occupation rather than on the task content of individual jobs. Following the latter — more meticulous — approach, a recent study by the OECD finds much lower estimates of jobs at risk of automation: 9% on average across a sample of 21 OECD member states[13]. Estimates for individual countries range from 12% of the workforce at risk in Austria, Germany and Spain to 6% in Estonia and Korea. The report explains that this heterogeneity may reflect "general differences in workplace organisation, differences in previous investments into automation technologies as well as differences in the education of workers".

Estimates of jobs at risk of automation — either more or less conservative — cannot be considered as expected employment losses from technological advances for two main reasons. First, the adoption of new technologies is a process with economic, legal and societal hurdles, which makes job substitution a far from straightforward process. Second, and more important, new technologies not only displace existing jobs, but also create new ones, both directly and indirectly. In fact, Acemoglu and Restrepo (2016) see the dynamics

9: Keynes, J. M. (1930). Economic Possibilities for Our Grandchildren. In *Essays in Persuasion*, New York, Norton & Co.
10: Leontief, W. W. (1982).The Distribution of Work and Income. *Scientific American*, 247(3), 188-204.
11: Frey, C. B., & Osborne, M. A. (2013). The Future of Employment: How Susceptible are Jobs to Computerisation, *Oxford Martin School Working Paper*, No. 7.
12: World Bank (2016). Digital Dividends. World Bank Development Report 2016.
13: Arntz, M., Gregory, T., & Zierahn, U. (2016). The Risk of Automation for Jobs in OECD Countries: A Comparative Analysis. *OECD Social, Employment and Migration Working Papers*, No. 189.

of modern labour markets as being characterised by a race between two technology-driven forces: automation on the side of machines, and the creation of new complex tasks on the side of humans[14].

New skilled tasks for humans and spillover effects

Technological advances introduce new and more complex tasks for which humans generally have (at least initially) a comparative advantage. These tasks give rise to new jobs such as app programmers, digital marketing managers, cyber security experts, data scientists or digital privacy lawyers. Acemoglu and Restrepo document the importance of new tasks in employment growth using data from the US labour market. They find that about half of total employment growth from 1980 to 2007 (8.8 out of 17.5%) is explained by the additional surge in occupations with new job titles — in which workers perform newer tasks than those in more traditional positions.

However, some authors point out that newer technology sectors are not creating the same employment opportunities as previous technological advances such as the railroad, the automobile or the telephone. There is indeed some evidence of a downward trend in job creation by technology industries since the computing revolution of the 1980s. For example, Lin (2011) suggests that, while around 8.2% of workers in the US shifted into new jobs during the 1980s which were associated with new technologies, this figure went down to 4.4% in the 1990s[15]. Berger and Frey (2015) estimate an even lower percentage for the following decade: less than 0.5% of the US workforce shifted into industries that emerged through the 2000s, including new activities such as online auctions, video and audio streaming[16].

The overall labour impact of technological advances is, notwithstanding, much greater. The new jobs created by technology industries increase the demand for services in the local economy and, therefore, create indirect jobs. This multiplier effect is higher for skilled jobs, which is the case of technology industries. Goos, Konings and Vandeweyer (2015) estimate for Europe that every job in the high-tech industry — which includes both manufacturing and knowledge-intensive services — creates five additional low-tech jobs in the region where the industry is located[17]. The same estimate is found by Moretti (2010) for an approximation of the US high tech sector[18]. These figures, together with the fact that technological advances create increasingly skilled jobs, suggest that the size of the local multiplier will play a key role in the future of employment.

A race between two forces

As technological advances automate existing jobs and introduce new tasks for humans — and indirect jobs — at the same time, the net effect on the labour market will depend on the race between these two forces. If automation outpaces job creation, the concerns of "technological unemployment" will materialize.

The two forces have been more or less balanced so far. To explain this fact, Acemoglu and Restrepo (2016) argue that automation and the creation of new tasks are not independent from each other. Since automation of existing jobs reduces labour demand and tends to reduce the cost of labour, it also makes the creation of new complex tasks for humans more profitable relative to further automation. This 'price effect' would act as a stabilizing force that tends over time to self-correct the labour shedding caused by technology.

However, if there is a change in the innovation possibilities frontier — i.e. the technology for creating new technologies — that makes automation-related innovations easier than creating new tasks, then Acemoglu and Restrepo predict that the economy will settle in a new equilibrium with a greater share of tasks performed by capital and worse prospects for labour. Following this reasoning, the future of employment would depend on whether the combination of ever-increasing computing power, artificial intelligence and the "Internet of Things" give rise or not to a fundamental shift in the innovation possibilities frontier.

14: Acemoglu, D., & Restrepo, P. (2016). The Race Between Machine and Man: Implications of Technology for Growth, Factor Shares and Employment. *NBER Working Papers*, No. 22252.
15: Lin, J. (2011). Technological Adaptation, Cities, and New Work. *Review of Economics and Statistics*, 93 (2), 554–574.
16: Berger, T., & Frey, C. B. (2015). Industrial Renewal in the 21st Century: Evidence from U.S. Cities. *Regional Studies*, forthcoming.
17: Goos, M., Konings, J., & Vandeweyer, M. (2015), Employment Growth in Europe: The Roles of Innovation, Local Job Multipliers and Institutions. *Utrecht School of Economics Discussion Paper Series*, Vol. 15, No. 10
18: Moretti, E. (2010). Local Multipliers. *American Economic Review* 100(2): 373-77.

3 Digital divide and development

An analysis of asymmetries in Internet use

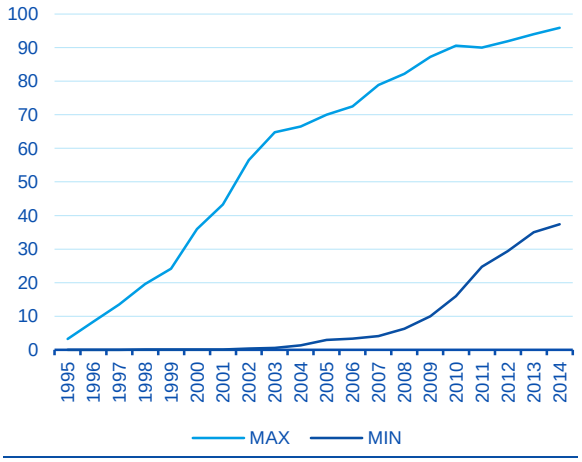
Information and Communication Technology (ICT) is a major engine of growth in the world economy. Interaction among economic agents is increasingly based on ICT, specifically on the Internet. This analysis provides an approximation to use over the past twenty years. It shows that Internet adoption around the world has come about unevenly and at differing speeds from one country to another. International institutions and national public organisations have an important role to play in promoting the use of ICT and encouraging innovation that can improve productivity and contribute to sustainable development.

Macroeconomic situation

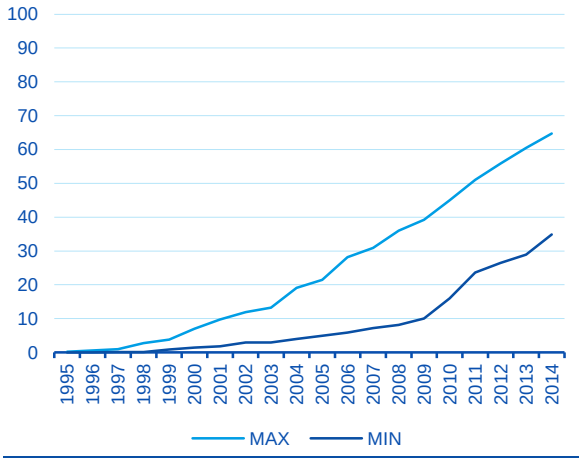
According to data published by the International Telecommunication Union (ITU) (2015), 43% of the world's population is now *online*. However, the online population is not distributed evenly among countries. In order to analyse the gap between them, we took information on Internet use in 160 countries, from 1995 to 2015. From the outset countries such as Norway and Finland have had significantly higher levels of Internet use than the rest of the world, while other countries such as Sierra Leone, Tanzania and Guinea have systematically registered values close to zero.

Figure 1.1 (left) shows a sample of 90 countries, after eliminating those considered as outliers (see Note 1). For these countries, the gap in Internet use started to close from 2006 onwards, as a combined result of gradual saturation in the most advanced societies and a wide margin of available improvement in the countries furthest behind. However, if we look at countries placed between the 30th and 70th percentiles (Figure 1.1, right), we see a different situation, in which the gap widened up until 2009 and has remained constant since then. This result suggests the existence of a global dual phenomenon in Internet use.

Figure 3.1
Changes in the gap in Internet use (%)



Note 1: Outliers calculated using the plus or minus two times standard deviation method. Any country considered an outlier for more than one year is removed from the sample
Source: BBVA Research and World Bank



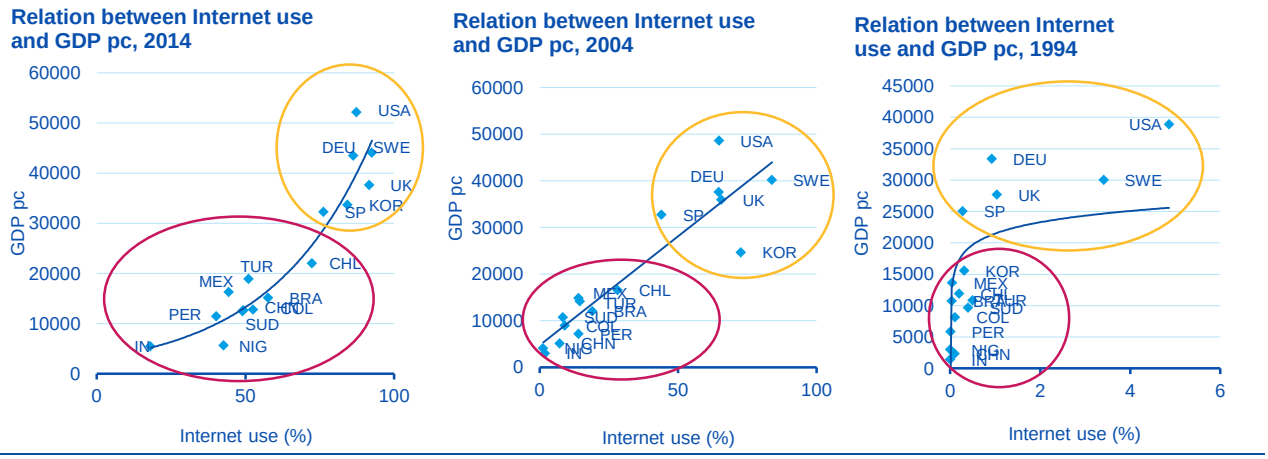
Note 2: Countries with levels of Internet use below the 30th or above the 70th percentile are considered outliers. Any country considered an outlier for more than one year is removed from the sample
Source: BBVA Research and World Bank

Growth of Internet use as an aspect of development

There are notable differences in Internet use, which are closely linked to countries' levels of development. In order to make the comparison more illustrative, we limited the study to two groups of countries based on the level of digital development shown in 2014: the digital leaders (Sweden, USA, UK, South Korea, Germany and Spain) and emerging countries (Chile, Colombia, Peru, Brazil, Mexico, India, China, Turkey, South Africa and Nigeria).

In Figure 2.1, which relates Internet use to GDP per capita, we see a phenomenon of transformation, with the shape going from concave in 1994 to convex in 2014. This result reflects the transition from Internet use as a sufficient condition for economic development, to its being a necessary but not a sufficient condition. In 2004 we see the polarisation of the two groups above-mentioned more clearly. In 2014 we see a process of concentration in the leading digital countries (close to saturation point) and increased dispersion in the group of emerging countries, with the disparities among these countries becoming more evident. This last aspect is a result of the catching-up process in some of these emerging countries, which leads to a narrowing of the gap between emerging and developed countries.

Figure 3.2
Relationship between Internet use (%) and GDP per capita (€) (1994, 2004 and 2014)



Source: BBVA Research and World Bank

Despite advances in the analysis of data relating to ICT, it seems that it has still not been possible to adequately estimate the economic consequences of this phenomenon. Improvements in the political, regulatory and business environment, as well as in countries' readiness in terms of infrastructure, digital content, prices and public education are crucial for advancing in the process that is opening the gates to the Digital Age.

4 InsurTech and the disruptive insurance ecosystem

InsurTech is reshaping the insurance market with new players, enabling new products, services and processes

The InsurTech ecosystem is formed by startups developing disruptive business models; technological giants, that are leveraging their technological leadership; and big insurance companies. Other sectors of the economy, such as automotive, are becoming new players in the insurance market. As a reaction, traditional insurers are adapting their strategies, also playing a key role in the new ecosystem.

Introduction

InsurTech can be defined as the result of the extensive use of technology in the insurance sector, materialized in new innovative products and services, and it is causing a revolution in this sector. InsurTech is often considered a part of Fintech, so the same transformational ideas underly and collaboration between incumbents and challengers is also on the rise. Disruptive startups have knocked down some of the main barriers to entry, while focusing on the problems that the insurance sector traditionally has struggled with, such as user experience. The InsurTech innovation involves the adoption of new digital applications, but also new business models and new corporate structures.

InsurTech still faces **legal uncertainty**, especially as regards new entrants or startups disrupting a highly regulated sector where compliance with sector-specific rules is burdensome. Generally, there are several regulations that must be taken into account by InsurTechs, mostly related to online issues, including data protection regulation and online consumers protection, among others. 100% native digital insurers have to comply with all the e-commerce regulation and must have in mind all the challenges that the digital ecosystem is posing, such as cybersecurity. Essentially, these regulatory challenges are quite similar as the ones Fintech is facing. Nevertheless, determining the concrete nature of the agent, i.e. whether a company becomes an insurance company, an insurance broker, a marketplace, an aggregator, etc, has particular relevance in InsurTech, as it obviously has an impact on the applicable regulatory framework.

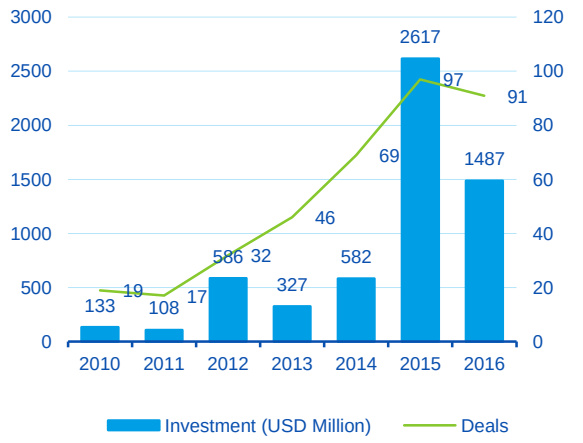
Investment

In accordance with a KPMG report[19], InsurTech attracted USD 2.5 billion of venture capital (VC) investment, a massive leap in funding compared to the previous four years. Annual investments in InsurTech start-ups have increased fivefold over the past three years, with cumulative funding reaching USD 4.3 billion since 2010. By comparison, the first three quarters of 2016 have seen over USD 1.4 billion in VC investment and significant activity by many traditional insurers that are increasingly creating their own VC funds in order to invest in InsurTech companies. It is still quite soon to support the idea of an upcoming slowdown in InsurTech investment, because during the last five quarters there have been significant investments in just a few companies, and it could happen again along the following quarters.

On a global basis, over 60% of VC-backed InsurTech deals occurred in the US during Q2'16. However, the UK is also seen as an important leader in the space. According to City A.M.[20], more than USD 22 million (GBP 16.5 million) has been ploughed into InsurTech so far this year in the UK - nearly triple the amount invested in the whole of last year and growing faster than any other country in the world.

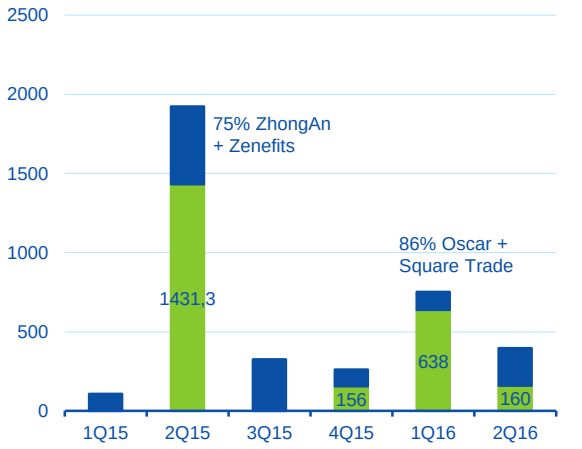
19: *The Pulse of Fintech, Q2 2016, Global Analysis of Fintech Venture Funding*, KPMG and CB Insights, 2016.
20: *Insurtech investment in the UK has tripled (press)*, 2016, City A.M.

Figure 4.1
Annual investments in InsurTech start-ups * (USD Million)



* Note: Updated as of 9/21/16
Source: FT Partners

Figure 4.2
InsurTech financing volume by quarter (USD Million)



* Note: Updated as of 9/21/16
Source: FT Partners

Ecosystem players behaviour

The emergence of a whole new ecosystem based on the extensive use of technology (it is the case of startups and technological giants) has brought new business perspectives and disruptive ideas that directly threaten the status of traditional insurance companies. All of theses new entrants have forced a reaction among incumbents. Based on the interaction of all players, the dynamics of this new ecosystem can be described as follows:

First, **startups** are arguably the most disruptive players at this stage. They have directly focused on long lasting issues in this sector. They are generating new business models based on **peer-to-peer insurance** (a reciprocity insurance contract based on the sharing economy concept), **usage-based insurance** (economic activity created by digital marketplaces that fulfill consumer demand via immediate access to and convenient provisioning of goods and services, e.g. Pay-as-you-Drive, in the auto insurance vertical) or **consumer platforms**, which aim to improve customer experience. These startups leverage in most cases **emergent technologies**, such as the Internet of Things (IoT) for SmartCars and SmartHomes; Big Data for managing and analyzing large volumes of information, blockchain technology and smart contracts for empowering contractual relations with customers in the claim process, for instance. Also, omnichannel, cross selling, and new 100% digital native insurers are new trends that are being observed.

Second, **technological giants** are entering the insurance sector for two main reasons: their technological leadership is a key advantage and their ownership of a huge volume of personal data allows them to make a better segmentation of their consumers. As a consequence, digital players are being able to offer more customizable insurance plans. Other players in the game are **top companies from other sectors** linked to mobility, such as the automotive sector, leveraging their competitive leadership, as in the case of Tesla and its new programme "Insure my Tesla".

Finally, **traditional insurers** are rethinking their strategy to adapt to this new competitive landscape. As a consequence, they have identified four principal axes to guide their actions: **collaboration** (Axa and BlaBlaCar announced their european collaboration on May, 2015), **partnership** (AXA and Alibaba announced their joint agreement on July, 2016), **VC investment** (Munich Re invested in Slice Labs, a startup that is launching an on-demand, pay-per-use insurance) and **startup incubation** (Allianz launched Allianz X InsurTech incubator).

Conclusions

InsurTech follows a customer-centric approach. With the fundamental aid of emerging technologies, such as IoT, Big Data or Artificial Intelligence, these startups have focused on certain deficiencies of the insurance sector and certain segments of the value chain, mainly in those related to delivery, such as marketplaces and insurance comparison sites. These technology-based companies have brought with them new business approaches that directly impact the activity of traditional companies. In addition, digital giants and companies from other sectors are leveraging their competitive advantages (mainly technology and user knowledge) to enter the insurance sector. Due to the innovation introduced by these new players, incumbents are currently reshaping their business models in an increasingly competitive market.

5 Virtual Assistants: artificial intelligence at your service

The leap from apps to conversational interaction

Advances in artificial intelligence are enabling the development of virtual assistants that mediate our relationships with resources accessible via the Internet, making life easier and changing the way we interact with businesses and services.

A virtual assistant is a piece of software that interacts with users through natural language (written or spoken) in specific environments, providing information or services contextually, just as a human assistant would. Often, in an attempt to establish a closer relationship with the user, they are represented by human avatars and given a name.

In their first stage, these assistants were limited to providing a friendlier interface than the usual question and answer databases. This is the case of Anna, IKEA's virtual assistant, one of the first tools of this type, and one which has been in service for 10 years.

The advance of technologies related to general artificial intelligence *(*deep learning*,* neural networks and natural language processing) and conversational systems (interactive voice response and voice recognition) enable the development of agents that channel all network-based user interaction, responding to all needs, more smoothly than apps can. The use of voice as an interface in the relationship between people and machines is the next step. Alexa, the Amazon assistant, is always connected and listening through the Echo device; it can consult a recipe, control the music you're listening to and handle the heating thermostat following voice instructions. Alexa handles all applications with simple commands in natural language, and can discern which application it should use in each case (if you say, "turn up the volume" it understands that you mean Spotify and that "raise the temperature" refers to the thermostat). Customers of neobanks N26 and Monzo can ask Apple's assistant Siri to perform financial transactions, such as transferring money between accounts, and Capital One can pay bills and check your statements using Alexa.

Internet giants are investing in these artificial intelligence tools, as evidenced by their movements this year around conversational platforms: in March Microsoft announced its chatbot, a virtual assistant that communicates with users through written text; in April, Facebook launched the implementation of chatbots in Messenger, allowing users to make reservations or purchases more easily; in May, Google announced its virtual voice assistant and Amazon made its assistant Alexa accessible without the need for the Echo device; and in June Apple opened iMessage to integrate third-party services. With all the great players in the game and a growing number of start-ups in this ecosystem, the trend towards conversational interaction seems to be reasserting itself. In addition to developing their own virtual assistants, these big companies open their platforms for the development of chatbots by third parties (equivalent to the app stores model), expanding the number of services that consumers can interact with through their assistants. The integration of services through voice-controlled assistants and messaging platforms may be the end of the app explosion, the latter are often downloaded and used only once.

As an alternative to voice interaction, the growing popularity and great scope of mobile messaging tools (the four major platforms total over 3,000 million users) are giving impetus to chatbots, especially in mobile communications. Users find these chatbots more user-friendly than apps (no need to download and access them), and they are also cheaper for companies to develop and maintain than apps are, especially those whose intelligence is simpler (based on machine learning instead of deep learning*).* In China, WeChat is more than a messaging tool: its more than 700 million users can buy, pay and check their bank accounts through messages, the main means of access to the web for many of them, instead of search engines. Although the preference for messaging is clear among young people, voice interaction with devices is

becoming consolidated and Google indicates that twenty percent of visits on mobile platforms are made by voice[21] .

In the financial world, the main functions that these bots can carry out are basic transactions, resolution of the most frequent queries in call centres and the possibility of opening conversations that are channelled to the sales force or human assistance. There are also numerous internal tasks in companies for which these wizards can be used, providing access to complex information, and carrying out routine tasks. The Royal Bank of Scotland is using Watson, IBM's cognitive platform, to develop Luvo, a tool that helps employees who assist companies, while learning from its users actions. Using devices that are voice-activated by employees can expedite access to information, generating significant cost savings.

Some data give us an idea of the potential of these tools:

- According to Tractica the consulting company, the profits generated by the Digital Virtual Assistants market will grow from 1,600 million dollars in 2015 to 15,800 million in 2021 [22],
- Over 11,000 chatbots have been developed on Facebook Messenger and 23,000 developers have registered[23]. According to Business Insider, if Facebook can monetize Messenger in the same way as Apple has monetized its Apple Store, it could generate 32,000 million dollars in profits for developers and Facebook itself[24].
- Gartner predicts that by 2019 this technology will be used as the primary interface for connected domestic services in at least 25% of households in developed countries[25].

One of these tools' main strengths is their ability to learn: if they do not know the answer, they resort to human assistants, and incorporate the answers into their knowledge base. Another example of this tool's technological progress is its ability to operate on devices like mobile phones, without the need for a supercomputer. The capability to recognise speech and emit messages is becoming ever closer to human standards (with a success rate of 90%), often making it impossible for the consumer to discern whether he or she is talking to a machine or a human assistant, although natural language processing remains a major challenge.

However, although the response to specific interactions such as ordering a pizza or booking a car is good, machines alone do not yet provide a satisfactory user experience in advising on or solving complex problems, especially if the machines are not dedicated to a single service. Many banks are committing to chatbots or integrating queries and operations in conversational platforms, but advisory work requires further development of the capabilities of artificial intelligence. Some bank assistants are already part of this new generation, such as MyKai, the wizard developed by Kasisto, which not only helps customer transactions through Facebook and Slack, but understands complex questions, and is closer to General Artificial Intelligence.

To achieve a real conversation with customers, we must not only have technology but, above all, correct treatment of data in real time which, for many financial institutions burdened by old technology platforms, should be the first step in their evolution toward intelligent virtual assistants.

21: Google Mobile Voice Study, cited by Search Engine Land, 18 May 2016
22: *The Virtual Digital Assistant Market Will Reach $15.8 Billion Worldwide by 2021*, Tractica Press Release, 3 August 2016
23: *eContext's White Paper Explores the Benefits of Structured Knowledge*, Business Wire, 28 July 2016
24: Beaver, Laurie (2016), *The chatbots explainer*, Business Insider Intelligence
25: *Gartner Says Digital Assistants Will Serve as the Primary Interface to the Connected Home*, Gartner Newsroom, 20 June 2016

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