Assessment of current and future impact of
Big Data on Financial Services

The Financial Services User Group (FSUG) is an expert group set up by the European Commission following the core objective "to secure high quality expert input to the Commission's financial services initiatives from representatives of financial services users and from individual financial services experts". The mandate of the group is to:

- advise the Commission in the context of the preparation of legislative acts or other policy initiatives affecting users of financial services, including consumers, retail investors and micro-enterprises;
- provide insight, opinion and advice concerning the practical implementation of such policies;
- proactively seek to identify key financial services issues which affect users of financial services;
- where appropriate, and in agreement with the Commission, liaise with and provide information to financial services user representatives and representative bodies at the European Union and national level, as well as to other consultative groups administered by the Commission, such as the European Consumer Consultative Group, the Payment Systems Market Expert Group, the European Securities Markets Expert Group and the Expert Group on Financial Education.

June 2016

Assessment of current and future impact of Big Data on Financial Services

Introduction

A common criticism about regulation is that it always lags behind innovations and is obsolete by the time it comes into law. This paper is an attempt at exploring potential future challenges brought about by Big Data on financial services and reflect on policies to ensure that consumers do not suffer any detriment.

It is always difficult to predict what the future will hold. Some of the issues discussed in this paper are already happening as we speak[1], others are more or less likely to happen. Fortunately, much of the technology that may have a deep impact on financial services already exists and is currently undergoing a revolution in its own right. The three main areas which will be or interest to this paper are:

- **Big Data**: the increased availability and size of data about users, some being proactively user generated and uploaded, some being generated by logging their behaviour.
- **The Internet of Things**: sensors and connected devices will surround users more and more. The smartphone was one of the first "Internet of Things" device, but with home appliances and wearables, the number of "things" collecting data about users will greatly increase.
- **Artificial Intelligence and Algorithms**: in order to process these extreme quantities of data and analyse them in a meaningful way, a parallel advance in algorithms and artificial intelligence will be necessary. Future algorithms will be able to identify "patterns" of behaviours across billions of data entries and even across different databases. With progress in deep learning, machines will be able to create and improve their own algorithms to analyse data, pushing even further the boundaries of predictability of human behaviour.

In theory, one of the effect of these three revolutions, combined, is a frighteningly accurate "predictability" of future behavior of any user, and thus, of future risk[2]. In practice, very few studies have looked specifically at the impact of Big Data on financial services, but the evidence so far does not always reflect the theory of increasingly accurate predictability. The National Consumer Law Center in the US for instance, has published a report on Big Data and scoring of consumer credit risk. The report concludes that far from delivering on its promises of enabling underserved consumers access to credit, expanding data points increased inaccuracies which in turn had consequences on access to credit[3].

Of course, the Big Data revolution has many other potential impacts which we will explore throughout the paper.

---

[1] http://www.wsj.com/articles/SB10001424052702304773104579266423512930050
http://www.telegraph.co.uk/finance/personalfinance/borrowing/loans/10268408/Your-Facebook-friends-could-damage-your-credit-rating.html
http://www.economist.com/news/finance-and-economics/21571468-lenders-are-turning-social-media-assess-borrowers-stat-oil
http://www.euromoney.com/Article/3379729/Digital-banking-Credit-scoring-goes-social.html
[2] http://pubsonline.informs.org/doi/abs/10.1287/opre.1080.0619
http://www.nature.com/articles/srep02923?message-global=remove&v=1362363401000?v=1362363401000
[3] http://www.nclc.org/issues/big-data.html

Potential benefits to consumers

While this paper looks predominantly at detriments stemming from the use of Big Data, it is also important to underline some of the potential benefits. The focus on detriments, however, is a conscious choice, since detriments are what compel policy makers to adapt regulation, whereas benefits usually do not require action on the part of regulatory authorities[4].

Among the potential benefits of the use of Big Data and related technologies on financial services we find:

- **Major cost savings across the entire value chain**: advances in technology, including Big Data, allow for tremendous cost savings. New, innovative services such as online payment services or money transfer services enable consumers to carry out certain transactions or access certain services at a fraction of the cost compared to traditional banks.
- **Enhanced security and transparency:** technologies such as Blockchain may revolutionize completely the way the entire financial industry operates. Instead of secrecy and sophisticated, opaque systems, financial transactions could become "public" and open using Block Chain technology.
- **Speed:** many traditional financial processes take time, be it money transfer, lending decisions or insurance policy approvals. With the use of Big Data and algorithms, all of these processes can be sped up tremendously, allowing instant access to products consumers may urgently need.
- **Faster innovation cycles:** using Big Data analytics, financial service providers will be able to respond to changes in the market, bringing new products that consumers may "need" much faster.
- **Financial advice, guidance and budgetary management:** real time analysis of consumer data carries much potential for financial advice in terms of financial investment and money management, guidance in terms of product comparison or finding/recommending products which best suit consumer needs, and also in terms of empowering consumers to manage their budgets more responsibly, notifying them of budget imbalances and potential financial problems down the road.
- **Preventing over-indebtedness:** the other side to the "budgetary management" coin, is that financial service providers may be able to identify problematic spending patterns or other problems in a consumer's budget, helping them to catch such issues early and prevent them from spiraling into over-indebtedness.
- **Tailored services:** financial products may move away from "bulk" offers, available to all consumers with the same conditions and features to personalized products tailored to consumers' needs based on their data.
- **Fraud prevention:** by gaining a deeper insight into consumers' behaviour, fraud can be prevented by early or even instant identification of suspicious behaviour.
- **Increased competition:** national markets with a low level of competition might benefit from innovation via digitalization of financial services and be forced to propose better products to match the competition from newer financial products.

---

[4] Except in cases where more or less natural monopolies emerge or when regulatory burdens prevent the emergence of beneficial innovations for consumers. This, however, is a very controversial issue which deserves its own paper, since there is no way to test such a claim. For instance, one could argue that interest rate caps prevent innovation in financial products, but there is no way to prove that getting rid of such regulation would benefit consumers or rather encourage the emergence of toxic financial products such as pay day loans.

Unfortunately, most of these potential benefits can also work against the interest of the consumer. For instance, cost reduction for banks can benefit shareholders and not be reflected in lower consumer prices, detailed insight into consumer's financial situation may be used to maximize profit as opposed to serving a consumer's best interest, budgetary management will inevitably be tinted with ideology promoting either a consumerist or an ascetic lifestyle,…

Policy makers should therefore also assess whether the effective realization of the benefits for consumers require an adjustment of the existing regulatory framework or whether the current framework is adequate.

The end of insurance?

As data available about individual users becomes more readily available and accessible for analysis, new algorithms will be designed to assess the risk of a person being injured during his/her vacation abroad, his/her home to catch on fire, or even his/her risk to develop a disease based on his/her diet.

Here are a few examples of how future algorithms will be able to assess risk:

- **Travel insurance**: this risk assessment can be made via looking at geo-location data left by social networks or by Google[5], what you have bought and the pictures/posts about your vacation to infer your habits and activities (is the neighborhood safe, are you staying in a 5 star hotel or a cheap motel, are you going to museums or kite surfing…)
- **Health insurance**: with data from a connected fridge, from an online shopping list (via a smartphone app), your supermarket's "customer" card, your favorite restaurants (social networking "likes"), geolocation data about places where you have eaten and other connected devices or software such as a cooking app, it will be easier to assess whether your eating habits are "healthy" and your risk of developing certain diseases linked with an unhealthy diet. And this is only about eating. Other data will also be available: the amount of physical activity thanks to sensors such as pedometers, the amount of sleep you are getting (there are already a number of apps and even devices that monitor your sleeping patterns)…
- **Car insurance:** connected cars are becoming the norm, and the data that is being transmitted includes geolocation but also the speed, usage of the brakes, perhaps even, in the future, data from on-board cameras. It will be easy to match certain driving "patterns" with an increased likelihood of accidents (for instance, driving too fast regardless of the road conditions – ice, rain…)
- **Creditworthiness and credit insurance:** private credit registers are already compiling a number of data other than the "traditional" parameters such as ongoing loans and missed payments. That data coupled with "new" forms of data such as consumers' spending habits and who their friends are on social networks[6] will enable lenders to accurately predict the default risk of a borrower. Other sets of data could be analyzed to predict whether a borrower is at high risk of being severely ill or dying (see above for health insurance) and whether his/her relationship is at risk (divorce) and therefore his/her ability to repay may be hindered (patterns in spending, whether the couple goes on vacation separately or together,…)

---

[5] https://maps.google.com/locationhistory/b/0
[6] http://consumerist.com/2015/08/05/facebook-patent-would-allow-lenders-to-determine-creditworthiness-by-looking-at-your-friends/

Taken together, should privacy and data protection laws allow for consumers to authorize access and sharing of their data through a "tick box" exercise – in essence, a precondition to using any kind of service such as Facebook or PayPal – this could mean the end of insurance and certain financial products as we know them. Consumers that would be "uninsurable" because of the high risk they present would be better off simply putting money aside to cover their risk themselves rather than relying on an unaffordable insurance, and consumers that present a very low risk would not "waste" money on an insurance policy they do not need[7].

Consumer's individual risk beliefs and their willingness-to-pay based on those beliefs directly affect their take-up of insurance products and also influence the insurance market and development of "new" insurance products. Increased predictability could directly affect consumer's risk beliefs and willingness-to-pay as they would have a better understanding/knowledge of their individual risk and therefore whether it is "worth" to take out an insurance policy or not based on their risk.

Finally, it is worth stressing that although risk assessment might dramatically increase in accuracy, it will never be 100% accurate. Life accidents will, for the most part, remain unpredictable. But Big Data runs the risk as being **treated** as 100% predictable, or at least, carrying a sufficient weight for it to be taken as an inescapable precondition for accessing certain financial services, or the terms under which a consumer can access them. For instance, credit scoring, although imperfect, will still be treated as a "reference" by financial service providers, thereby either excluding consumers from access to certain products or conditioning such access to very stringent and detrimental conditions.

Data and algorithms: are they really neutral?

First of all, let's look at data. In the words of researchers Solon Barocas and Andrew Selbst "[A]n algorithm is only as good as the data it works with."[8] In essence, algorithms will simply "lock" users in their vulnerability by excluding them from accessing certain services, thereby contributing to the intergenerational transmission of poverty and social exclusion: a phenomenon called the "disparate impact" of Big Data. And this is assuming that the data is accurate. But there are many ways to "game" the system and falsify data and information provided online. One can easily attach a pedometer to a dog, trick a fridge into thinking there is "healthy" food in it, downloading "healthy cooking apps", create "fake" shopping lists for healthy foods, liking healthy restaurants, manipulating your geolocation data with an app like Fake GPS[9] to make algorithms believe you are in "safe" places…

In short, in the "best" case scenario, with accurate data, vulnerable users will be even more discriminated against, and in an alternative scenario, those who will have technical knowledge will be able to profiteer from the system, putting an extra burden on those who "play fair". Indeed, should many people "cheat" and falsify their data, risk hedging models will have to take that into account and increase the price of their products to hedge for that risk, making certain services even more expensive.

Second, algorithms present their own sets of issues. Big Data analysis relies on the identification of patterns and correlations, which means that any user whose data is highly unusual and does not fit into a model might also face discriminations. For instance, users who travel and move a lot, users who like to try new things as opposed to sticking to their habits, users who do not own many connected devices or protect their privacy making data available about them scarce. Their case

---

[7] http://www.sciencedirect.com/science/article/pii/S0167268112000145
[8] http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2477899
[9] https://play.google.com/store/apps/details?id=com.lexa.fakegps&hl=en

would be similar to the discrimination certain "mystery shoppers" experience, since they have "polluted" data available about them and their habits. Arguably, should Big Data analytics reach a global scale, this issue would be minimized since the probability of having a "unique" profile would be virtually null. But this raises the question of whether Big Data *should* reach a global scale. Huge social networks are already striving for achieving a global scale and data collected about users, which includes anything from posting patterns to political views, and the analytics of such data pose important ethical questions.

This leads to another interesting question: what happens when users deliberately take care in protecting any personal data about them? Making a parallel with credit data, we can assume that if financial services rely on Big Data analysis, and if there is little to no data available about a user, he/she will be denied access to certain financial products. Should Big Data become commonly used in risk assessment, users will be **forced** to create an "online CV" for themselves, actively share data about them, or face exclusion from certain financial services.

Even as the public gradually becomes more familiar with the way platforms work with data, and even with more pointed data scrutiny, it is still a common belief that data and algorithms systematically and impartially uncover genuine patterns of user activity. Big data and algorithms cannot and do not work without some form of human intervention/supervision. In fact, algorithms just do what they are programmed to do very quickly and with a vast amount of data. Algorithms identify patterns in data, but they cannot operate a judgment on that data. In the end, people are behind the algorithm because they produce the activity being measured, they design the algorithms and set their evaluative criteria, they decide what counts as a trend, they name and summarize them, etc. In the end these people who programmed the algorithms employ their own human judgment in its design, clouding such reality by assuming algorithms provide analytical certainty. But who are the people behind the algorithms and who gives them instructions? They are the holders of an incredible power in dictating what is and is not displayed, what is and is not presented, the logics, etc. In short, the whole functioning and results of their use. This process is far from being neutral and there is always a strong human bias, which in this case is the financial services industry bias and/or interests.

This does not mean that algorithms will never be helpful for consumers, but that without proper supervision, there is no way to guarantee that they will work in the interest of consumers. Examples of "positive" use for algorithms include early detection of financial difficulties or money management advice. But without proper supervision of the use of such algorithms, they can also be exploited to identify vulnerable consumers who may be perfect targets to advertise credit consolidation deals, or identify consumers with specific spending patterns for better targeted marketing. Any innovation in Big Data analytics has to be carefully assessed against strict criteria including potential consumer detriment, effects on discrimination of consumers, data protection, proportionality of use of the data, etc.

Consumer information, consumer control, consumer consent

How much will the consumer know about Big Data, about his/her "score" based on that data and how it influences the price he/she is paying or how it influences the decision to refuse access to credit/insurance or any other financial product? In reality, even for the current "scoring" techniques, consumers are kept in the dark about how specific data influences their overall score and how it influences the price or the decision to refuse access to a financial product. It is therefore highly unlikely that consumers will be properly informed about even more complex scoring techniques based on ever bigger sets of data and advanced algorithms. It may even be that consumers **couldn't** be informed due to the complexity of the algorithms developed and the inability for the financial

service providers' staff selling a product to understand and explain the "score" to the consumer, even if they were willing to do so. The inherent opacity of future profiling models poses a real challenge in terms of transparency and information vis-à-vis the consumer.

This brings us to another consideration: **automated advice**[10]. Algorithms are already used to advertise to consumers based on data. The technology is ripe for providing consumers with personalized advice based on that same data. The "quality" and accuracy of "automated advice" provided to a consumer will be directly related to the quality and quantity of data available about him/her (spending patterns, savings, salary,…) and the "quality" of the algorithm. For instance, we could imagine an "online banking" service which advises a consumer to take out an insurance policy before going on vacation, based on data suggesting that he/she had an accident during his last trip and had to shell out a considerable amount of money to pay for medical expenses abroad. Another service could also "suggest" to a consumer to invest money that is sitting on his/her savings account into a more "profitable" investment opportunity on the financial markets[11]. In the end, however, who will be responsible for such advice? We have witnessed in the past, scandals about consumer "misinformation" which lead to serious consumer detriments such as the recent Swiss Franck loans scandal. But who will be to blame if consumers follow such automated advice and end up suffering a severe detriment?

Thinking further into the future, automated advice could even shift to **automated money management.** Algorithms could be designed to automatically invest/manage a portfolio for a consumer, where the consumer would only decide when to sell it all to get his/her investment back. This also raises a great number of questions. How can the consumer "compare" between competing automated money management algorithms? What indicators would be used (risk profile of the algorithm)? Since performance will have to be measured over a certain number of years before any conclusions can be drawn about their effectiveness, how will these services be assessed when they are first made available? More importantly, how would one decide whether a mismanagement of invested funds is due to the market or to a poorly coded algorithm?

As mentioned already above, algorithms and data are not neutral. What if there is a mistake in the data used to assess a consumer's creditworthiness or a consumer's health? What if automated advice or automated money management is flawed because it relies on false data about the consumer and therefore overestimates his/her risk profile?

This raises the question of **consumer control** over his/her data, the ability to correct mistakes or simply decide what he/she wishes to share/make available. At a time when EU data protection law is securing the right for users and citizens to have control over their personal data, it is essential to look at the "practical" implications of such a right and its enforcement. The enforcement aspects of control over data is much more delicate and complex than the ongoing debate about what constitutes "personal data"[12] and pose a great number of challenges.

The "general" definition for personal data is anything that could be used to identify someone or single someone out. Given the vast amount of data generated daily by users or generated about them based on their actions, it is still unclear whether data such as mouse clicks will be sufficient to identify someone.

---

[10] http://www.cnet.com/news/your-next-insurance-agent-will-be-a-robot/
[11] http://www.valuewalk.com/2016/01/robo-advisors-digital-disruption-in-asset-and-wealth-management/
[12] Does it include logs of where you click with your mouse, where you move the cursor of your mouse, the logs of your smartphone's position and all other metadata that you generate, or is it limited to data you "actively" generate i.e., that you upload online such as a picture, a comment…

Furthermore, even if such data is identified as being "personal", exerting "control" over it is a loose concept. For instance, how can a user "correct" mistakes about his/her surfing habits? (for instance, should someone else have hacked into one or more of their online accounts) In practice, it would imply modifying millions and millions of rows of data about clicks on links, pages visited, mouse/keyboard input etc… A much more likely enforcement would be to allow the user to "delete" certain records completely, similar to the "right to be forgotten". This also poses a number of challenges, especially in the light of the possibility to manipulate algorithms. Should a consumer have the right to "delete" records that clearly would make them ineligible for credit (for instance, if they are already highly over-indebted and engaged in online gambling)? Doesn't this go against the principle of responsible lending and preventing over-indebtedness?

In the end, much of the questions above will have to be addressed during the implementation and enforcement process of the GDPR (General Data Protection Regulation).

Finally, let us look at the issue of **consumer consent** in the digital age. With the spread of online banking and technologies such as e-signatures (via a digipass) or e-ID cards and card readers, consumers can give their "consent" to actions that used to require a physical presence (at financial institution's premises) and a physical signature.

A first issue is the equivalence of a "digital" versus a "physical" signature. Does a signature carried out at the physical premises of a financial institution carry the same "weight" as a digital signature done waiting at a bus stop on a mobile phone? This is unrelated to Big Data but nonetheless important to mention.

A second issue is consumer consent with regards to sharing data. As underlined above, does ticking a box constitute a consumer's consent to share all his private data? Unfortunately, instead of opting for a high level of privacy protection by default, the current legal framework relies on consumers systematically giving their "consent" to allow for websites to collect data, especially in the form of cookies, about them. In effect, however, consumers often dismiss these "pop up" windows as they interfere with their "user experience".

Besides, data sharing and privacy are not really a "choice", much rather a "take it or leave it" option whereby a user either agrees to sharing data and giving up part of his/her privacy, or is not allowed to use an online service. We could almost compare it to "price fixing" practices; in this case, "privacy fixing". The dangers of this situation is that consumers may be "forced" into consent by all online services to widely share their data and especially, allowing these services to make their data available to actors such as financial institutions. It can also happen on the financial institutions' end, whereby consumers would have to agree that financial institutions are authorized to access their online data as a precondition to access a financial product.

While the GDPR specifies that a service provider cannot make a service conditional on consenting to the acceptance of processing personal data which is not necessary to provide the service, credit intermediaries might argue that accessing personal data of consumers *is* necessary for the provision of their services, since it allows them to better "personalize" the offer to the consumers' situation. Again, the implementation and enforcement process of the GDPR or courts and jurisprudence will be needed to clarify the meaning of what constitutes "data necessary to provide the service".

From increased predictability to shaping present and future behaviour

Big Data analysis does not only enable predictability, it can also be used to influence and shape consumer behaviour. This was already touched upon with the concept of "automated advice", but it is much broader than that. **Targeted advertising** will become more prevalent and especially, more relevant and accurate to maximize the click-through rates and especially the conversion rate (converting a site visitor into a paying customer).

More data available about consumers could enable, for instance, advertising of products they desire but cannot afford (like a new 3D television before a World Cup) associated with a consumer credit that would enable them to make the purchase.

Consumer behaviour could thus be shaped in favour of impulsive consumerism rather than responsible financial/budgetary management, privileging products like consumer credit versus savings.

Consumer behaviour will also be shaped by financial services' decisions with regards to the **data they choose to examine** in their risk assessment models. For instance, credit scoring relies heavily on whether consumers successfully repaid a credit rather than on their ability to save money, which effectively means that in order to access credit, consumers have to **write their credit CV** by taking out credit even when they don't need to. On a more positive note, in health insurance, including data about smoking habits and adjusting insurance premiums accordingly serves a more general public health interest by encouraging consumers to quit smoking. The choice of the data sets examined in any given risk assessment model is therefore highly sensitive and has direct consequences on consumer behaviour.

From price comparison and price competition to dynamic pricing

Airlines have already been known for applying dynamic pricing techniques to maximize the revenue from selling tickets online. A consumer who has a browsing history suggesting that he/she does not spend much time comparing prices and buys tickets without looking at the price will be shown a higher price than other consumers. Geolocation has also been known to influence price since the purchasing power of consumers in certain areas/countries is higher than in other areas/countries.

The same technique can be applied to financial services, where consumers may be proposed deals which do not necessarily reflect their risk, but based on whether they pay attention to prices, compare offers or come from richer or poorer regions/areas/countries.

New "pricing" methods relying on Big Data are appearing in various forms and dynamic pricing is but one of them and it is unclear if consumers are benefiting from it. For instance, Uber's "surge pricing" is another example of how Big Data can adapt prices in real time based on a number of parameters and it has already been subject to much controversy. The price of an Uber ride is adapted in real time based on the offer and demand. At "peak" hours (for instance at 1am on New Year's Eve), a multiplier is applied to the fare to reflect the increase in demand compared to the offer[13].

While financial services cannot directly take on board "dynamic pricing" techniques as they are used by various online services since their pricing is dependent on other factors besides supply and demand, new notions such as Customer Lifetime Value (CLV) are developing. Financial products can

---

[13] http://www.nbcconnecticut.com/news/local/Everything-You-Need-to-Know-About-Ubers-Surge-Pricing-364032031.html

be priced based on a prediction of a Customer's Lifetime Value[14]. Again, this may push customers from behaving in a way which will positively affect their CLV score such as taking out loans for consumer goods instead of paying with their savings.

Big Data at the service of private companies

At present, Big Data is especially used to the benefit of the private sector, notably because it is the private sector which hosts the data about consumers. Social networks, search engines, operating systems, online merchants… all of these services sit on huge amounts of data about users and is used to serve the interests of those services, ranging from maximizing sales to optimizing/updating their services and identifying bugs or security flaws.

But all this data could also be used in the interest of users themselves. For instance, users could choose to what extent results they are shown are based on the analysis of their previous searches and actions in order to get either "customized" recommendations or "neutral" search results. Options to limit access to their data and how it influences what they are being shown can also limit dynamic pricing.

By providing the possibility for users to access their own data and analytical algorithms, the logic of individual risk based pricing discussed in the section entitled "the end of insurance?" could be reversed. Through access to their data and algorithms, users could consult their probability of having a car accident based on their driving behaviour, the probability of having an accident during vacation based on their activities and the country they go to, the probability of developing a disease based on their diet etc… The "end result" could be two-fold: the end of insurance (since only consumers who have a high risk would consider paying for an insurance) and/or a drastic homogenization of consumer behaviour or cheating their data to get the best deal (modifying driving behaviour, eating better, choosing "safe" travel destinations and activities). In the latter case, even if the effect seems positive, shaping consumer behaviour in such a manner might go too far.

Coming back to the issue of "automated advice", such a tool **could** work in the interest of the consumer depending on how the algorithm is configured. Users could get interesting insight into their financial situation and opportunities for better financial/budgetary management based on the analysis of their data. This raises, again, the question of the "neutrality" of algorithms, which might be highly dependent on who codes them (private companies, public bodies…) and whether their interests are "coded" into the algorithm. One example is the Swedish large data collection done by public authorities in the field of health and social needs which helps anticipate needs with innovative solutions.

Big Data at the service of risk capital investors

Risk capital has an important role in supporting the creation and development of European high growth companies. Risk capital includes two main sources of financing: formal investors (hereinafter Venture Capital) and informal investors (hereinafter Business Angels). At present, Business Angel financing has become the primary source of external seed and early stage equity financing in many countries in Europe.

Venture capital firms are well regulated and structured organizations. Investment decision come at the end of a very deep due diligence process: the integrity, the quality and the business capabilities of the founders/team are all relevant criteria.

---

[14] http://thefinancialbrand.com/57318/business-case-for-dynamic-pricing-in-banking/

Business Angels, acting as individual investors, have less financial resources to dedicate in the due diligence process, so founders and team are frequently evaluated with an emphatic approach.

A US study[15] found that Business Angels who spent more than 20 hours on due diligence experienced 5 times higher returns than those who spent less time. Equally important, they also reduced their losses by about one-third.

Due to the recent financial crises, a more professionalized approach is applied in the selection of new start-ups to fund. The risks can be reduced by shining a light on potential weaknesses and future problems, which help investors prepare for any problems/risks and help the target company as it grows.

Business Angels, in addition, need to stimulate and leverage their investments. At present, an option that can help the investment capacity enhancement is established through Business Angels syndicates and Clubs. A further positive development is to create a team which includes a leader who supervises deadlines and makes assignments for each business angel to investigate on their own. Thanks to newly available financial resources, syndicates and clubs can perform more accurate due diligence.

This new approach's first objective is dedicated to verify how the target firm is perceived from all the external players involved in the company value chain. Specific software tools (i.e. www.mention.com) can quickly analyze public opinion with sentiment analysis for various topics: name, brand, products and services, CEO... There is a commercial offer adapted to every size and type of analysis so the investors can choose the one that fits their monitoring goals pay a monthly or an annual rate.

The second objective concerns the assessment of the management team. It turns out that the management team is always among the top one criteria to validate. The due diligence process starts with their references and continues by looking more in depth to get a fuller picture. Professional social netwoks can help find other people connected to the team who can be interviewed and can offer a different perspective coming from a different niches/background.

If something seems suspect in the integrity of the management team, a complete check can be performed using dedicated, and more expensive, software applications based on multi-lingual semantic technology.

Web sites, social networks, online newspapers, blogs, international publishers with expertise in private company financial data, corporate ownership structures and business intelligence (i.e. Bureau van Dijk) are the sources used by such software. The semantic engine understands the meaning of words in context much the way that people do, only that the tool can read and process unstructured content at the speed of contemporary technology.

Thanks to a "language map", an ontology that contains millions of word definitions and related concepts with millions of relationships, it is possible to achieve a combined capability which provides powerful automated disambiguation, classification, entity extraction and metadata.

The investors can understand the meaning in context within unstructured text, so the existing systems and analytics can be empowered in order to deliver a complete picture facilitating the investment decision.

---

[15] http://www.angelcapitalassociation.org/data/Documents/Resources/AngelGroupResarch/1d%20-%20Resources%20-%20Research/6%20RSCH_-_ACEF_-_Returns_to_Angel_Investor_in_Groups.pdf

Cyber-security, scams and fraud

Cyber-security is a growing concern. In the last few year, there were several high profile cases of hacking and data theft including the Target case where millions of consumer credit card details were stolen. Most major companies can expect to be hacked in the years to come, as even major security and surveillance agencies like the NSA have been hacked… This trend, combined with the gradual "digitization" of financial services (including digital authentication mechanisms, e-signatures, e-ID and e-payment systems) provides for a major risk for fraud and scams.

Stolen credit card details are widely available on the "Dark net" for as little as a dollar per credit card, and can be used to purchase digital goods such as multimedia content or software which cannot be easily "refunded" even if a theft is reported. Consumers may get reimbursed for the purchase, but the stolen good cannot be returned since it has been downloaded.

At the same time, Big Data can help prevent fraud and scams by identifying unusual purchase patterns or logging locations to block transactions or ask for further security details.

A further risk does not necessarily stem from hacking but rather the legal uncertainty over the safe storage of consumer data. Many Fintech startups do not necessarily set up and own data centres. Rather, they rent out "cloud services" (reserving space in a physical data centre) from a company. This means that Fintechs outsource a part of the "security" of their data since they are reliant on the security set up by their cloud service provider, but also they have to trust the cloud service provider for respecting the privacy of the data hosted on their servers. For most data centres and cloud service providers, this is not an issue, especially if they are hosted in countries with strong regulation. But cloud service providers with data centres in countries with low levels regulation and enforcement could exploit such data even without the Fintech's knowledge.

The customer as the weakest link

Much effort is being made to grant consumers the right to consult their data, control their data, or simply grant them ownership over their data. Even if, in principle, making sure that a consumer remains the owner of his/her data poses a new series of issues. Consumers can be pressured to grant access to their data as a precondition to buying a financial product.

In Belgium, for instance, although intermediaries on the credit market are not supposed to have access to a consumers' credit data, they ask the consumer for his/her private access to their credit data or ask for a print-out as a precondition for accessing their services.

As consumers become more and more in control of their data, it also poses a threat of abuse of their data by financial service providers/intermediaries. As long as consumers could not access their data, a service provider/intermediary had no hope of accessing data about a consumer that was held by a competitor, but once a consumer has access to his/her data, that reality changes.

This is especially true now that "new" online banks start to develop. One example is the "ImaginBank" launched by the Caixa Bank in Spain which is a "mobile only" bank for millenials[16]. A similar initiative is developing in the US with Moven[17]. Moven tracks every purchase made by a consumer and can provide advice or monitor the financial situation of a consumer, letting him/her know if his spending patterns are changing, if he/she is managing to save money at the end of the

---

[16] http://press.lacaixa.es/caixabank/press-releases/imaginbank-spain-s-first-mobile-only-bank-for-millennials__1775-c-23497__.html
[17] https://moven.com/

month and so forth. But this data, now available to consumers, can also be easily requested by third parties (any other financial service operator) as a precondition to access a financial service.

Product related Information, transparency, product diversity and choice

To revisit a theme already discussed in a previous FSUG paper on a *Simple Financial Products Regime*[18], the combination of innovations in Big Data analytics, Internet of Things and Artificial Intelligence/Algorithms create a ripe environment for a sustained growth of Fintech companies, "new" business models in financial services and "new" financial products. The FSUG paper on a Simple Financial Products Regime has already underlined the phenomenon of consumers facing information overload, complexity overload and product choice overload. In essence, there is too much information to read, many financial products are too complex (unnecessarily complex) and there are too many of them for an average consumer to make an informed decision.

In 2014, venture capital investment in Fintechs tripled from 2013 to $12.21 billion. In 2015, investment nearly doubled to 22.2$ billion and in the first quarter of 2016 reached $5.3 billion, a 67 percent increase over the same period last year[19]. This "boom" in Fintech companies will have a direct impact on the product offer available to consumers and also on consumer acquisition (namely via new online marketing strategies such as "agile marketing"[20]).

There are several issues linked to the emergence of Fintech companies and products which need to be addressed:

- With **information** being provided online, there are both risks and opportunities in terms of transparency, clarity… The way information is presented and the design of the website or app which hosts the information can greatly affect the user's experience and understanding of the information. Information in a digital form carries the advantage of being interactive, which can facilitate a consumer's access to a range of information unavailable in "paper" format, but it can also overwhelm the consumer or lose him/her completely in poorly designed websites/apps/user interfaces. Big Data and algorithms can also serve the purpose of displaying **relevant** content only based on the data generated by the user. For instance, by detecting a users' investment habits, or reading habits and even by testing the users' knowledge, the information shown to the user could be tailored to his/her needs/knowledge. This is becoming more and more necessary as the quantity of information available to consumers is mushrooming online. At the same time, it bears new risks in terms of transparency and oversight needs to move further than the present KID and PRIIPS but also to the way such algorithms which filter/tailor information are designed.
- A growth of the fintech industry will also mean a growth in **product diversity and consumer choice.** But as consumers are already overwhelmed by the current product diversity offline, fintechs might further exacerbate consumer choice overload. Again, Big Data and algorithms can help in sorting products. Indeed, search engines already "filter" information when searching for keywords such as "mortgage credit" or "consumer credit". Displaying consumer organisations' comparison websites for such products to the top or the bottom of search results, or displaying commercial offers from select financial service providers may directly influence consumers' choice.

---

[18] http://ec.europa.eu/finance/finservices-retail/docs/fsug/papers/1411-simple-products-project_en.pdf
[19] https://newsroom.accenture.com/news/global-fintech-investment-growth-continues-in-2016-driven-by-europe-and-asia-accenture-study-finds.htm
[20] http://thefinancialbrand.com/57877/agile-marketing-digital-strategy/

Discrimination on political or other grounds

In China, user behaviour online is associated to a "citizen score" which influences on his/her credit score. Should a user buy/play many video games or post "non approved" political comments online, his "citizen score" will drop along with his/her credit score[21].

We are far from such a situation in the EU, but this practice should be a warning to the potential ways in which Big Data can be used to discriminate users.

Recommendations:

- The European Commission should recognize the impact of Big Data on financial services and **launch a formal policy process**, in cooperation with the European Parliament, to prevent any potential future consumer detriment due to the increasing use of Big Data. This formal policy process should be mandated to answer a number of questions including
  o What are the implications of big data/ fintech/ algorithms? There are many claims and counterclaims about its value for financial services and indeed its utility. But, there are surprisingly few good, objective analyses which try to assess the practical applications.
  o Specifically, what would the impact be on different groups of consumers including implications for access/ exclusion, on their behaviours and decision-making abilities, and therefore on markets?
  o What are the implications for data protection, conduct, competition, prudential/ financial stability regulation? How fit-for-purpose is our system of regulation in this new environment? Does financial regulation and data protection regulation interact properly to protect consumers?
  o What is the appropriate policy response to these developments? Do we have the right framework to allow us to identify the positive aspects of these developments whilst protecting consumers against the very obvious risks?
  o Are efficiency gains, economies of scale, and other benefits equally redistributed along the value chain? Do consumers benefit from these developments by better value for money or does the industry keep most of the profits either for increasing their profit margins or paying out dividends to shareholders?

- The European Commission should define **governance rules** for all actors providing personal data to financial service providers. This includes credit bureaus, but also any potential actor which may provide personal information about a financial services user (for instance, a company selling health sensors sharing data with insurance companies). The governance rules should ensure that decisions about the use of data and the extent to which risk is mutualized or socialized is a collective decision by all interested stakeholders (public authorities, financial services providers, consumers, data protection authorities). Such bodies need to decide about the proportionality of using personal data. *See the FSUG's paper on credit data.* The impact of Big Data and the importance of **ethical use of data**, however, goes much beyond the scope of financial services alone.
- The future European Data Protection Board (EDPB), which will gather all the European Data Protection Authorities, should specifically analyse what the GDPR rules mean for Big Data and Fintech. Their mandate should extend to assessing how data is used, whether it respects

---

[21] http://www.computerworld.com/article/2990203/security/aclu-orwellian-citizen-score-chinas-credit-score-system-is-a-warning-for-americans.html

certain ethical criteria or proportionality, and the likely impact on consumers/society (will it fuel discrimination, contribute to the intergenerational transmission of poverty…). Inspirations for powers granted to such an authority could be drawn from the current **RAPEX or REACH** systems as well as the **Regulatory Sandbox** currently in vigor in the UK. Innovation in financial services can bring about positive change for consumers, but it needs **legal certainty,** especially with regards to the use of data.

- The issue of cyber-security should be openly discussed between a variety of stakeholders, building on the philosophy of **Open Source** software and solutions and **strong open standards** to ensure the highest level of security for consumer's private data. Many innovative solutions exist to keep data safe and all of them should be explored:
    o The "FreedomBox" is a personal server where consumers can store **all** of their online data. Social networks, emails… all their data can be stored locally on their personal server. Consumers have full control over who has access to their data[22].
    o Using encryption for sensitive information such as credit card numbers.
    o Storing user data on their own personal "cloud" account instead of centralizing it in company databases.
    o Mainstreaming two-factor authentication or even three-factor.

- Initiatives which make **Big Data analytics work in the interest of consumers** and under their control should be encouraged and promoted. For instance, consumers could use Big Data analytics of their spending patterns to predict future expenditure, providing them advice on how to manage their budgets more efficiently. Algorithms can also shop for consumers to find the "best" deal in a matter of seconds. Consumers can use algorithms to evaluate their own personal risk based on their financial situation and the assorted price they should "expect" to pay, helping them evaluate whether offers they are given are fair or purposefully overpriced. To this end, Data Protection and Privacy laws need to guarantee that consumers not only have access to their data, but also access to analytics tools and algorithms which rely on their data.

- Further reflection needs to be given to consumer information, consumer control and consumer consent in the digital world, and applied to Big Data. Some of the following questions should be addressed with the new GDPR, but others go beyond what is in the GDPR in particular as regards on 'how to ensure that privacy by design/default becomes a guiding principle in the age of Big Data'.
    o Consumer information: how can consumers be informed about the data used by algorithms, how algorithms work, how to correct mistakes? The fact that transparency and information may be impossible, given the increased complexity of data and algorithms, solutions such as a minimalization of data use for the objective pursued, mutualization/socialization of risk and better governance of data use should be implemented (see FSUG paper on Credit Data).
    o Consumer control: how much control can consumers exert on their "data trail"? Should we generalize options for consumers to "tweak" the algorithms for their needs? Should we provide for an option to disable the use of Big Data and algorithms altogether (similar to using a search engine which does not analyze your surfing habits to display search results)? Should we generalize the use of Cryptology

---

[22] https://freedomboxfoundation.org/

to enhance consumer's privacy online[23]? How can we address the issue of consumers being pressured into giving away access to their data as a precondition to access a service?

- o Consumer consent: how does consumer consent translate to the digital world? Is ticking a box equivalent to signing a contract? Should we focus on "consent" or rather create a legal framework which protects consumers' data by default?

---

[23] https://gigaom.com/2014/10/06/pretty-easy-privacy-project-aims-to-make-encryption-easier-for-regular-people-to-use/