



# FINTECH IN NORWAY

The Effect of FinTech on the Traditional Norwegian Banking Sector

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NORWEGIAN SCHOOL OF ECONOMICS

This thesis is written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible — through the approval of this thesis — for the theories and methods used, or results and conclusions drawn in this work.

## EXECUTIVE SUMMARY

The purpose of this thesis is to investigate the effect of FinTech on the Norwegian banking industry. We investigate the drivers of FinTech, the current and potential Norwegian FinTech market, and the international competitiveness of the Norwegian FinTech movement.

We identify nine segments of FinTech within the traditional banking functions Financing, Asset management, Payments and Authentication, and we find the key drivers behind the rapid growth of the FinTech market as changing consumer preferences and technology innovation. Bank customers demand quicker, easier, and cheaper banking than what the traditional banks have offered, and we conclude that the increasingly tech-savvy population is ripe for adopting FinTech solutions. The formation of FinTech startups is facilitated by customized and transparent regulations, access to seed and growth capital, and access to technological and entrepreneurial talent.

Through a bottom-up market sizing of the current players in the Norwegian FinTech industry, we find a low FinTech adoption rate in all segments except all-digital banks and Authentication. However, Norway is positively positioned on the drivers of FinTech development, and we forecast a significantly increased FinTech adoption within five years.

The incumbent banks are highly aware of the changes caused by technology infusion, and they are open and proactive in developing solutions in cooperation with FinTech startups. We believe the banks have recognized that their strengths lie in IT infrastructure, customer data, capital access and regulatory knowledge, while the FinTechs offer innovation, flexibility and tailored solutions. This has resulted in FinTech having considerable disrupting effects on how banking is done, but has allowed the incumbent banks to maintain important positions.

Finally, we have assessed Norwegian FinTech's competitiveness in the light of world leading FinTech nations. We conclude that while there are several positive trends in Norway, there are significant scale advantages in FinTech development, which diminishes the chances of competing on an international level. Recent attempts at increasing the cross-Nordic cooperation could have positive effects. We also see that although Norway will have difficulties competing internationally, this does not exclude the possibility of individual successes within the FinTech segments.

## PREFACE

This study is written as a final part of our master's degree with a specialization in Finance at the Norwegian School of Economics (NHH). The theme selection was made with a genuine interest in the digital shift in the economy, as well as a desire to write about something relevant and interesting for everyone to read. In the early phases of our research, we came to find that FinTech in Norwegian banking was something every industry interest talked about, but that rather few had looked at in a bigger scope. There was especially a lack of quantitative analysis into the potential of Norwegian FinTech. Along the way, we have continuously discovered people with extensive knowledge, research and thoughts about the future within their respective segments, which has made it inspiring to attempt to create a comprehensive overview of the full movement. In addition, there has been no shortage of media reports and news over the last months directly related to our thesis' objective, which has made this work exciting and awarding.

We wish to thank the industry experts who graciously spent considerable time answering our questions, allowing us to use their experience to understand a fast-paced, complex business. Furthermore, we wish to thank our supervisor, Xunhua Su, for his feedback and guidance, and particularly for leading us towards writing about a topic we initially knew nothing about.

Bergen, December 2017

  
Ida Gjendem

  
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# TABLE OF CONTENTS

|   |    |
|---|----|
| FinTech in Norway                               | 1  |
| Executive Summary                               | 2  |
| Preface   | 3  |
| Table of Contents                               | 4  |
| Tables and figures                              | 6  |
| 1. Introduction                                 | 7  |
| <i>1.1 Background and Motivation</i>            | 7  |
| <i>1.2 Research Question</i>                    | 7  |
| <i>1.3 Outline</i>                              | 7  |
| <i>1.4 List of Experts</i>                      | 9  |
| 2. What is FinTech?                             | 11 |
| <i>2.1 Financial Technology in Banking</i>      | 11 |
| <i>2.2 Traditional Banking Value Chain</i>      | 12 |
| <i>2.3 FinTechs' Value Chain</i>                | 13 |
| 3. FinTech Drivers                              | 16 |
| <i>3.1 Financial Services Drivers</i>           | 17 |
| <i>3.2 FinTech Formation Drivers</i>            | 17 |
| 4. Banking & FinTech in Norway                  | 27 |
| <i>4.1 Traditional Banking in Norway</i>        | 27 |
| <i>4.2 FinTech Market in Norway</i>             | 29 |
| 4.2.1 Current Players                           | 29 |
| 4.2.2 Market Sizing                             | 32 |
| 5. International Progress of FinTech            | 44 |
| <i>World Leading Nations on FinTech</i>         | 44 |
| 5.1 USA   | 45 |
| 5.2 China                                       | 48 |
| 5.3 United Kingdoms                             | 49 |
| 5.4 Germany                                     | 51 |
| 6. The Future of FinTech in Norway              | 53 |
| <i>6.1 The Drivers Behind Norwegian FinTech</i> | 53 |

|  |           |
|--|-----------|
| 6.1.1 Financial Services Drivers in Norway           | 53        |
| 6.1.2 FinTech Formation Drivers in Norway            | 54        |
| <i>6.2 Market Entry Conditions</i>                   | <i>63</i> |
| <i>6.3 Forecasting the FinTech Market</i>            | <i>68</i> |
| 6.3.1 Methodology                                    | 68        |
| 6.3.2 Estimated Segment Sizes                        | 68        |
| <i>6.4 Impact on the Traditional Banking Sector</i>  | <i>76</i> |
| 6.4.1 Organizational Structure                       | 76        |
| 6.4.2 Channel Preference                             | 77        |
| 6.4.3 Payments                                       | 77        |
| 6.4.4 Financing                                      | 79        |
| 6.4.5 Asset Management                               | 81        |
| 6.4.6 Authentication                                 | 81        |
| 6.4.7 Conclusion                                     | 81        |
| 7. The Future of Norwegian FinTech Internationally   | 83        |
| <i>The competitive Position of Norwegian FinTech</i> | <i>83</i> |
| Appendices   | 92        |
| Appendix 1: Norwegian FinTech Companies              | 92        |
| Appendix 2: Crowdfunding Market Sizing               | 93        |
| Appendix 3: Investment Banking                       | 93        |
| References   | 94        |

## TABLES AND FIGURES

|           |    |
|-----------|----|
| Figure 1  | 12 |
| Figure 2  | 13 |
| Figure 3  | 16 |
| Figure 4  | 17 |
| Figure 5  | 19 |
| Figure 6  | 23 |
| Figure 7  | 28 |
| Figure 8  | 30 |
| Figure 9  | 34 |
| Figure 10 | 35 |
| Figure 11 | 37 |
| Figure 12 | 38 |
| Figure 13 | 39 |
| Figure 14 | 40 |
| Figure 15 | 42 |
| Figure 16 | 43 |
| Figure 17 | 45 |
| Figure 18 | 46 |
| Figure 19 | 54 |
| Figure 20 | 63 |
| Figure 21 | 67 |
| Figure 22 | 83 |

# 1. INTRODUCTION

## 1.1 BACKGROUND AND MOTIVATION

”Banking is necessary, banks are not”, Bill Gates said in 1994. At that time, the banks still held their position as strong and stable financial institutions for both the personal and corporate market, working as an intermediary platform for most financial activities. While many people disagreed with him then, the changes happening in today’s financial sector indicate that he might have been right in his predictions.

The FinTech movement is causing significant changes in the banking sector and in the economy in general. For many banks, FinTech startups are emerging as a disruptive force, comparable to the early days of Amazon in the retail industry and Uber’s impact on the transportation sector (Moholkar, 2016). FinTech has become the leading buzzword of 2017, with significant resources allocated to further its progress and understanding its impact by traditional banks, startup environments and educational facilities.

While there is no shortage of industry players presenting their view on the future state of banking, to date no academic studies have investigated the full potential of the various FinTech segments in Norway, and their total effect on traditional banking’s value chain. Several studies have looked closely on specific segments, or the technology behind them. As we see it, it is not sufficient to look at each segment’s effect on banking and the economy, as they are all small components of a major digital shift. This paper presents a comprehensive overview of that shift.

## 1.2 RESEARCH QUESTION

The ultimate purpose of this paper is to investigate the impact of the FinTech movement on the traditional banking sector in Norway. This requires an extensive review of FinTech in general, the drivers of FinTech development and the progress of FinTech today. Additionally, we seek to utilize findings from the FinTech forecast to review the competitive strengths and weaknesses of Norwegian FinTech in a global setting, to offer insight on the potential of Norway becoming a leading FinTech player. Our problem definition is:

***What is the effect of FinTech on the traditional Norwegian banking sector?***

## 1.3 OUTLINE

This paper consists of an introductory part, where we present our motivation and research question, and our most important source, expert interviews. Following is a description of FinTech in general terms, before an investigation of the current state of FinTech in Norway. We then look into the current state of FinTech globally. The final parts present our findings on the future of FinTech in Norway, both its impact on the Norwegian banking sector, and its potential to expand globally.

At the time this paper was written, the research and information on Norwegian FinTech, especially its effect on the country’s traditional banking sector, was very limited. An

important source of information, inspiration and thoughts on potential development was a range of interviews we conducted over the fall of 2017. The next chapter gives a short presentation of the experts we spoke with. Their input is at times quoted throughout this paper, but more than that their teachings have been the drivers behind the direction of the entire paper, and used in practically all logical conclusions.

The first section of the paper is a description of FinTech in general, and our definition of the traditional banking sector and the different FinTech segments. This is followed by an investigation of the general drivers of FinTech development. The driver tree was built using input from experts combined with economic theory on the drivers of financial services and technology adoption.

After defining and understanding the FinTech sector in general, we present the current state of banking and FinTech in Norway. We use several sources to uncover the most influential startups in the different segments, and perform a bottom-up market sizing based on identified players. To understand how far FinTech has progressed at this point, we provide context by identifying the potential addressable markets of the different segments and the proportion of said market they are currently serving.

To understand both the current progress of FinTech in Norway, and its future potential, we must also understand what is happening in the countries that lead FinTech development globally. We first use several metrics to determine the world leaders on FinTech, before presenting their progress and competitive strengths and weaknesses through the perspective of the driver tree.

The final section of the paper presents our findings on the future of Norwegian FinTech. Our forecast of possible scenarios within the FinTech market in Norway results from the combination of identified drivers of FinTech demand and supply, theoretical economic models, the study of growth in related technologies and countries, and estimates from leading experts on FinTech in Norway. Naturally, there is high uncertainty in how FinTech will develop going forward, and a wide range of variables that will have significant impact. However, we believe there is significant value in investigating possible scenarios in the different segments. This forecast is then used to look at the impact on the traditional banking sector, and finally the competitive position of Norwegian FinTech internationally.



## 1.4 LIST OF EXPERTS

This paper has been enriched by input from various industry experts, specialized in different competence areas, with different level of experience and backgrounds. This has helped us form a comprehensive overview of all parts of the banking and the FinTech sector. We sincerely thank them all for their direct and indirect impact on all parts of this paper.

**Lars Erik Fjørtoft**, Partner at PWC and Head of IT Risk. Lars Erik is one of the leading consultants on IT advisory and management in Norway. His position as a business consultant with expert knowledge of IT and technology provided an important perspective on FinTech through understanding the market and business conditions. He also has extensive knowledge of how banks and startups are positioning themselves in the market.

**Gro Eirin Dyrnes**, Regional Director Americas at Innovation Norway, San Francisco & Silicon Valley and Chair at Nordic Innovation House. Through her position in Innovation Norway, situated at the heart of technology development in Silicon Valley, Gro Eirin provided valuable context on what is happening in Norway compared to the US. Her knowledge of the international market, the newest trends and developments and competitive strengths and weaknesses was impactful on understanding Norway's international position.

**Geir Atle Bore**, CEO and Co-founder at crowdlending platform [FundingPartner.no](https://www.fundingpartner.no). With experience from finance and consulting firms Goldman Sachs and McKinsey, where he became Associate Partner, Geir Atle started the crowdlending FinTech startup FundingPartner with Tor Herman Smedsrud and Marius Borthen in 2016. Geir Atle offered input on how to understand the business behind alternative finance markets and the market strategies that FinTech startups are pursuing. His extensive experience with market and business valuation was obvious. He also put us in contact with other important sources, which helped us improve our knowledge.

**Marius Borthen**, Co-founder and Head of Risk & Credit at FundingPartner. Marius started as an analyst in Swedbank, and in 2010 founded the investment firm Blueberry Capital. In 2016, he co-founded FundingPartner in Oslo. He has been dedicated to the financial markets for 15 years and as Head of Risk and Credit scoring, Marius had valuable insight on the financing market, and provided us with understanding on equity investment, credit mediation and the credit scoring process both at traditional banks and FinTechs.

**Susanne Hannestad**, CEO at FinTech Mundi. Chairman/Board Director at Payr, Zwipe, Nordax Bank and Vio Media. Susanne has gained unique competence within FinTech with experience from various positions within banking, payments, FinTech and now as CEO in the ecosystem Fintech Mundi, where she helps high potential startups develop ideas, commercialize their products and expand internationally. This hands-on experience was incredible helpful for understanding the Norwegian and Nordic FinTech market, and gave us one-of-a-kind insight on both the drivers and potential of FinTech.

**Ken Kristensen**, Market Lead at Klarna. Ken has 25 years of experience in executive positions in Norwegian and international businesses, particularly within payments. After working in credit card/payments companies Visa Norge and Teller, he is now Market Lead at

Swedish-born Klarna. He is also a partner in TBE Group as a strategic consultant. We benefitted greatly from his knowledge on payments and transaction services, and his thoughts on the future of payments. His input also helped us understand credit scoring services.

**Helge Lunde**, Co-founder of Kameo. Helge is currently a senior consultant and partner at Crux Consulting, after executive positions at Signatur and Digi, as well as brokering at RS Platou, Kaputhing and Orion Sec. He also has experience from GK Nordic. As such, his areas of expertise lies within finance, PR and communication. After founding Kameo, Helge has a very interesting combination of knowledge and experience both in traditional business and alternative financing.

**Rotem Shneor**, Associate Professor at the University of Agder, Academic Director of the Center of Entrepreneurship. Shneor has been leading the Nordic Crowdfunding Alliance of platforms since 2014, serving as an associate researcher at the Cambridge University Center for Alternative Finance and has held talks and seminars on crowdfunding in more than a dozen countries. He is the leading academic researcher on crowdfunding in the Nordics. His input helped us understand the complex crowdfunding and -lending markets, with insight on both the current and potential impact of crowd financing platforms.

**Øyvind W. Brekke**, Head of Digital Innovation in DNB Personal market. Øyvind has worked for DNB for several years and currently leads DNB towards a digitalized banking market. From his position, he has a valuable view on how traditional banks are positioning themselves in this movement, and he offered good insight on the impact of FinTech on DNB's traditional value chain.

**Anonymous experts:** In addition to the listed experts, we have spoken to people whom prefer not to be mentioned by name in this paper. With experience from leading financial services institutions and powerhouses, such as Norwegian Bank Investment Management (NBIM), McKinsey and the Norwegian bank sector, these experts also offered valuable input for us to use.

## 2. WHAT IS FINTECH?

### 2.1 FINANCIAL TECHNOLOGY IN BANKING

FinTech is short for financial technology and denotes the use of technology to support, enhance and innovate services and products traditionally offered by the incumbent financial services institutions, including banks, insurance companies and investment funds.

FinTech has made banking more user-friendly, efficient, cheaper and digital (Dorfleitner, Hornhuf, Schmitt, & Weber, 2017), and given rise to new business models, services and products. While technology use in the bank sector has been gaining increasingly more attention over the past decade, particularly after the financial crisis in 2008, the technological infusion in the financial sector actually begun as long as sixty years ago: In the 1950s, credit cards were introduced to ease the risk and burden of carrying cash only, and in the 1960s the first ATM was installed, which replaced many physical tellers and bank branches. Computers and data storage systems were then introduced to the banking sector during the 1980s, and the Internet was created and taken into use in the 90s, and several banks launched online websites (Desai, 2015). A common denominator for the historical infusion of technology in banking is that the banks have controlled and capitalized on them.

However, FinTech startups have recently been able to threaten the banks long-held position by cherry-picking components of the banks' value chains, refining and optimizing them, and offer segment-specific value propositions that meet the changing consumer preferences and financial needs. As FinTech development increases in quality and proliferation, so does its potential of fundamentally changing banking as we know it.

## 2.2 TRADITIONAL BANKING VALUE CHAIN

To analyze FinTech’s effect on Norwegian banks, we must first identify the incumbent banks’ traditional value chain, based on formal definitions of banking and what customer needs the banks serve. Regardless of the future bank structure, the overall objective will still be to satisfy the customers’ financial needs.

The banks’ official function is to promote saving by receiving deposits from depositors and safely manage their assets. They also work as intermediaries between investors of capital and those needing capital for consumption or investments. Furthermore, banks also offer financial advisory on investments and other services for their customers. As such, SNL splits the banks’ functions into five main categories: Credit Mediation and Payment Services, Storing and Managing Valuables, Managing Securities and Financial Advisory (SNL, 2017). We see these functions as developed to meet the five customer needs, defined by Booz & Company: Financing, Asset management, Payments, Insurance and Advice (Booz & Company, 2009).

As a credit mediator, the banks channel funds from savers with money surplus to customers looking for funding, and thereby offer Financing for their customers. Payments solutions are offered through credit and debit cards, checks, and online transactions, enabling customers to pay and receive money across accounts. Storing and Managing of valuables and securities is part of the Asset Management need of customers who have an excess amount of resources, and is looking for somewhere to keep it safe and receive interest. For simplicity, we include Advice in Asset management, as the Advice services we will be looking at exclusively entails advice with regards to investments and wealth management. Insurance services are a value-creation function heavily populated by the traditional banks. In addition, there are two important functions that are not necessarily generating income directly, but are necessary for the other functions. Authentication services allow the banks to control that only the right persons are given access to information and functions, while Back-office infrastructure, such as IT infrastructure, provides the banks with the ability to perform their core services. This results in a 6-step value chain for the traditional functions, as seen in figure 1.

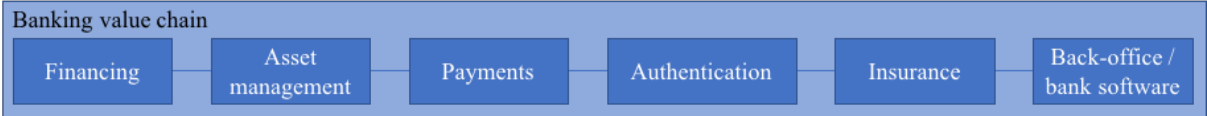


FIGURE 1: THE TRADITIONAL BANKING VALUE CHAIN

Our analysis leaves out the Insurance and Back-Office parts of the defined value chain, as we consider the other four segments as more core traditional banking functions for the customer needs we have looked at. However, there are a lot of interesting developments in these two segments as well, and investigating these can be fascinating subjects for further analysis.

### 2.3 FINTECHS' VALUE CHAIN

Having identified the traditional banking value chain, we continue by segmenting the FinTech operational areas, based on what traditional banking function they target.

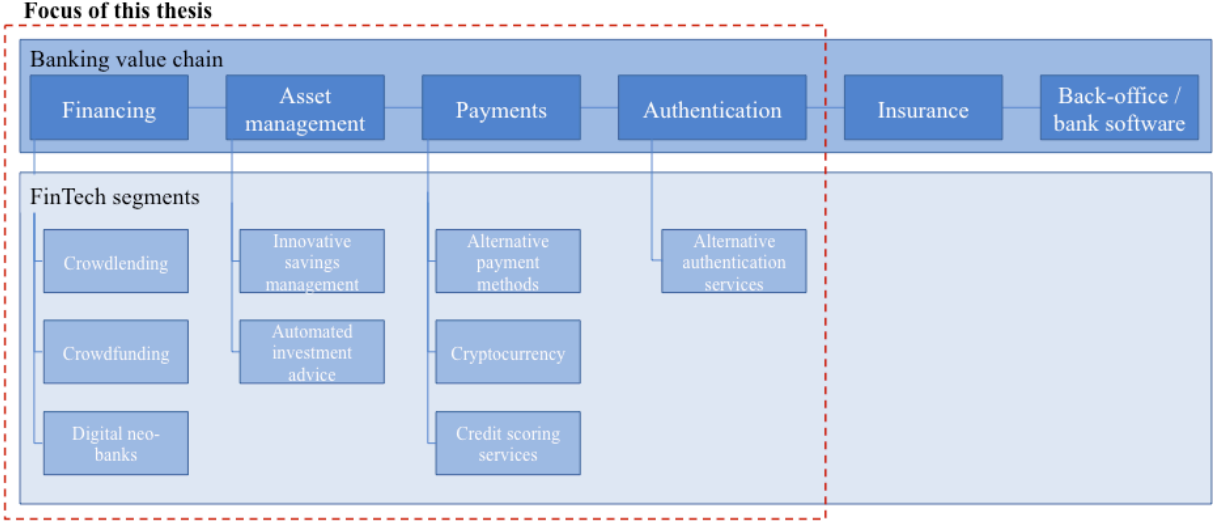


FIGURE 2: THE FINTECH SEGMENTS IN THE VALUE CHAIN

Within **Financing**, entailing all lending and credit mediation serviced provided by the banks, we have chosen to split the FinTech companies into three operating areas: Crowdlending, Crowdfunding and Neo-Banks. Crowd financing is based on pooling a group of investors to fund larger investments, both person-to-person (P2P) and person-to-business (P2B). As this is a new, recently established business area, there is no formal definition of the different segments. Below is an explanation of our definition, which naturally differs from that used by others.

**Crowdlending** companies, in our definition, connect capital-seeking companies with private investors looking to invest in and lend directly to businesses. Through the lending platform, businesses are enabled to secure loans from a crowd of small investors. The investors receive a pre-determined interest rate, while the platform provider receives fees depending on the credit score and the duration of the loan. The process is similar to the banks' traditional lending model. The main difference is in the level of risk and responsibility: While a bank lends money from its balance sheet, and guarantees its depositors their promised interest, a crowd based lending platform is solely an intermediary connecting lenders and borrowers and do not take any risk for defaulted loans themselves.

**Crowdfunding**, by our definition, is a platform facilitating for P2P lending, as well as funding projects, events, humanitarian measures or other non-corporate entities. By creating a marketplace where lenders and borrowers meet directly, personal financing demand and supply can be directly matched. In addition, it allows lenders to personally diversify and risk-adjust their own portfolio, causing disintermediation of banks. Further, Crowdfunding enables the launch of projects that are unable to find financing from banks. (Companisto, 2017). There is also a sub-segment called Crowdinvesting, where investors receive a share of equity,

debt or hybrid ownership in a company, and profit from successful companies. As such, it's a reward-based Crowdfunding (Jansrud, 2017).

There is no formal definition of **Neo-banks** either, but they are suggested as banks operating exclusively online with no physical branches. They are still close to the traditional banks' business models, and often offer a range of banking services. However, a distinction of Neo-banks is their focus on consumer credit, and based on this we have included them in the Financing function. The new, all-digital banks have also been called challenger banks, and the line between Neo-banks and challenger banks is somewhat unclear. For simplicity, we have chosen to include all of them in the Neo-banks definition.

A core service of traditional banking is management of the customers' deposits. FinTechs in the **innovative deposits management** segment use alternative solutions to offer the same service in a new package, using new technology or innovative solutions. We look at two distinctive types of innovative deposits solutions; players either offer to manage your deposits using new solutions, or offer advisory services enabling you to better manage your own deposits. Examples are cheap, accessible advice platforms to make it easier for people to manage their own savings, and robots that analyze hundreds of banks and move your deposits to the bank with highest interest rates automatically. The reduced costs and human resources required make these services more available for people across all levels of income and fortune.

The other core function of banks within Asset management is professional investment advisory services, traditionally served through investment bankers, asset managers and corporate finance divisions. **Automated investment advice** refers to portfolio management systems that use technology to provide digital, automated and algorithm-driven advice to professional investors with minimal or no human supervision. These services are also called robo-advisory, and were introduced already in 2008. The robo-advisors utilize big data analytics and information collected from their clients to offer advice or automatically invest assets on their behalf. Compared to humans, computers can process and manage extreme amounts of data, and are now involved in sophisticated tasks related to tax-loss harvesting, investment selection and retirement planning (Kitces, 2017). In addition to capacity benefits, robo-advisors are available from everywhere, at all hours, and they also tend to charge a lower fee than human advisors: With an average annual flat fee of 0.2%-0.5%, they lay below the typical 1%-2% rate of human advisors, and even lower than the rates of the exclusive investment banks (Investopedia, 2017).

The FinTech industry is also redefining how payments are made in the modern world and challenges the banks' long-standing position as payment processors: While the banks were previously necessary as intermediaries between the transaction parties, various FinTech companies offer digital payment solutions without the direct use of neither banks nor their payment cards. These are **alternative payment methods**, where customers are for instance offered the use of a "payment account" in the form of an app or a web-based user, moving the payment outside of the banks' established payment system (Kreutzer, 2016). Other examples of innovative payment solutions are e-wallets, which store payment cards, personal

information and passwords in one protected platform for easier accessibility, and real-time bank transfers (Rubini, 2017).

Some alternative payment methods are conducted with **cryptocurrencies**; digital currencies that replace traditional national currencies. While traditional currency is based on the value of physical assets, the value of cryptocurrencies is solemnly in the trust that you can utilize the asset for transactions. They exist only digitally, removing the need for cash. An example is the popular Bitcoin, which was created with the intention to circumvent the banks. Cryptocurrencies run on the Blockchain technology. This means that instead of relying on a central authority like a bank to verify transactions and store historical data, digital currency transactions rely on a network of computers. While cryptocurrencies have been a popular buzzword the last few years, they have yet to emerge as a true alternative to traditional currency for payments and transactions.

FinTechs also innovate traditional credit scoring. New **credit scoring solutions** are used by players in Financing to achieve cheaper risk analysis, but are also utilized by a range of players outside Financing. The speed and simplicity of the solutions mean that a credit scoring can be performed on any transaction within seconds. Thus, customers can be offered consumer credit in real-time while purchasing goods or services. This is the reason credit scoring is placed in the Payments sector. How the solutions are built and function is a heavily guarded secret. What they reveal is that they use big data, new variables and complex computer-based scoring models. They utilize information from social networks, payment records, educational level and other factors that are not part of traditional credit scoring in banks to estimate your credit worthiness quicker and cheaper.

**Authentication** and identification is a crucial part of keeping online financial services secure. While traditional banking previously involved physical branches, physical and visual contact and thus made it easy to identify customers, the digitalization of banking services has put pressure on the banks' authentication of online users. It is important that banks can verify user information across multiple channels. Digital authentication is now necessary for a range of banking functions, but the two primary categories are logging into your internet or mobile bank, and authorizing transactions. FinTechs are driving the development of new approaches of verification and authentication of users online, both selling their technologies to banks and making their own products even more secure — cyber security is extremely important for the public's trust in FinTechs and their products. For example, biometric techniques, such as fingerprints and voice recognition, allow for more seamless and secure digital authentication.

In sum, we see how FinTech infuses all parts of the incumbent banks' value chain by finding elements to improve and new functions to introduce in traditional banking. Although many FinTech startups and technologies are small in size, with narrow value propositions, we see how they are collectively breaking up the banking system and revolutionizing the business.

### 3. FINTECH DRIVERS

As we have seen, FinTech offers new value propositions in traditional banking functions. It is clear that technology infusion will affect banks and their business model in the future, but to what extent the effects are disruptive or value creating requires further investigation. This chapter aims to analyze the underlying drivers of technology infusion in banking today, and to what extent they will further fuel or hamper FinTech growth in the future. The drivers we have identified are illustrated in Figure 3 below.

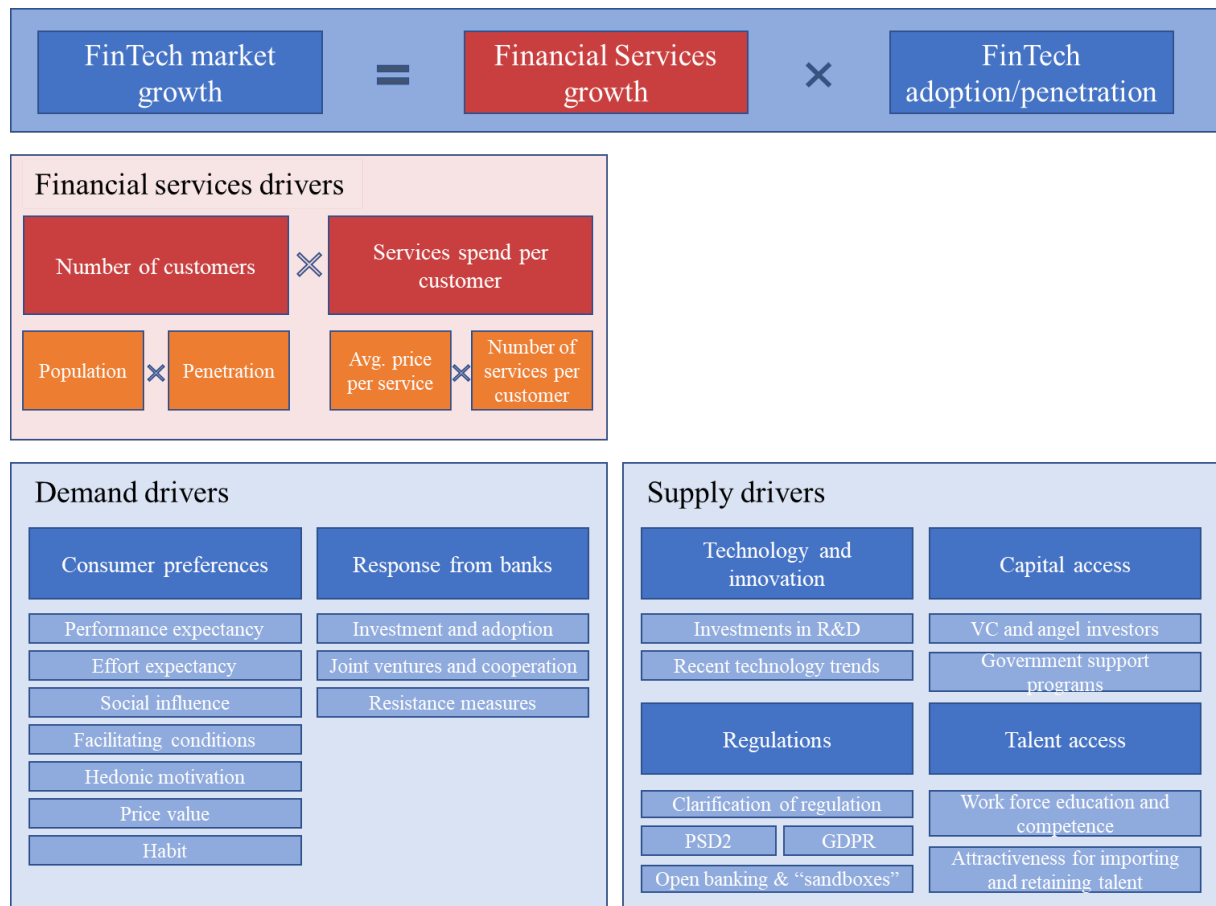


FIGURE 3: FINTECH MARKET GROWTH, DRIVER TREE

In very simple terms, the value of the FinTech market can be defined as the financial services market times the market’s FinTech adoption. The growth in FinTech is thus determined by financial services growth and FinTech adoption rate. For financial services, we look at growth drivers within number of customers and spending per customer. For the FinTech adoption rate, we first look at drivers from consumers and banks that impact the demand for FinTech services. We also look at facilitating conditions within technology, regulations, talent and capital access that impact the supply of FinTech startups and new services.

Our driver tree is developed using several academic research papers, input and insight from our expert interviews, and general knowledge of economic market effects, to capture the most important drivers of FinTech. However, we acknowledge that the likelihood of this being a collectively exhaustive list of FinTech drivers is very low. There is likely a range of relevant



factors we have not managed to include. Furthermore, we are not trying to quantify the effect of each driver. Our mission is to determine positive and negative effects that affect the potential impact of FinTech. Improving the list and quantifying the effects in an empirical analysis can be a very interesting exercise for further research on FinTech.

In the following chapters, we investigate each of the drivers and assess their potential positive or negative impact on the development of FinTech.

### 3.1 FINANCIAL SERVICES DRIVERS

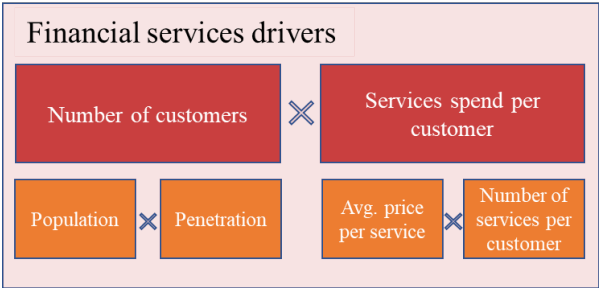


FIGURE 4: FINANCIAL SERVICES MARKET GROWTH, DRIVER TREE

The number of bank customers depends on the population size and to what extent the population is utilizing banking services. World Bank statistics show that in high-income OECD countries, the average penetration of financial services is 97% (World Bank, 2014). Here, the financial services market is highly saturated, giving very little room to increase the customer base other than through the population growth rate.

In the services spend per customer, we expect that increased supply from FinTech entrants, combined with decreased costs due to efficiency, might reduce the average price of banking services. However, the number of services per customer will grow, as new solutions are easier and cheaper to access for a larger part of the population. Based on this, we expect the services spend per customer on an aggregated level to remain stable.

In conclusion, the saturated state of the financial services market in general means there is relatively low space for excessive growth long-term. The actual year on year development of financial services will of course not be as simple, and is impacted by a long range of macroeconomic factors. A detailed investigation of these is outside the scope of this paper. In addition, there are growth potential differences between the different financial services segments. These differences often relate to the extent to which FinTech and new solutions can increase penetration in the population. This is further investigated in later chapters, if relevant for the FinTech segments discussed.

### 3.2 FINTECH FORMATION DRIVERS

To identify and assess important FinTech formation drivers, we use a combination of statistic and qualitative sources. We use two academic research papers based on empirical analysis. One investigates FinTech drivers over 64 countries, while the other looks at the drivers of consumer technology adoption and preferences. The following paragraphs describe these

papers and their findings. Further, we use several reports by leading consulting firms, such as EY, PWC, KPMG and Deloitte, which are based on large surveys, expert input and their extensive experience. Finally, our own expert interviews were used to assess and supplement previous research.

*The Emergence of the Global Fintech Market: Economic and Technological Determinants* is an empirical paper from 2016, where the authors Christian Haddad and Lars Hornuf conducted a statistical analysis to assess key drivers of FinTech startups. Looking at 64 different countries, of which 27 European, they investigated the economic and general technological determinants facilitating more FinTech startups within a country. They found that countries with more FinTech startup formations differ from those with less by having more well-developed capital markets, access to the latest technology and a large mobile proliferation among the population, as these factors are all important drivers of general demand for FinTech. On the supply side, they found that the supply of entrepreneurs entering the FinTech industry is increasing in the available labor force. Thus, high unemployment rate and a lower reference point with respect to salary and work security, causes people to take chances as entrepreneurs. Lastly, they found that the soundness and stability of the country's financial system constitute a barrier for FinTech startups and has a negative effect on supply.

To assess the impact customer preferences will have on FinTech adoption, we utilize the UTAUT model. Theoretical models to predict technology acceptance and use have been a large field of study over the past decades, primarily developed from theories in psychology and sociology. In 2003, a group of professors from four universities in the US, led by Viswanath Venkatesh from the University of Maryland, reviewed eight of the most prominent models and formulated a unified model that integrated elements from each model. The new model, called the Unified Theory of Acceptance and Use of Technology (UTAUT), was based on four key constructs; performance expectancy, effort expectancy, social influence and facilitating conditions.

However, an important constraint of the UTAUT model is that it is solely relevant for predicting technology acceptance among employees in organizations, which is irrelevant for consumer adoption of Financial technology. Adjusting the model to be relevant in the consumer use context was done by Venkatesh and new group of professors in 2012. They reviewed the extensive prior research on the UTAUT, and adjusted the model in several ways. First, they adapted the four original constructs. In addition to adjusting their definitions, they transformed the model to a two-stage process, where performance expectancy, effort expectancy and social influence determine behavioral intention to use a new technology, and behavioral intention and facilitating conditions determine technology use. Second, they added three new constructs that complemented the originals. They added a hedonic (or intrinsic) motivation construct, to complement the utilitarian value captured in the performance expectancy construct. Hedonic motivation has been empirically tested as an important variable in much consumer behavior research. A price/cost construct was added to reflect the fact that in an employee setting, effort expectancy does not include paying for the new technology yourself, whereas consumers adopting technology must. Finally, they added a context habit construct, to incorporate prior research that showed much technology use was

not necessarily based on intentionality. The third and final adjustment was including the individual difference moderators age, gender and experience. Figure 5 illustrates the model. The UTAUT2 has been tested in several papers, with good results. Venkatesh tested it on 1,512 users of mobile internet technology, and achieved an R-squared of 73%. Based on the successful results in comparable industries, we use the UTAUT2 model as a framework for analyzing consumer preferences in adoption of FinTech.

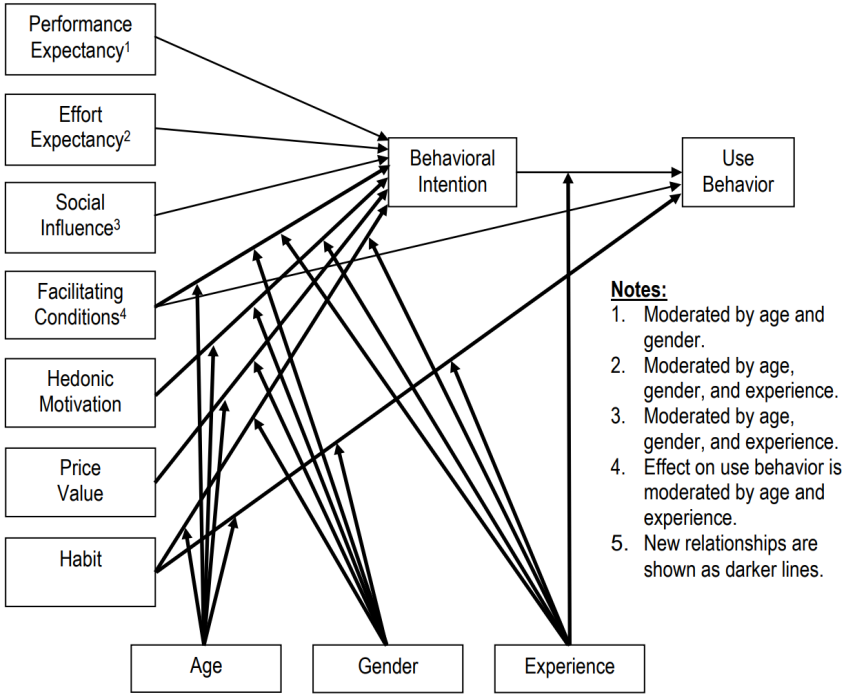


FIGURE 5: UTAUT FRAMEWORK

### 3.2.1 CONSUMER PREFERENCES

Several FinTech and banking experts highlight changing consumer preferences as the most important driver of FinTech demand today, pushing banks to revolve less around the bankers and more around the customers. Although the customers' underlying financial needs remain the same, we see changes in how they prefer to fulfill these needs. The general FinTech adoption rate, measured as the share of the digitally active population using FinTech services, has more than doubled over the last two years from 16% to 33% (EY, 2017). This indicates that FinTech has identified, filled and capitalized on a gap between consumer preferences and the incumbent banks' value proposition, which the banks have failed to do themselves.

To assess the consumer demand and desire for FinTech products and services over traditional banking, we use UTAUT's factors for people's acceptance and use of technology. We investigate the changes in consumers' performance expectancy and effort expectancy, and the impact of price value. We then look at the degree of social influence, facilitating conditions and habit effects.

Within performance expectancy, we see that customers are looking for simplicity, accessibility and customizability. EY found ease of use as the most important reason for using FinTech products and services, while Capgemini listed the need for real-time services, efficiency and availability, and the price-value-relationship as key performance expectations (EY, 2017) (Capgemini, 2017, s. 15). KPMG reported that bank customers value customized pricing, products and digital authentication (KPMG, 2017). In general, 67% of all millennials state that innovation is a crucial factor for winning them as customers (Medallia, 2016).

Further, customers expect banking services to require less effort in terms of both time and money spent. In a survey among 10 000 millennials by Scratch, 70% expected to handle their finances and conduct payments completely differently within the next five years (Scratch, 2015). Particularly, people expect to save both time and costs by using more technology based banking providers, in addition to having constant accessibility to banking services from wherever, whenever (PwC, 2017). As such, we see the significant need for adapting and innovating to be able to meet the lower effort expectancy.

We believe that being able to deliver higher performance and lower effort at an acceptable price value will require FinTech adoption in the banking sector. With respect to costs, technology and digitalization are the most effective drivers. PayPal CEO Daniel Schulman claims that the digital banking world can be 80%-90% less expensive than physically serving bank customers (Flanagan, 2017). Without the inefficiencies attached to the banking sector, such as high costs from physical branch networks and legacy IT issues, the FinTech platforms can deliver the same services at a fraction of the time and cost as the incumbent banks (Dunkley, 2016). For instance, payments can be executed with one click on a mobile device, rather than by logging in to your internet bank, and loan applications are often processed online and instantly (McKinsey & Company, 2016). This benefit is then passed on to customers in lower fees and transaction costs. As such, FinTech is financially attractive for both sides of the banking market.

UTAUT also found social influence from peers, superiors, friends and family to be a strong determinant of technology acceptance and use, which is highly relevant for the adoption of technology in banking. First, there are significant network effects, meaning that the probability of you starting to use a new service increases as the rest of your network does the same. Some functions, like payments and transactions, are social activities where the user experience is enhanced by being on the same platform as your friends. We see this for instance in the millennial bank customers (aged 18-34), who are collectively embracing and using FinTech solutions on a significantly higher and faster scale than the rest of the population (Deloitte, 2015). Second, another key effect of social influence is reducing skepticism towards the use of technology (PwC, 2011). As emphasized by Fjærtøft, the combination of Internet, technology, finances and personal information is often initially met with concerns and skepticism. For many, witnessing successful and safe adoption by those around you is the most effective way of erasing concerns. Through these effects, we see how social influence can create a positive, increasing spiral for the growth of FinTech.

When looking at facilitating conditions, we see that growing up in an increasingly digitalized environment increases the affinity for using technological solutions for banking functions. For instance, a PwC survey from 2017 on 1,951 consumers showed that people up to 72 years old prefer digital channels when applying for a loan. They also found that digital preference was negatively correlated with age, with millennials aged 18-34 the most digitally focused (Marous, 2017). Millennials are aware of the general potential of technology, expect instant access to information and services and are all over less skeptical to tech infusion (PwC, 2011). Young and future generations, who are growing up with digitalization, will continue to easily adopt a habit for choosing digital banking platforms.

Further, Haddad and Hornuf found mobile proliferation as a key driver of FinTech startup formations. As mobile devices are becoming the world's number one internet access device, Capgemini found it was customers' second most important interaction channel with their banks, after the computer (Capgemini, 2017, s. 16). As mobile banking enables immediate access to accounts and services anywhere, at all hours, we believe it facilitates FinTech demand. In addition to simplifying the banking processes and functions, the accessibility and availability makes it easier to reach and bank the 2 billion unbanked people in the world. This is seen in emerging countries, where mobile devices are practically replacing formal financial institutions through for example mobile payments and mobile crowd lending. This large potential customer base is an incentive for FinTech development globally (Haddad & Hornuf, 2016, s. 8).

Our analysis indicates consumer preference trends favoring alternative FinTech solutions, providing extensive FinTech demand. As the population gets increasingly more comfortable and skilled with using technology in banking, demand for FinTech solutions will continue growing.

### 3.2.2 RESPONSE FROM BANKS

The demand for FinTech is driven not only by the consumer preferences, but also by the response from the incumbent banks. Banks are often the FinTechs' largest customers, as they

purchase FinTech products to enhance their service offering. In addition, FinTechs can benefit from banks' investments and cooperation programs. However, banks also have the ability to constrain FinTech development by choosing to resist rather than assist.

Globally, the banks have gradually realized the non-reversible impact that technology has on their traditional business models. Only 13% of all banks feel they have the right systems and infrastructure in place to adapt to the digitalization (Capgemini, 2016) and 82% of banking respondents expect to increase their FinTech partnerships within the next three to five years. They are looking to invest in new technologies to attract customers, cut costs and buoy profits, as they recognize the shifting consumer preferences towards ease of use, intuitive product design and 24/7 accessibility (PwC, 2017). Various studies show that banks tend to enter partnerships with FinTechs, start incubators for FinTech development, or create venture funds to finance FinTechs from the outside (Deza, 2017).

An example of a cooperative effort is the banks provision of APIs, Application Programme Interface. Open API interfaces enable third parties to access account information of the banks' customers and build applications and services around the bank. In 2017, the UK Competition and Markets Authority (CMA) issued a regulation that demanded UK's nine biggest banks to allow licensed startups direct access to their data, so that they could build applications upon them and called it Open Banking (Manthorpe, 2017). The impact of unlimited access to customer data can have a large impact on the traditional banking sector, as seen in other industries: Uber combined maps and the users' location data, while Facebook was created with names, ages and universities as basis for connecting people who knew each other. Startups will for example have access to customers' credit history, which can help them identify needs that the customers didn't even know they had. Thus, open banking solutions can substantially drive FinTech growth within traditional banks.

The cooperative nature of the banks' response might have come as a surprise to many in the industry, as FinTechs can be seen as disruptive, challenging competitors. By choosing not to cooperate, banks could have had considerable restraining effects on the FinTech development. However, we believe banks have realized that they and FinTechs have complementary strengths they could utilize to create a better customer experience and increase their products and services. While FinTech excels in flexibility, innovation and utilizing technology, the banks offer infrastructure and capital, large customer bases and regulatory competency. Firstly, banks have the infrastructure to build technology upon, and the capital available to do the necessary investments in expensive or complex technology. Secondly, they have the network and scale benefits in form of a large customer base and partnerships, making it easier to proliferate their technologies and products, compared to smaller, independent FinTech startups, which might not have sufficient resources to do so. Finally, knowledge of regulations and security requirements is an important asset of banks, as one barrier for FinTechs' entrance to banking is the strict regulatory requirements of managing assets and sensitive information.

As such, we believe banks' response of adoption, investments and cooperation with FinTech is a clear driver for further growth.

### 3.2.3 TECHNOLOGY

The next driver we will look at is technology. Technology is an important driver for the supply of FinTech services, as Haddad and Hornuf found that FinTech startup formations highly depend on new and innovative technology to improve banking services.

In a fast-paced changing technological development, where 90% of all the world's data has been created in the past two years, it becomes increasingly important to invest sufficient resources in R&D for any player wishing to remain in the financial services industry. New technological innovations are happening at unprecedented levels, and attempting to predict which technologies will be the most important going forward is almost useless. To provide some insight into what is happening within financial technology, we will explain the top three emerging technologies identified by PwC: Blockchain, AI and Biometrics (PwC, 2017). Interestingly, PwC also found that FinTechs and traditional financial institutions differ in their focus on technological areas of investment. While FinTechs invest in and develop solutions for data analytics, mobile and artificial intelligence, incumbent players seem more focused on robotics, biometrics and Blockchain, as well as cyber security.

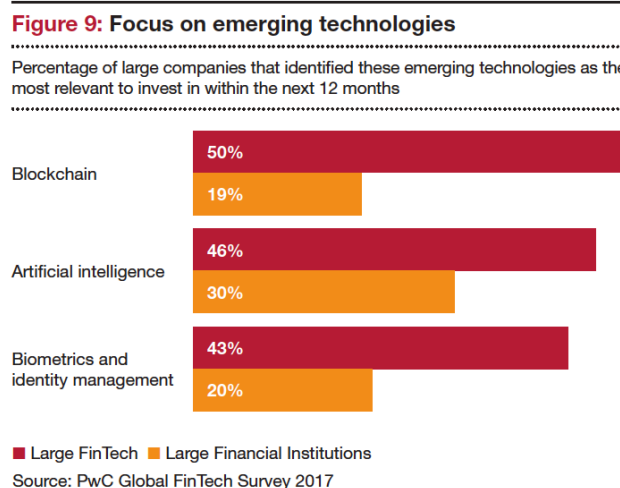


FIGURE 6: PWC GLOBAL FINTECH SURVEY 2017 RESULTS

The first technology, Blockchain, can be explained as a distributed database where all the nodes in the network are always on the same information in real-time. The fact that it is distributed means that there is no central device that controls the system, and all information is sent in a peer-to-peer network (Rubini, 2017). This makes Blockchain very difficult to hack, as it is practically impossible to change the information without most participants in the network agreeing that a change is in accordance with the pre-defined rules that apply to a transaction. As such, once a transaction is done, it is not possible to manipulate later. For example, such a rule may be that you cannot send an amount higher than what you keep in an account. Thus, Blockchain technology enables safer, faster and cheaper transactions. Transferring money from one person to another, however, is just one of a wide range of potential applications for this technology. 77% of all banks expect to adopt Blockchain as a part of their production system or process by 2020 (PwC, 2017). However, on a global level, only 24% of banks say to be very familiar with Blockchain technology.

The second technology, Artificial Intelligence, was initially invented in the 1950s, but has not until recent years become a part of daily life. The broad definition of artificial intelligence (AI) is machines capable of performing specific tasks that normally require human intelligence, such as visual perception, speech recognition, decision-making and language translation. AI is expected to take over customer service functions, financial advisory and personal assistants. Currently tech giants such as Alphabet, Amazon and Apple are investing heavily in AI technology and the AI market is estimated to be worth \$46 billion within 2020 (Neiger, 2017). While some financial institutions have done the same for a few years, two thirds of US financial services respondents said operations processes, regulations and resources limited their reliance on AI (PwC, 2016), and as such is the reason why they only now are beginning to catch up with the technology development.

The final technology segment to be watched, biometrics, is currently experiencing growth due to the adoption of biometric authentication, such as fingerprints, voice recognition and even face recognition. Behavioral biometrics such as type speed and rhythm can also contribute to create a highly complex algorithm that enables authentication online. To keep online and mobile banking safe and secure for all involved parties, banks and FinTechs are investing in biometric technology across all segments. By the end of 2020 it is estimated that some 450 million bank customers will be using biometrics (Goode Intelligence, 2015). In addition to security incentives, the growing demand for biometrics from banks and FinTechs can be linked to their customers' preference for seamless processes and easy accessibility to banking services. Thus, we believe that access to the latest biometric technology can further facilitate FinTech growth and increase the FinTech customer base.

The focus on identifying, investing in and utilizing these new emerging technologies is evident in all major players, from banks and tech giants to startups in all fields. We consider that a significantly positive driver for further FinTech activity and supply worldwide.

#### 3.2.4 REGULATORY ENVIRONMENT

As the FinTech industry keeps growing in both customer base and assets managed, we expect the regulatory institutions to increasingly turn their attention toward FinTech companies. 54% of incumbent banks see data storage, privacy and protection as main barriers to innovation within banking, and FinTechs will be facing the same issues when they launch and grow (PwC, 2017). The importance of safe and secure banking functions is absolute, as it protects both personal economy and the financial systems globally.

Increased regulation can hamper the growth for smaller startups, as regulatory compliance often require significant competence and other resources. Acquiring or developing such competence in-house can be costly. In some countries, the government has offered support by having an open dialogue with the FinTech players and adapting the legislative environment to the specific requirements of the FinTech industry. Regulatory sandboxes are one key initiative proven to facilitate for more startups, and has currently been launched in eight countries, including the UK, Singapore, Canada and Australia (BBVA, 2017). Such initiatives make it easier to understand and comply with the rules without having to relate to the entire complex financial services legislation. Additionally, some best-in-class governments offer mentoring



services that provide startups with information on how to protect their business ideas and value propositions, how to do their accounting properly and regulatory advice. The Monetary Authority of Singapore (MAS) is the first regulatory organ to appoint a Chief FinTech Officer. Sopnendu Mohanty is set to lead the FinTech & Innovation Group within MAS to promote the nation's FinTech innovation in line with safety and security (BBVA, 2017).

Open regulations allow FinTechs to innovate the traditional banks' financial services (EY, 2017). A significant regulatory driver for FinTech startups and usage is the Payment Service Directive 2 (PSD2) launching in EU and EEA countries. PSD2 aims to facilitate increased competition in the payment services market, promote innovation and strengthen the security of online payments and access to accounts (Weldeghebriel, Shifter.no, 2016). It allows for companies to get licensed as Account Information Service Providers (AISP) and Payment Information Service Providers (PISP). AISP enables third parties to, by approval of the customer through for example BankID, access a customer's full account history from all its bank and finance connections. An overview of account balances, loans and credits can be presented on one platform, such as an app on a mobile device. PISP providers can transfer money for a customer, by approval, without involving any banks or credit card companies in the transaction. As such, non-banks can work as payment intermediaries through a license, and pose a threat towards banks and credit card companies, which until date have had exclusive rights to do this. We believe these opportunities for non-banks will further drive the supply of FinTech startups.

While PSD2 opens banking, the EU's general data protection regulation, GDPR, is developed to ensure the privacy of individuals and give regulatory authorities greater authority to act against companies that get too comfortable with sensitive information. GDPR affects all companies handling personal data for individuals within the EU, including international data transfers, in four main ways: Firstly, the new regulations ensure the customers' rights over their own personal data, now defined to include genetic, mental, cultural, economic and social identity information. To gather and process personal data, companies are explicitly mandated to gain clear consent from their customers and have a purpose for needing the data. Secondly, the customers have the right to be forgotten and deleted from registers. Thirdly, companies processing large amounts of personal data are required to keep a Data Protection Officer in addition to data managers, whom must have judicially viable reasons for processing and gathering personal data. They are also directly responsible for the safety of this data. Finally, companies are mandated to report data breach to supervisory authorities within 72 hours. Companies whom breach any part of the GDPR regulatory will be fined up to EUR 20 million or 4% of their global annual turnover (Datatilsynet, 2016). As such, the GDPR will require all financial services providers to adjust their organizational structure and business model.

We believe these regulations together will force FinTechs to invest in sufficient judicial competency and systems that oblige with the new laws. Access to personal data on bank customers will give FinTechs opportunities to further innovate and enhance their products and services, but also requires knowledge and secure systems.

### 3.2.5 CAPITAL AND TALENT ACCESS

Two additional key drivers Haddad and Hornuf found increasing the FinTech startup formation activity of a country was access to human talent for creating ideas and building a company, and a well-developed capital market to provide capital to fund their business ideas.

Being able to develop, attract and retain technology talent is a key driver to fuel the FinTech evolution, and achieving a successful and thriving tech talent base requires several conditions to be fulfilled. First, talented people need formal education and skill development. Second, attracting international talent that brings diversity and nuances to the tech competence is important. Last, it is crucial that benefits and the working environment are good to retain the talented people. France's recent French Tech Ticket program is an example of a state initiative to attract tech talent. The program offers a package of a work visa, renewable grant money, office space in an incubator in Paris, as well as mentoring and support from an advisor program. The initiative is praised for attracting attention to French entrepreneurship and FinTech sector development (Bloch, 2016). Similar visa programs have been launched in the UK as well.

Availability of capital through venture funding in FinTech startups is also a key driver behind the industry growth. Haddad and Hornuf found proof that the more well-developed the country's capital market is, the better access entrepreneurs will have to crucial funding for their business. While small business financing does not happen through the large capital market institutions, FinTech startups will for instance depend on active stock markets for exit opportunities through IPOs. Knowing this will work is a positive incentive for entrepreneurs. For funding, FinTech startups typically depend on private investors, incubators or accelerator programs. Haddad and Hornuf statistics show that the countries offering the latter programs tend to have well-established capital markets (Haddad & Hornuf, 2016). Direct economic funding programs from the government will help competitive and dedicated startups launch and expand. The UK government has been dedicated to this, for instance through their start up loans scheme, offering up to GDP 25 000 at a fixed 6% interest rate, as well as mentoring and guidance from competent people (Carey, 2017).

Initiatives in facilitating for both talent and financial capital are proving to be facilitating FinTech activity, and in line with Haddad and Hornuf's results, we believe these factors are positive drivers of the new industry.

Conclusively, we see clear indications that consumers are ripe for increased adoption of FinTech, particularly due to increasing requirements to speed, efficiency, transparency and availability of banking services, and to the consumers' tech-savviness and preference for digitalized products and services. Demand is further driven by the banks, who have mainly chosen to cooperate and invest in FinTech. On the supply side, investments in new technologies enable new improvements and innovations in traditional financial services. Although the regulatory environment is lagging, we see governmental initiatives and support programs that have positive effects on FinTech supply.

## 4. BANKING & FINTECH IN NORWAY

### 4.1 TRADITIONAL BANKING IN NORWAY

We define “Norwegian banks” as all banks or branches of foreign banks that are established in the Norwegian market and serve personal or corporate customers in Norway. This includes foreign banks like Nordea, Handelsbanken and Danske Bank.

Norwegian banks are classified as either savings or commercial banks. By the end of 2016 there were 22 Norwegian commercial banks (Norges Bank, 2017), and 140 independent savings banks (Sparebankforeningen, 2017). Traditionally, the commercial banks target businesses nation-wide, while savings banks focus more locally. Savings banks in Norway generally offer savings and transactional accounts, credit and debit cards, personal loan, and financial advisory. Basic investment products and funds savings are also normally offered (Baldwin, 2017). However, over the last decades the category distinction has become less clear and less important. Commercial banks have increased their focus on loans to consumers, while savings banks offer financing to smaller businesses and enterprises. Today, most banks cover all segments and parts of the value chain, and the main difference is related to ownership structure.

In 1985, foreign banks were allowed to operate in Norway. As such, several foreign banks established Norwegian subsidiaries and physical branches, like Danske Bank, Nordea and Handelsbanken. These are all important players in the Norwegian banking sector today.

Increased competition from large foreign players was one of the factors that initiated a major consolidation trend in the Norwegian banking industry, both between smaller and larger banks, and savings and commercial banks. The number of independent savings banks decreased substantially, from over 600 in the 1960s to around 140 in 2017 (Sparebankforeningen, 2017). Along with the consolidation trend, the presence of local physical branches has been greatly reduced. Digitalization and changed customer behavior has reduced the need for physical presence, and the entrance of fully-digital banks have challenged the large fixed cost structure of the traditional banks. Today, most banks only have a few, large branches, and offer limited services in these compared to online. (FinansNorge, 2017).

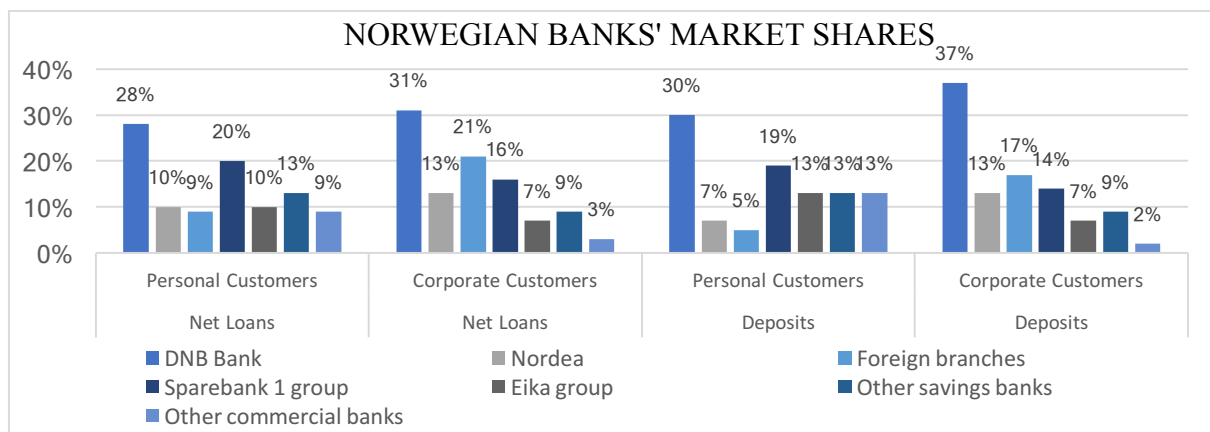


FIGURE 7: MARKET SHARES, 12/2016

Figure 7 shows how DNB is undisputedly the largest player in Norwegian banking, in both the personal and the corporate market. DNB is a result of a merger in 1990 between Bergens Bank and Den Norske Creditbank. We see that the foreign banks' branches operating in Norway focus on corporate customers. Both Sparebank1 and Eika group are involved in corporate lending and deposits as well, but are strongly positioned as savings banks for the personal market. Today, most Norwegian savings banks are part of one of three groups: DNB, Sparebank 1 Gruppen and Eika-Gruppen (Sparebankforeningen, 2017). The Eika group includes over 80 smaller savings banks. A detailed explanation of the figure is included in Appendix 2.

## 4.2 FINTECH MARKET IN NORWAY

### 4.2.1 CURRENT PLAYERS

In this paper, we define a Norwegian FinTech company as one which operations and revenue streams are directly dependent on the intersection between finance and technology. This area is bordered by technology firms such as Google and Facebook on one side, and traditional banks on the others, e.g. Bank of America and DNB. FinTech companies we look at can either be independent startups, owned by its founders or private investors, or initiatives funded and owned by banks, like Vipps. Further, we consider Norwegian FinTech as players operating in and directly affecting the traditional banking in Norway. This means that we include affiliates of foreign startups, such as Klarna Norge. We also leave out comparison sites, such as fixrate.no, as they neither operate directly within technology nor finance. Finally, we focus solely on the FinTech companies operating within the four categories in the scope of this paper.

The FinTech startup scene in Norway is quickly evolving, with new players entering seemingly every day. We used several sources to identify companies and players in Norway, and we believe our list is comprehensive for Norwegian FinTech as of 2016-2017. Although it is impossible to discover all startups and initiatives, we believe our list should include those with significant reported revenue or activity. As our main target is to estimate the current market size, these are the most important players. We do recognize that the industry is in constant change and thus expect more startups to emerge within short time, which will disrupt the overview we've created.

Our primary sources have been reports from leading Norwegian FinTech experts. Both Sbanken's Christoffer Hernæs through his personal blog, and FinTech Mundi's Susanne Hannestad through a market report, present lists on Norwegian FinTech companies operating in different segments. Rotem Shneor of the University in Agder does annual research on crowdfunding and crowdlending in the Nordics, and presented us with a report on the activity and leading players in these segments. Further, our research has allowed us to speak with executives from consulting firms, founders of startups and people involved in accelerator programs, who several times have pointed us towards new FinTech companies. In addition, attendance to FinTech conferences arranged by NHH and by DN provided us additional insight. Using these sources, we have identified 45 current, active players in the Norwegian FinTech market.

To provide some concrete insight as to what is happening in FinTech in Norway, we present some examples of interesting companies we have encountered in our research. The full list is presented in Appendix 1.

|                                |  |   |
|--------------------------------|--|---|
| Alternative Payments           |   |  |
| Authentication                 |  |  |
| Credit Scoring                 |   |  |
| Crowdfunding                   |   |  |
| Crowdlending                   |   |  |
| Innovative Deposits Management |  |  |
| Innovative Advisory Services   |   |  |
| Neo-Banks                      |  |  |

FIGURE 8: KEY FINTECH COMPANIES IN EACH DEFINED SEGMENT

**Payr** currently offers user-friendly payments systems online and in mobile apps and seeks to make payments faster, easier and more flexible for their customers. Regardless of bank affiliations, customers can connect all bank cards to their Payr account and conduct payments and pay bills from there. Their long-term vision is to create an independent internet banking service on top of the traditional banks, like a dashboard for personal finances, with access to all relevant products and services to manage your finances. Going forward, Payr seeks to analyze all payments and give advice on what providers to use for different services. As such, Payr will provide intelligent and independent financial advice, regardless of bank affiliations.

**Zwipe** is one of the exciting companies within authentication services in Norway. They offer authentication solutions within payments, access control and identification. Zwipe is the world's only provider of a biometric authentication program independent of batteries or fixed power supply and has won several awards for their technology. The payments system allows contactless and biometrics-based credit card payments. Through partnerships with MasterCard and the Japanese tech firm Hitachi High-Technologies, the FinTech company has been able to develop and improve its unique solutions for biometrics. In 2017, Zwipe raised \$4.3 million from new and existing investors, indicating an equity value of NOK 310 million (Charleses, 2017).

**FundingPartner** was formed in 2016 and serves as a lending facilitator. They offer an internet based data driven credit scoring service and a marketplace through their website FundingPartner.no, where credit worthy SMEs are connected with private savers and investors looking for a return on investment higher than the bank's deposit rates. FundingPartner aims to deliver interest rates of 5-20%, by allowing all savers to invest directly into Norwegian growth companies.

**Quantfolio** is a robo-advisory company founded in Norway, developing artificial intelligence for savings advisory in banking. The robot bases its decisions and advisory on facts and calculated optimal strategies, using AI and algorithms on historical data. AI enables processing of large amounts of information quickly and precisely, as well as objective analysis, free of influence from internal or external factors. Bank customers are initially asked to inform about their economy, specify their desired risk profile and other preferences. This information is then combined with historical data of financial performances and market developments, and then delivered to the customers in the form of tailored and automatic advice on funds and other objects to invest in. Quantfolio was recently acquired by Sbanken to complement and expand their deposits service offering.

**InFront** is a Norwegian company offering real-time solutions for traders and brokers in banks worldwide, as one of the largest Nordic providers of exchange terminals. Through InFront's platform, customers get access to real-time market data on stocks, interest rates, indexes, currencies and commodities, as well as market news and analytic reports. InFront has over 20 years developed products that reduces costs and enables more effective handling of large amounts of information. Thus, we see how InFront offers innovative investment advisory. InFront went public in September 2017.

**Huddlestock** is a professional investment advice platform based in London and Oslo. Their business proposition is to make professional investment advisory available for everyone who wishes to trade in the stock market. By pooling individual investors into one group, Huddlestock connects individuals with professional investment advisors and brokers, and enables them to buy stocks at a more reasonable price, due to the large scale. This is something previously reserved for professional, wealthy and large-cap investors. Huddlestock has won several innovation awards, and is described as a unique company, with currently no direct competitors. After entering a partnership with an Asian investment bank, Huddlestock is now scaling their business for the Emirates, India and Pakistan.

In April 2000, **Sbanken** (recently Skandiabanken) was launched as the first pure digital bank in Norway. Today, the Bank offers a comprehensive range of financial products and services to individuals and households in Norway within payments and card services, deposit-based savings, investment products, long-term loans and short-term loans. The Bank has no branches and all products and services are offered directly through the digital platform, which is available on a broad range of user devices. By the end of 2016, Skandiabanken had 388,614 account customers with a balance, and total assets of NOK 71,2 billion (Skandiabanken, 2017)

## 4.2.2 MARKET SIZING

### 4.2.2 MARKET SIZING METHODOLOGY

We use a bottom-up approach in our estimation of the Norwegian FinTech market, by summarizing financial data from the FinTech players identified in 4.2.1. The best variables for estimating the market size vary between segments. When possible, we use variables that indicate the market volume sizes rather than revenues, as revenue can differ with companies' income models and thus weaken the comparability. Secondly, revenues are often highly impacted by prices or interest rates, and these fluctuations are irrelevant for measuring FinTech impact on the banking sector.

For Financing operations, the best measurement is the NOK value of issued credit. This represents their operating volume, and it removes the effects of differing income models and interest rate fluctuations.

For Asset management, we find the best measuring variables to be assets under management, and advisory revenues. With these, we capture the two sub-segments of FinTech players, who either offer to manage the customers' deposits in new, innovative ways, or simply offer advisory services to either investors or consumers.

We can define the Payment methods market size as number of transactions or the value of them. Both methods represent the market volume and both provide interesting insights on FinTech's impact on the traditional banking segment. For Cryptocurrencies, we look at the NOK value of cryptocurrency in circulation in Norway. The Credit Scoring services, however, require us to look at revenues. To estimate the total market, we must include both the credit scoring used for payment services, such as Klarna's solutions, and the credit scoring for loans, traditionally performed by the banks themselves.

For Authentication, the most relevant measurement is revenues. Authentication services for the banking sector are provided for many different functions, such as to log into your mobile bank or to confirm and validate a transaction. Attempting to measure the market size by number of uses or other volume measurements would be both impractical and illogical for comparison.

Using the most relevant market size estimator, each segment's size is calculated based on the sum of the players in that segment. First, players are assigned to their most relevant FinTech segment. Some of the players operate in more than one segment. In these cases, we first attempt to identify the highest-revenue segment for the company. If this is impossible to identify, we utilize company websites and presentations to assume their focus segment. If necessary, the third step was to contact the companies directly.

Second, we collect market data for all identified companies, primarily from Proff.no, Brønnøysundregisteret, annual reports and other publicly available sources. For companies where publicly available information is insufficient, we either contact the companies directly, or rely on good input from experts. We prioritize the newest information available, which for



most FinTech companies are 2016 numbers. Appendix 1 provides a full overview of every company identified, their segment, and the relevant size estimator.

Finally, to provide insight on FinTech impact on the banking sector, we provide an estimate on the potential addressable markets of the different FinTech segments, and we look at the size of the FinTechs relative to their potential addressable markets. This will also be a helpful tool for estimating the future potential of each segment. The potential addressable market is the overall market opportunity available for the specific services offered by the FinTech companies. Our definition of the potential addressable market (PAM) differs from the traditional definition of the total addressable market (TAM) in two ways. The TAM is defined as “the overall revenue opportunity available or foreseen for a specific product or service, including the future expansion scenarios.” (Divestopedia, 2017) First, we will continue to measure market sizes with our defined most relevant measurement variables, as our goal is to measure effect on traditional services, not income potential. Second, we will not consider future expansion scenarios. We will focus solely on the potential market for the single service offered in the FinTech segment.

#### 4.2.3 ESTIMATED SEGMENT SIZES

##### FINANCING: CROWDFUNDING- AND LENDING AND NEO-BANKS

The measurement variable and PAM for FinTech Financing is net loans to businesses and consumers. However, not all financing options lay in the scope of the FinTech players. Interestingly, Crowdfunding platforms and Neo-banks currently target the same niche: Unsecured consumer credit. As such, both segments have the same PAM. The estimations for the different Financing segments of FinTech companies are presented below.

##### CROWDLENDING

##### **Crowdlending:** Loans issued = 0 NOK

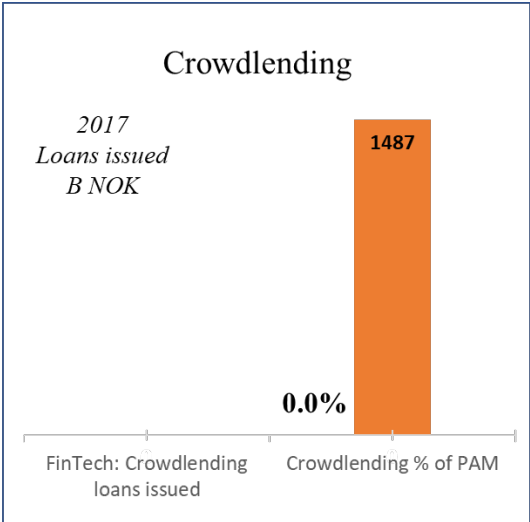
Rotem Shneur of the University in Agder has been collecting market data on the Crowdlending and Crowdfunding market in Norway since 2012. He states that there were no active Crowdlending platforms operating in Norway in 2016 and that Crowdlending of all forms only became operative in 2017. Therefore, he expects to collect statistics in early 2018. For updated statistics on crowd-platform activity, we refer to his research and reports.

We can, however, estimate the PAM of Crowdlending. The segment, as we have defined it, aims to serve the business financing demand. There is a myriad of different financing options for businesses, and only some are relevant for the Crowdlending players. Based on input from Crowdlending executives and Kameo during DN’s FinTech conference, the current target segment is SMEs, normally in the early stages of the business life cycle. (Harung, 2017) Their two major financing options are debt and equity. Our Crowdlending experts argue that replacing equity financing is out of the scope for Crowdlending platforms, as equity financing at early stages of businesses is to a large extent also used for partnering. The larger and more complex financing products, such as the bonds market, are also out of their business scope, as these are only relevant at later stages in the business life cycle. Traditional banking loans,

however, is a relevant financing method for SMEs in Norway. In addition, there is an “underbanked” credit market. These are creditworthy businesses looking for financing, but unable to acquire banking loans or investor equity because of short financial history, a lack of security or proper documentation, or other reasons that the rigid bank credit assessment will not bypass. Today, this segment is either served through capital from friends and family, or not served at all (Steinar Fossen, 1999). Our experts indicate this segment to be about 10% of total banking loans. Norges Bank provides statistics on net banking loans to businesses through their Financial Stability reports (Norges Bank, 2017). The total PAM is thus estimated as:

**Crowdlending PAM** = Net banking loans to business + Underbanked businesses

**1 487b NOK** = 1 352b NOK + 10% = 1 352b NOK + 135b NOK



**FIGURE 9: PAM CCROWDLENDING**

As mentioned, FinTech Crowdlending startups are very young. Some have become operative in 2017, but still at very low volumes. In Rotem Shneur’s report on the Nordic Crowdfunding and -lending market, we find that other Nordic countries have significantly more active Crowdlending segments (Shneur, 2 Nov 2017). Kameo and FundingPartner, two Crowdlending startups in Norway, highlight strict regulations from Finanstilsynet, including a long process for receiving concession to operate as a lender, as their main hinder.

**Crowdfunding:** Loans issued = 45.4m NOK

**Digital neo – banks:** Loans issued = 33.6b NOK

In our definition of Crowdfunding, it facilitates person-to-person (P2P), or consumer-to-consumer, lending, as well as donations to charities, projects and non-profit organizations such as sports clubs. As within Crowdlending, Shneur reports that there were no active platforms for P2P lending in 2016. There were, however, some active players within rewards-, equity- and donation-based crowdfunding. Neo-banks have been active in Norway for some time, and we have measured their consumer credit through quarterly reports for Q3 2017.

Crowdfunding and Neo-banks are primarily targeting the consumer segment with consumer credit products. As previously mentioned, Neo-banks also operate in other segments and markets, but we choose to limit our analysis to their consumer credit business. The relevant market for these players to capture is the unsecured debt issued to consumers from banks. In addition, one could argue that there exists an “underbanked” credit market here as well, that is partially covered by personal loans from friends and family and partially unserved. This underbanked credit market also contains the non-profits and projects targeted by rewards-based crowdfunding. Our experts estimate the underbanked consumer credit market to 15-20% of the covered market. We choose a 15% conservative approach for our market sizing estimates. The Financial Supervisory Authority of Norway includes consumer credit statistics in the Income Statement for Financial Services reports (Finanstilsynet, 2017), which we use to estimate the PAM:

**Crowdfunding and Digital neo – banks PAM**  
 = Consumer credit + Underbanked consumers

**111.1b NOK** = 96.6b NOK + 15% = 96.6b NOK + 14.5b NOK

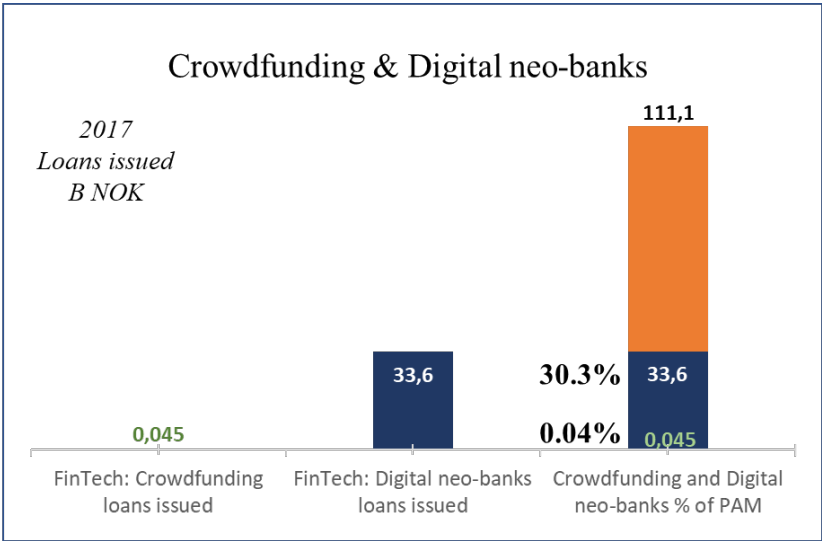


FIGURE 10: PAM CROWDFUNDING AND DIGITAL NEO-BANKS

In line with Crowdlending, Crowdfunding is also in its early phase in Norway. Currently active players are operating in niches like non-corporate organizations, charities or project funding and are thus not yet targeting what we see as the core market; consumer credit. Neo-Banks are far more active. They have managed to target a high-risk, high-yield consumer credit market where there was significant unmet credit demand. Traditional banks have yet to be willing to take on such risk, and are more concerned with financial stability and a stable portfolio than the Neo-Banks.

ASSET MANAGEMENT: INNOVATIVE DEPOSITS MANAGEMENT AND AUTOMATED INVESTMENT ADVISORY SERVICES (ROBO-ADVICE)

In Asset Management, there are, as mentioned, two relevant FinTech sub-segments to measure. To reflect the two different business models in Innovative Deposits Management, we look at deposits from personal customers in banks, and the revenue possibilities on these deposits. For the Investment Advice Segment, we look at revenue from relevant players, as these are pure advisory services. The two segment sizes and PAMs are presented below.

INNOVATIVE DEPOSITS MANAGEMENT

**Innovative deposits management:** Deposits managed = 175m NOK

**Innovative deposits advisory services:** Revenues = 0.834m NOK

The FinTech companies in the Innovative deposits management segment are targeting traditional bank’s personal customer deposits. The FinTechs either offer to manage deposits using innovative methods, or offer advice on alternative deposits placement. The numbers above show the sum of the relevant FinTech players within each sub-segment. To find the PAM, we use both deposits from personal customers, as reported by Norges Bank (Norges Bank, 2017), and an estimate on revenues from deposit services. This is measured using interest margin on personal customers, as reported by SSB (SSB, 2017). The interest margin is the spread on banks’ deposit and loan interest rates. The banks also make direct revenues through charging fees and advisory services for performing the deposit operations. The larger Norwegian banks do not specifically report this number, and we therefore estimate an extra 10% on advisory revenue, after discussions with an expert. This provides us with the following measurements of the Innovative Deposits Management PAMs:

Assets under management:

**Innovative deposits management PAM** = Deposits from personal customers

**1 158b NOK** = 1 158b NOK

Revenues from deposit services:

**Innovative deposits advisory PAM**

$$= \text{Deposits from personal customers} \times \text{Interest margin} + \text{Fees on deposit services}$$

$$34\,902\text{m NOK} = 1\,158\text{b NOK} \times 2.74\% + 3\,173\text{m NOK}$$

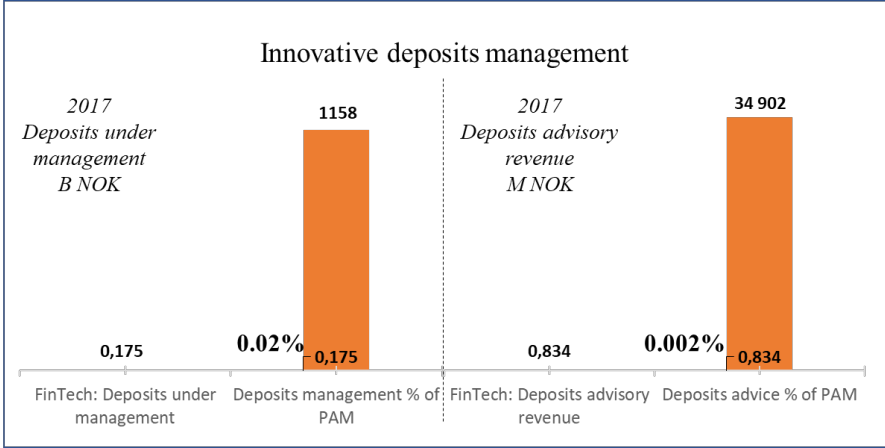


FIGURE 11: PAM INNOVATIVE DEPOSITS MANAGEMENT

The Innovative Deposits Management FinTech segment is young, and the penetration of the PAM is very low. However, this is also an effect of the fact that the PAM in this segment is huge. The banks’ deposit services are at the very core of traditional bank operations, and we see a large potential market if FinTechs can offer improved alternatives. While the current active players are young and seemingly small, they are operating within smaller niches of the market and have managed to find significant positions.

**AUTOMATED INVESTMENT ADVICE**

**Automated investment advice:** Revenues = 179m NOK

While Innovative Deposits Management are services targeting the personal deposits in banks, Automated Investment Advisory services target the professional investor segment, both individual professionals and fund managers. We estimate current FinTech revenues of 179m NOK. Traditionally, this segment is served through investment bankers, asset managers and corporate finance divisions. Estimating the PAM in Norway through the sum of revenues is a challenging task, as investment banks and corporate finance advisors report as few numbers as possible. As an estimate, we collect revenues from the Norwegian affiliates of the banks that are close to pure-play investment houses, through Proff.no and annual reports. We also estimate the size of the Markets and Asset Management divisions of all-around banks such as DNB, Danske Bank, Nordea and SEB. Details on the assumptions made can be found in Appendix 3.

**Automated investment advice PAM** = Revenues from relevant players

$$15\,801\text{m NOK} = 15\,801\text{m NOK}$$

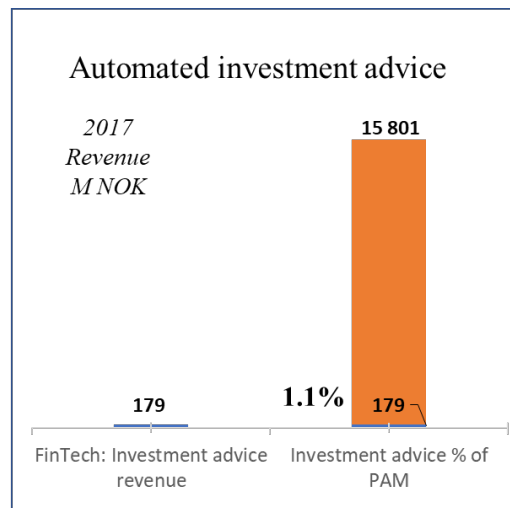


FIGURE 12: PAM AUTOMATED INVESTMENT ADVICE

At first glance, the low penetration rate of FinTechs in the PAM for Automated Investment Advice shows barely any presence in this market. However, current revenues of NOK 179 million on robo-advice signal an already significant demand for such services within Asset Management, although they are camouflaged by the large absolute value of the potential market. Current players have managed to target niches with unmet demand, and have been able to expand the market by offering cheaper, more accessible services.

#### PAYMENTS

For Payments, the best measurement variables are the number of or the value of transactions in Alternative payment methods, a percentage of the money supply in Cryptocurrencies and revenues in Credit Scoring.

#### ALTERNATIVE PAYMENT METHODS

**Alternative payments:** Number of transactions = 127.8m

**Alternative payments:** Value of transactions = 63.2b NOK

Alternative Payment methods are targeting all categories of transactions, from payment cards to account-to-account transfers. To find the number of alternative payments, we use numbers from DNB's Vidar Korsberg Dalsbø on the current Vipps usage. After mCash and MobilePay announced they would discontinue during 2017, Vipps is now the mobile payments solution for all larger Norwegian banks. Other payments solutions, such as Klarna, are currently not replacing the traditional payment methods, as their services aim to enhance the payment experience, regardless of payment method. Thus, we assume that the current Vipps usage approximates the entire Alternative Payments market. Vipps usage has grown significantly in 2017, and to estimate the most accurate current market, we use the December daily transaction average and multiply by 365 days to find the run-rate annual usage. For the PAM, we use Norges Bank's statistics on both number and value of transactions in their payment reports (Norges Bank, 2017).

Number of payments:

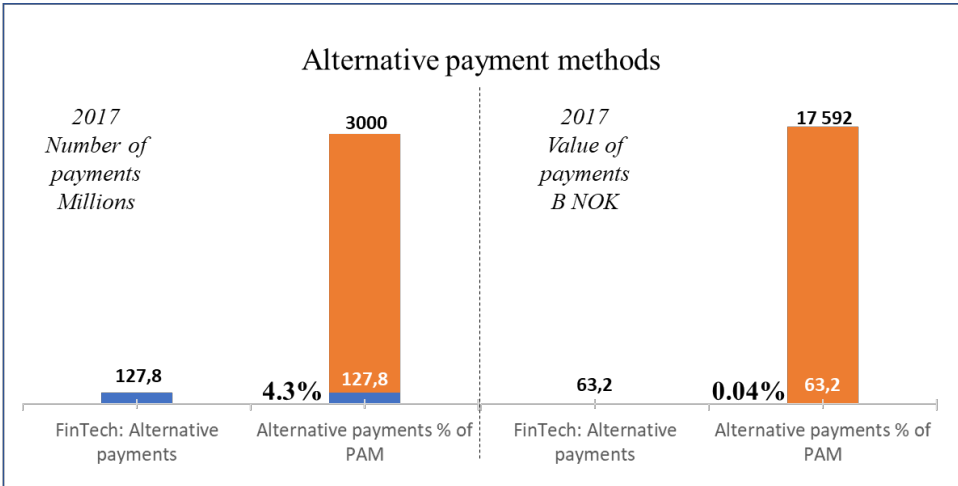
**Alternative payment methods PAM = Number of transactions**

**3 000m = 3 000m**

Value of payments:

**Alternative payment methods PAM = Value of transactions**

**17 592b NOK = 17 592b NOK**



**FIGURE 13: PAM ALTERNATIVE PAYMENT METHODS**

As evidenced by the low penetration, traditional payment methods are still the primary solutions for Norwegians. An interesting takeaway from these numbers is the fact that alternative mobile payments are less significant when measured in value. This is probably an effect of the fact that most of Vipps’ transactions are person-to-person transactions between friends and family, which tend to be small in value compared to business transactions. As Vipps and other providers expand further into the business segment, their value share could increase.

**CRYPTOCURRENCIES**

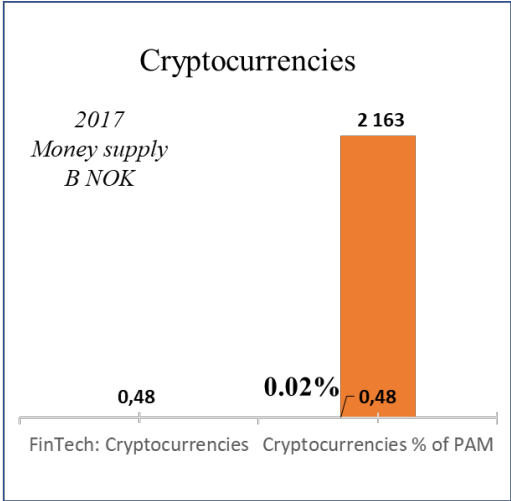
**Cryptocurrencies: Bitcoin money supply = 0.48b NOK**

Cryptocurrencies are targeting to replace the money supply in the economy. In June 2017, Business Insider reported the total money supply of Bitcoin to be \$41 billion, while the world’s money supply was \$83.6 trillion. This estimates the Bitcoin supply as 0.049% of the total money supply (Business Insider, 2017). The Coin Dance website reports statistics on cryptocurrencies, and indicates the Bitcoin market cap to make up 56% of the total cryptocurrency market. (Coin Dance, 2017) This would bring cryptocurrencies to 0.088% of the money supply. There are no reports on the number of cryptocurrencies held by Norwegian investors. We know that cryptocurrency trading is driven primarily by Southeast Asia and the US, with Japan accounting for over 50% of all Bitcoin trades (Jones, 2017) Thus, we assume Norway to be significantly below the global average, and estimate cryptocurrency supply of

0.022%, one fourth of the global average. The cryptocurrency PAM is the total Norwegian money supply, reported by SSB as money supply M3. (SSB, 2017)

**Cryptocurrencies PAM = Money supply**

**2 163b NOK = 2 163b NOK**



**FIGURE 14: PAM CRYPTOCURRENCIES**

Cryptocurrencies have yet to be preferred alternatives to traditional currencies for conducting payments and transactions in Norway. They are still purely speculative assets, without the required technology, nor the economy’s trust, to function for payments.

Blockchain-based cryptocurrencies have several strengths over traditional physical-based currencies. They offer safe transactions, approved by a network of different nodes, and they are independent from central institutions, and thus offer anonymity for consumers. However, several challenges with technology and security have impeded the digital revolution in currencies predicted by some. First, a currency’s payment value is dependent on the trust and stability given to it by consumers and businesses – while there are exchange rate fluctuations and inflation, you know you can buy an ice cream for about 20 NOK. Bitcoin is the opposite of stable, with the exchange rate towards USD up 1660% YTD. Second, cryptocurrencies are subject to hacking attempts. Bitcoin has been hacked 40 times since it was launched in 2009 (Investopedia, 2017). Third, the current technology is ineffective. Christoffer Hernæs said during DN’s FinTech conference that one Bitcoin payment requires the electricity spent by an average household in a week. Finally, cryptocurrencies are outside the influence of central banks and governments, and thus drastically reduce the effects of monetary policies. These challenges have all contributed to cryptocurrencies remaining an insignificant part of the money supply.



**Credit scoring: Revenues = 201m NOK**

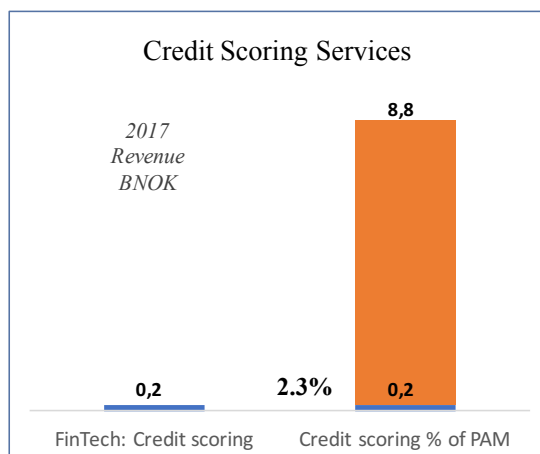
The FinTech companies within Credit Scoring show aggregated revenues of NOK 27.7 million, where Klarna is the biggest contributor. In addition, the traditional banks have started automating their credit scoring services. In November 2017, Dagens Næringsliv estimated that around 40% of new loans in DNB are refinancing of existing loans, and that of these, around ¼ are granted automatically (Trumpy, 2017). The large Norwegian banks are understandably cautious with reporting specific cost statistics, and thus we use estimates that around 1200 people in DNB work directly with customers and have authority to grant loans, that the average credit analyst salary is NOK 543 000 and that about 80% of their time is spent credit scoring, to estimate the total amount of resources spent on credit scoring in DNB (Glassdoor, 2017). We then divide by their net loans market share of 30% (we assume other traditional banks on average are as automated as DNB), to find both the total amount of resources spent and the contribution to innovative credit scoring from traditional banks. This results in a contribution to FinTech revenues of NOK 174 million.

To estimate the PAM, we see the FinTechs within Credit scoring services to be targeting two traditional markets. At Klarna's presentation during the DN FinTech conference, Chief Commercial Officer Martin Tivéus explained his view on the potential market for Klarna, who is by far the leading Nordic player on alternative credit scoring (Tivéus, 2017). According to him, the core market is online transactions, while the potential market is all business-to-consumer transactions. Thus, Klarna provides payments-based credit scoring solutions. On the other hand, traditional banks like DNB credit scores customers they provide loans to, providing financing-based credit scoring. To measure the Credit Scoring PAM size in revenues, we need to estimate both markets. For the payments-based market, we look at the number of business-to-consumer transactions in Norway, and multiply by a credit scoring-based commission income per transaction estimated from Klarna's financial reports. The Klarna Group reports 650 000 transactions per day (Klarna AB, 2017), and transaction-based commission of NOK 2 243 million (Klarna AB, 2017). From speaking with Klarna, we know that credit scoring is just one part of the transaction-based commission, and that they themselves only view this as a total service-package. Thus, we estimate around ¼ of these revenues to be credit scoring-based. The financing-based market we described above, using an estimate of resources spent in DNB and their market share to extrapolate the market size.

**Credit scoring PAM**

$$= B - \text{to} - C \text{ transactions} \times \text{revenue per transaction} \\ + \text{Credit scoring costs in banks}$$

$$\mathbf{8.8b \text{ NOK}} = 3b \times 2.36 \text{ NOK} + 1.7b \text{ NOK}$$



**FIGURE 15: PAM CREDIT SCORING SERVICES**

Within the Credit Scoring services market in Norway, we currently see few FinTech startups that have managed to acquire significant size. Swedish-born Klarna is the largest Nordic player, and is expanding in both Europe and the US. To date, most FinTech startups operate within payments-based credit scoring, as the incumbent banks have shown an ability to innovate and automate credit scoring for loan operations in-house.

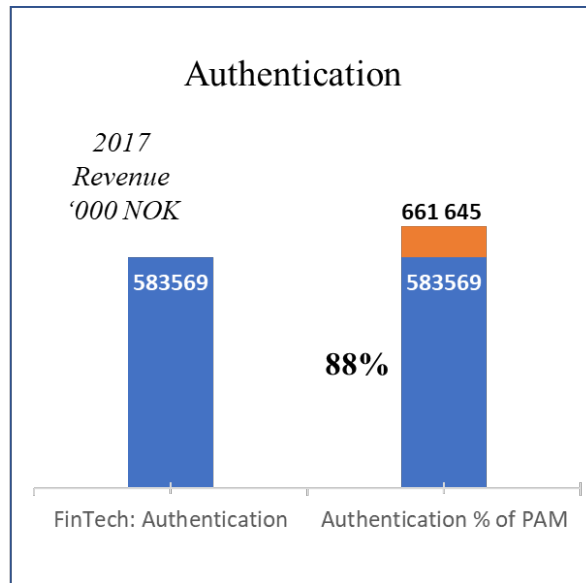
**AUTHENTICATION: ALTERNATIVE AUTHENTICATION SERVICES**

**FinTech Authentication:** Revenues = 583.6m NOK

The size and PAM for Alternative authentication services is best estimated through the revenues of the relevant players, who provide authentication services to the banking sector primarily through two avenues: logging in to your internet or mobile bank, and authorizing transactions. We find that the active players within authentication services can mostly be regarded as a part of early FinTech. This includes BankID, a product developed in Norway, which is lauded for its innovation of how customers are identified online.

**Authentication PAM** = Revenues from relevant players

**661.6 NOK** = 663.7m NOK



**FIGURE 16: PAM AUTHENTICATION SERVICES**

Within authentication services for secure logins on online banking platforms, the key Norwegian FinTech company is BankID. BankID is highlighted by industry experts as the first and most successful Norwegian initiative on innovating banking with technology, and is thus included as FinTech penetration. On authentication services for payments and transactions, 8 out of 10 payment card transactions in stores are authorized with BankAsept systems. These are the traditional card terminals, based on payment card pin codes. This is a manual solution that we choose not to count as FinTech.

## 5. INTERNATIONAL PROGRESS OF FINTECH

We found that the Norwegian FinTech industry already has significant adoption in some segments of the banking industry, and we see how the incumbent banks are realizing the need to respond to technological changes to stay competitive for their customers. To truly understand the current and future position of FinTech in Norway, we wish to compare the progress here to the globally leading FinTech nations. We believe that by understanding their development trends and competitive strengths and weaknesses, we are in a better position to assess both the effect FinTech will have on traditional banks in Norway going forward, and ultimately what position Norwegian FinTech can achieve globally.

### WORLD LEADING NATIONS ON FINTECH

Several methodologies have been used to define the world leaders in FinTech. Haddad & Hornhuf (2016) rank a range of countries by mapping out the number of FinTech startups per year. The result shows the US and UK as clear leaders with 235 and 231 start-ups in 2014, respectively, followed by Germany, 54, and France, 53. However, there are several weaknesses with this method. First, as the data does not take into consideration the relative relationship between number of companies and country size, the number of companies itself is not a good indication on the advancement of FinTech within a country. Second, the list of countries includes Europe and America only, which is not sufficient to provide a global perspective. Finally, using 2014 numbers as a basis for a 2017 paper is not solid in such a high-paced market as FinTech.

KPMG provides a more updated list of the 100 globally leading FinTech companies of 2016 (KPMG, 2016). Their list considers the quality of each company by looking at capital raised, rate of capital raising, geographic and sectorial diversity, and innovation. The number of companies per country on this list can thus be more relevant for the quality of the FinTech sector. However, this list has also not considered the relative relationship between country size and FinTech activity: More people mean more capital available and more startups. In order to adjust for this and measure the per capita quality, we choose to include three other statistics: Number of startups as found by Haddad & Hornuf per million inhabitants, adoption rate defined as FinTech users in percent of digitally active population (EY, 2017), and percent of customers using at least one non-traditional firm for financial services (Capgemini, 2017). We believe these ratios are complementing for indicating the sophistication of the countries' FinTech sector. Based on these five statistics, we present the leading countries per region in Figure 17 below.

| Country   | Companies in the Fintech100: leading global innovators (KPMG, 2016) | Number of startups in 2014 (Haddad & Hornhuf, 2016) | Number of startups; per M capita (calculated from Haddad & Hornhuf, 2016) | Adoption; Fin.tech users in % of digitally active population (EY, 2017) | % of customers using at least one non-traditional firm for Fin.services (Capgemini, 2016) |
|-----------|---|---|---|---|---|
| USA       | 25  | 235   | 0,721   | 33 %  | 46 %  |
| Canada    | 6   |   |   | 18 %  | 40 %  |
| UK        | 12  | 231   | 3,519   | 42 %  | 49 %  |
| Germany   | 4   | 54  | 0,652   | 35 %  |   |
| France    | 3   | 53  | 0,789   | 27 %  | 36 %  |
| Australia | 9   |   |   | 37 %  | 43 %  |
| China     | 8   |   |   | 69 %  | 84 %  |
| India     | 3   |   |   | 52 %  | 77 %  |
| Singapore | 1   |   |   | 23 %  | 53 %  |
| Brazil    | 3   |   |   | 40 %  |   |
| Mexico    | 1   |   |   | 36 %  |   |

FIGURE 17: LEADING COUNTRIES AS OF 2017 WITHIN FINTECH, PER REGION

Both KPMG and Haddad & Hornhuf indicate that the countries with the largest FinTech sectors currently are USA and UK. KPMG also point to Australia and China as advanced countries. By adoption rates, China and India are the clear leaders, with UK a step behind. The combination of our five indicators thus concludes that the leaders on FinTech currently are USA, UK and China.

For our further analysis, we choose to additionally include Germany, primarily because of comparability with Norway, but also because of recent positive trends. Germany is not currently on the same level as the world leaders, but similarities with Norway on geographic position, economic environment and culture makes Germany an interesting comparative for the future potential of Norwegian FinTech (Bremnes, Gjerde, & Sættem, 2000). In addition, Germany will be the leading FinTech country in the EU when the UK exits, following the Brexit vote in 2016.

## 5.1 USA

The US have since the beginning of the FinTech movement been a clear leader on startups and technical advancements. Their technology hubs in Silicon Valley and New York provide unmatched experience on innovation and progress. Five of the world's seven largest companies by market cap are IT-related companies from the US, with three of those being headquartered in California (Wikipedia, 2017). While the US consumer adoption rate is somewhat lagging, especially compared to China and India, the US is the world's fourth most FinTech adoptive within financial planning, savings, investments and borrowing (EY, 2017).

The extensive experience with technological innovation also provides an excellent basis for investment capital access. As seen in figure 18 below, the US was globally dominant on invested capital in the early years of FinTech. In 2013, 67% of invested capital in FinTech startups globally was raised in the US (KPMG, 2017). In terms of investments made, payments and lending are the two largest FinTech segments in the US (Marino J. , 2015). Gro Eirin Dyrnes, the Regional Director Americas of Innovation Norway and chair at Nordic Innovation House, highlights the sophisticated and extensive venture capital (VC) and angel investor environment around Silicon Valley as an important reason for why the US was able to boost the FinTech development fast and early. An important driver for investment capital being allocated into a new area such as FinTech, is investors' knowledge on the industry and market. Silicon Valley attracts investors with high technological competence, with a broad

specter of niche investors specialized in most developments. Through this strength, as well as a well-functioning environment where investors and startups are in constant contact, the US has significant scale advantages when it comes to investment capital access.

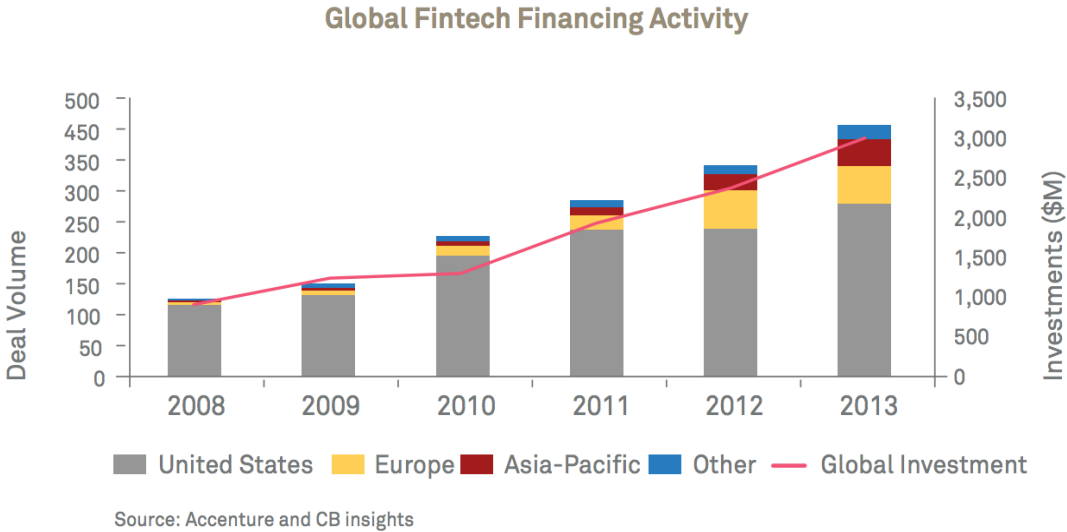


FIGURE 18: GLOBAL FINTECH FINANCING ACTIVITY, FROM ACCENTURE’S INSURANCE BLOG (CUSANO, 2016)

While the US still maintains a strong position in FinTech, the world has been catching up over the last two years. The US FinTech investments global share dropped from 62% in 2015 to 40% in 2016 (KPMG, 2017). Although this still constitutes a market leading position, the drop indicates that the FinTech development is increasingly being driven by other nations. A possible explanation may be that this is a natural consequence of a more saturated startup market, and more conservative investor behavior. According to Dyrnes, US investors previously showed a higher tendency towards investing in FinTech startups that simply showed the ability to grow. Now, there are higher expectations and a focus on also being able to turn profitable.

However, finance and law experts are suggesting that the reduced FinTech activity is due to more structural issues, criticizing the US regulatory system for a lack of effectiveness and adaption. US FinTech regulations on the federal level are influenced by several agencies with their own views on the regulatory needs in the industry. Some of them are the Office of the Comptroller of the Currency, the Consumer Financial Protection Bureau, the Federal Deposit Insurance Corporation, the Federal Reserve and the Securities and Exchange Commission (Cutler & Horsley, 2017). On top of this, the FinTech hubs in California and New York, who stand behind a large part of US FinTech innovation, are subject to regulation at the state level (Kuznetsov, 2017). The result is a complex regulatory environment where startups could easily “be completely lost in the current quagmire of federal and state laws.” The effect could be both a loss of faith and momentum, and unintentional harming of customers. Both would have a significant negative impact on FinTech development (Cutler & Horsley, 2017)

While there are some recent positive trends in US regulation, the market consensus is more than anything painted by uncertainty. The Financial Services Innovation Act of 2016 suggests creating a Financial Services Innovation Office that centralize all FinTech regulation, and to

open a FinTech “sandbox”, where startups can create and test their products in protected environments (Rep. McHenry, 2016). UK is among the countries that have introduced these actions and seen positive effects on national FinTech activity. However, the Act is still in its very early stages, and no one knows when it will be launched. As a result, PWC recently found that 86 percent of US FinTech CEOs were worried of tightening national regulations, and the effect this will have on their business (Marino J. , 2015). This fear of a tightening instead of liberating development is influenced by two major factors. First, “the traditional banking industry is famously — or even infamously — influential in Washington” (Kuznetsov, 2017). Traditional banks struggling with adaptation and uneager to share revenues may use tighter regulation as a tool to slow down the progress. Second, the impact of President Trump’s politics is still uncertain. His anti-regulation focus might make it more difficult to change the agency landscape and pass acts like the Financial Services Innovation Act. However, he also has a strong focus on economic growth and an “America First” worldview (Cutler & Horsley, 2017). The overall effect is yet to be seen, but without an improved regulatory landscape it will be difficult for the US to remain the leading driver of technological innovation in financial services.

## 5.2 CHINA

While the US' growth has declined, China has over the last few years exploded into a leading player in the global FinTech scene. While only 1% of global FinTech investments were done in China in 2013, they amounted to 20% in 2016, achieving a 280% annual growth rate in investments. China is by far the biggest market for digital payments, as it accounts for almost half of the transaction value in the global market — over \$5.5 trillion. This is more than 50 times the size of the US' transaction value (Lavin, 2017). One of the key players within payments is Alipay, owned by Alibaba, the most widely used third-party online payment service provider in China, representing over half of the total transaction value. Over 100 million transactions are conducted daily from over 520 million active users. Alipay offers a mobile wallet that enables customers to transfer and purchase directly from their mobile devices (The Economist, 2017). Another large FinTech company is Tencent, which recently reached a marked cap of \$530 billion. It provides social media and messaging platforms such as QQ and WeChat, and gaming sites such as QQ Games, and offers financial services and online and mobile payments through for instance TenPay. In all applications and products, Tencent had 938 million users by April 2017 (Rutherford, 2017).

There are several reasons for the tremendous growth. On the demand side, the Chinese population is amongst the worlds' most FinTech adoptive, with 700 million people shopping online and the value of mobile payments conducted in 2016 reaching 5.5 trillion USD (Lavin, 2017). This was enabled by an unsophisticated and slow to adapt banking sector. According to The Economist, new technology and forward-leaning entrepreneurs allowed consumers to vault over traditional banks and go straight to smartpurses, e-commerce and P2P lending (The Economist, 2017).

On the supply side, the FinTech industry growth in China was enabled by large tech businesses, such as Alibaba, Tencent, Baidu and JD, entering the financial services sector. Through leveraging their huge customer bases, investment capital and technological competence, new FinTech solutions achieved significant scale quickly. In addition, the beginning of FinTech in China saw open and liberal regulations. The government focused on opening the Chinese market for foreign investors, encouraging growth and innovation, and supported extremely fast growth with low regulatory intervention (Liao, 2017).

However, the low regulatory supervision supported a growth that proved costly for the consumers in some segments, and recent policy changes highlight how regulations are beginning to catch up (Liao, 2017). In 2015, there were 896 lending platforms in China with problems with misappropriation, material misrepresentations and selling of inappropriate products to small investors. Some severe cases drew much public attention (e.g. platform lender Ezubao), leading to a string of policy reforms starting December 2015. These included general guidelines for internet finance, a policy denying P2P and P2B lenders from funding loans from their own balance sheet, and a restriction for balance sheet lenders to accept public deposits. The severity of the policy changes made the government provide an 18-month grace period, which expired mid-August 2017 (World Economic Forum, 2016). While the full effects on the FinTech market is therefore yet to be seen, David Liao, President and CEO of



HSBC China, says some estimates show “just one in 10 of the country’s thousands of P2P lending platforms will survive under the much stricter requirements” (Liao, 2017). In addition, China has decided to ban ICOs (Initial Coin Offerings, a new capital raise method based on cryptocurrencies), another example of how regulatory reactions to the past years’ problems with illegal FinTech activities can impede its development (Milanovic, 2017).

A second issue for FinTech development in China is that traditional banks have shown a resistance to partnering with startups. As mentioned, the supply side of FinTech in China was mainly driven by the large tech-companies. According to PwC’s Global FinTech Survey 2017, only 40% of responding banks are currently engaging in partnerships with FinTechs, below the global average of 45%. Asked whether they expect to be engaging in partnerships over the next three to five years, 68% responded yes, significantly below the global average of 82% (PwC, 2017). This resistance could create increased conflict going forward. Chinese consumers have shown a clear FinTech adoption trend, and traditional banks might struggle to retain their position if they are unable to adapt to the new trends.

### 5.3 UNITED KINGDOMS

Many have labeled the UK the leading force on FinTech the last couple of years (EY, 2016). By investments in FinTech, the UK was the clear number two in the world from 2013 to 2015. Capital invested in FinTech grew heavily, and remained at 10-15% of all global FinTech investments. While not on the same consumer adoption levels as China and India, the UK is leading all western countries, according to both EY and Capgemini. According to EY, FinTech users as a percentage of the digitally active population grew from 14% to 42% over the last two years (EY, 2016). At DN’s FinTech conference, the CEO of crowdlending platform Kameo used UK as an example of the potential of crowdfinancing. In 2016, 15% of gross lending to businesses in the UK was funneled through crowdlending platforms (Harung, 2017). These numbers indicate that while the US and China are benefitting from their large scale in both investment capital and consumer base to build big FinTech markets, the UK might be the country that has achieved largest advances in their Financial Services.

EY finds that Payments is the UK’s largest FinTech segment, representing 13,5% of all UK FinTech companies (EY, 2017). An example is TransferWise, a UK based FinTech company within the payments segment, allowing customers to transfer money abroad cheaper based on a P2P system. TransferWise offers borderless payments, by running a system that automatically match people who want to transfer money in the opposite conversion. It pays from the local currency account, meaning that money never crosses borders and that the customers save large amounts of banking fees and exchange rate losses (TransferWise, 2017). Another important segment is P2P lending: The UK accounted for over 84% of the European P2P lending market by July 2016. Much of the success can be attributed to Funding Circle, an online marketplace for P2B loans, with over 50 000 investors in its community. It was the first to launch an online P2P business-funding platform in the UK (FinTechs Switzerland, 2016). The second largest P2P lending platform is Ratesetter, which introduced a “provision fund” concept into P2P lending that provides a buffer against poorly performing loans and spreads the risk (FinTechs Switzerland, 2016).

The transition to an innovative financial services industry has been aided by active and focused UK government policy action, which is widely viewed as the best-in-class regulatory model. To facilitate the regulatory needs of the FinTech growth and the changing financial market, the UK in 2013 divided the financial regulatory system into two parts. The first organization, the Prudential Regulation Authority, became responsible for “supervising systemically important financial institutions”. Effectively this mostly encompasses traditional banking institutions. The other agency, the Financial Conduct Authority, received supervision responsibility of all other financial institutions, mainly FinTech startups and projects (Yang, 2017). In a move that by some is seen as groundbreaking for innovating regulatory authorities in finance, part of the FCAs statutory objectives is promoting competition. After the financial crisis, breaking up the old monopolies that dominated financial services, and doing so in a way that benefits consumers, has been a major goal of UK financial policies. (Binham, 2016) The FCA represented a shift from the government purely overseeing any illegal conduct, to interactively providing a supporting marketplace for innovation (Yang, 2017). An example of initiatives that have proven effective is the FCA Project Innovate, which included a “sandbox” project where FinTech startups could test and develop their products freely without regulatory resistance, under supervision. The FCA also built a legal advisory service for FinTech startups that provided direct and customized support to enquiring startups on understanding and complying with policies relevant to their business. The regulatory focus on providing a safe and transparent environment was a major supporting pillar for London’s rise to one of the leading FinTech hubs over the last few years (EY, 2016).

While the 2013 to 2015 period was extremely successful for the FinTech scene in London, the Brexit decision implications are now looming upon the entire financial services industry, including FinTech. So far, the impact of Brexit is still highly uncertain. In 2016, UK FinTech investments dropped from 10% to 2% of the global level. However, London was still ranked as the top international financial center by the financial publication *The Banker*, as it still attracts and generates the largest number of foreign direct investment projects in financial services (Pavoni, 2017). According to a survey of 1200 UK FinTech c-suites in 2016, most did not expect significant negative impacts of a Brexit, as only 22% of respondents expected to scale back planned growth ambitions. The respondents did however see some large issues that will require resolving by the government. First, maintaining a globally leading position will require UK FinTech startups to be able to attract and retain the very best talent. This will require access to non-UK employees. Half of the respondents believe their ability to do so will be lessened following Brexit, and ~80% want improvements to the visa system. Second, Brexit will have an impact on the ability to raise sufficient capital, as half of respondents plan to raise capital outside the UK in the next year (Tech City, 2016). While the overall market sentiment remains positive, the UK government’s ability to renegotiate and resolve the upcoming issues will have a large impact on the future competitive position of London as a global FinTech hub.

## 5.4 GERMANY

Germany had by 2016 yet to achieve the same level of advancement in FinTech investments and adoption as for example the US, UK and China. However, the investments level has shown a positive development with high growth in line with the global average, outgrowing the rest of the Western world. German consumer adoption is also in line with the global average. The area where Germany positively stands out the most is on partnerships between traditional banks and FinTechs: 70% of traditional banks are currently engaged in partnerships with FinTechs, significantly above the global average of 45%. This is especially important for countries with a strong financial services sector, such as Germany.

EY ranks Payments and Crowdfunding as the largest German FinTech segments to date, while robo-advisory has the strongest growth (EY, 2017). 21,5% of all German FinTech companies were engaged in the Payments segment, while 15% operated in the donation and reward-based crowdfunding sub-segments (Dorfleitner, Hornhuf, Schmitt, & Weber, 2017). N26 is an example of a successful payments company, which currently serves over 80 000 customers. It is an online bank offering worldwide money withdrawal at no additional cost and accounts for easy cash withdrawal, deposits and overdraft services. Over the last two years, N26 has integrated insurance, investment and alternative credit products of other FinTech companies into its product portfolio, creating a unique FinTech ecosystem. In crowdfunding, a company worth noting is Companisto, the leading equity crowdfunding platform in Germany, Switzerland and Austria. Companisto connects private individuals looking to invest their savings with start-ups and offer investments without transaction and account fees. So far, their users have invested over EUR 46 million in start-ups (Companisto, 2017).

Germany has a large Financial Services sector with extensive history, and this has created a complex and somewhat unclear regulatory landscape for FinTechs, which might have contributed to the relatively slow start of the country's FinTech development. German financial regulatory laws have grown with the Financial Services market, and without developing specific FinTech policies, this landscape has become complex and difficult to navigate. Dependent on their business model, some FinTechs are subject to the Federal Financial Supervisory Authority (BaFin), while others are not. There are different licensing requirements under different Acts for each segment of financial services, creating difficulties and complexity for FinTech startups that might be operating in several or altogether new segments. According to Christian Schmies of Hengeler Mueller, "given the comprehensive and still expanding nature of financial regulation, careful analysis of applicable regulatory regimes is indispensable prior to starting any FinTech business in Germany" (Schmies & Kempe-Mueller, 2017).

Recently, BaFin has begun clearly laying out regulatory requirements for FinTechs, and the effort has supported Germany in increasingly catching up with the UK. The BaFin FinTech project started up November 2015, with the aim of mapping out the current regulatory practice in the country and drawing a roadmap for the necessary adjustments (Danker, 2016). The project concluded that successful FinTech regulation in Germany going forward would

require increased collaboration between BaFin and the relevant undertakings. It also highlighted that coordination and more accessible information was a larger issue than the policies themselves. As a result of this, BaFin created a FinTech segment on its website, with specified regulations for each segment of the FinTech sector (BaFin, 2017). Further, it opened a service for new FinTech startups to fill out a contact form and receive specific information on the applicable authorization requirements (BaFin, 2017). These changes are a definitive step towards UK's best-in-class model (Business Insider Intelligence, 2017).

As we have seen, the international leaders on FinTech have different strengths and weaknesses when it comes to consumer demand and banks adaption, access to capital and talent, regulatory environment and technological advancements. Forecasting which of these countries that will be leading going forward, and other countries that will enter the scene, is an impossible task and fortunately not our goal. In the final parts of the paper, we will use insights from these countries on drivers and constraints on FinTech to assist us in determining the future potential of FinTech in Norway. While Norway is a smaller and different market to these four giants, it has similarities and comparability to certain aspects of each of them. This will be further investigated in the next chapter.

## 6. THE FUTURE OF FINTECH IN NORWAY

Having identified the drivers of FinTech demand and supply, the potential addressable markets and the progress of international leaders, we will assess the potential of FinTech in Norway and consider the effect on the traditional banking sector.

We first investigate the position of Norwegian FinTech potential through the identified drivers of demand and supply. Second, we determine the market entry conditions for each segment. We then utilize these factors and the potential addressable markets to forecast different scenarios for the FinTech segments over the next five years. There is a high level of uncertainty in how the FinTech market will develop, but by combining insights on international development, what we have seen in other technological advancements and extensive input from the experts we have interviewed, we believe there is significant value in envisioning specific possible scenarios for the next five years.

### 6.1 THE DRIVERS BEHIND NORWEGIAN FINTECH

High-paced changing technologies, consumer preferences and global competition within banking threaten the incumbent Norwegian banks' relevance and position. As FinTech success is highly attributed to the ability to enhance parts of the banks' traditional value chains, the banks must adapt to the new business environment to stay relevant for their customers. This part of the paper looks closer on Norway's situation on the various drivers of Financial Services and FinTech. From this, we can understand how current Norwegian FinTechs have been able to grow, but more importantly, we create a basis for assessing how they might develop going forward. This will help us investigate the disintermediation risk Norwegian banks is facing in the near future, as well as Norway's potential of becoming a leading FinTech nation.

#### 6.1.1 FINANCIAL SERVICES DRIVERS IN NORWAY

Driven by number of bank customers and spend per customer, we expect a moderate, stable growth in financial services in Norway. In the number of Norwegian bank customers, we expect a stable, population driven growth. Approximately 100% of Norwegians had a bank account in 2017 (World Bank, 2014), placing Norway above the average 97% for high-income OECD countries (Oudheusden, 2015). As such, we see banking as fully incorporated into Norwegians' economy as a necessity and we do not expect any drastic changes in the demand for banking and financial services in Norway soon. Furthermore, Norway's financial system is ranked as the ninth best in the world, based on criteria such as access to services, their related usage costs and capital access through different types of channels (Bull Jenssen, Høiseth-Gilje, & Fjose, 2017). This means banking is already easy and accessible for Norwegians, strengthening our hypothesis of a stable growth in the usage of financial services.

The spend per consumer can be seen through several measurement variables, such as deposits, net loans, transactions and various revenue measurements. The value of these segments is expected to depend on the general economic temperature. While we see there are annual and

segmental differences and fluctuations in Financial Services growth, the overall long-term spending growth is expected to correlate with GDP and general consumption (Norges Bank, 2017).

Conclusively, we expect the demand for financial services and products to be driven by the population growth, and the spending level to be driven by macroeconomic factors and roughly follow the development in the GDP long-term.

6.1.2 FINTECH FORMATION DRIVERS IN NORWAY

Following our general driver tree for FinTech adoption, the demand of FinTech is dependent on consumer preferences and response from banks. On the supply side, technology, the regulatory environment and access to capital and talent are the determinants. To assess the total impact on FinTech in Norway, we investigate the positive and negative effects seen within the drivers in Norway.

CONSUMER PREFERENCES

While Norwegian banks have focused on becoming leaner and cutting costs in the past years, bank customers’ performance expectancy is continuously increasing, with a focus on easy-to-use products and services, constant accessibility and tailored user experiences. As such, the banks are forced to change their role in customer relationships, and transition their service offering to remain relevant in the channels preferred by consumers. According to research by Fintech Mundi, 70% of Norwegian bank employees said meeting customer preferences was their top challenge, in addition to innovating their products and utilizing internal data analytics (Hannestad, 2017). This is further underlined by how 55% of the respondents in a survey conducted by Finans Norge in 2017 said they were interested in a solution with access to all their accounts and balances across banks and financial institutions. As explained by PwC’s Lars Erik Fjørtoft, the implication is that the importance of a good user experience and tailored interfacing increases at the cost of customers’ brand loyalty.

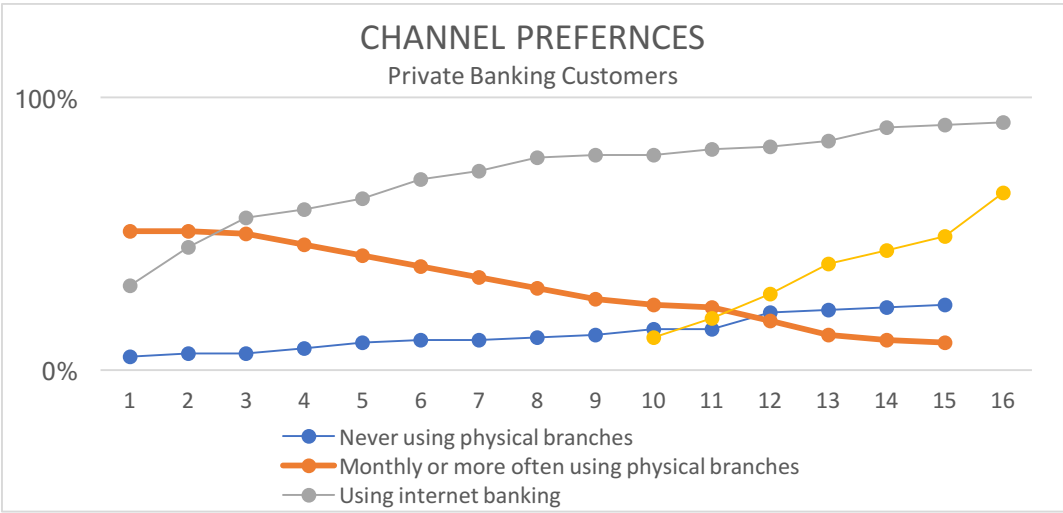


FIGURE 19: NORWEGIAN CONSUMERS’ CHANNEL PREFERENCES, FROM FINANS NORGE (SSB, 2017) (FINANS NORGE, 2017)

The yearly Finans Norge trend survey among Norwegian bank customers shows a clear change in channel preferences of Norwegian bank customers: A steady decline in frequent users of physical branches and the increasing share of people not using them at all is offset by a steady growth in internet banking usage, currently at 91%, and a high growth rate in use of mobile banking, used by 70% of all Norwegian bank customers. The speed of the transition can be seen at DNB, as their mobile banking app went from 700 000 visits in 2013 to over 17 million visits in 2016. Gunnar Hovland in BN Bank says the preference for digital banking is due to consumer habits of internet and mobile usage, and that the digital solutions are continuously enhanced and improved (NTB, 2015). This habit transition is enabled by Norway's facilitating conditions in terms of advanced digitalization, with high computer and mobile proliferation. As Haddad and Hornuf proved, access to and use of mobile devices help facilitate FinTech startup formations (Haddad & Hornuf, 2016) and makes it easy for the mobile owners to access and do their banking. Today, 80% of all Norwegians own a smartphone, including "practically everyone between 12 and 49 years old" (Futsæter, 2017).

We believe UTAUT's theory of social influence affecting adoption and use of technology is an explanatory factor for this development. Network effects are an obvious factor in for instance the rise of Vipps as an alternative to internet bank transfers or cash payments. These are relationship-based services, where the user experience is increased if you are at the same platform as your network of friends and family. The same trend is present in SME banking (Finextra, 2017).

Haddad and Hornuf proved in their paper that the less established and thus trusted the countries' banks are, the greater the potential of FinTech startup formations will be (Haddad & Hornuf, 2016). As mentioned, the lack of consumers' fundamental trust in the incumbent banks has been a driver for the rise of FinTech globally. Although Norway was relatively unaffected by the financial crisis, a skepticism towards the incumbent banks is also present here: A 2016 survey conducted by InFact Norge showed that 67% of the respondents stated that their trust in DNB was weakened and that they became more negative towards the bank after the Panama Papers scandal the same year (Haugan, 2016). The scandal was a fact when DNB was caught heavily involved in helping wealthy Norwegians transfer money to the well-known tax paradise of the Seychelles. Finans Norge's 2017 survey showed the same tendencies among Norwegian consumers' perception of their banks' reputation, where the past two years show an 11% decrease in "Excellent" and "Very Good" (Finans Norge, 2017).

Nevertheless, several industry experts pointed out Norwegian banks' good relationship with their customers as one of their key competitive advantages versus the FinTechs. Banks maintain a generally high level of trust in the Norwegian population. With regards to the seamless, integrated banking solution, 61% of all respondents felt most comfortable with the banks offering such a service, followed by the government and insurance companies. As many as 59% felt distrust with social media players such as Facebook. Thus, Norwegians seem to be selectively open to FinTech, depending on who offers it. After all, as emphasized by Finanstilsynet, Norwegian financial infrastructure is solid, with strong banks and particularly a strong central bank that has proven to perform good monetary policies in times of recession (Finanstilsynet, 2016).

In sum, we consider Norwegian customers as early and fast adopters of FinTech, highly open to technology enhanced banking, especially to in-house solutions offered by the traditional banks, which enjoys a good level of trust in the population. We believe the consumer preferences for mobile and digital platforms are driving their FinTech adoption rate, as well as the FinTech integration in Norwegian banks and financial institutions.

#### BANKS' RESPONSE TO FINTECH

As in the US and in most of Europe, Norwegian FinTech activity has until recently been driven to a larger degree by startups and entrepreneurs than the banks themselves. We believe the influx of FinTech startups has forced the banks to innovate and engage, as 74% of Nordic banks said they'd cooperate with FinTechs in 2017, up from less than 50% of the respondent banks in 2016 (Hannestad, 2017).

Realizing that FinTech startups' strengths lie in technology competence, innovative skills and fast development, both DNB and Nordea explicitly stated at DN's FinTech conference that they are choosing to cooperate and collaborate with FinTech startups. Our conferred experts on both the bank side and the FinTech side indicate that the support programs and willingness to purchase or support FinTech development by Norwegian banks is unparalleled in other leading countries like the UK and the US. We have yet to see a resistance movement from Norwegian banks against FinTech companies and developers, as the trend has been cooperation.

Norwegian banks are cooperating with FinTech startups and entrepreneurs in several ways. Some initiatives focus on facilitating the development of new solutions on their platforms, by opening the system and allowing access to customer data. Others provide direct support to external developers and academics, such as accelerator programs. In addition, Norwegian banks are investing directly in startups, either through providing equity or simply through purchasing new services. The banks are also driving further FinTech development themselves, and are building their own digital R&D divisions. We have even seen examples of competing banks cooperating with each other to develop new solutions, such as Vipps and BankAxept.

An example of a cooperation initiative is *Open Banking*, which is utilized by both Nordea and DNB in Norway. The ambition is to facilitate innovation and secure transparency and cooperation with FinTech players, by creating a digitally connected banking ecosystem. By offering APIs, third parties are invited to build applications and FinTech products on the banks' platforms, with access to valuable customer data, and thus collaborate with the incumbent banks in developing future banking services. Nordea had by November 2017 had 700 startups sign up for their API program, while DNB is developing open banking through The FinTech Platform. Nordea's Ine Gjerstad acknowledged that sharing their data may seem like an unattractive situation for the banks, but that doing nothing will lead to the banks losing control of the customer experience at first, and ultimately over the rich data from their customers' transactions and payment habits (Gjerstad, 2017). Through *Open Banking*, we see that Norwegian banks are embracing FinTech development rather than attempting to resist it, and are making efforts to in-house innovation from startups and entrepreneurs.



In addition to their efforts in open banking, DNB is engaging undergrads in DNB Digital Challenge, where Norwegian students compete in inventing, developing and finally presenting the best solutions to shape future banking. The winning team gets a project week at DNB's offices, where they will be able to continue to develop their ideas in practice. DNB reports that this initiative has provided them valuable insight and good relations with future talent (Skarsgaard, 2017). Furthermore, DNB also launched the NXT Accelerator program in collaboration with StartupLab in 2017. Øyvind Brekke explains how this three-month accelerator program aims to connect ideas with capital and create commercial opportunities for both the startups and DNB. The participants receive a mentor from both StartupLab and DNB, in addition to access to a large professional network and potential stakeholders.

Other banks have also made significant efforts to be a part of the FinTech wave and the future digital banking. Sparebank 1 dedicated 300 million NOK to their innovation program, FinStart Nordic, which launches in 2018 (Sparebank 1, 2017). Through international collaboration with other FinTech communities, they hope to access the best ideas, competence, and relevant professional networks and thus stay up-to-date on the FinTech development. In addition, they launched F3 in August 2017, an incubator providing FinTech startups access to competence, network, teaching, and advise to develop their ideas in Trøndelag. F3 already houses FinTech startups like Folkeinvest and Mito.ai. Sbanken is Norway's largest all-digital bank, and their efforts to stay on the forefront are seen for example in the investment in Quantfolio, a robo-advisory company. Sparebank 1 SR-Bank has invested in Boost.AI and Vester, offering artificial intelligence and a marketplace lending platform for banks. These are just some examples of a range of initiatives by banks in all segments and of all sizes, showing that Norwegian banks are clearly seeing the benefits of investing resources into staying relevant in FinTech.

We believe Norwegian banks' initiatives show that they are open for and driving cooperation between banks, startups and entrepreneurs, and that they can mutually benefit from this. As emphasized by experts, Norwegian banks' efforts are highly supportive of further FinTech growth, which we believe will be an important positive driver going forward.

## TECHNOLOGY

Norway is one of the globally leading nations on digitalization, an important factor for technological advancement. According to Menon Economics, Norway is the second most digitalized country in Europe, based on network connection, digital competence among professionals, usage of internet-based services, and digitalization of the business sector and of public services. Norway scores higher than the European average on internet service usage, and currently 95% of the population has internet access (Hernæs, 2017). It is ranked as the world's 7<sup>th</sup> best country with respect to technological ripeness, based on technology adaption and IKT usage in the population (Bull Jenssen, Høiseth-Gilje, & Fjose, 2017). This access to the latest technology upon which FinTech startups can build their business models is an important driver of FinTech formation. (Haddad & Hornuf, 2016).

While there is little doubt among industry experts in FinTech and finance that Norway is advanced on technological development, MasterCard's Digital Evolution Index of 2017 states

that although the government has been an early investor in digitalization, Norway has suffered from “a combination of demand saturation and clogged innovation engines”, resulting in a risk of losing relevance in the global digital economy (MasterCard, 2017). Haddad and Hornuf emphasized that access to *new* technology is what drives FinTech startup formation and further development. We will therefore look closer at Norway’s efforts within the three key emerging technologies as identified in the general drivers’ section; biometrics, Blockchain and AI.

Digital authentication services have been a premier characterization of the Norwegian bank industry, with BankID a solution lauded by many. Susanne Hannestad in Fintech Mundi believes Norway has continued to be leading in developing authentication services within new biometric technologies. Norwegian Zwipe is one example, having worked with fingerprint identification since 2010. They are now shipping out their technology to all parts of the world, from the US to South Africa and Japan (Zwipe, 2017). The expansion of Zwipe indicates the strong competitiveness of Norwegian biometric technology.

To improve the access to Blockchain technology in Norway, Bankenes Standardiseringskontor (BSK) has initiated a forum where banks can discuss the changes and look at opportunities of cryptocurrencies and Blockchain. The ambition is to create a national guide for standardization and introduction of Blockchain technology in Norway, and consequently become one of the first countries globally to succeed in doing so (EVRY, 2015). Another Blockchain initiative is R3CEV, a consortium consisting of more than 70 of the world’s largest financial institutions, including Nordea and Danske Bank (Nagel, 2017). Based on the preliminary status of the technology and solutions, Norwegian banks are hesitant to reveal the specific projects they are working on within Blockchain. However, through speaking with banks, we have a clear impression that discovering Blockchain’s true value and possible solutions is high on the R&D agenda. The interest in Blockchain was evident when Bergen-based Blockchain company Hubii raised over 800 000 USD in four hours through an ICO in September 2017.

Finally, Norway is also in the process of developing and utilizing AI technology. Some AI functions, like Chatbots, are already proliferated in online banking, retailing and insurance institutions. DNB’s chatbot was in 2017 capable of answering over 100 questions from customers, and they expect it to handle 80% of all inquiries going forward. Although the large Norwegian banks are investing resources in AI, IBM Data Scientist Mai Tran says we have barely begun exploring the opportunities and technology of AI. She addresses the problem that much tech competency leaves for Silicon Valley or other technology clusters, or is recruited by the large, financially strong corporations. Morten Goodwin, first amanuensis at the University of Agder (UiA), supports her statement by explaining that Norway is far behind on AI investments and development. Thus, in March 2017 he co-launched the research center CAIR at UiA with 14 researchers working on AI with focus on different academic fields. CAIR has already established local partnerships with businesses and say they have ambitions of challenging international giants such as Google and IBM on AI (Wehus, 2017). The same AI efforts are seen in Trondheim, where Norway’s leading engineering university,

NTNU, and Telenor co-created the NTNU-Telenor AI-Lab as an effort in developing Norwegian AI and machine learning.

To summarize, Norway has until now been a world leader in digitalization and tech adaption rate, but maintaining a leading FinTech development position will require additional investments in technology research. Being able to incorporate industry and academics, and retaining the leading talent, will be especially important. We believe the efforts described above are good examples, and that technology development has the potential to be a positive driver of FinTech in Norway.

#### REGULATORY ENVIRONMENT

World Bank Group rates Norway's regulatory environment as one of the world's most business friendly. Thus, the government is facilitating attractive business development and operations (World Bank Group, 2017), for instance by keeping a low number of procedures to go through prior to starting a business (World Bank, 2017). However, as in the rest of the world, the Norwegian financial industries sector is heavily regulated to promote safety for consumers and the economy, and new FinTech adapted regulations will come into effect to ensure both competition and safety with the new technological developments in the industry.

The complex financial regulatory environment has been and will be a challenge for FinTech startups, as the safety of personal finance and the general economy is more important than creating an optimal competitive environment. Co-founder of FundingPartner, Marius Borthen, explains that Norwegian startups face time and capital consuming tasks in applying for concessions, learning the regulatory and legislative environment and adapting in the start-up-phase. Compared to large financial institutions, which have lawyers, accountants and long experience with legal compliance, the FinTech startups are at a clear disadvantage.

Two regulatory changes coming soon is PSD2 and GDPR, which are described in the section on general drivers. The directive will be processed in Stortinget by the start of 2018 and will most likely be launched during the year. PSD2 aims to facilitate increased competition in the payment services market, promote innovation and strengthen the security of online payments and access to accounts (Weldeghebriel, Shifter.no, 2016). In short, Finans Norge expects PSD2 to result in immediate money transfers across bank providers and lower costs for the consumers and retailers (Finans Norge, 2017). In combination with the GDPR, these two regulations will require FinTechs to invest in sufficient judicial competence and systems that oblige with the new laws. Access to personal data on Norwegian bank customers will give FinTechs opportunities to further innovate and enhance their products and services and give better customer experience, but also requires more knowledge and efforts.

While regulations seem an obvious hurdle for FinTech startups, there are several interest organizations working for a more beneficial and transparent regulatory environment. IKT Norge is an interest organization for all IT companies in Norway, working to strengthen the technology sector's regulatory and growth conditions. They have been highly engaged in issues within FinTech regulations over the last years. They have expressed concerns about entrepreneurs' familiarity with regulatory and general requirements for financial services

providers. IKT Norge has been working to establish a regulatory sandbox to help small tech start-ups with legal expertise and experience, which is something they rarely have the resources to acquire themselves (IKT Norge, 2017). The Parliament voted in favor of the initiative and has asked the government to consider the proposition. They also, together with the law firm Selmer, published The FinTech Guide earlier this year, as an effort to make the regulatory process clearer and more transparent (IKT Norge, 2017).

Further, Finans Norge is the largest interest organization in the Norwegian financial industry, representing over 240 companies nationally and fronting the industry's interest towards politicians, authorities, international partners and consumers. As such, they recently took initiative to convince the Department of Finance to regulate the crowdfunding segment to secure a market with a high level of trust from both investors and lenders. Finans Norge suggested a possible starting point for a temporary regulatory framework, while waiting for EU legislation. They also contributed in developing IKT Norge's sandbox proposition.

In addition, Norway has recently seen several hub initiatives, backed by banks, consultancy firms, universities and other financial institutions, that will strengthen tech and FinTech efforts. The idea is to connect, share knowledge and innovate together to strengthen the already-established cooperative relationship between Norwegian FinTech players. In the spring of 2017, Finance Innovation was established in Bergen, aiming to make Norway leading within financial technology. Its' members include DNB, NHH, PWC, Bergen Chamber of Commerce and Industry, and a range of other banks and institutions. So far, Finance Innovation has accelerated 27 FinTech startups, invested in 13 of them and already helped one complete an exit (Lindersgaard & Frier, 2017). Shortly after Finance Innovation opened in Bergen, the Oslo FinTech Hub was established. In addition, the Tequity Cluster in Trondheim consists of 50 players, including investment companies, angel investors, tech companies and research and development communities. The cluster aims to increase value creation in technology-based start-up companies with international growth potential through active ownership (Skjervold, 2017).

We believe the Norwegian initiatives mentioned above will attract FinTech startups in the future and increase the general national and international interest in the Norwegian sector. Although the regulatory environment is lagging and not ahead of the FinTech development, we believe the initiatives so far are steps in the right direction of more FinTech activity.

#### FUNCTIONAL CAPITAL AND TALENT MARKETS

FinTech startups need access to seed and growth capital to develop their services, and they need the right talent and human resources to succeed. Access to capital is in Norway achieved through both the capital markets with private investors, and government support programs. Acquiring an efficient human resources pool requires both education and training programs to develop national talent, and the ability to attract international talent. In the following sections, we investigate the strengths and weaknesses within these four avenues in Norway.

With respect to functional capital markets, Menon listed the Norwegian financial system as the world's ninth most developed, based on access to financial services, the cost of using

them, and capital access through different channels. Unfortunately, we find that very little of Norway's venture capital and banks' investment capital go to startups and FinTech. Deloitte found that Norway FinTech VC deal values of USD 4 million, while the global FinTech VC deal value hit USD 17.4 billion. To Deloitte, Heidi Austlid in IKT Norge highlights access to capital as a key challenge for Oslo to become a FinTech Hub (Deloitte, 2017). Gro Eirin Dyrnes in Innovation Norway believes the lack of VC capital access can partly be attributed to insufficient technology interest and experience in the VC investor environment. However, she believes that recent trends show a positive development, where previous entrepreneurs with technology and engineering backgrounds, that now possess investment capital, are leading an investor push into technology. Profiles such as Umoe Invest, Ole Andreas Halvorsen, Novelda and Tandberg, are among the players that have shown interest. The positive development is supported by statistics, as a report from FIN, the association for innovation companies in Norway states that since 2015, the investments in incubators have doubled, and the capital invested in research based growth companies has tripled since 2014 (Moe, 2017).

Although the capital market for seed and growth funding is not at a desired level, we see that Norwegian authorities are trying to improve the situation through different public initiatives. Both the Research Council of Norway and Innovasjon Norge are offering financial support for innovative startups: Since 2013, the Research Council has supported research and innovation with over NOK 3 billion, and industry minister Monica Mæland recently directly urged Norwegian companies to apply for financial support (NTB, 2017). Innovasjon Norge is an organization financially supported by the government, aiming to facilitate innovation and competitiveness for Norwegian startups with international potential. Among various initiatives, they offer seed funding for small, innovative businesses in their early development phase. The seed fund will financially support establishment and development of innovative, internationally competitive growth companies, and thus further drive FinTech activity in Norway. A final example of state financial support is the new tax deductions on income of up to NOK 500 000 for startup investments, and effort to entice more private investors (Selmer, 2017).

Regarding access to talent and human resources, Haddad and Hornuf's regression results show that entrepreneurial supply is positively linked to population size. This constitutes a barrier for Norway, with just over five million inhabitants. We therefore believe it is important to invest in the talent we have. Providing good education opportunities in the cross-section of finance and technology will strengthen the FinTech talent access in the Norwegian workforce and help drive innovation further. IKT-Norge requested 1000 new IT study spots in 2016, but the government only offered funding for half of them. Ultimately, only 200 new study spots were opened in 2016. We find this alarming, especially when knowing that the applications to IT related studies reached an all-time-high in 2016 (Røise, 2017). However, strong educational institutions like NHH are gradually responding to the demand for tech competence and recently introduced both a FinTech master's profile and various other technology courses (NHH, 2017). Furthermore, NTNU and Telenor opened a lab for AI research earlier in 2017, which is run by NTNU professors and will house fifty undergraduates and PhD students. By combining theory and practice, the lab will help

businesses develop new products, services, companies and workplaces. We believe this is a step in the right direction of attracting talent and opening the eyes of students to explore and chase a career within FinTech.

In addition to developing talent nationally, it is also important to be an attractive marketplace for international human resources. Gro Dyrnes in Innovation Norway explains that Norway has a competitive advantage in attracting foreign labor due to globally leading living standards and citizen benefits, including great employment conditions. This both attracts foreign talent and improves the ability to retain employees in Norway. Dyrnes emphasized that while we see several good examples of this today, there are still issues with visa agreements and movement of labor deals with important countries. Thus, if able to solve these issues, Norway should be able to increasingly complement human resources within FinTech through international talent.

Conclusively, there are some issues and question marks with regards to both access to capital and talent within FinTech in Norway. Positive trends, driven by the work of interest organizations and the government, as well as an attractive working environment, show that this could improve going forward, but that it will require concerted efforts.

#### TOTAL IMPACT OF DRIVERS

We illustrate the results from our analysis of Norway's position in the various FinTech formation drivers below. We consider the green drivers positive for Norwegian FinTech growth and development. The yellow drivers have both positive and negative trends, and an uncertain overall effect. The red drivers are currently working against a positive growth rate.

Overall, we consider the Norwegian status on the FinTech drivers to indicate further growth and industry adoption going forward. The demand side is showing a clear positive effect. First, the Norwegian consumers' preferences are clearly indicating a readiness and openness to FinTech products and services in banking. Second, the banks efforts towards cooperation and investments in technology will further drive demand for FinTech solutions.

to a more technology-focused world is hurting the effectiveness of the education system. This makes Norway more dependent on its ability to attract international talent.

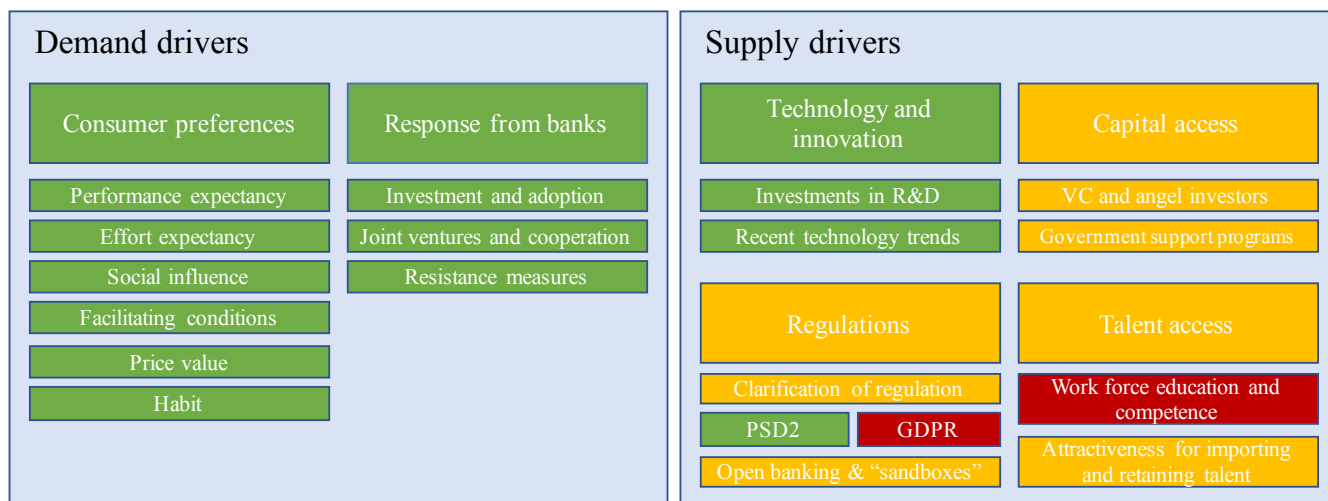


FIGURE 20: THE EFFECT OF THE FINTECH ACTIVITY DRIVERS IN NORWAY

## 6.2 MARKET ENTRY CONDITIONS

Now that we have identified and assessed the situation in the drivers of FinTech in Norway, we seek to understand the market entry conditions for new players in the FinTech segments. This will let us determine whether the market conditions allow for FinTech startups to enter, or if there are structural or competitive entry barriers. To provide a general overview of the market conditions for the entry of new players in the different segments of financial services, we utilize the framework of Joseph Bain.

Bain argued that entry conditions were dependent on the magnitude of structural entry barriers, and the ability and profitability of incumbent players to utilize entry-detering strategies. Analyzing these factors, Bain identified three market conditions:

1. **Blockaded entry:** A market with high structural barriers will be difficult or impossible to enter, regardless of the incumbents' entry-detering strategies
2. **Accommodated entry:** If the structural barriers are low, and the incumbents either are unable to effectively utilize entry-detering strategies, or the cost of utilizing these strategies are higher than the lost profit of new market entrants, entry is accommodated for new entrants.
3. **Deterred entry:** If the structural barriers are low, but the incumbents can effectively utilize entry-detering strategies, entry is deterred. (Bain, 2014)

There are three main types of structural entry barriers:

- 1.1 **Control of essential resources:** Incumbents have effectively assumed control of a resource or channel in the vertical value chain, and can use this control to hinder new entrants from gaining access.
- 1.2 **Economies of scale and scope:** Markets with large scale advantages, for example in production or distribution, will make it hard for new entrants to operate at low volumes. Entrants must hope to achieve critical mass before they can hope to compete effectively against the incumbents, and this requires a larger initial investment.

1.3 Marketing advantages of incumbency: In markets with high brand loyalty or other strong customer relationships, building a customer base and achieving a successful market entrance is hard for new players.

In addition to structural barriers, incumbent players might attempt entry-deterring strategies to reduce competition. Examples of entry-deterring strategies are limit and predatory pricing, where incumbents lower prices to signal lower expected profits or drive out smaller rivals. Another example is strategic bundling; the ability to offer a group of products that either lowers accumulated prices or improves user experience (Besanko & Dranove, 2013). The ability to utilize these strategies will impact the market entry conditions. In the following sections, we have investigated the structural entry barriers and entry-deterring strategies in each of the four banking functions.



## FINANCING

In Financing, the primary resource a bank needs to be able to lend to its customers is access to capital. Traditional banking bases its ability to lend on its asset management operations. Customers deposit money in the banks, and the banks use these balance sheet assets as security in lending to its customers. In this way, the incumbent banks have a clear advantage over new entrants, who often target this specific segment without having any asset management operations. This might be one of the reasons new entrants primarily target the smaller loan segments, such as consumer credit, where the need for large balance sheet assets is lower. However, the new FinTech solutions of Crowdfunding- and lending do not have the same restraint. P2P lending is based on creating a platform where individual lenders provide capital directly to demanding consumers or businesses. This circumvents the need for large assets on the balance sheet, and thus lowers the barriers to entry.

The incremental costs of lending to one additional customer are low, which should point toward lower average costs at higher volumes and economics of scale effects. However, the influx of new, more effective technologies lead to startups being able to serve customers at lower costs. The go-to-market of new solutions is solely through websites, a low-cost sales channel. Further, new automated solutions for credit scoring are decreasing the need for credit analysis personnel. Traditional banks have also benefitted from unique access to consumer information to be able to assess creditability more effectively than other players. However, part of the new PSD2 regulation requires banks to share this information with any enquiring party. Thus, through lower sales and operating costs, startups avoid building large SG&A assets that traditional banks are paying for today. New entrants can in this way offer lower prices than the incumbents.

The marketing advantages of incumbency vary between the different segments within financing. When discussing consumer preferences in the previous chapter, we looked at the trust consumers have in Norwegian banks. We found that while brand loyalty and trust is important, especially in larger financing decisions such as housing loans, the trend is leaning towards higher customer mobility, focus on easy solutions, and price. This is evident in the consumer credit market, where new players with no brand or customer base have been able to take considerable market shares.

Finally, incumbent players have shown limited ability to utilize entry-detering strategies. The loan market is already characterized by competition between the incumbent banks, with relatively price sensitive customers. There are some bundling effects as consumers have shown preferences toward keeping all banking products with the same bank. However, as new solutions are developed that increases accessibility to all products regardless of supplier, the benefits of bundling will be reduced.

## ASSET MANAGEMENT

In Asset management, the easy access to cheap data capacity means the primary resources for effective Asset management are knowledge and capabilities. The ability to offer superior returns requires personnel with extensive investment knowledge, which is expensive to build

from scratch. The value proposition of new technology solutions in this area is the automation of the investment process. Robo-advice and innovative wealth management solutions attempt to effectively manage investments with lower dependency on personnel, and thus at lower costs. At this point, the effectiveness of these solutions is still unproven. Regarding economies of scale, as seen in the Financing segment new IT and digital solutions combined with cheap data capacity diminishes the initial investment needs for new Asset management entrants, and reduces scale effects.

Brand loyalty within Asset management is characterized by the same trends as seen in Financing. For larger decisions with heavy implications for the safety of your finances, there are benefits of being a larger bank with higher trust among consumers. Thus, especially deposits management might be heavily influenced by brand loyalty and trust. However, consumer preferences are constantly changing, and if new entrants can prove an ability to deliver better user experiences and products, the importance of brand loyalty will likely diminish.

As we have seen, one of the main value propositions of for example robo-advice is delivering higher returns with lower costs. If solutions are able to deliver on this, traditional asset managers structurally have too high operating costs to be able to utilize entry-detering strategies.

#### PAYMENTS

As PSD2 opens the Payment Services market to all third-party players, control of information and access to transaction data will no longer lie solely with the incumbent banks. All interested parties will be given free access to the required resources, and experts indicate the payments and transaction services markets might be the most affected by PSD2 and FinTech in general.

Today, there also seems to be no economics of scale in payments. Vipps, the current market dominator, is operated by incumbent banks with negative profit on each transaction made through the application. The expectation is that new technology, like Blockchain, will decrease the costs of operating these services, and the ability to utilize this technology might just as likely lie with new startups as with traditional banks.

Free access to information and new technology means that the real battle for the Payments market will be fought through consumer access and becoming the “go-to solution” for users. One could view the already strong position of Vipps as a strength, as they are the clear top-of-mind solution within mobile payments in Norway. However, there are other services that have significantly higher user access and brand recognition than Vipps. Examples are Facebook, Google and Apple. These companies are moving into mobile payment services and friend-to-friend transactions. As such, in the Payments market it might actually be the new entrants who have marketing advantage over the incumbents.

## AUTHENTICATION

As seen, the incumbent solutions in Norway are mainly forms of early FinTech, and as such technologically advanced products. The essential resource for challenging these incumbents is technology, the ability to develop new products that easier, cheaper and just as safely identify and authenticate users. While developing new, advanced technology is expensive and requires significant expertise, FinTechs like Zwipe have shown that it is possible also for challengers.

The economies of scale within authentication depends heavily on the solution; a new authentication software can easily be rolled out to a large amount of users with low fixed costs, while producing and installing new physical products, for example a face recognition interface, will require significant scale. This is possible for startups to achieve, but it will require considerable time and resources, and thus might require startups to assume partnerships with incumbent players.

The main determinant for customers of authentication products is complete trust in the security of the solution. This makes the marketing advantage of incumbency high.

## CONCLUSION

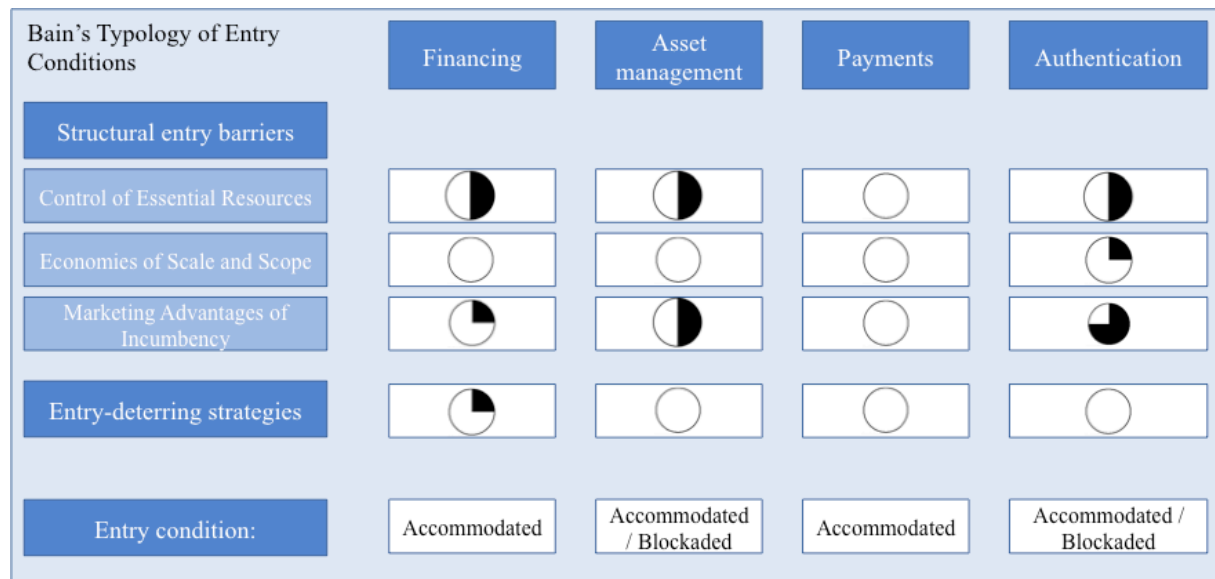


FIGURE 21: BAIN'S TYPOLOGY OF ENTRY CONDITIONS

As seen in figure 21, the overall market entry conditions are positive for new FinTech startups. The exception is within some segments of Asset management and Authentication. In Asset management, delivering superior returns is dependent on significant expertise which takes time to build, and consumers require a high level of trust in who they let manage and advice them on their finances. In Authentication, some services require an absolute trust in the solution provider, and achieving the required trust takes time. While these barriers create more challenging market entry conditions for some FinTechs, they can be broken down over time.

## 6.3 FORECASTING THE FINTECH MARKET

### 6.3.1 METHODOLOGY

In this part of the paper, we seek to utilize our investigations into the different drivers, segments and market conditions of FinTech to forecast some possible scenarios for the FinTech development over the next five years. First of all, the future development of a young and highly volatile market such as FinTech is extremely difficult to project. Being able to accurately forecast the size of the different segments is thus impossible. However, we do believe there is significant value in looking at different possible scenarios, investigating the different variables that will affect the future development, and attempting to quantify some of these effects. As previously mentioned, we use the identified potential addressable markets (PAMs), comparable market developments, economic theory and input from expert interviews to do this.

First, we look at the PAMs. This is the addressable market for each segment, representing the roof of the market size at 100% penetration. The maximum total value of the FinTech segment market in 2022 is thus the forecasted value of the PAM in 2022. The PAMs are markets within Financial Services. As previously determined, Financial Services in Norway are on a general and long-term basis saturated, steady growing markets. There are of course segments with different characteristics, but mainly, there is a steady historic growth and a low probability of large disruption. The year-to-year fluctuations can be significant, but for this purpose, it is only necessary to look at the total, accumulated effect over five years. On this basis, we estimate a five-year CAGR, determined from historic growth rates, controlled for eventual trends or one-off fluctuations.

After determining the five-year forward PAM, we look at different scenarios for the adoption or penetration of FinTech in five years within each segment. Where possible, we look at comparable market developments. These can be the development of the same segment in different countries, or the development of comparable technologies. We then take into account the situation within the different FinTech drivers in Norway, and the market entry conditions. Finally, we also rely on expert input. Through these considerations, we attempt to determine what variables or happenings that will determine which scenario actually unfolds, and where possible, the quantitative impact.

### 6.3.2 ESTIMATED SEGMENT SIZES

#### FINANCING

Within the financing segments, we considered net loans to measure FinTech penetration and potential addressable markets. In addition, we saw an underbanked segment that will be increasingly serviced with the growth of new solutions. We found that the current penetration of crowdlending and crowdfunding platforms is low, as these services have yet to be established in the Norwegian market. The digital Neo-banks, however, have found a profitable position in consumer credit.

The PAM for the Crowdlending segment was measured as net loans to corporate customers, plus a 10% underbanked segment, amounting to 1 487b NOK. Looking at the historical statistics for net loans to corporate customers, the annual growth rate has been low and fairly stable, with an average annual growth rate of ~4% since 2012. However, this is partly driven by an uncharacteristic boost from 2014 to 2015 of 10%. We therefore believe the correct long-term, stable growth rate is around the median 3-4%. Using a CAGR of 3.5%, the 2022 PAM of crowdlending is 1 766b NOK in net loans.

In Crowdfunding and Neo-banks, the PAM was measured as consumer credit, plus a 15% underbanked segment, which amounted to 111b NOK. Statistics since 2012 show a fairly stable growth rate of ~5% annually within net loans to personal customers, with a significantly higher growth rate within the consumer credit segment. Consumer credit amounts to 3.8% of the personal loan market, and has an average CAGR of 9.1%. We assume that the historic resilience of these growth rates indicates they will continue also over the next five years. This could change dramatically if the consumer credit growth is proved to be a bubble, as some experts fear. However, even given these growth rates, consumer credits will only amount to 4.6% of the personal loan market in 2022, which is still not a dramatic portion. Thus, we estimate a PAM in 2022 of 172b NOK.

To look at the potential Fintech penetration of Crowdlending and -funding, we looked at the comparable success scenario in the UK, where crowd platforms have been established and successful for several years. They now amount to 15% of the lending market. In Norway, there are no obvious differences to the UK on key drivers of crowd platforming such as consumer and investor preferences, or access to technology and talent. There are also low market entry barriers. What is different however, is that Norwegian regulations are lagging significantly, and making it difficult for new players to enter the market.

When testing this scenario on experts, they agreed that regulations are the main constraint for the crowd platforms in Norway. Most agree that at least the 15% seen in the UK is achievable – it will however take more than five years to reach this level. Another constraint identified is the strong trust Norwegian consumers have to banks, which might further slow adoption. They see the strongest potential for fast growth in the underbanked segment, while challenging the banks in their core business will be harder. These considerations suggest an estimated crowd-platform market of 5-10% of the PAM. For crowdlending to businesses, 5-10% of the PAM equals lending volumes of 90b-180b NOK in 2022. For crowdfunding consumer credit, it equals consumer credit lending volumes of 9b-17b NOK in 2022. This is an ambitious forecast, and achieving anything close to this level requires quick changes to regulations. If regulations continue to lag, we could potentially continue to see low-to-none activity in crowdlending platforms in Norway.

Within digital neo-banks, the technology adoption is basically finished. 91% of Norwegians use internet banking, and it happened within a handful of years. However, the traditional banks were quick to adapt, and offer the same products as the neo-banks on most services. Thus, the neo-banks are now competing against traditional banks. In 2017, we found the neo-banks' market share within consumer credit to be 36%.

The competition for market share over the next five years will probably be intense. The consumer credit market has delivered high profits, and the Neo-banks have been especially dominant in selling high-risk consumer credit with large interest margins. The outcome is uncertain, and will likely depend heavily on consumer preferences. Assuming the Neo-banks can perform the loan services cheaper because of lower fixed cost positions, the consumers' choice is either slightly better interest rates at the Neo-banks, or brand loyalty and trust levels in traditional banks. Consumer preferences are also likely to determine to what degree traditional banks pursue an entry into the profitable high-risk consumer credit market. According to Øyvind Brekke in DNB, a main reason for not pursuing this market is a higher responsibility for financial stability. However, if consumers show that there are no negative brand effects of operating in these markets, and the profitability maintains its high levels, we believe the traditional banks will eventually pursue higher yield consumer credit. In addition to consumer preferences, changes to regulations will be influential. Regulations are currently allowing the Neo-banks to push the border for high-risk consumer credit, and a shift to stricter regulations will negatively affect the Neo-banks' competitiveness.

To summarize these considerations and illustrate the uncertainty in how market shares will develop, we have identified several possible scenarios below.

Scenarios in market shares of consumer credit:

1. Consumer preferences moving towards lower brand loyalty, traditional banks unable to adapt cost structure = Increasing market share of Neo-banks.
2. Consumer preferences moving towards lower brand loyalty, traditional banks able to adapt cost structure = Continued competition for market shares, assume no change
3. Consumer preferences trending towards higher loyalty and more skepticism to neo-banks = Decreasing market share of neo-banks.

Scenarios in market shares of high-risk consumer credit:

1. No regulatory hinder, no increased competition from traditional banks = Neo-banks maintaining dominant position
2. No regulatory hinder, traditional banks aggressively moving into high-risk consumer credit = Continued competition for market shares, assume no change
3. Stricter regulatory environment for high-risk consumer credit = Lower market growth and decreasing market share of Neo-banks.

Conclusively, we see both positive and negative possible developments in the neo-banks' market share, and the outcome depending on consumer preferences and regulations. Assuming the Neo-banks maintain their current market share of 36% of consumer credit, this amounts to 53b NOK of consumer credit in 2022.

## ASSET MANAGEMENT

Within asset management, we looked at both deposits managed, and advisory revenue. We found that the FinTech asset management players in Norway have been able to secure positions in smaller niches, but are currently serving a very low percentage of the potential market.

For Innovative deposits services, we found a PAM of 1 158b NOK personal deposits under management, and an advisory revenue of 34.9b NOK. Since 2012, personal deposits volumes have grown by an average annual growth rate of 7%, but with a decreasing trend. In 2017, the growth was 4.6%. To account for this trend, we assume a five-year CAGR of 5%. This results in a 2022 PAM of 1 478b NOK deposits under management. The interest margin on deposits from personal customers has fluctuated between 2.3% and 2.7% since 2008. We therefore assume an interest margin of 2.5% in 2022. We thus find a deposits advisory revenue PAM of 37.6b NOK in 2022.

For Automated investment advice, we estimated professional investment advisory revenues to find a PAM of 15.8b NOK. Assuming a saturated and stable market, we expect its development over the next five years to follow GDP growth. Statista forecasts GDP growth of ~1.86% p.a. in Norway. (Statista, 2017) Using this, we find an estimated PAM in 2022 of 17.3b NOK.

Robo-advice, advanced analytics and automated deposits management are the FinTech solutions utilizing the newest, most advanced technology. Even in the US, who is leading the charge in robo-advice, popularity did not really soar before 2016. Over the last year however, successful players have been growing extremely fast. One example is Nutmeg. Over the last 12 months, Nutmeg has doubled both assets under management and customers, reaching £1bn assets from 49,000 customers. (Beioley, 2017) Globally, assets under management in the robo-advice segment grew by ~80% in 2017, but the growth is expected to slow down going forward. (Statista, 2017) We are currently in the early phases of the majority accepting and adopting robo-advice solutions, and as the market matures, annual doubling of managed assets is unlikely.

In Norway, we have yet to see an initial surge into automated asset management solutions. As the services become mainstream in other markets, we expect this to be mirrored here. Assets under management globally grew by ~90% in 2016 and ~80% in 2017, with expectations of a continuously decreasing growth rate over the next five years. (Statista, 2017) A simulation of the effect a similar development would have on assets managed in Norway is seen in the table below.

| <b>First year of initial surge</b>                             | <b>2018</b> | <b>2019</b> | <b>2020</b> | <b>2021</b> |
|--|-------------|-------------|-------------|-------------|
| <b>Assets under management by end of year 2022 (M NOK)</b>     | 2 442       | 1 628       | 1 017       | 599         |
| <b>FinTech penetration on deposits from personal customers</b> | 0.17%       | 0.11%       | 0.07%       | 0.04%       |

These scenarios indicate that even though we might see a quick growth in assets under management in FinTechs, the penetration on deposits from customers will probably remain low. When it comes to managing deposits, consumers are generally highly risk-averse, and the habit of saving in bank accounts is highly robust, especially for consumers without an excess amount of income or wealth. There are high barriers for allocating deposits out of risk-free bank accounts. This has been evident over the last few years in Norway, where record low interest rates, even negative real interest rates, had relatively little effect on personal saving habits. (Havnes, 2016)

Advisory revenues within both alternative solutions for deposits and professional investments are likely to follow the trend seen in assets under management. However, building revenues is often a more gradual process than building assets; revenues are often dependent on and a function of the utilization of assets. While assets under management can experience a sudden surge, there will often be a delay in converting these to revenues.

The advisory services will build on technologies such as AI, machine learning and big data analytics. The development in revenues might therefore follow the development in revenues within these segments. Statista estimates the global AI market, including all industries, to grow by ~60% p.a. until 2022, and they estimate the global big data analytics market to grow by ~20% p.a. over the same period. (Statista, 2017) Using these numbers as comparable technology growth forecasts, we can estimate deposits advisory revenues of 2m-9m NOK, and investment advisory revenues of 446m-1880m NOK, in 2022. These spreads are obviously very large, and they underline the uncertainty of attempting to forecast markets that just recently became relevant, based on new technology still under development.

Even at the 60% p.a. growth rates, FinTech seems to remain a small part of asset management advisory in 2022. The penetration would be 0.02% within deposits and 11% within investment advisory. One of the main constraints of FinTech growth in this area is the fact that consumers have trust issues with leaving their deposits and investments with robots. However, an interesting aspect of the asset management FinTech solutions is the fact that not all experts see them as competing replacements for the traditional, human advisors. Some see them as complementary services that will enhance what investment banks and wealth managers deliver today. A positive response from banks could drive faster adoption of FinTech solutions, without having to convince consumers to trust in robo-advisors. This would potentially boost the penetration numbers significantly.

## PAYMENTS

### **Alternative payment methods:**

Within alternative payment methods, we looked at the number and the value of transactions to find the PAM. In 2017, there were 3b transactions in Norway. Over the last 8 years, electronic card payments have grown with a stable rate of ~9% annually, while the overall number of payments has grown by ~7%. We expect this to continue, meaning non-electronic payments will decrease. This results in 4.3b payments in 2022. At the same time, the average transaction value has decreased every year since 2008. We assume this trend to continue, at



around -2% p.a. In 2017, the total transaction value was 17 592b NOK. With our estimates, the PAM in 2022 will be 22 657b NOK.

The FinTech penetration in 2017 was 4.3% in the number of transactions, and 0.04% in the value of transactions. These seem like low numbers, but considering the fact that two years ago the penetration was 0%, mobile payment solutions have grown extremely fast. The experts we talked to indicated that this trend will continue, and they expect new payment solutions to have close to 100% penetration in some functions.

The two important sub-segments within payments in Norway are payment cards and account transactions. First, experts believe that in the long-range, mobile and other alternative solutions will replace physical payment cards completely. Whether this will happen within 5 years is uncertain. It is also uncertain whether the dominating solutions will be the mobile alternatives we see today, such as Vipps or Alipay, or new solutions based on new technology, for example biometrics. There is, however, little doubt in the fact that the way we pay for goods and services on the go will change drastically. Second, experts also expect changes within account transactions, but to a lower degree. The way account transactions can be performed today, for example through the bank application on your mobile, is not that different from the FinTech mobile payment solutions. Experts do however expect paper invoices, and to some degree all invoicing, to gradually transition into new solutions that offer optimized processes. An example of a relevant player in this segment is Klarna, who is aiming to make B-to-C online transactions smoother.

To estimate the FinTech penetration in 2022, we assume that ~80% of payment card transactions will be handled by new solutions. The remaining ~20% signifies that some consumer segments have significantly above average stickiness, slowing down the penetration rate as it gets closer to saturation. This is evidenced in the technology adoption curve of other technologies such as the telephone, the credit card and social media, which looks like an S-curve. (Rieder, 2015) In addition, Norway is on the forefront of utilizing new payment methods and we believe the rest of Europe and the US will be slower to adapt, meaning international transactions will still require the traditional payment methods. In account transactions, we believe FinTech solutions will grow fast, but more gradually. From 2016 to 2017, mobile transaction methods grew by 30% in Norway, and it is possible to envision this growth rate continuing.

These assumptions and estimates result in a FinTech penetration of ~70% of the total number of payments in 2022. This is ambitious, but realistic based on the optimism towards alternative payment solutions in the financial services industry in Norway today, especially as alternatives to payment cards. The penetration measured in value is significantly lower, around 5-10%. This is a result of a relatively low penetration of ~16% in account transfers, which stood for ~95% of transaction value in 2016. For alternative payment methods to increase their relevance measured in transaction value, new solutions that significantly improve the payment processes in consumer-to-business and business-to-business transactions will need to emerge.

### **Cryptocurrencies:**

The current utilization rate of cryptocurrencies for payment services is zero. As previously determined, the current popular currencies are purely speculative investment assets, without any real applications in financial services. Thus, any assumption on the five-year forward penetration rate is without value. Cryptocurrencies can both remain a speculative product with no practical use, and become a complete replacement of traditional currencies. The main determinant is whether new cryptocurrencies can achieve full trust from consumers, businesses and authorities.

### **Credit scoring services:**

The final segment within payments is credit scoring services. Here, we estimated the PAM by looking at the current resources spent on credit scoring within financing, and the potential revenue from transactions within payments. To estimate the PAM in 2022, we use the 4.3b transactions forecasted within alternative payment methods, and assume an equal revenue opportunity per transaction. Within financing, which is pure financial services revenue, we expect a growth equal to GDP. This results in a PAM of 12.1b NOK in 2022.

Our investigation showed that automated credit scoring services are already an important function, and that especially traditional banks are increasingly utilizing these automated solutions. The banks are expecting huge cost savings going forward, as loan granting and credit scoring moves to automatic solutions. As both FinTech startups and traditional banks have adopted these solutions, we asked some of the experts on the area whether automated credit scoring is about to completely replace human credit advisors. The response we got was that for all standard credit scoring of personal and corporate customers, the answer is yes. For the more complex loan processes, for example larger corporate loans, human advisors are still necessary. In addition, the GDPR regulations include a rule that customers have the right to demand manual credit scoring. These considerations indicate that the roof of the FinTech penetration is below 100%. In addition, one must consider the S-curve of the technology adoption curve, with diminishing penetration rate closer to saturation. Thus, we estimate a penetration of ~70% of the financial credit scoring PAM in 2022, which would amount to 1.3b NOK.

Within payments-solutions, we expect a slower adoption, as these solutions are not solely replacing credit scoring services done manually today, but attempting to create a new market where customers are offered consumer credit on the spot as they conduct payments. Payment credit scoring solutions also have a very low current penetration rate at around 0.4%. Increasing this would depend heavily on the development of the payments-market. As mentioned, the core market is online transactions, as it is easier to conduct automatic, instant credit scoring on online shoppers. We believe that in five years, this will continue to be the important segment. Measured in NOK, online shopping amounted to 50.1b in 2016, which would signify 0.3% of total transaction value (PostNord, 2017). This is about the same penetration as FinTech, and is expected to grow significantly. However, even at a CAGR of 50%-100%, online shopping will not amount to more than 2%-9% measured in value. A development in FinTech penetration along these lines, 2%-9%, would indicate FinTech payments-based credit scoring revenues of 203m-914m NOK.

Combined, the financing and payments based credit scoring services would amount to 31% of the PAM in 2022.

**ALTERNATIVE AUTHENTICATION SERVICES:**

In authentication services, we saw that a large part of the currently utilized services are seen as a part of early FinTech, such as BankID. This caused the current FinTech penetration to be high, at 88%. The major non-FinTech player was BankAxept, who provide authentication services for physical payment cards. As described in the payments segments, physical payment cards are on a declining trend and might be extinct within 5 years. BankAxept has even updated their mission statement, now aiming to “develop new payment services for a constantly changing world.” (BankAxept, 2017) In addition, new solutions based on advanced technology, such as biometrics, might further revolutionize how consumers are identified and authorized. Thus, we expect that the FinTech penetration within authentication services will be close to 100% within five years.

Forecasting the size of the authentication market in five years is difficult, as the historic growth has been volatile. Since 2012, we can see market growth rates from 3% to 60%. The market growth is likely highly sensitive to the introduction and popularity of new solutions. The introduction of a new, revolutionizing solution might cause a sudden, large replacement of existing systems, temporarily boosting revenues. To underline this volatility, we have illustrated three scenarios below; either 0, 1 or 2 revolutionizing solutions are introduced to the authentication market. In normal years, we assume a growth rate of 5%, which is the average of low-growth years since 2012. In years with new solutions, we assume a 50% growth rate, which is the average of high-growth years since 2012.

| <b>Years with revolutionizing solutions</b> | <b>None</b> | <b>2020</b> | <b>2019 and 2021</b> |
|---|-------------|-------------|----------------------|
| <b>Market size 2022 (M NOK)</b>             | 886.7       | 1 266.7     | 1 809.5              |

Estimating the market size is, as predicted, uncertain. However, we do have confidence that authentication in 2022 will be close to 100% serviced by FinTech solutions.

## 6.4 IMPACT ON THE TRADITIONAL BANKING SECTOR

We have seen that while the expected growth of the FinTech movement varies between the different segments, it will have implications in all parts of the banking value chain. We will now investigate the effects FinTech will have on traditional banks within each segment. First, we will discuss some of the cross-segment impacts. These include changes to the banks' organizational structure, and the effect of the consumers' channel preferences. We will then provide a segment-by-segment analysis into the role traditional banks might play in the future banking market.

### 6.4.1 ORGANIZATIONAL STRUCTURE

With an increasing number of new startups in the market for alternative banking, and decreasing customer and brand loyalty, the competitive environment among the banks is increasing, which put pressure on profits.

In an interview with Finansforbundet earlier this year, the four largest Norwegian commercial and savings banks, DNB, Nordea, Sparebank 1 and Eika acknowledged that investments in infrastructure and tech competence within their corporation is a crucial organizational structure change to remain a competitive and relevant banking platform for their customers. Heavy infrastructure investments are made to meet customer expectations in the new digital world, such as the need for real-time bank applications and more online self-service products (FinansForbundet, 2017). As mentioned, many Norwegian banks invest resources in establishing accelerator programs, incubators or spin-off companies like Vipps, to ensure sufficient competitiveness on FinTech and digitalization in general.

The increased digitalization and infrastructure changes leads to a shift in the competence requirements and the workforce size in the incumbent banks. Firstly, the banks are turning their heads towards tech expertise. In Finans Norge's annual competence survey, 90% of employers in the financial services sector expected to hire more expertise within technology, data, service design and analytics (Kerr, 2016). Banks need tech competence both to innovate and drive the banks in the right direction, but also to comply with regulations. For instance, we see how the increased amount of sensitive information available online and the GDPR regulations call for increased cyber security, authentication and monitoring from the banks.

The second change in the organizational structure is seen through large cuts in the workforce. As more services are digitalized, and the required competence levels change, the banks will need to let go of employees. Nordea, which currently employs over 32 000 people across 17 countries, stated in their Q3 report in 2017 that they would cut 6000 positions, including in Norway. Their newly launched chat-bot managed to answer over 10 000 questions from customers within one month only, meaning there will be less need for human consultants in the future with continuing digitalization (Nordea Bank AB, 2017). Another example is how DNB has already estimated that they will be able to reduce their 1200 loan granting staff by 50% within the next one to two years due to automatization and algorithms performing credit scoring (Trumpy, 2017).

Organizational restructuring to more tech-focused human resources, lower number of employees and investments in tech infrastructure will change the operating model of Norwegian banks. We believe Nordea when they project the future Norwegian bank to "look more like a software company than a traditional bank."

#### 6.4.2 CHANNEL PREFERENCE

Through our description of the FinTech segments, it is evident that practically all FinTechs are attempting to move all banking to digital channels. We have seen that although Norwegian bank customers increasingly prefer digital banking, the preference for human advisors remain strong in some functions. A 2017 EY survey showed that the most important reason for not using FinTechs was a clear preference for the possibility to contact human advisors for important financial decisions (EY, 2017). Glenn Sæther in Sparebank 1 emphasizes that although the younger generations are more tech-savvy and digitalized, they still prefer human interaction in larger financial decisions, such as buying their first homes (SpareBank 1, 2016).

Based on consumer preferences, we do not believe in a full digitalization of all banking functions within the next 5-10 years. A more likely scenario is that we will see more omnichannel banking, where customers can effortlessly and seamlessly intertwine their bank interactions across multiple channels, thus bridging physical and digital banking (Hadjikyriacos, 2017). It pertains to creating an "anywhere, anytime" experience for customers, personally tailored to their individual needs and preferences and thus leaving the former one-size-fits-all mass market approach behind (World Economic Forum, 2015, s. 102).

Within digital banking, consumers will to a larger degree demand instant access to their banking services at the platform they are on. As such, banking channels will follow the development of other consumer electronics, like the smartphone or the smartwatch. This means that while Internet and mobile banking were revolutionizing technologies when they were introduced and adopted, they might be completely irrelevant at some point in the future. This further underlines a point made earlier, that the focus on banking will increasingly move to the consumer experience. Players who want to remain relevant must be able to meet the consumers in their preferred channel, requiring swift adapting to technology trends not only in banking, but across all industries.

#### 6.4.3 PAYMENTS

In the forecasting segment, we found that experts are expecting FinTech to penetrate a large part of the Payments market. To investigate the impact this development will have on traditional banks, we need to consider two questions: First, which players will dominate the P2P and C2B payments segment? And second, which technologies will they be utilizing?

In the P2P segment, the current leading FinTech player is Vipps. Starting as a DNB initiative, Vipps is now backed by all major Norwegian banks. In November 2017, Vipps announced it would be merging with BankID and BankAxept. This move is seen as an attempt to create a complete payments services provider, as they now cover all aspects of payments from authentication to payment cards and mobile transactions. It is also seen as a response to the

increasing entrance threat from global tech giants (Finans Norge, 2017). While Vipps currently has a clear leading position, Facebook, Snapchat and Apple have even larger customer bases and network benefits, meaning that proliferation of their own payment services will happen quickly and in large scale. Facebook has already received concession to operate as a payments provider in Europe, which in combination with PSD2 in 2018 will allow Facebook's users to check their balances and conduct payments directly through the Facebook or Messenger app. With over 3,4 million Norwegian users, Facebook has a unique starting point for challenging the banks' control over user interfaces (Hernaes, 2017). Apple recently entered both the Swedish, Danish and Finnish payments market, but has yet to confirm a Norwegian market entry (Moe, 2017).

Further complicating the payments competitive landscape, is the fact that Vipps is currently not making any profits on P2P transactions. By January 2017, DNB had invested around NOK 600 million in developing and operating the payment app, without making any profits (Hoemsnes, 2017). At DN's FinTech conference, Vipps claimed to gain from controlling customer relations and building consumer behavior information, but has not currently shown the ability to convert this into real profit. This is also evidenced by Vipps aggressively attempting to move into C2B transactions, both in retail and e-factoring, which have higher margins (FinansForbundet, 2017). Whether larger scale players, like Facebook, might profit in this segment, is still unknown.

In the C2B market, the traditional banks and the payment card companies like MasterCard and Visa currently hold strong positions. As seen in the forecast segment, business and account transactions are likely to have more competitive strength versus the FinTech solutions, and might not experience as quick change as the P2P. In addition, the payment card companies have shown innovative abilities themselves, and they may be the ones who can ultimately offer the best solutions to their users. In Norway, their strongest challengers are Vipps, and the tech giants, who are also attempting to create invoicing services directly in their mobile applications. In addition, players like Klarna offer complementary solutions that aim to optimize processes regardless of payment methods, and if successful they might claim a significant portion of the profit pool.

As for what technologies these players, or at least the ones who prove themselves competitive, will be utilizing, most experts believe the physical payment cards will become extinct. The future value-add of a physical payment card is unclear as the adoption of alternative payment solutions and digital wallets increases. The payment cards are today used to connect a transaction to a specific bank account, and to authorize the validity of the transaction. New mobile or other digital solutions will be able to provide these services in streamlined processes. For instance, eWallets offer instant access to all digital payment cards, and allows for a simple, common authorization, while Klarna offers one-click checkouts where consumers can easily choose between all payment methods. Another example is moving payment authorization to smart wearables, such as Fitbit Pay, which allows their customers to pay with their Fitbit smartwatch in regular bankcard terminals (Lorentzen, 2017). These solutions even have some experts projecting a future within payments where payment cards are extinct not only physically, but in all forms.

While we believe in the transition towards smartphones and wearables for conducting payments in the future, we see it primarily as a bridge to the use of biometrics. Although it may take more than five years before the technology is sufficiently developed, secured and proliferated in Norway, we believe in a gradual adoption of fingerprint, face identification and voice recognition to conduct payments both P2P and C2B, and in both digital and physical payments situations. Norwegian biometrics company IDEX recently announced their partnership with MasterCard, which will provide their next generation MasterCards with IDEX' flexible off-chip fingerprint sensor (IDEX ASA, 2017). On a global level, MasterCard recently launched a test of a biometric based payment system with "MasterCard Identity Check", also known as "selfie pay", where the customers use facial recognition to verify and conduct payments. The solution is available in US, Canada and Netherlands. In San Fransisco, Google also recently finished a test launch of their innovative payments service Google Handsfree, using voice recognition and smart phones to authenticate purchases (Bølum, 2017).

Another exciting trend in payments, although not a replacing alternative payment method, is the transition towards real-time-payments processes, away from the traditional batching process. This is an update of the banking infrastructure for payments, and is expected to replace existing technology within five years. Susanne Hannestad in FinTech Mundi lists this as a dominant theme towards 2020. The system will allow for instant transactions, which will save both customers and PSPs time and money, for instance through removing currency exchange fluctuations due to processing lags.

Conclusively, we expect to see large changes in payments in the coming years. In Norway, the traditional banks are well positioned through the Vipps, BankID and BankAxept merger, but are facing increased competition from international players. We also expect a transition away from traditional payment cards to more innovative solutions, and the ability to lead this change might determine the winner of the payments race.

#### 6.4.4 FINANCING

Within Financing, our forecast scenarios saw a significant, but still relatively small penetration of 5-10% from crowdfunding and –lending platforms. The Neo-banks are already established, and are competing with traditional banks. We see two specific impacts this FinTech development will have on traditional banking. First, the technologies will increase the segmentation in the lending market by introducing new lending platforms. Second, they will bring more competition and transparency into the lending market, forcing all players to optimize their processes.

Several of our industry experts believe in a lending market with new and increased segmentation, where the different customer needs are catered on different lending platforms. The crowd platforms are attempting to remove the need for banks functioning as financing intermediaries. However, for large-cap loans to both private individuals, such as mortgages, and to larger businesses, in project financing and in investment capital, we believe the need for banks as intermediaries will remain. This is based on the banks' competitive advantage of high capital reserves, security in the central bank, regulatory knowledge and long experience

within banking. On the smaller scale however, we believe that FinTech companies in crowdfunding and crowdlending will be able to cater the underbanked customers. Marius Borthen in the crowdlending platform FundingPartner explains how banks tend to decline many loan applications from startups, SMEs or persons that are considered too small or too risky, or that simply don't fit into the bank's current portfolio, although they are credit worthy. We expect such borrowers to increasingly be served by Neo-banks and crowd platforms in the future. The lenders are compensated for the higher uncertainty of their loans through higher interest rates, at an estimated 5-20%, according to FundingPartner. This makes the new segment attractive and profitable for lenders, and FundingPartner believes this type of "mini-bonds" is an easy and transparent investment alternative to property, stocks and funds. If the trust level between borrowers, lenders and the platform sustains and is further strengthened, we expect the development of this alternative financing segment to continue.

Given this hypothesis of filling a demand gap in lending, we do not believe alternative finance providers pose a significant threat to the banks' value proposition. They are primarily expanding the financing market by serving underbanked borrower demand (Gjerde, 2017, s. 18). Ideally, FinTech disruption in the financing segment will enable a more efficient matching between risk preferences of borrowers and lender, and increased capital access for a broader range of borrowers.

The second effect on banking we expect is that introduction of online and mobile platforms will lead to more transparency in loan conditions and requirements, which will increase the competition. This will then require providers to yield quicker, easier and thus more efficient loan processes and credit checks. An example is the rise of comparison sites, such as penger.no and fixrate.no, which allow borrowers to compare loans, rates and conditions.

Earlier in 2017, DNB launched an automated and technology based lending process, where their customers could get refinancing online without the involvement of a human advisor. On 21 November, they made the service available also to non-existing DNB customers, and within the first day a few hundred had been granted funding certificates for a mortgage online. By having the customers do more of the work related to loan applications themselves, and using technology for automating the bank's credit checks and paper work, Head of Private Banking Trond Bentestuen estimates the whole process can take two minutes, even for non-customers (Trumpy, 2017). As such, regardless of the final market positions of the different lenders, we expect the increased competition from FinTech companies to push banks to increase their operative efficiency.



#### 6.4.5 ASSET MANAGEMENT

In Asset management, we saw expectations of fast growth in robo-advisory and innovate asset management. With a large potential market, the services can achieve significant revenues even at low penetration rates. In Norway, Nordea will be launching their robo-advisor, Nora, during 2017 (Nordea Bank AB, 2017), and in a competitive landscape we expect the other Norwegian banks to follow soon.

While traditional Asset management and Investment advisory is expected to prevail, we believe there are two avenues for the innovative solutions to create significant revenue, and establish a robust position. First, we believe digitalization of Asset Management services will make them more available for everyone, expanding the breadth of the customers. The cost benefits combined with accessibility means a much larger part of the population can utilize these services, and the FinTech services will be able to profit from this expanded market.

Second, we believe innovative, automated solutions will be serving as complementing solutions to human advisors. The low cost combined with large analysis capacity and extreme precision makes it believable that robo-advisory in most ways will be able to outperform human advisors. Still, Norwegians value human interaction, and have more trust in humans being able to safely manage their deposits and investments (Finans Norge, 2017). Susanne Hannestad expects human financial advisory to withstand, as people wish to talk to human advisors. Thus, we believe a hybrid Asset Management segment is more realistic than a full dismissal of human workforce within banking advisory.

#### 6.4.6 AUTHENTICATION

Within Authentication, FinTech is already dominating the solutions, and will likely have full penetration within five years. The largest technological trend we see is biometrics, and the uses and potential of biometrics was explained in the segment on Payments. Some FinTech experts have said they expect mobile and biometric authentication to replace pin codes within five years (Palmer, 2015). This requires Norwegian authentication companies, such as Signicat and BankID, to invest in developing technologies and improvement of their current services and products to remain competitive.

#### 6.4.7 CONCLUSION

Despite substantial media focus on how FinTech companies are disrupting and replacing the banks, the banks have shown considerable adaption ability. Norwegian banks have not crumbled in the face of the new competition, but they have been pushed to innovate, participate and refine their business models through cost cutting, efficiency improvements and changes in the talent recruited. Banks are investing large resources into cooperating with FinTech startups, and in tech expertise to develop their business models. We believe in an increasingly FinTech infused banking industry in the future, which will affect all parts of the value chain, from mortgages to payments.

As such, FinTech has definitely a disruptive effect on the traditional banks in Norway. No bank will be able to maintain the position they have today. However, the banks still possess

relevant strengths, and those who are able to utilize these, adapt their business model and participate in the development, will still be able to remain relevant players.

The trend we have seen in Norway that might be the primary reason banks have been able to adapt to the changing technology and consumer preferences, is the creation of a cooperative environment with FinTech startups. By utilizing their complementing strengths, banks and FinTechs have made consumers the biggest winners, in terms of benefiting from time and cost efficiency, user experiences and accessibility to banking services.

## 7. THE FUTURE OF NORWEGIAN FINTECH INTERNATIONALLY

We have investigated and presented the Norwegian FinTech market, our predictions for future development and growth of this new industry, as well as the effect on the traditional banking sector. In the last section, we seek to leverage the knowledge and insight acquired from this work to assess Norway's international potential, relative to other world leading FinTech nations.

### THE COMPETITIVE POSITION OF NORWEGIAN FINTECH

To determine the ability of Norwegian FinTech companies to expand and compete on a global scale, we identify advantages and disadvantages of the FinTech market in Norway compared to other leading countries. We utilize the insights from the other chapters of this paper, as well as input from the interviews conducted. We look at the advantages and disadvantages through the perspective of the identified driver tree, as the factors within are the leading determinants of the success of FinTech. In addition, we discuss an added dimension that was often mentioned in our interviews when discussing global competition; culture.

For our comparison of Norway with the UK, the US, Germany and China, we supplement our previous sources with a report from the Norwegian research company Abelia to quantify some of the arguments in this section. Their annual report, "Omstillingsbarometeret", compares Norway with 27 other OECD countries on their ability to restructure and adapt to digitalization and technology shifts. The agenda is to assess Norway's potential in a future with less dependence on the petroleum sector, and a restructuring towards more technology and innovation, based on around 100 key indicators. The report provides a comprehensive overview of Norway's strengths and weaknesses. The results are summarized in four main dimensions; human capital, entrepreneurship, innovation and R&D, and technology and digitalization. The key results for our analysis are presented in figure 22.

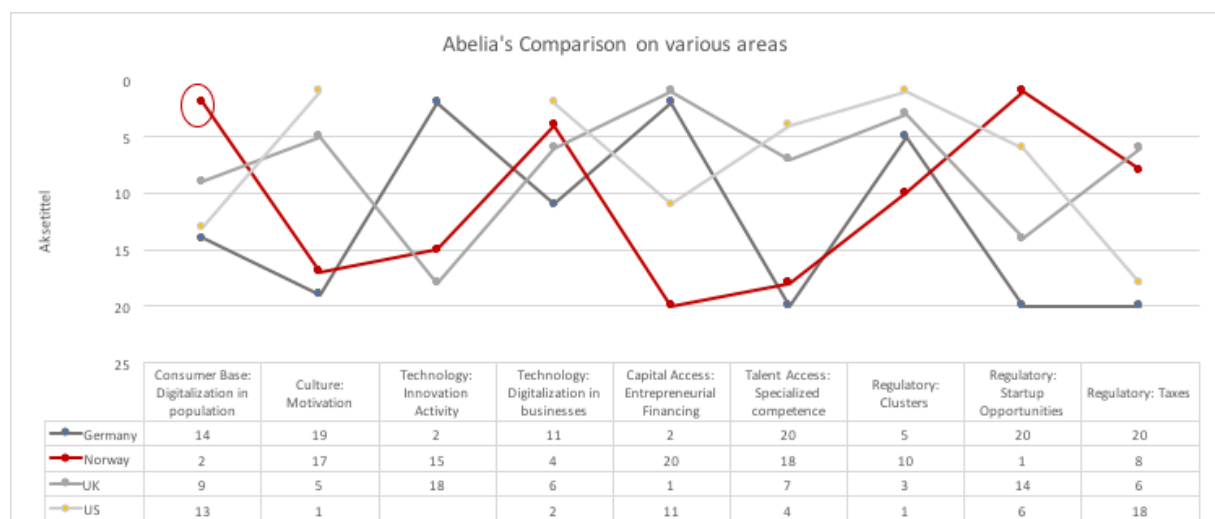







FIGURE 22: ABELIA'S RESULTS

Abelia's results show that Norway positively stands out on digitalization in the population in the business sector, and on perceived startup opportunities. These components can all drive

entrepreneurial activity within FinTech. It is therefore alarming that we see a lag on both capital access and talent access for entrepreneurs, and that the motivation for starting one’s own business is very low. These factors can both explain, and be a result of, the low innovation activity in Norway. While the tax environment is reportedly good, we still see areas of improvement in this type of regulation.

There are a range of other organizations and researchers that have attempted to rank or score Norway and Oslo on technology, digitalization or startup-opportunities. The results are often highly contradictory, and attempting to draw any objective conclusion seems impossible. One report, conducted on behalf of the city of Copenhagen (Oxford Research, 2017), ranked different cities across the globe, including Oslo, London (UK) and New York (US), on the potential of becoming a FinTech hub. They concluded with Oslo as the city with the lowest overall ranking, and London and New York as leading in all areas. At the same time, the Business Cities Group investigated Oslo’s potential of becoming a startup hub, and placed the Norwegian capital in the top 25 of global start-up hubs in the world and ranked Oslo as the world’s 6<sup>th</sup> most attractive medium-sized city for start-up investment globally. This is attributed to the increase in clusters of start-ups and entrepreneurs and a well-developed technology and data infrastructure, as well as good capital access. Oslo was also listed in the global top 5 Smart Cities, based on 40 metrics on technology, economy and open data (Clark, Moonen, & Couturier, 2017).

As such, the attractiveness and competitiveness of the Norwegian FinTech scene is debatable. To provide our own view on the situation, we utilize the insights from this paper and the interviews we conducted, and discuss Norway’s competitive position within the key drivers of FinTech growth. This will provide a comprehensive overview of the fundamental business and facilitating conditions for international FinTech success from Norway.

|                  | China<br>   | US<br> | UK<br> | Germany<br> | Norway<br> |
|------------------|--|---|---|--|---|
| <b>User Base</b> | <p>We have defined the market size potential for FinTech in Norway as banking customers and FinTech penetration rate. With a population of 1,4 billion people and a FinTech adaption rate of 70%, China’s FinTech market size potential is huge (EY, 2017). The US, UK and Germany have respectively 325 million, 66 million and 82 million inhabitants (Worldometers, 2017), all with FinTech adoption rates over 33% (EY, 2017). Even with a high penetration rate, the total potential market in Norway is too small to achieve significant network effects and economies of scale, compared to foreign competitors. This can be illustrated by looking at Vipps, which has reached an impressive 50% penetration rate in the Norwegian population, but still only has 2,7 million users — a fraction of Amazons 450 million, and the 358 million Chinese consumers using</p> |   |   |  |   |

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|                             | <p>mobile payments (EY, 2016). Marius Borthen in FundingParner also highlights critical mass as a key challenge for several Norwegian FinTech companies. As such, the Norwegian customer base itself is too small today to make it easy or possible for Norwegian FinTechs to stand out internationally.</p> <p>However, a benefit of a small consumer base is that it forces the ambitious FinTech companies to expand their markets and enter other countries as well. In addition, Gro Eirin Dyrnes in Innovation Norway highlights how the short distance between the main FinTech hubs in Oslo, Bergen and Trondheim makes cooperation easier, whereas in the US, the large distance between for instance New York, San Francisco and California significantly hampers collaboration. Cooperative efforts and dialogue between companies, FinTech organizations and the government has also been easy and effective in Norway, for instance through the mentioned IKT-Norge initiatives on FinTechguiden and the regulatory sandbox.</p>   |
| <p><b>Bank Response</b></p> | <p>From our previous elaboration on Norwegian banks' response to FinTech startups and their offerings, we consider the established Norwegian banking sector as open and friendly to cooperation with tech entrants. However, we find it hard to argue that they differ significantly from the other countries' efforts in both capital provision and other facilitation for further growth of the industry. Overall, 52 of the world's top 100 global banks have formed FinTech partnerships, and 37 have completed several acquisitions. For instance, already in 2014, the London-based bank HSBC allocated USD 200 million to fund for investments in FinTech startups to ensure the bank's technology development. While we have highlighted both Nordea, DNB and Sparebank 1's initiatives within accelerators, startup communities and financial support, such efforts are also being done in the world's FinTech leading nations: In UK, Barclays' accelerator program invest a small minority equity stake in startups, and provide mentoring and knowledge for further growth, while the American Citibank offers a similar accelerator program through Citi Plug. In Germany, all 10 largest banks seem to pursue a multi-response approach towards FinTech (EY, 2016), and Deutsche Bank has opened innovation hubs in London, Berlin and Silicon Valley to try to improve its use of digital technology (LTP, 2016). Chinese banks, on the other hand, have previously focused on buying technology and services from FinTech companies, but the trend is slowly turning towards Norway's model of more partnerships and support programs (PwC China, 2017). However, we do not believe the Norwegian banks' initiatives stand out compared to other countries'. As such, banks' response and cooperativeness is not a competitive advantage for Norwegian FinTech.</p> |

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| <p><b>Technology</b></p> | <p>It is difficult to compare the countries’ technology situation, as we have no comprehensive overview of all efforts within technology R&amp;D and initiatives for all countries. We do however see a benefit for development of Norwegian technology in Menon’s ranking of Norwegian technological ripeness as the world’s seventh best, based on access to the latest technology and the infrastructure to utilize it. Surpassed by UK and China, Norway still ranks above both Germany and the US.</p> <p>The clear drawback for Norwegian potential in developing technology for use in banking is the small scale, and having to compete with huge global players on various levels.</p> <p>On the individual talent level, Norway scores low with respect to master and phd students in science and technology courses. We will discuss this further under Talent Access.</p> <p>On the company and cluster level, Silicon Valley and Chinese technology hubs are more attractive for establishing operations and developing underlying technology, than Norwegian hubs in Bergen, Oslo and Trondheim. Minister of Industries Monica Mæland says that Norwegian businesses meet hard international competition every day, and hopes to see an increase in the amount of businesses applying to Forskningsrådet for financial support to develop new and world leading technology (NTB, 2017). Finance Innovation was in 2017 the first Norwegian cluster to work with financial technology and their effort was referred to as “pioneering” by Innovation Norway CEO Anita Krohn Traaseth (Aadland, 2017). We believe this itself is an indication on the lag in Norwegian efforts within finance technology innovation.</p> <p>On the state level, the Digital Economy Outlook report of 2017 shows how the effort levels of the Norwegian government is significantly lagging other leading nations. The report explains that policy makers in both China, Germany, UK and the US have developed specific AI-plans to intersect technology with other business sectors. US presented the “National Artificial Intelligence Research and Development Strategic Plan” on how to invest in research and integrate AI in public services (OECD, 2017). Within Blockchain, the US recently launched a plan to move over \$11 trillion of derivatives to a Blockchain infrastructure (OECD, 2017). Such initiatives are currently unparalleled in Norway, both in absolute and relative measures.</p> <p>What Norway does have is a positive development in terms of capacity for innovation and company spending on R&amp;D since 2015, according to Issuu, where banking and FinTech are the strongest innovation areas. Furthermore, Oslo is reportedly gaining international recognition as an</p> |
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|                          | <p>innovation location for a city of its size and is one of the top 10 most innovation-intense European regions, relative to country size (Clark, Moonen, &amp; Couturier, 2017). This is a healthy sign of Norway's innovation competitiveness, which hopefully will affect FinTech competitiveness.</p>  |
| <p><b>Regulatory</b></p> | <p>The regulatory environment is an important factor in international FinTech competition. Complex and strict regulations will affect not just the number of startups and initiatives in a country, but also heavily affect the ability to attract international capital and talent.</p> <p>We have seen that some leading countries have a more proactive and engaged government than what Norway currently does. IKT Norge calls out for more governmental initiative to push Norwegian FinTech industry, as Finanstilsynet is relatively absent, with no clear mandate to facilitate for FinTech development other than to assist companies that need concession to operate in the financial services sector. IKT points to how London has been shaped by a unique cooperation between the government, local authorities and the business sector. For instance, the British FCA launched Project Innovate to develop the FinTech industry as early as in 2014 (EY, 2016), and the London FinTech Sandbox initiative was the motivation behind IKT Norge's proposal for a Norwegian one. (IKT Norge, 2017).</p> <p>Although Abelia's survey shows a generally good perception of the Norwegian regulatory framework, we see how Norway is lagging on taxation on options and management incentive programs. This is an important incentive for entrepreneurs and for attracting talent in the first steps of a business. Helge Lunde in Kameo calls out for relaxing this tax regulation, and thus follow in the steps of the US, the UK and Sweden. On the other hand, Norway's corporate tax level is competitive at approximately 24%, lower than both the US (40%), Germany (29,8%) and China (29%) (KPMG, 2017).</p> <p>Further increasing the ability to attract foreign capital and talent is the fact that Norway is a small, open economy, with a high level of international trade and investments. As part of the EEA agreement with EFTA and EU, Norway has full access to the EU internal market and can freely move people, goods, services and capital across EU state borders. Both China and—US – and eventually the UK after Brexit, will have a harder time entering the EU market, compared to Norway and Germany. This itself is a competitive advantage for Norwegian FinTech. PwC expects Brexit to slow down the growth of the UK's FinTech activity, particularly foreign countries' investments in London (PwC UK, 2017).</p> <p>Simply having the most liberal regulatory environment is not always</p> |

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|                       | <p>positive. An example is China, where regulations have been very pro-FinTech, but are now going through large changes that may negatively affect the attractiveness of Chinese FinTech. Although Norwegian legislation may lag Chinese and American, it's development is stable and predictable, which is reassuring for the business sector. World Data highlight the attractiveness of starting businesses in Norway: With an average of four regulatory processes to go through to start a business, Norway is far ahead of both China (11), Germany (9) and the US (6) (World Bank Group, 2017). In addition, Norway tops Abelia's ranking as the country with the best startup opportunities, explained by good public welfare and security programs.</p> <p>In total, there are both negative and positive trends within Norwegian FinTech regulation. Some players are plying for more proactive regulation and supporting efforts, and authorities are definitely lagging the best-in-class efforts of for example UK and Germany. However, there is large trust and security in Norwegian authorities, which have contributed to Norway avoiding the issues seen in for example China.</p> |
| <b>Culture</b>        | <p>Despite good facilitations, a key concern we see in Abelia's report is Norwegians' generally low motivation to start their own businesses, with a score far below the average and the UK, the US and Germany. Abelia emphasizes how lower motivation and an underlying fear of failure gives lower entrepreneurial activity. Our industry experts point to risk-averseness and the good social security network, provided by a strong public sector, as explanatory factors for the low entrepreneurial motivation. While private investors have looked to real estate, corporate money have often found its way towards the petroleum sector, both historically yielding high return and low risk. Susanne Hannestad states that the Norwegian business mindset is generally too narrow and has been lacking sufficient international ambitions. These cultural traits have negative effects on the supply of ambitious FinTech projects, and reduces Norwegian FinTechs' international competitiveness.</p>  |
| <b>Capital Access</b> | <p>As previously argued, the Norwegian capital markets are generally good, but our industry experts and Oslo Business Region have highlighted the lack of competent risk-seeking capital as a key challenge for Norwegian FinTech startups. For instance, while the global Oslo's Q1Y17 investments were USD 17 million, London's level reached USD 421 million (Sachar, 2017). This indicates either that Norwegian FinTech startups are not standing out at an international level, or that there is not sufficient access to such capital nationally – or, worst case, both. Abelia found a clear consensus that Norway is ranked as the third worst of 22</p>   |



|                             |  |
|-----------------------------|--|
|                             | <p>countries on access to start-up financing (Abelia, 2017).</p> <p>UK initiatives, such as Enterprise Investment Scheme and Seed Enterprise Investment Scheme are highlighted as key for capital access in the UK, providing seed and growth capital. Chinese governments have been proactive and ensured strong financial support over the last few years. So far, over 750 public funds have invested in national FinTech, and EY emphasizes in a report that China is active within both seed, growth and listings investments (EY, 2016). We believe the Norwegian government has shown good efforts to assist Norwegian startups and entrepreneurs across all sectors. Today, Innovation Norway provides SMEs with innovation loans, and stand as guarantees in loan applications at private banks. In the revised state budget of 2017, it was suggested to increase the lending roof by NOK 300 million, which would allow Innovation Norway to lend out NOK 1,2 billion to innovative growth companies and startups and raise the loan guarantee roof from NOK 40 to 80 million.</p> <p>Access to capital is important not only in the early stages of businesses, but also as entrepreneurs and early investors seek to exit or capitalize on their investments. As such, an attractive IPO market will increase the number of startups and seed funding in a country. Overall, US and China have historically had the most attractive markets for listings of tech-based companies, as the EU has been lagging (Innovate Finance, 2017). The Chinese market has completed more IPOs than leading US and UK exchanges over the past ten years (EY, 2016), while the larger capital investments for listings tend to come from the US (EY, 2016).</p> <p>Conclusively, the Norwegian private capital markets are competitively weak when it comes to supporting FinTech startups. This might simply be an effect of scale advantages in investor communities, where large markets such as Silicon Valley and China are leading. Attracting this foreign capital into Norway can be difficult when also considering the small scale in the customer base. This further emphasizes the dependence Norwegian FinTech has on government support programs. Significant and competent efforts will have to be made if Norwegian FinTech shall be able to compete internationally.</p> |
| <p><b>Talent Access</b></p> | <p>On education of world-leading tech talent, both the UK and the US score far better than Norway. Norway has a good educational system and sufficient resources to offer financial support to all students, but there is obviously something missing at the elite levels. US and California “leads the depth of talent overall” for FinTech, while the UK has a high level of expertise, ranking higher than for instance Hong Kong (EY, 2016). Abelia is calling for more attractive study environments to attract national and foreign students with expertise and interest for technology, as Norway</p>   |

|  |  |
|--|--|
|  | <p>scores far below average in specialized education at masters and Ph.D. level. On the positive side, only 4.7% of Norwegian youths were neither in education nor work in 2017, which is lower than any other European country in Issuu’s survey (Clark, Moonen, &amp; Couturier, 2017). This indicates that the facilitating conditions for creating a world-leading educational system is there – but the execution has been missing.</p> <p>To attract foreign talent and entrepreneurs, Norway must utilize its greatest competitive advantage: The highest living standard in the world, with great social security and work conditions. This can be used to attract and retain talent, without outperforming the large economies on salary levels and exit opportunities. Norwegian authorities have not been proactive enough in capitalizing on these strengths. Both Chinese, British and German governments have launched initiatives to raise awareness and attract startups. Examples worth mentioning are InvestHK supporting foreign FinTechs in establishing themselves in Hong Kong, UKTI, a FinTech roadshow in numerous countries, and the BMWi Start-up portal for assistance on setting up businesses in Germany.</p> |
|--|--|

In sum, we see significant competitive challenges for the Norwegian FinTech scene to be able to succeed internationally. Most of the issues we find within the drivers point back to a key argument: Norway is not scaled to be a FinTech leading nation.

There are significant scale advantages in FinTech that make it difficult to see Norway competing at the level of the large economies. First, diversity in competence and risk-profiles in the investor community, in addition to the general investment activity level, creates far more efficient VC and seed funding markets in for example the US. Second, a very small customer base, even considering leading technology facilitation and adoption, means Norwegian startups must start with very low scale and gradually build a user base. This makes it difficult to beat for example China and India, where startups get a significant head start when they can run pilots on 100 million users. Third, the lack of competence diversity seen in the investor community is also evident in the talent base. As a result, it is difficult for small-scale countries to be leading in technology innovation and development.

With significant scale advantages, the likelihood of countries like the UK, US, China and Germany remaining world leading on FinTech in absolute terms is high. It also indicates that the giant global players, such as Facebook, Google, Alibaba and Tencent, have significant competitive advantages in developing and rolling out new services. However, this does not exclude the opportunity for individual Norwegian successes within FinTech segments. A good example of this is Klarna. Founded in Sweden and beginning with a small customer base, Klarna faced a tough challenge in expanding its business. They faced the threat of competition from heavy financial institutions on one side, and huge technology giants on the

other. However, through smart strategic positioning and aggressive innovation, they have been able to carve out a profitable niche, with high international demand.

Positive aspects for Norway are the increased awareness of and focus on FinTech. This is evident in the consumer preferences, where alternative, innovative solutions like Vipps are accepted very quickly, and in the number of initiatives and support programs from banks, interest organizations and government bodies. In addition, the community is characterized by a focus on positive cooperation over competition. Susanne Hannestad mentioned that significant efforts are being made to increase cooperation across borders in the Nordics. This would be a step in the right direction for increasing scale and improving the ability to resist the global tech giants.

*“The Nordic FinTech collaboration will help startups scale in the Nordics and gain market traction across the borders. We will share events, marketing efforts and general knowledge across companies to fuel the Nordic FinTech startup scene. (...) we believe that a strong Nordic FinTech-front will stand stronger in the global FinTech race, compared with each country’s initiatives standing alone,”*

Ingar Bentsen, CEO and Partner at TheFactory, 2017 (Lindersgaard & Frier, 2017).

# APPENDICES

## APPENDIX 1: NORWEGIAN FINTECH COMPANIES

| SEGMENT              | Crowdfunding (Investments)     |                       | Crowdlending (Loans)         |                       |
|----------------------|--------------------------------|-----------------------|------------------------------|-----------------------|
| Market Data Source   | Equity raised                  | Input from Mr. Shenor | Net loans                    | Input from Mr. Shenor |
|                      | Aparto                         |                       | Folkeinvest (prev. Myshare)  |                       |
|                      | Bidra.no                       |                       | FundingPartner               |                       |
|                      | Funde AS                       |                       | Kameo                        |                       |
|                      | MinAksjon                      |                       | Monner.no (prev. Vester)     |                       |
|                      | NewJelly                       |                       | Pangea Funds AS              |                       |
|                      | Spleis.no (prev. Frunder)      |                       | SparkUp                      |                       |
|                      | Startskudd.no                  |                       |                              |                       |
| SEGMENT              | Innovative deposits management |                       | Investment advisory services |                       |
| Market Data Source   | Assets managed & Revenues      | NOK thousands, 2016   | Revenue                      | NOK thousands, 2016   |
| Revenue              | Digipig                        | -                     | Aksjeservice                 | 9 577                 |
| Revenue              | Edgefolio                      | 114                   | Enin                         | 50                    |
| Revenue              | Enin                           | 50                    | InFront                      | 143 792               |
| Assets managed       | Fronteer solutions             | 175 000               | Islero                       | 256                   |
| Revenue              | Huddlestock                    | 77                    | KolibriFX                    | 1 156                 |
| Revenue              | Liqvi                          | 85                    | Mito.AI AS                   | 170                   |
| Revenue              | Quantfolio                     | 452                   | Oslo Market Solutions        | 21 694                |
| Revenue              | Spiff                          | 170                   |                              |                       |
| Revenue              | Yeyney                         | -                     |                              |                       |
| SEGMENT              | Alternative Payment            |                       | Credit Scoring               |                       |
| Market Data Source   | Transaction value, mNOK        | Based on Vipps, 2016  | Revenue                      | NOK thousands, 2016   |
|                      | Aera (prev. RetailPayment)     | -                     | 24sevenfinans                | 733                   |
|                      | Auka                           | -                     | Debet AS                     | 1 729                 |
|                      | BankAxept                      | -                     | Klarna Norge AS              | 16 333                |
|                      | Flexi.Cash                     | -                     | Precise Prediction           | 8 600                 |
|                      | Link Mobility Group AS         | -                     | Risk-partner                 | 229                   |
|                      | mCash                          | -                     | Sequra                       | -                     |
|                      | MeaWallet                      | -                     |                              |                       |
|                      | Payr                           | -                     |                              |                       |
|                      | Strex                          | -                     |                              |                       |
|                      | Vipps                          | 127 800               |                              |                       |
| SEGMENT              | Authentication                 |                       | Neo-Banks                    |                       |
| Relevant market data | Revenue                        | NOK thousands, 2016   | Net loans to customers       | NOK thousands, 2016   |
|                      | BankID                         | 113 328               | Bank Norwegian AS            | 16 030 958            |
|                      | BuyPass                        | 119 926               | BNbank ASA                   | 893 978               |
|                      | Encap                          | 127 538               | Easybank ASA                 | 1 549 848             |
|                      | ForgeRock                      | 39 162                | Instabank ASA                | 787 401               |
|                      | Protectoria                    | 174 000               | Komplett Bank ASA            | 4 910 760             |
|                      | Signicat                       | 90 031                | Monobank ASA                 | 1 866 839             |
|                      | Zwipe                          | 597 000               | Skandiabanken ASA            | 2 709 023             |
|                      |                                |                       | YA Bank AS                   | 5 573 685             |

## APPENDIX 2: CROWDFUNDING MARKET SIZING

To estimate the crowdfunding market size, we used the personal credit market, hereunder total value of credit cards loans (interest rate bearing) and unsecured loans. The personal market includes wage earners, students, retirees and social security receivers. Finanstilsynet collected data from 15 banks and 12 financial institutions, covering most the Norwegian personal credit market (Finanstilsynet, 2017). We assume that unsecured loans make out the remaining part of non-credit-cards personal credits market. The market shares were calculated by summarizing the banks in their mother bank groups:

DNB = DNB Bank, DNB Boligkreditt and DNB Næringskreditt

Nordea = Nordea Bank AB, Norwegian branches and Nordea Eiendomskreditt

Foreign banks = Danske Bank, Handelsbanken, Handelsbanken Eiendomskreditt + 8 other branches + 1 credit company Sparebank 1 group = All SpareBank 1 savings banks, SpareBank 1 Boligkreditt, BN Bank + 1 corporate credit company + 1 credit company + 1 housing credit company

Eika group = Eika Boligkreditt, Eika Kredittbank, 72 savings banks and 3 commercial banks that are owners in Eika Gruppen AS + 2 other housing creditors.

Other savings banks = 7 Sparebanken Vest, Sparebanken Vest Boligkreditt, Sparebanken Sør, Sparebanken Møre and Sparebanken Sogn og Fjordane + 13 other savings banks, 7 housing creditors, 1 creditor and 1 hybrid OMF creditor.

Other commercial banks = 8 Skandiabanken ASA, Santander Consumer Bank AS, Eksportfinans, Gjensidige Bank ASA, Storebrand Bank og Landkreditt Bank + 13 other commercial banks and 5 housing creditors + Kommunalbanken og 1 municipality creditor.

## APPENDIX 3: INVESTMENT BANKING

| SEGMENT                             | Investment Banking          |              |
|-------------------------------------|-----------------------------|--------------|
| Market Data                         | Revenue NOK thousands, 2016 | Reported SEK |
| Pareto                              | 457 940                     |              |
| ABG Sundal Collier                  | 1 235 335                   |              |
| Carnegie                            | 300 336                     |              |
| Swedbank Norway                     | 1 636 036                   | 1 727 000    |
| SEB Norway                          | 2 770 735                   | 5 178 000    |
| Clarksons Platou Project Finance AS | 29 447                      |              |
| Handelsbanken Capital Markets       | 271 239                     | 4 772 000    |
| JP Morgan Europe Ltd, Oslo branch   | 56 769                      | 6 575        |
| Arctic Securities                   | 730 924                     |              |
| DNB Markets                         | 2 770 735                   |              |
| Nordea Markets                      | 2 770 735                   |              |
| Danske Bank Markets                 | 2 770 735                   |              |
| Sum                                 | 15 800 965                  |              |

Numbers in SEK were converted to NOK with the currency exchange rate as of 31.12.2016. Not all companies provided revenue numbers on their investment banking operations. For SEB Norway, we used the gross income times the percentage share of business in large corporates, financial institutions and investments. For Handelsbanken Capital Markets, used the fraction of employees in Norway as basis for total company revenue share, thus  $90/1500 * \text{Capital Markets revenue}$ . As neither DNB's, Nordea's nor Danske Bank's Markets and Wealth Management divisions wanted to share their numbers, we assumed them to be at least as large as the currently largest, SEB, and thus we chose a conservative approach in estimating the Investment Banking segment in Norway.

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