

NHH



Norwegian School of Economics

Bergen, Fall 2018

Open Banking in Norway

*The Potential for Third Party Providers and the Impact on the
Banking Industry*

Sjur Høgetveit and Thomas Thorkildsen

Supervisor: Xunhua Su

Master Thesis, Finance

NORWEGIAN SCHOOL OF ECONOMICS

This thesis was 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 impact of Open Banking on the Norwegian commercial banking industry and the potential for third parties in Norway. We proceed by defining the various concepts involved in Open Banking. This includes a discussion of PSD2, third parties, APIs and the risks involved with increased digitization and data-sharing.

We define and discuss the drivers behind Open Banking development, which are divided into demand and supply side considerations. We then proceed to analyze the Norwegian market for Open Banking. First, we perform a competitive analysis of the Norwegian banking industry, where we find the market to be moderately concentrated and characterized by strong inequality between the players.

We then examine the current state of Open Banking in Norway which is characterized by some degree of investments and startups into the sector. DNB, Nordea, Danske Bank and Sbanken have created developer portals who return dummy or personal data to enable individuals to create banking services based on their infrastructure. Further, there are some startups positioning themselves as third parties to provide payment or account information services.

The estimation of the third parties' markets show moderate penetration and a strong potential for growth in Norway. However, there is uncertainty relating to the specifications of their business models and how they can monetize their services. This is further problematized due to the already low margins in the payment service industry and the ability to scale such services. There are potentially strong effects on the incumbent banks' profitability, where the indirect effects dominate. These effects entail the loss from increased focus on product attributions, and hereby a weakened connection to the customers.

Finally, we analyze the drivers with regards to Norway. We conclude that the most favorable drivers are regulations, consumer preferences and the population's digital capabilities. However, there are concerns regarding the capital accessibility and the availability of governmental support. We conclude the thesis by discussing our findings and their implications for the outlook of the Norwegian banking industry.

Acknowledgements

We would like to express our gratitude to our supervisor Xunhua Su for his useful comments, feedback and guidance in the process of writing this thesis. Furthermore, we would like to thank him for introducing us to and engaging us in the topic. We also thank the interview objects for their considerable time spent planning, discussing and answering questions. In particular, we would like to thank:

Christoffer Hernæs, CDO of Sbanken.

Bent Bentsen and Ellen Halden, New Business Payment at DNB

Ina Gjerstad, Open Banking Development at Nordea.

Kenneth Wagenius, CTO of Neonomics.

Elisabeth Line Haugsbø, Senior Cybersecurity Engineer at DNV GL

Claudia Del Pozo, Head of Operations of C Minds

Kathryn Wardell, Analyst Structural Reform Group at The Treasury of Australia

Adedeji Olowe, Trustee at Open Banking Nigeria

Oslo FinTech Hub and The Factory

These have made significant contributions in various ways, either through interviews and discussions, answering questions or providing access to seminars. Some of their comments are directly quoted in the text, but more importantly are their contributions to our increased understanding of the topic.

Table of Contents

EXECUTIVE SUMMARY	2
ACKNOWLEDGEMENTS	3
TABLE OF CONTENTS	4
TABLE OF FIGURES	6
1. INTRODUCTION	7
1.1 RESEARCH QUESTION.....	10
1.2 METHODOLOGY.....	11
1.3 DELIMITATIONS.....	12
2. OPEN BANKING	13
2.1 DEFINITION AND INTRODUCTORY DESCRIPTION	13
2.2 PAYMENT SERVICES DIRECTIVE 2	13
2.3 THIRD PARTY PROVIDERS	17
2.4 THE APPLICATION PROGRAMMING INTERFACE	21
2.5 RISKS OF OPEN BANKING	22
2.5.1 <i>Risks of Data Sharing</i>	22
2.5.2 <i>Digital Exclusion</i>	23
2.5.3 <i>The Design of Security Solutions</i>	24
3. THE DRIVERS OF OPEN BANKING ACTIVITY	26
3.1 DEMAND DRIVERS	27
3.2 SUPPLY DRIVERS.....	29
4. A COMPETITIVE ANALYSIS OF THE NORWEGIAN BANKING INDUSTRY	33
5. THE CURRENT STATE OF OPEN BANKING IN NORWAY	44
6. THIRD PARTY MARKET POTENTIAL	50
6.1 THE PAYMENT INITIATION SERVICE PROVIDER INDUSTRY.....	50
6.2 THE ACCOUNT INFORMATION SERVICE PROVIDER INDUSTRY.....	58

7.	THE IMPACT ON PROFITABILITY IN THE NORWEGIAN BANKING INDUSTRY	66
8.	THE POTENTIAL OF OPEN BANKING IN NORWAY	73
8.1	DEMAND DRIVERS IN A NORWEGIAN CONTEXT	74
8.2	SUPPLY DRIVERS IN A NORWEGIAN CONTEXT	76
8.3	MARKET CHARACTERISTICS	82
9.	OUTLOOK FOR THE NORWEGIAN BANKING INDUSTRY	88
	REFERENCES	91

Table of Figures

Figure 1	15
Figure 2	18
Figure 3	19
Figure 4	20
Figure 5	27
Figure 6	34
Figure 7	35
Figure 8	37
Figure 9	40
Figure 10	42
Figure 11	43
Figure 12	65
Figure 13	75
Figure 14	84
Table 1	61
Table 2	68
Table 3	69
Table 4	71

1. Introduction

The Norwegian banking industry has historically been characterized by a low threat of new entrants and rigid market positions. The market has been dominated by a few large banks, where one of these has held a unique position as by far the largest player. The market has also been defined by low customer mobility where the Norwegian consumers have traditionally stayed with one main bank throughout their life. This has led to criticism regarding the competitive intensity of the industry. Further, the banks have been able to keep a closed model and hereby control every aspect of their value chain. This has created possibilities to extract value from multiple activities such as loans, payment services and financial advisory.

These favorable characteristics of the banking industry could be about to change. The newly applicable Payment Service Directive 2 (PSD2) brings about specific changes to the industry where the main goal is to encourage increased competition and a more integrated European payment market. To achieve these objectives, it mandates increased sharing of customer data which historically has been exclusively available for the banks. This development has been come to known as the move towards Open Banking. This entails access to account information and the ability to initiate payments, which provides third parties with an access point to the financial industry. Further, it enables direct access to certain aspects of the banks' value chain and with this comes the possibility to gradually increase their presence. While PSD2 is an integral part of the Open Banking development, the concept of Open Banking includes much more than what the directive imposes. Open Banking includes the opportunity to consolidate information, initiate payments and altogether offer a more convenient banking experience. This enables the creation of multiple innovative services within deposit management, payment solutions and financial advisory. These services deliver increased value to the consumers through their enhanced convenience and efficiency.

The directive quickly became one of the talking points in the banking industry, and the banks were unsure on how to deal with the shifting competitive landscape. This has led to differences in strategic approaches, and there is no consensus on how the banks should position themselves. The topic has been widely discussed among industry experts, consulting firms and the banks themselves. There are large differences in opinion regarding the impact on the banking industry and whether the third parties can monetize on the increased market access. The directive is currently under implementation in the EU member states, but in Norway it is

yet to be implemented into national law. However, it is expected to enter application in the first half of 2019. This implies that the Norwegian banks are currently in the process of determining their strategic approach. The differences in approach could have strong implications for the future banking industry. Additionally, the expected implementation has led to investments in the third party domain where there has been multiple entrepreneurial projects who aim to exploit the new opportunities that arise. This could increase the competition in the industry and hereby affect the profitability of the banks.

The developments described above were the main contributors to our choice of topic. Open Banking is a highly relevant topic where the evolution takes place at the present time. The future implications could be substantial, both for banks and their customers. Looking back, the current era of banking can potentially be perceived as a crossroads for the industry. Either the incumbents are able to adapt to the changing circumstances or they could see themselves become obsolete. The distinctive features of the Norwegian banking industry make it a compelling research field. Further, there exists close to no academic literature on the topic, which makes it a truly interesting area to study.

This thesis proceeds by defining the concept of Open Banking and the main components involved. This includes a description of PSD2 and the objectives it sets out to achieve. Further, we define the third party providers and the services they offer to the consumers. These providers are Account Information Service Providers (AISPs) and Payment Initiation Service Providers (PISPs). The AISPs are expected to provide a consolidated view of the customer's finances and hereby enable better financial decision making. The PISPs increase convenience by offering innovative payment solutions and can initiate payments from the user's checking account. On the basis of the third party definitions we identify that the payment, deposit management and financial advisory are the aspects of the value chain which are most threatened by the new entrants. The sharing of data between banks and third parties are facilitated by APIs, which allows an application to extract data and functions from a system. Further, the move towards Open Banking brings a set of risks, which are identified as the risk of digital exclusion and data breaches. The definitions and discussions above allow us to establish a framework to examine the potential for Open Banking activity.

The framework is based on supply and demand drivers. The favorability of these drivers largely defines the potential for Open Banking activity and third parties. These drivers vary in their impact on the overall potential, but each one possesses a specific contribution to Open Banking. They are largely based on entrepreneurship indicators and the favorability of the market for technological startups. We argue that the most important drivers are the regulations in place and the consumer preferences.

To evaluate Open Banking's impact on the banking industry, we proceed by analyzing the current competitive landscape of the industry. This entails the use of concentration and competitive measurements as well as the identification of the largest players and trends in the industry. We find the banking industry to be moderately concentrated with high inequality between the players. This is largely due to the fact that DNB holds close to 40% of the market. However, the market has become increasingly competitive, and the net-interest spread has decreased significantly over the last decades.

Investigating the current state of Open Banking in Norway displays that mostly the large banks are actively preparing for the implementation of PSD2 and have defined it as a strategic opportunity. Some of these banks have functioning developer portals, but they primarily return dummy data through test-APIs. Additionally, there are some investments and entrepreneurial activity in the third party segment, where some firms have gained licenses as AISPs and PISPs. However, the main concern for Open Banking in Norway arise due to the uncertainty regarding the timeline of PSD2 implementation.

To get a sense of the third parties' prospects in Norway we estimate the potential Norwegian AISP and PISP market and their current penetration into the market. The markets are divided into short-term and long-term markets. This is based on the probability of success within the markets. These estimates suggest that there is moderate current penetration, but also strong opportunities for growth. However, there are several uncertainties related to the business models of the third parties. Specifically, regarding their ability to turn a profit and how to monetize their services. Further, the ability to scale services beyond Norway or offer additional services may be necessary due to the low margins in the Norwegian market.

The impact of the third parties on the banking industry's profitability are characterized by large uncertainty due to the unpredictability of the third parties' business models. It depends

strongly on the ability of third parties to increase their presence in the banking domain. However, we suggest that the effect on margins due to increased competition might be more severe than the market shares lost by incumbents. This entails downwards pressure on the net-interest spread and a weakened connection to the customers through increased focus on product attributions.

To further understand the potential of third parties and Open Banking in Norway we evaluate the previously defined framework in a Norwegian context. We find that the drivers vary significantly in their favorability. The Norwegians' digital capabilities and demand for convenience are expected to drive the Open Banking development from the demand side. These coupled with the impending regulations are identified as the most favorable aspects of the Norwegian market. At the other end, the capital accessibility in Norway is weak, and the funds that accrue to entrepreneurship in the financial service industry is limited. Furthermore, the lack of governmental support and tailored assistance is considered to be unfavorable features. The remaining drivers exhibit more ambiguous traits. Market characteristics beyond those defined in the framework are considered to gain an even broader view of the Norwegian market and particularly in an international context. Here we further argue the need for Norwegian third parties to expand their operations beyond Norway. Additionally, the Norwegian market may be favorable to enter for foreign third parties if they already have achieved proper scales in other regions.

Overall, our analysis suggests that the move towards Open Banking in the Norwegian banking industry could propose challenges to the incumbents and opportunities for third parties. However, the markets are still early in their development which entails strong uncertainty regarding the future landscape.

1.1 Research Question

The purpose of this thesis is to examine the potential of Open Banking in Norway and its impact on the banking industry. We investigate the current banking industry, the potential for third parties and the impact on the industry incumbents. Further, we examine the outlook for the banking industry under Open Banking. To clarify these questions, we need a comprehensive look into the theory behind Open Banking, the main drivers behind its development and the characteristics of the Norwegian market. The area of research for this

thesis is defined by the motivation described above. This focuses largely on the third parties and the impact on incumbent banks. Thus, our research question becomes:

What is the potential for third party providers in Norway and how will Open Banking impact the Norwegian banking industry?

1.2 Methodology

This thesis contains a mixture of quantitative and qualitative analysis, where the main emphasis is put on the qualitative discussions. The quantitative methods are utilized to provide additional insight into the current and historical banking industry. However, for Open Banking one cannot rely on past data to analyze its implications. As the concept were introduced in recent times there is limited academic studies and data available. The data used in the quantitative analysis have largely been based on availability. This lack of data entails a certain degree of uncertainty and are therefore mainly used to facilitate discussion. Thus, we utilize qualitative methods, such as interviews, seminars and observations. This is to gain further understanding of Open Banking and how it affects the banking industry. The interviews were conducted throughout the writing process. The personal interview approach was characterized by a mutual discussion on pre-determined topics where the direction of the conversation was largely influenced by the interviewees. There were four main areas of discussion, which was the interviewee's line of work, the organization and its approach to Open Banking, Open Banking as a concept and the potential for third parties. Other interviews were conducted through correspondence over email due to practical reasons, such as location and time differences. These contained largely the same topics. The insights gained in the interview process have been utilized throughout the thesis but have been especially influential in determining the drivers of Open Banking activity and the current state in Norway. The interviews were useful in gaining a practical perspective on Open Banking and the multiple legal aspects involved with the concept and PSD2.

Qualitative research has certain benefits and disadvantages. It allows for a more detailed examination of the topic, and the framework becomes fluid. This entails that the research can be more easily adjusted as new information is brought forward. The ability to rapidly adjust has been important, as we have experienced a constant change in information over the period of writing this thesis. Through our qualitative research we have sought to explore and explain

the concept as an open-ended process. Given our limited initial knowledge, the ability to allow for such an approach has been crucial. However, the personal nature of qualitative research can make the results somewhat subjective. Thus, our aim has been to gather information from different areas of the industry. These interviews, seminars and observations have been our source of primary data. Secondary data are the data provided by Statistics Norway, Norges Bank, Proff.no and Finance Norway on various aspects of the Norwegian banking and financial service industry. This includes data on customer deposits in Norwegian banks from 2000-2017, the net interest spread from 1980-2017 and various statistics from the payment industry. Additionally, we utilize statistics and insight from several other sources to support our discussions. These includes reports, articles, white-papers and surveys.

The agile nature of the qualitative framework has allowed us to respond to continuous changes in the industry throughout the writing process. Additionally, the quantitative analysis has been performed where the relevant historical data have been available. This mixture of qualitative and quantitative research has given us a broad perspective of the subject and allowed for an extensive discussion of the Norwegian banking industry.

1.3 Delimitations

The scope of this study is to investigate the commercial banking industry and third parties in Norway. Therefore, we exclude the impact on other financial institutions such as investment banks. We base the discussion on Open Banking as defined under the Payment Services Directive 2, but also look beyond the scope of the directive to examine further impacts. This includes third parties' expansion to other services of the commercial banks' value chain.

2. Open Banking

This section aims to provide a definition of Open Banking. This involves examining the various components of the concept. The definition is based on the Payment Services Directive 2 (PSD2) introduced by the European Commission as this will be the relevant directive for Norway. We proceed by defining PSD2, third parties and application programming interfaces. The last part of the section investigates the risks involved with Open Banking.

2.1 Definition and introductory description

In defining Open Banking, one encounters an obstacle due to the lack of a universal definition. It is a broad term which meaning can vary depending on one's perspective. Common for most definitions is that Open Banking is a collaborative system where data is shared among two or more independent parties. Open Banking allows for a smooth delivery of banking services across platforms. Given the consent of customers the third parties can access their data and can use this data in creating new services. This data sharing allows for the creation of many customer-friendly products and opens the financial market to new players. The idea is to make it more convenient for customers to manage or switch their accounts, as well as making it easier to conduct transactions through competing banks or non-banks (Swinton & Roma, 2018).

2.2 Payment Services Directive 2

The Payment Service Directive 2 is an essential component in the development of Open Banking in Europe. The directive was proposed by the European Commission in July 2013 (European Commission, 2015b) and was passed by the Council of the European Union on November 16, 2015. The member states had two years to prepare and implement this directive into their national law, and the directive became applicable on January 13, 2018 for the EU states. However, many of the states are yet to properly implement it, which has postponed its full effect. With regards to Norway, the directive has yet to be adopted by the time this thesis is written. The directive must first pass a voting in the Norwegian parliament, although this is perceived as a mere technicality. It is expected to enter application in the first half of 2019. PSD2 is a directive which implies that it sets objectives that must be met by the member states, however each state is in charge of creating their own legislation to ensure that the targets are

met. This differs from EU regulations, which are binding legislative acts that must be applied by the member states.

PSD2 is an updated and complementary version of PSD1. The first Payment Service Directive passed on December 25, 2007. As with PSD2, the member states were given approximately two years to incorporate it into their national laws. The main purpose of the directive was to ensure that payments throughout the EU became easy, efficient and secure. To achieve these objectives, PSD1 incorporated rights and obligations regarding payment services such as credit transfers and card payments. It also introduced certain information requirements as it became mandatory for payment service providers to communicate information about fees, payment amounts and complaint procedures. Furthermore, the directive states that any transaction done using euros or the domestic currency of a member state must be executed within one working day. PSD2 effectively repealed PSD1 as it came into play on January 13, 2018 (EU, 2010).

PSD2 was designed with the aim to further develop and modernize the infrastructure provided by PSD1. PSD2 takes a broader approach in defining what a payment service provider is and extends the scope of the directive through including payments where only one of the parties is based in the EEA and payments that are made in non-EEA currencies. This is referred to as a one-leg approach rather than the two-legged approach entailed by PSD1. PSD1 also left some open points that PSD2 is trying to close. The first directive had several generic exemptions as well as many unregulated operators and intermediaries. It also applied different fees among EU-members. PSD2 seeks to regulate new market players and applies uniform fees on card payments (EU, 2017). Through these changes PSD2 tries to cope with the challenges of PSD1.

The main objective of PSD2 is to provide a legal framework for a more integrated market of payment systems in the EU. The aim is to make transfers of international payments in EU as simple as transfers within a single country, and it attempts to achieve this through a comprehensive set of rules for the payment service industry. Such an objective is important to increase the competition and efficiency in the market and is relevant as European inhabitants seem to have a strong current aversion against dealing with foreign-based financial institutions. Only 3% of Europeans have bought a banking service from another EU-country (European Commission, 2015a). As figure 1 displays, this is not entirely down to homogenous prices. The three main variables that influences the low level of integration in European markets are consumer preferences, market mechanisms and complicated legal framework.

These are closely interconnected. European consumers prefer to purchase financial products in their domestic country partly because the market lacks efficient mechanisms that facilitates cross-border trading of financial services. Complicated and differentiated legal frameworks in EU-states drives up the costs for both consumers and suppliers. This makes it costly for domestic customers to enter a foreign market and hence distorts their purchasing decisions.

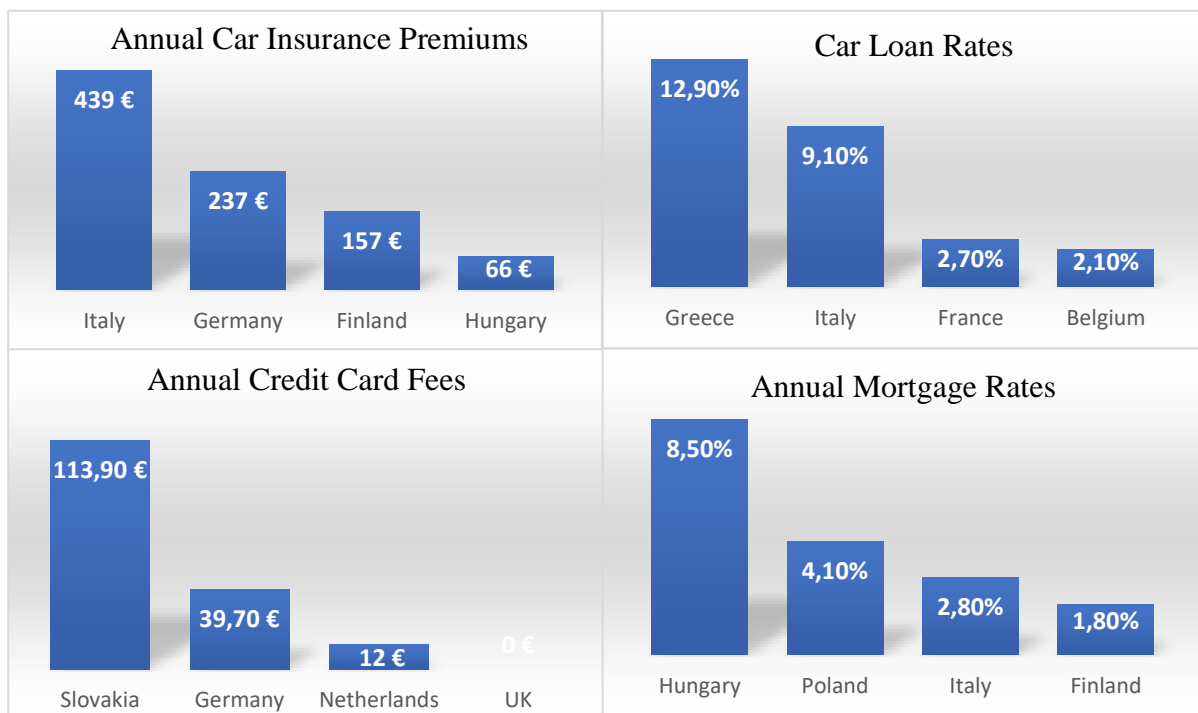


Figure 1 displays the differences in prices of financial products within the EU (European Commission, 2015a).

However, the large differences in prices throughout the EU need not only reflect what one stands to gain from a more integrated European market. The differences in these prices could, at least partly, reflect that some countries are characterized by a riskier pool of borrowers or more asymmetric information. An average Hungarian who switches to a Finnish mortgage provider would likely not see his rate drop to 1,8%. Nevertheless, it appears unlikely that such variations in the domestic markets should account for the entirety of these considerable differences.

The aim of PSD2 is not only to further integrate the current European market, but also to increase the competition within that market to supply greater choice and better prices to consumers. In this process it considers the potential of innovation and technology to increase the efficiency of the financial industry. It aspires to increase competition by enabling new

entrants to compete on equal terms through greater access to data. PSD2 increases data availability by demanding the incumbent banks to share their customer data given the consent of the customer. This is data that relates to the checking accounts of the customers. This data can be accessed by Third Party Providers (TPP), which are authorized online service providers. They are not part of your relationship with the bank but can carry out online transactions (Royal Bank of Scotland, 2018). PSD2 will allow these TPPs to build applications around the bank's infrastructure. The consensus is that this will be carried out using open APIs, although this is not clearly specified in the directive. The Regulatory Technical Standards (RTS) published by the EU regarding PSD2 further recommends the use of APIs to share data with third parties (European Commission, 2017a). The final RTS were approved on the 13th of March 2018 and aims to define security measures and facilitate effective and secure communication between the parties involved. These are only addressed through general principals in PSD2 and the final RTS concretizes these important issues (European Payment Council, 2018). Further, the RTS specifies that the banks must have ready data sharing testing facilities and specifications by 14. March 2019. They also must comply with the remaining obligations of the RTS by 14. September 2019 (Jones, 2018), which is mainly specifications regarding strong-customer authentication and secure open standards of communication. The RTS will be applicable in Norway when PSD2 has passed legislation.

PSD2 aims to make payments more efficient and secure through strict security requirements for electronic payment services. The initiation and processing of payments is secured by enhancing the customer authentication requirements for payment providers. The customer authentication procedure is used to validate the identity of the customer and thus avoid theft and fraudulent activities (Merch, 2018).

The directive also aims to increase the consumer protection as consumers have complete control of the transmission of their personal data. Furthermore, only personal data necessary for the agreed upon transaction may be accessed and the third party providers commit to inform their customers on how the data is processed (European Commission, 2017b).

2.3 Third Party Providers

A third party provider (TPP) is defined as an online service provider which operates outside of your relationship with the bank. Even though it is in no direct relation with the bank, it can gather information and carry out transactions from accounts. As explained above, the PSD2 opens the market for these TPPs by mandating banks to open the customers' checking accounts to external parties. The third parties can only access the information given the consent of the bank account holder and can only access the information needed to perform the task requested by the customer. While regular banks need one license for each country it operates in, the TPPs only need to be licensed in their home state to operate within the entire EU (EVRY, 2018).

Third party providers can be divided into two main types of service providers. These are Account Information Service Providers (AISPs) and Payment Initiation Service Providers (PISPs). The two differ in the service they supply and their approach to the customer data provided by the banks.

The AISPs are service providers which aim to aggregate the individual's customer data from multiple financial institutions and consolidate this data. This enables the customer to have a single platform where he can easily manage his accounts. The process begins by a customer granting an AISP access to his account information which can be held by several Account Servicing Payment Service Provider (ASPSP). An ASPSP is defined as an institution which maintains and provides a payment account for a payer. In other words, it is a bank where a customer holds a checking account (OBIE, 2018). When given access, the AISP reports your financial situation in a clear and centralized way. Further, an AISP is obligated to protect the customer through indemnity insurance, which compensates the customer if an error were to occur. PSD2 also forbids AISPs to store sensitive payment data and requires them to register at the European Banking Authority (Deutsche Bank, PPI AG, 2016, ss. 16-27).

The AISP provides a more convenient way for the user to manage his accounts as it can provide a consolidated view of the user's finances. This entails the ability to check the balance of accounts from multiple banks in one application. Further, the data accessed by the AISPs could be used to analyze transactions, spending behavior and patterns in the data to provide financial advice. This is a significant value proposition to the customers as it enables better decision making and increased understanding of financial products.

The Function of the AISP

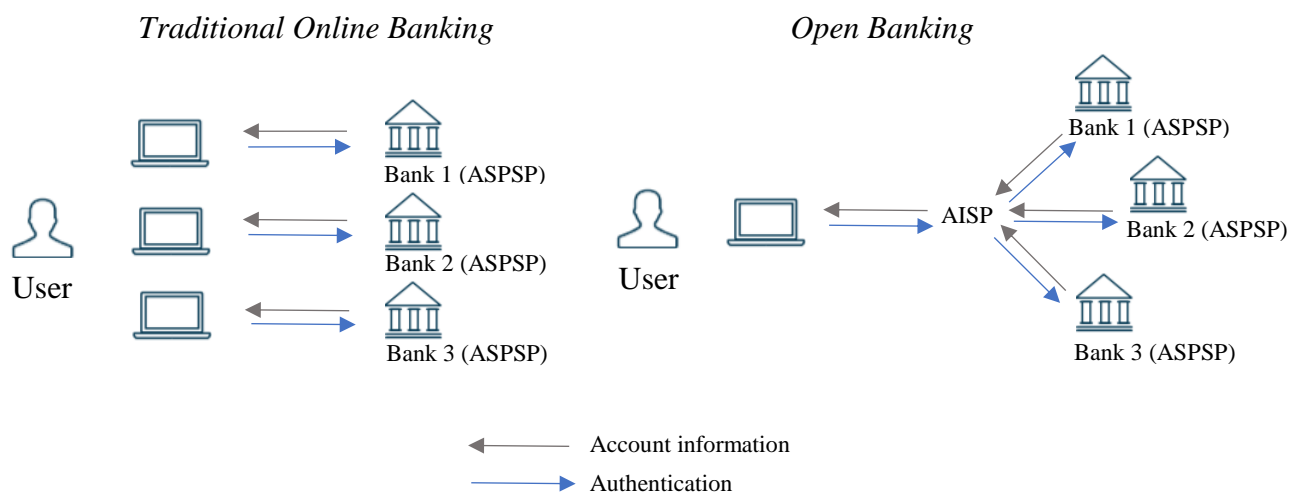


Figure 2 illustrates how the AISP can gather information and provide the user with a consolidated view of his accounts. The illustrations and the outline for the figure is collected from EVRY (2016b, s. 9).

The PISPs are the other main group of service providers that are characterized as third party providers. Their aim is to initiate payments on behalf of their customers to make the payment process easier and more efficient. First, the user must agree upon the terms and conditions of the PISP, granting the PISP access to the user's data and accounts. The user can then authorize the PISP to initiate a payment. The PISP proceeds by transmitting the payment order to the account of the customer, and consequently the payment is executed, and funds transferred from the payer to the payee (Deutsche Bank, PPI AG, 2016, s. 16).

Like AISPs, PISPs are also forbidden to store sensitive payment data, as well as processing information that are not strictly necessary to carry out the transaction. The PISP builds a bridge between two separate accounts and processes the information to execute transactions between them. This makes it easier to transfer funds for customers as it involves fewer parties and does not require them to reveal details about their credit or debit cards. In this way, the PISPs are able to streamline the traditional payment value chain, hereby enabling possibilities for decreased fees involved in the process. Another important aspect of PISPs value proposition is the increased convenience for customers as their model enables easier mobile payments and the enhanced ability to conveniently incorporate payments into other applications.

The Function of the PISP

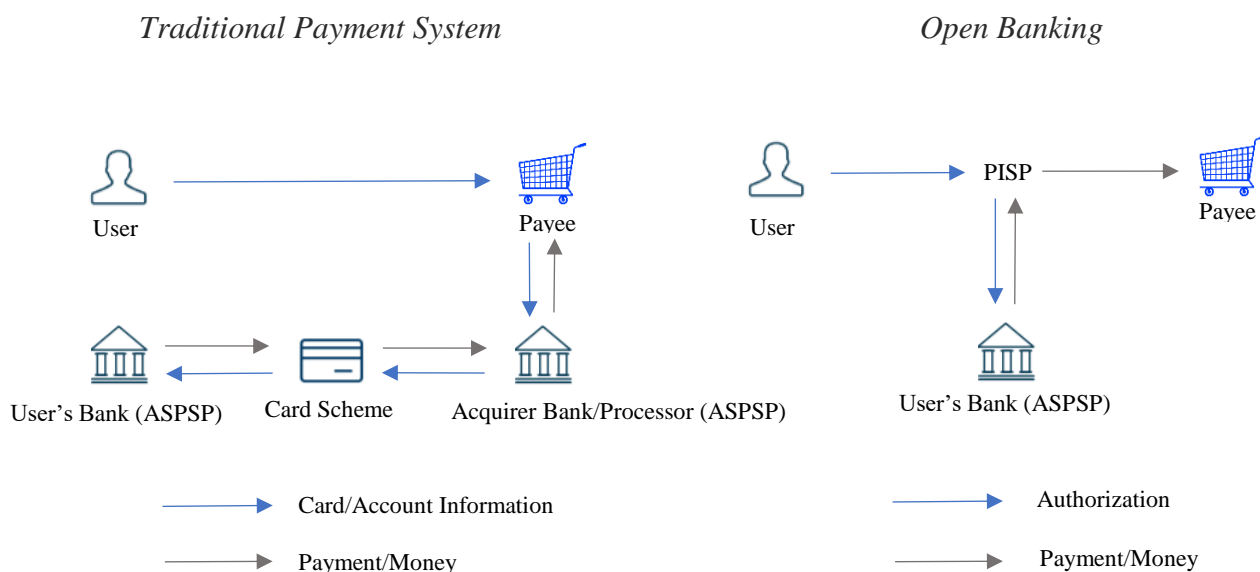


Figure 3 illustrates the PISPs role in the payment process. The user initiates a payment and the PISP completes it through a transfer from the user's bank account to the payee, which can be either a business or an individual. Illustrations are collected from EVRY (2016b, s. 10) and the outline for the figure is collected from (CGI, 2016, s. 12).

These are the two types of third parties as defined by PSD2. However, firms regularly operate over the specter of these definitions and are often licensed as both an AISP and a PISP. This allows them to offer a broader range of services in one application, which enhances the application's convenience.

The above examination of third party business models displays that AISPs and PISPs have direct effects on the value proposition of the incumbent banks. The main proposition of these banks has been largely to grant loans and accept deposits, earning their revenue on the spread between the rates offered on the two products. However, in more recent times they have expanded their value proposition and increased their focus on complementary activities. These activities are mainly focused around financial advisory, wealth management, insurance products and payment services. The complementary activities make up a significant and increasing share of the banks' value proposition and thus their revenue. The banks have been able to earn high margins by keeping their value chain closed through offering all the product and services above. This has led to the banks having a unique position as they keep the customer at every step of the value chain. However, Open Banking decreases this ability by enabling access for third parties. This entails the TPPs increased opportunity to select specific

components to focus on. This specialization enhances consumer value by enabling more efficiency and convenience across the value chain. It also facilitates improved innovation within the banking industry through greater competition and access to data. The examination of the TPPs' business models identify which components of the banks' value chain that will primarily be affected. The AISP model mainly operates within the financial advisory component through the consolidation of information and by analyzing spending behavior. The PISP model operates in the payment service segment of the value chain and enables increased efficiency through its innovative payment models. However, there are several options to expand these operations into other parts of the banks' value chain, such as insurance and asset management, and these options will be further examined in section 6. In particular, the ability to offer a price comparison platform which affects the deposit and loan domain is identified as a strong opportunity.

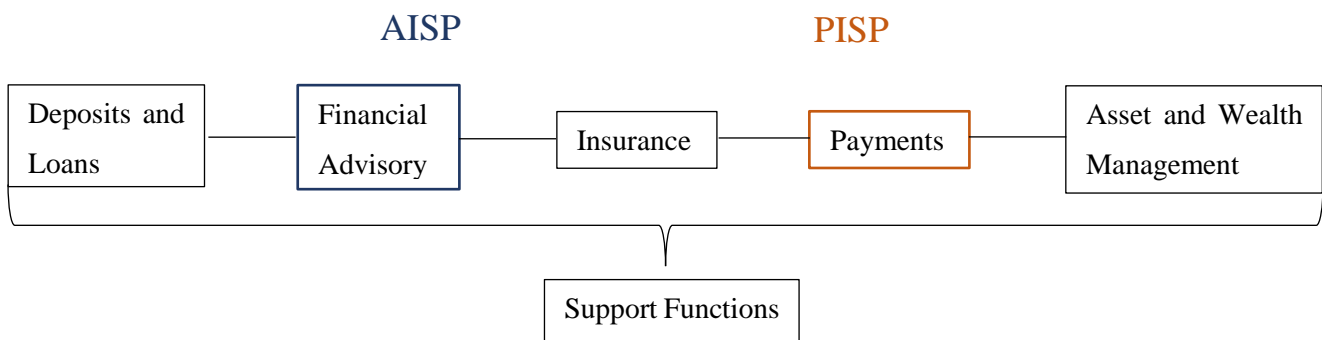


Figure 4 illustrates the main components of the banks value chain which the third parties are expected to operate in. The solid blue line indicates AISP domain while the solid orange line indicates PISP domain.

The definitions regarding the third party business models and Open Banking enables insight and ground for further analysis of the impact on the traditional banking sector. The TPPs can position themselves as a direct competitor to the incumbent banks and offer innovative services on top of their infrastructure. This increases the total number of players in the market by lowering the barriers to entry, which can have strong effects on the obtainable margins. Thus, it could propose significant consequences on the profitability in the current industry. To be able to offer innovative services and hereby increase the competition in the market, the third parties must be able to efficiently and securely access the customer data. This efficient

data exchange is facilitated through APIs, which enables the third parties to extract information and functions from the banks' databases.

2.4 The Application Programming Interface

An API is defined as “a set of functions and procedures allowing the creation of applications that access the features or data of an operating system, application, or other service” (Oxford Dictionary, 2018) . It follows from this definition that an API enables one application to interact with another application or operating system to extract information or functions. The API is useful for programmers creating an application as an efficient API has clear commands that can be reused, such that it is not necessary for each developer to build everything from scratch. The finance industry was early adopters of the API technology and used it to import data on rates, performance and more from third parties into their desktop programs. The implementation of APIs has also vastly improved the growth of technological leaders such as Google, Apple and Facebook and is seen as an essential part of their operations.

When defining APIs, it is useful to divide them into three subdivisions to describe the degree to which they can be accessed by the public. These three categories are private APIs, partner APIs and public APIs.

The private APIs are closed for outside partners of the firm and are created to enable company's internal systems to interact with each other. Thus, no third parties can access these types of APIs. It reduces friction within the company and hence increases the operational efficiency. Private APIs were and still are an essential aspect of the traditional banking industry (Marous, 2018).

The partner APIs can be accessed by the firm's preferred partners. The partner API enables the integration of software between the company and its business partners. These partners could be suppliers, resellers or others. This enables the firm to interact and cooperate better with its partners, while largely still maintaining control over the shared data.

The public APIs can be accessed by any third party and are open to all developers, even those

who are not directly dealing with the company. The third party may be required to sign a basic registration form, but nothing more than that. A public API should be easy to extract data from and should enable developers to build applications on top of the infrastructure of the provider. This increases the company's reach and traffic such that more third parties can create applications using their data. It also comes with much less control of the shared data and larger exposure to data theft and misuse. The public APIs are commonly the ones that are associated with Open Banking (EVERY, 2018).

The definition above helps to understand why APIs are perceived as the channel banks will use to grant the third parties access to data. They are efficient and makes interaction between systems simple and thus facilitates agile data sharing. This enables the PISP and AISP to create new services and could fuel the start of countless FinTech firms. The banks will have to build APIs, or find another way to share data, to properly cope with the framework of the PSD2 directive. Many banks have come quite far in their development of APIs and certain FinTech firms are already capitalizing on this progress. The introduction of open APIs in the banking industry could expand the reach of the banks but could also have severe consequences for their operations and profitability. Further, open APIs also raises large data concerns regarding fraud and misuse.

2.5 Risks of Open Banking

The move towards Open Banking brings forward many great opportunities, but it also poses a series of threats and risks. More technological innovations mixed with a larger availability of data has led to several concerns regarding the safekeeping and usage of the information provided. Consumers are not always mindful towards whom they share their data with and their supervision ability is limited. Therefore, this section aims to investigate such risks and discuss their implications for Open Banking. This enables a better understanding of the concept and provides insight on how Open Banking can be more efficiently implemented.

2.5.1 Risks of Data Sharing

Consumers today generate a lot of data through their daily life, but few has a clear overview of what they are producing and who owns it. Open Banking opens the door for financial data to be merged with other datasets, creating products and solutions not previously available. In addition, there will likely be a more dispersed set of firms who possess this data, making it

even harder to keep track of. This could induce problems related to data surveillance and give rise to potential misuse. Since the shared data relates to bank details even minor breaches might have severe consequences. Therefore, one strong fear is that consumers will consent to sharing data without fully grasping the consequences (Reynolds, 2017, s. 18). This is supported by a Deloitte study which found that 91% of the participants willingly accept terms and conditions without reading through them. A statistic which was as high as 97% for ages 18-34 (Deloitte, 2017, s. 12). This suggest that it could become a significant problem.

An additional issue is that it could become difficult for consumers to separate the reliable and unreliable third parties (Reynolds, 2017, s. 22). This could lead to them either not being willing to share their data or them giving consent to all parties which further increases the probability of data misuse. The latter seems more likely considering the results found in the Deloitte report, but the consumers might be more careful regarding bank details and as a result avoid third parties altogether. These issues have led to a growing field of providers who develop interfaces between customers and services, with an extensive focus on screening of the service providers and hereby helps individuals to protect their data.

2.5.2 Digital Exclusion

Digital exclusion is the result of a certain proportion of the population not having access to the digital world. Such an exclusion has large consequences since the subjects fall further behind as the technology of the world progresses. The old products and services become outdated and the digitally excluded are not able to take part in the new value created in the changing industry landscape. This inability to take advantage of new services increases the segregation between digital and non-digital customers.

This is an evident problem as highly digitally capable people seem to make more informed financial decisions. They are more than three times as likely to check their bank balance. They are also saving nearly twice as often and more than twice as much as people with no or little digital knowledge (Lloyds Bank, 2018, s. 7). The digitally excluded lose out on such apparent benefits as continuous access to accounts, easier payments and transfers abroad (Lloyds Bank, 2018, s. 26).

The concept of Open Banking is built upon digital innovations and could therefore lead to a significant share of the population losing out on the benefits provided. This is a concern which

is not easily mitigated by the authorities, but other aspects of government policy could improve the situation.

2.5.3 The Design of Security Solutions

Considering the problems related to data sharing, data security under Open Banking has gained much attention. In addition, several recent high-profile hacking and data misuse cases has led to an exposure of the weaknesses among large corporations to properly protect the customers' data. Therefore, certain mechanisms must be in place to ensure that the customers are protected from these hazards and that they understand the procedures to go through given a mishap with the data. This has led the European Banking Authorities to focus on Strong Customer Authentication (SCA). SCA sets a two-factor authentication procedure which is a part of the regulatory technical standards of PSD2. The directive requires authentication to be based on at least two of three elements which are knowledge, ownership and inherence. These are defined below.

- Knowledge refers to some personal information that the customer possesses, for example a password or personal identification number.
- Ownership entails a physical object in the customer's possession like a mobile phone or token.
- Inherence refers to biological features of the customer such as fingerprints or facial recognition (SWIFT, 2017).

These requirements increase the security involved in Open Banking activities and ensures the proper authentication of the customers before performing any transactions. However, it somewhat reduces the efficiency of transactions.

A regulation which takes a larger aim in increasing personal data protection is the newly applicable General Data Protection Regulation (GDPR), which came into force on May 25, 2018. GDPR aims to protect the privacy of all EU citizens and does so by applying requirements to all companies which hold any data regarding EU citizens, even if the company is not located within the EU. The focus on penalties has also increased and failure to comply with the regulation can be fined by up to 4% of annual global turnover or €20 million, whichever is greater. Given a data breach, the affected customer and the regulators must be informed within 72 hours after the organization has discovered the incident. Further, GDPR

introduces privacy by design as a legal requirement. This entails that data protection must be included in the design of the companies' systems and not just as an addition which works outside of the main infrastructure. These requirements to the design of the organizational processes should help to mitigate some of the cyberattack concerns. Overall, the introduction of GDPR alleviates some privacy and data concerns regarding Open Banking. (EU GDPR, 2018)

Albeit such requirements entailed by GDPR should dampen data concerns, they bring forth implications for the banks willingness to cope with PSD2 and actively pursue Open Banking. To see this, consider that one of the main regulatory changes in GDPR is the greatly increased fines for data breaches. Furthermore, PSD2 aims to enable data sharing through open APIs which generate many new data concerns and thus possible breaches. The banks must adopt such a technology, which is exposed to risks, and share it with any third party demanding it. Multiple previous instances have shown the risk of APIs (Chabrow, 2015) (Kirk, 2017) and should the bank fall victim to similar acts, then they would likely be fined by a great amount. This decreases the banks incentive to pursue open APIs for their own sake and encourages a more defensive approach. Although it has such implications for behavior, the GDPR still provides some much-needed security requirements to enhance the consumers' trust in Open Banking.

The definition and concepts discussed regarding Open Banking enables an identification of certain aspects which must be considered when determining its potential for growth in an economy.

3. The Drivers of Open Banking Activity

Previously, we have discussed how Open Banking offers new value to the consumers by enabling a more seamless banking experience and increased competition in the industry. However, its ability to impact the banking industry depends on the degree to which the services are adopted by consumers. Further, it is conditional on the favorability of the environment and the ability to create firms which supply such services. Therefore, to understand the ability of Open Banking to impact the banking industry, one must examine the conditions which drives its growth. Thus, this section aims to identify these drivers and how they impact the development of Open Banking.

The identification of these drivers will enable a framework for analyzing the potential of Open Banking and third parties in Norway, which is done in section 8. The main basis for the drivers is the OECD/EUROSTAT framework for entrepreneurship indicators (Ahmad & Hoffman, 2007). Additionally, we utilize findings from Haddad and Hornuf (2016) who investigate the economic and technological determinants of the emergence of FinTech markets. The framework is supplemented with insights from experts and implementers, observations from the development in other regions and knowledge gained in the process of writing this thesis.

In general, one can distinguish between two main categories of drivers behind the advancement in consumer-adopted technology, namely supply and demand drivers. The demand drivers determine the aggregate interest in a product and are determined by the consumers' perceived value. The supply drivers determine the quantity and variety of products offered in the market. These drivers are a product of market and regulatory conditions. An illustration of the relevant drivers is given on the following page and these are then discussed individually.

The Drivers of Open Banking



Figure 5 displays the drivers of Open Banking activity.

3.1 Demand Drivers

Consumer Preferences

The consumer preferences describe the attributes which the consumers value in a product. These preferences are complex and plentiful, but one can define some main features. However, it is important to keep in mind that these features are strongly entangled, making it difficult to differentiate their impact.

The main features representing consumer preferences for Open Banking are defined as product quality, relative price and convenience. For new services provided by Open Banking to gain traction in the market, they must develop these such that they better meet the preferences in

comparison to the existing products (Gjerstad, Personal Communication, November 16, 2018). The convenience feature of the preferences is highlighted as perhaps the most important aspect where new players can outperform the existing solutions (Hernaes, Personal Communication, November 7, 2018). The nature of the new services created following PSD2 highlights this as they are focused on providing a single platform whereas the consumers can satisfy their financial needs. Convenience is also closely related to the quality of these services, where such aspects as faster payments can be defined as an increase in both quality and convenience. The price of the services is highlighted as another aspect where the new services should have an advantage given that they are likely to streamline the payment value chain. However, the prices in the traditional industry is not easily observable, making this effect somewhat weaker than in many other industries. Furthermore, in markets where the price among suppliers is close to homogenous, the emphasis often falls on the convenience of the services offered (Hernaes, Personal Communication, November 7, 2018).

Digital Capabilities

The technological capabilities of the consumers determine their ability to utilize the third party services and hence determines the demand for such services. We have previously argued the importance of digital inclusion to ensure that a large share of the population can participate in the value created by Open Banking. The digital inclusion aspect has been the main concern among the implementers in less developed economies, where the digital excluded typically represents a large share of the population (Pozo, Personal Communication, September 24, 2018) (Olowe, Personal Communication, September 25, 2018). While digital inclusion relates closely to the share of the population with digital access, the information processing relates to their digital abilities. This links to the understanding of how third parties access and use their data as well as the potential consequences of sharing their data. Further, it relates to the ability to take advantage of the new services created by third parties. Open Banking services are perceived as highly technological such that these aspects become crucial to ensure widespread consumer adoption. The digital infrastructure supports the population's ability to develop their digital capabilities and ensures that gradually a larger share of the population reaches a higher technical level. The implementation process in the EU provides insight into the need for such capabilities and infrastructure, as the highly capable countries have been faster in their implementation in comparison to countries with lower scores on these aspects. This is highlighted by the current difference in implementation between the western and eastern part of Europe.

3.2 Supply Drivers

Capital Accessibility

The supply drivers are made up of a larger set of components and we first consider the access to capital in the market. The access to capital means the entrepreneurs and existing firms' ability to raise funds for new projects. The early stage funding, such as venture capital, are particularly important for Open Banking. To be able to increase competition and enable new services, there must be available capital for the entrepreneurs planning to provide third party services. Thus, emphasizing the need for early funding. Empirical evidence further supports the importance of available early stage funding for entrepreneurial activity. Samila and Sorenson (2011) finds a positive impact from increased venture capital on the number of firms created. However, the funding process does not need to happen in the marketplace. Government assistance to innovative startups is an important and common way to raise funds. This further enables entrepreneurial activity, especially in markets where venture capital traditionally has not been prominent.

Labor Force

The supply of labor represents the availability of employees and their qualifications with regards to the needs in the market. This feature of the economy is important for entrepreneurship to ensure that the startups can access qualified labor and that there exist individuals qualified to start their own businesses. The importance of the labor force for FinTech activity is highlighted by Haddad & Hornuf (2016), where the authors find a positive statistically significant impact of qualified labor on FinTech formation. Open Banking is a highly technological concept building on the services provided in the traditional banking model. Therefore, the availability of employees with qualifications within technological and financial areas are crucial to the development of third party solutions. This emphasizes the need for strong educational institutions and a broad access among the public to these. Additionally, the ability to attract foreign talent will be important to enable additional supply of qualified labor.

Regulations

The regulatory environment determines the framework under which the market operates. Such regulations have been highlighted as the primary determinant of Open Banking activity. They change the conditions for competition and sets out to enable new entrants to more easily enter

the market. They also mitigate certain risks attached to Open Banking and divides the responsibilities between the parties given data breaches. The importance of regulations has been highlighted by the various countries who have created such regulations to increase the competition and hence the Open Banking activity. This entails such regulations and directives as “The Law to Regulate Financial Technology Institutions” of Mexico, the Competition and Market Authorities regulation of Open Banking in the UK, the Consumer Data Right of Australia and the previously mentioned PSD2. This driver of Open Banking also considers the influence from existing regulations on the third party services.

Financial Markets

Advanced financial markets facilitate the aggregation of comprehensive datasets. Without well-functioning financial markets there will be a lack of transactional and account data, thus inhibiting the creation of third party services. Therefore, the infrastructure of the banking system is important to facilitate safe transfer of data between parties. Further, transparency in the financial markets enables increased willingness among the population to share their financial data. Transparency also includes the access to information regarding the third parties’ practices which enables the consumers to make more informed decisions.

Technology

The state of technology in the market determines the services which can be produced. This entails how the third parties can utilize the consumer data to build innovative solutions. Additionally, it enables stronger security processes which mitigates risks involved with data breaches. Research and development investments enables continuous technological progress. Further, this progress implies that the third parties can perform their operations more efficiently and propose new services to the consumers. Thus, they can replace a larger share of the banks value chain as the progress continues. In addition, the digital infrastructure allows for rapid exchange of data and aids the entrepreneurs in the creation of services. Haddad & Hornuf (2016) finds further support for this argument, reporting positive impact of the technological progress on FinTech formation.

Governmental Support

While the regulations set the framework for the market, the government’s ability to raise awareness links directly to the adoption rate of Open Banking. The government can accelerate the adoption rate by raising awareness among the banks about the opportunities Open Banking brings to the market, thus increasing their willingness to comply with the regulations.

Additionally, they inform the entrepreneurs about the changes in the banking industry, encouraging them to act. An additional feature of this driver is the government's ability to provide assistance and work closely with the market participants to ensure rapid compliance and effective implementation. A common approach undertaken by governments has been to establish a dedicated unit to perform these operations. This is highlighted by the establishment of the Open Banking Implementation Entity in the UK, the Mexico Open Banking Initiative and Open Banking Europe. Their main function is to advocate Open Banking to the banks and the public. They also serve as a point of contact for inquiries regarding Open Banking and the regulations.

Entrepreneurial Activity

In a general manner, entrepreneurial activity is defined as the human actions taken to generate value through new products, processes or markets (Ahmad & Seymour, 2008). The extent to which these actions are taken depends on the culture of the inhabitants and the market conditions. The culture contains such features as the risk attitude, the desire for business ownership and the perception of entrepreneurs in society. The entrepreneurial market is characterized by high risk as not many firms are able to grow beyond the initial phase (Patel, 2015). Therefore, higher risk willingness should be positive for entrepreneurial activity. Further, a strong desire for business ownership induces entrepreneurial activity as the inhabitants are more inclined to own an independent firm. The societies perception of entrepreneurs also affects the degree to which entrepreneurial activities are pursued in the market. The features mentioned above drive the inhabitants' entrepreneurial aspirations and hereby their aim to create innovative solutions. The market conditions relate to the barriers to entry into the various markets. This entails antitrust laws, intensity of competition, property rights and the access to domestic and foreign markets. These factors determine the complexity of the startup process and the ability to sustain gains from innovations (Ahmad & Hoffman, 2007). Strong entrepreneurial activity indicates willingness among the inhabitants to seize the opportunities which Open Banking brings to the market.

The development of Open Banking is complex and driven by many factors. We have identified the most evident of these factors as this facilitates an orderly and detailed discussion about Open Banking development. However, the importance of the factors is not equal in magnitude as certain aspects are more crucial for further growth than others. Based on discussion with players in the industry and the evidence from other countries, we argue that the most important

drivers are the regulations in place and the consumer preferences. Having established the framework, we now shift the focus to the Norwegian banking industry and Open Banking in Norway. We analyze the Norwegian banking industry and the current state of Open Banking. Then we estimate the market potential for third parties and their potential impact on banks' profitability. Once we have established the current environment and potential impact of the third parties, we utilize the framework established above to analyze the potential for Open Banking in Norway.

4. A Competitive Analysis of The Norwegian Banking Industry

This section aims to provide a competitive analysis of the current Norwegian banking industry to assess the degree of concentration and competitiveness among the incumbents. Further, we assess the balance of power in the industry and identify the large players as well as their respective market shares. We discuss recent trends in the industry and the origin of these trends. This entails discussions regarding the interest margin and changes in the banks' market shares. The analysis of the competitive state and trends in the industry provides insight into the ability for third parties to impact the profitability of the current industry as high concentration and market power indicates abnormal margins. These margins can be diminished by increased competition from new entrants. Further, it facilitates discussion regarding the impact of Open Banking on the market composition.

The trend in the Norwegian banking industry from mid-1990s has been characterized by mergers between banks resulting in a more concentrated competitive environment. Based on standard economic theory, one would expect such a shift to decrease the competitive intensity within a sector as the large players would exercise market power (Porter, 1979). In other words, the market concentration in any market have implications for the consumers utility gained from such products. To test the market concentration within the Norwegian banking industry we employ the Herfindahl-Hirschman Index (HHI) and the Gini coefficient on data collected from FinansNorge (Finans Norge, 2017b) and Statistics Norway (SSB, 2018b).

In the following discussion we use the banks respective shares of total consumer deposits as a proxy for market share. This proxy of market share allows us to track the market composition further back as there is limited data available for other measurements, and thus enabling us to examine its response to major events in the industry. Additionally, it provides data on a larger number of banks for each of the years observed. However, the deposit proxy does not account the composition of products which the average customer holds in the bank. This implies that one bank might have less deposits, but its customers could hold a much larger share in mutual funds or insurance. Nonetheless, the banks considered are limited in their differences with regards to product composition making it a sufficient proxy for its purpose.

The current market is dominated by DNB, which find themselves in a unique position. Their market share constitutes 39,22% of the entire market, making them by far the largest player.

This position provides them with large bargaining power in the industry. However, the smaller banks are more evenly matched insofar as market share goes. The composition of the Norwegian banking industry differs from the ones in most other European countries.



Figure 6 illustrates the composition of the Norwegian banking sector given the banks' respective market shares.

The Herfindahl-Hirschman Index is an often-used tool by academics and market authorities in determining the degree to which a market is competitive. In addition, it is employed to assess the effects on the market by potential mergers. The index score is defined as the following:

$$HHI = \sum_{i=1}^n MS_i^2$$

where MS = market share

The maximum value of HHI is, by definition, equal to 10 000 in the case of a monopolist market.

$$HHI = 100^2 = 10\,000$$

On the contrary, in a perfectly competitive market one would have an HHI value converging towards zero.

$$\lim_{n \rightarrow \infty} \sum_{i=1}^n MS_i^2 = 0$$

given that we can approximate market share as equal shares such that

$$MS_i = \frac{100}{n}, \forall i = 1, 2, \dots, n$$

The validity of this index relies upon the structure-conduct-performance (SCP) paradigm. The essence of this paradigm is, as described above, that structure affects the decisions and behavior of firms which in the end determines their performance.

The prediction made by the paradigm is that increased concentration will lead the firms towards collusive behavior which ultimately will cause the setting of prices to diverge from the ones in a perfectly competitive market, causing a deadweight loss to society. The exact relationship between the number of firms and exercised market power is heavily debated among experts with many suggesting it may not be linear, but rather s-shaped. This is due to the differences in the marginal effect of concentration on market power over the course of HHI-values (Cetorelli, 1999).

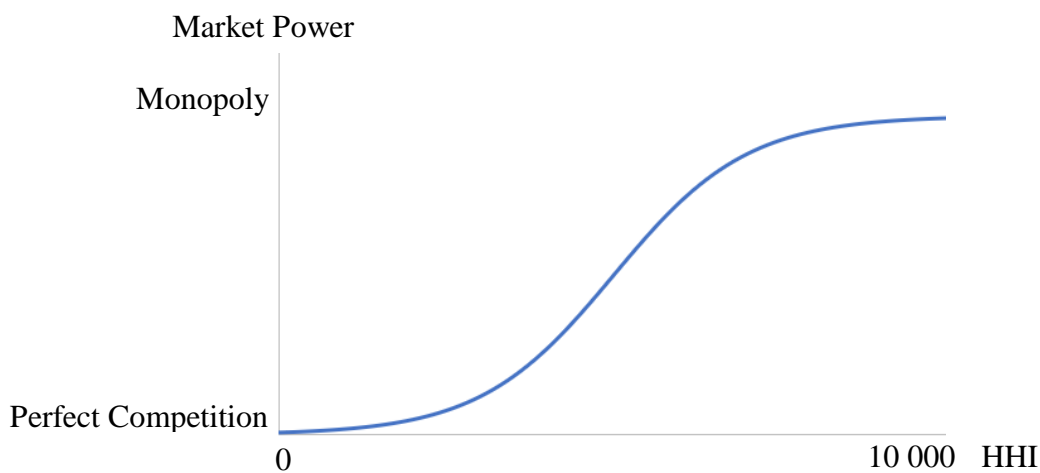


Figure 7 displays the theoretical S-shaped relationship between market concentration and market power. (Cetorelli, 1999, s. 3).

However, there is somewhat ambiguous evidence on whether firms exhibit market power when faced with fewer players in the market. Berger and Hannan (1989) finds strong evidence in favor of the SCP paradigm when analyzing a cross-section of local banking markets. They model the effect of concentration, as measured by HHI, on the deposit rate paid to consumers

controlling for exogenous variables such as growth in deposits and local wages. This is done for six deposit categories with 3500 to 4000 observations each, and they find a negative significant relationship between the HHI and deposit rates as predicted by the SCP. Additionally, Neumark and Sharpe (1992) and Berger and Hannan (1991) finds further evidence supporting this. On the contrary, some newer studies find that such a relationship might not be monotonic (Jackson, 1997) (Rhoades, 1995) (Carlton & Perloff, 2015, ss. 270-304). Implying that the usage of market power varies over the spectra of HHI-values, and at certain points decreases in concentration may lead to more exhibition of market power. This entails some uncertainty regarding the usage of HHI.

As previously stated, consumer deposits are used as a proxy for banks' market share when calculating the HHI for the Norwegian banking industry. This is the most common way to apply the index to the banking industry, and it allows us to employ more observations such as to better map the index's response to major events. We estimate the HHI over a period of 17 years to observe how the market concentration has developed over time and how it reacts to important events in the sector. The statistics used are gathered from Finance Norway and Statistics Norway. They represent the market shares of the 15 largest banks in the period 2000-2011, and the ten largest banks in the period 2011-2017. In addition, they include a bracket categorized as others. For simplicity, we assume that the remaining Norwegian banks have an equal part in the market share of others. Thus, we calculate their individual shares as the total market share of the others bracket divided by the number of banks exceeding the top 10/15 in the given years. These artificial market shares are subsequently used to calculate the HHI. Such an assumption has little consequence for the score as these values are small and variations in them will have only a negligible effect on the HHI values.

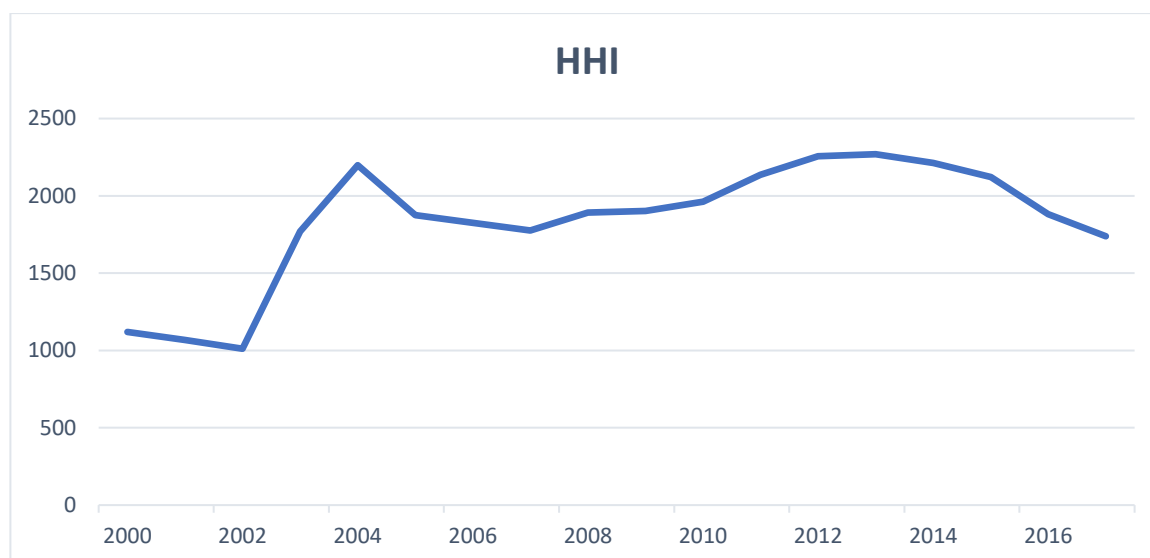


Figure 8 displays the development of the Herfindahl-Hirschman Index over the time period 2000-2017.

As observed from Figure 8, the HHI have been relatively stable during the last few years. We observe a slight decline starting from the peak in 2013, indicating that the market concentration has decreased over the last 5 years. This is largely because DNB has lost about six percentage-points of the market during this period. With its position as the country's clearly largest bank, this development goes a long way in explaining the drop in the index. The other significant factor in the index's decline is that Norway's second largest bank, Nordea, also have lost market share over this period. This implies that other, smaller banks have gained market shares, and this have contributed to driving the HHI down.

We can also see a spike in the HHI from 2002 to 2003. This is due to the merger between the two largest banks at the time, DNB and Gjensidige Nor Sparebank. In 2002 they had market shares of 23.4% and 14.7% respectively. After the merger the bank, which was named DnB Nor, constituted a market share of 39.4%. This is the driving factor behind the large increase, and as the new merged bank continued to gain ground during its first year, we see the rise in the index continue through 2004.

As mentioned earlier, the HHI take values from 0 to 10 000. Therefore, it is useful to understand what different values of the index implies. In general, the values are divided into three brackets; unconcentrated markets, moderately concentrated markets and highly concentrated markets. This is the standard applied by the US Department of Justice and the US Federal Trade Commission when assessing market concentration. An unconcentrated

market is defined as a market with an HHI score below 1500. A moderately concentrated market takes values between 1500 and 2500, while a highly concentrated market has an HHI value above 2500 (U.S. Department of Justice and the Federal Trade Commission, 2010). These agencies use the index to evaluate market mergers. They calculate the change in the index as twice the product of the two parties' market shares. For mergers resulting in moderately and highly concentrated markets a change of over 100 points raise competitive concerns and warrants scrutiny. The change in the index following from DNB's and Gjensidige Nor's merger would with this calculation equal 686 and took the Norwegian banking sector into the moderately competitive bracket, from a value of 1011 to 1770. At the time of the merger the Norwegian Competition Authority and the Norwegian Department of Finance set several demands for the new bank and approved the merger given that these were met.

The Norwegian banking industry's score for 2017 was 1739 implying a moderately competitive industry characterized by some market power among the large players. Additionally, the industry has received criticism from domestic and foreign institutions due to its weak competitive environment (Konkurransetilsynet, 2006) (Dagens Næringsliv, 2014). The main target of criticism regarding this has been the lack of mobility among consumers in the sector and inhibiting regulations which makes it problematic to start a new bank branch (Finans Norge, 2015). Some evidence has been found for these statements as it has been observed that in situations where the lending costs of banks decrease, the lending rate charged by banks remains stable. Such a situation creates higher profit margins among the banks. This is somewhat contradicted by the banks themselves who report strong competition for consumers and profits within the sector. Of course, these statements must be evaluated carefully as the banks themselves has an incentive to portray an illusion of a competitive market. The fact that DNB is losing market share and the HHI is declining supports the banks' view of an increasingly competitive market. This is further backed by research done by Finance Norway, who finds that 40% of respondents have taken out a new mortgage or shifted their mortgage to a new bank at some point. Furthermore, for the ones who have not changed their bank 72% are pleased with their current one. Only 6% of this group cites difficulty in changing as a reason to stay (Finans Norge, 2014).

The HHI has received some criticism for its inability to give a comprehensive description of the competitive market situation. Albeit empirical evidence has suggested some predictive power on market competition, it gives far from a perfect picture of the market. It is only able

to give a direct measurement of the concentration of market shares but does not give sufficient insight into the dispersion of these market shares among the industry players. That is, it does not sufficiently portray the inequality within the relevant market. Consider a market containing three main players with respective market shares of 15%, 10% and 5%. In addition, the market has 97 smaller players with equal shares, resulting in 0,51% for each of these players. This would give an HHI score of 1176, which indicates an unconcentrated market. However, there clearly exists dominance among the top three firms, which gives rise to potential market power. This example is credited to Mishra and Rao (2014, s. 7). Another caveat of the HHI is that multiple market structures can have the same index score, leading to a complication of the scores' interpretation. To combat such potential problems, Rhoades (1995) suggests that one should include an additional measurement for the inequality of shares within the market. This is done by including the widely used Gini coefficient in the analysis. The Gini coefficient is mainly attributed as a measurement of income distribution within a country or region. However, it has a long tradition of usage in the field of competitive analysis (Ávila, Flores, López-Gallo, & Márquez, 2012) (McLeary, 1969) (Bikker & Haaf, 2002), and its main use is to measure the inequality of market shares among the players. This gives us an additional measurement of the market distribution of the industry players to supplement the findings from the HHI.

The Gini coefficient is defined as the area enclosed by the Lorenz curve and the absolute equality line, which we define as area A, as a share of the entire area underneath the equality line, which we define as area A plus some area B. Here, area B represents the area underneath the Lorenz curve. This implies that the Gini Coefficient ranges from its minimum value of 0 to its maximum value of 1, where 0 indicates absolute equality and 1 indicates absolute inequality.

Based on our data on the market shares of the various banks we can obtain the Lorenz curve for the Norwegian bank industry. The market shares are once again measured as bank's deposits as a share of total industry deposits. Further, we have again assumed the equal shares among the non-top-ten banks as we lack exact data on these. If these differed from each other, the Gini coefficient would be higher which implies that our estimate is a conservative one.

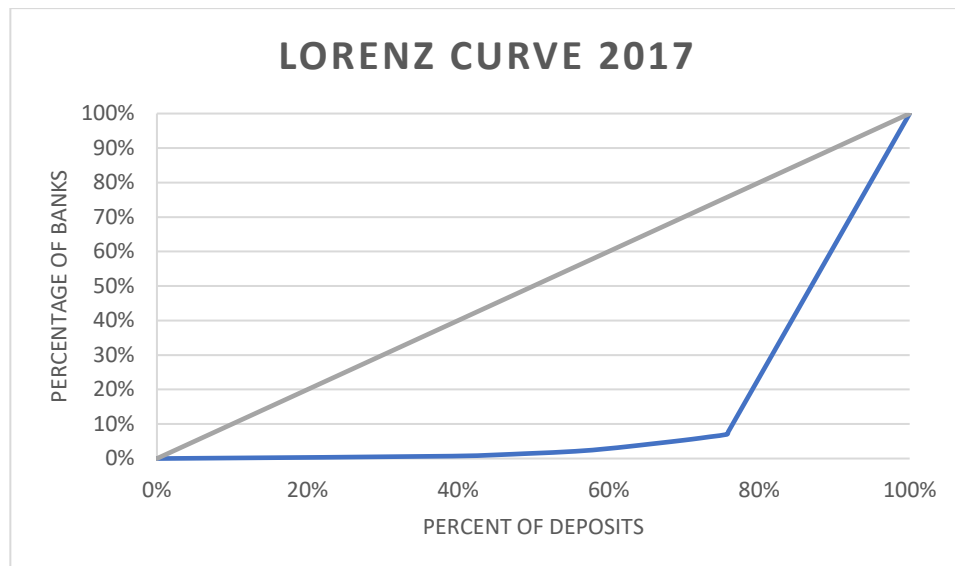


Figure 9 illustrates the Lorenz curve (blue) for the Norwegian bank industry for 2017 and the absolute equality line (grey). The Lorenz curve ranks the banks starting with the largest bank and moving towards the smallest one.

The shape of this Lorenz curve is far from the absolute equality line, which implies that we should expect a high Gini coefficient. The curve itself provides some additional insight into the market composition, such as that approximately 76% of the defined market is owned by the 8% largest banks. This is evidence of a high level of inequality within the sector. Furthermore, it is in line with the HHI's assessment of the sector's market concentration.

Based on this Lorenz curve, we estimate the Gini coefficient for the industry. Previously, we have explained that the Gini coefficient is defined as the following

$$GC = \frac{A}{A + B}$$

Since both axes has a max value equal to 1, this implies that $A + B = 0,5$, which further implies that $GC = 2A = 1 - 2B$

If we have some function representing the Lorenz Curve given by $L(x)$ we have that

$$B = \int_0^1 L(x) dx$$

and finally, we can calculate the Gini coefficient as

$$GC = 1 - 2 \int_0^1 L(x)dx \text{ (Dorfman, 1979)}$$

Thus, by performing such a calculation on the Lorenz curve of the Norwegian banking sector we obtain the sector's Gini coefficient.

$$GC = 0,72$$

This score is evidence of high inequality within the players of the sector, and the score is high in comparison to what one typically finds in the banking industry of other countries (Altunbas & Chakravarty, 1998). This lends support to the evidence found by HHI of market concentration within the industry. The coefficient has been decreasing over the past years, which is in line with the HHI's development. This reflects the loss of market shares among Nordea and DNB, but additionally reflects that the shares of the smaller banks have in general increased and converged with each other. In total, the deposit shares are more evenly distributed throughout the industry. This is further evidence of a move towards a more equal and competitive Norwegian banking industry. However, as with the HHI, the Gini coefficient suggests that some market power still pertains, which, as previously argued, decreases consumer utility. The evidence from this analysis suggest that the competition enhancing requirements of PSD2 are well justified, and that the benefits brought forth for consumers should outweigh the costs associated with compliance to additional regulations.

The loss in market share of Nordea and DNB is an interesting trend and have strong implications for the future of banking, especially if it were to continue. DNB prescribes this development due to their inability to grow as fast as the market in general and states that their growth rate is satisfactory. The reason behind why DNB is unable to grow as fast as the market is in part due to the additional regulations and requirements which is imposed on DNB as they are defined as a systematically important bank. This leads to higher and more comprehensive cash and capital requirements, which again inhibits their efficiency. Thus, when any bank becomes large enough to be considered a systematically important bank, it would imply additional constraints on profitability. These constraints lead to lower profitability, meaning that the smaller players would be likely to gain market share compared to the systematically important banks. This would imply that the trend is likely to continue and that markets could become less concentrated in the future. The current systemically important banks are Nordea and DNB, which has both lost significant market shares over the last years.

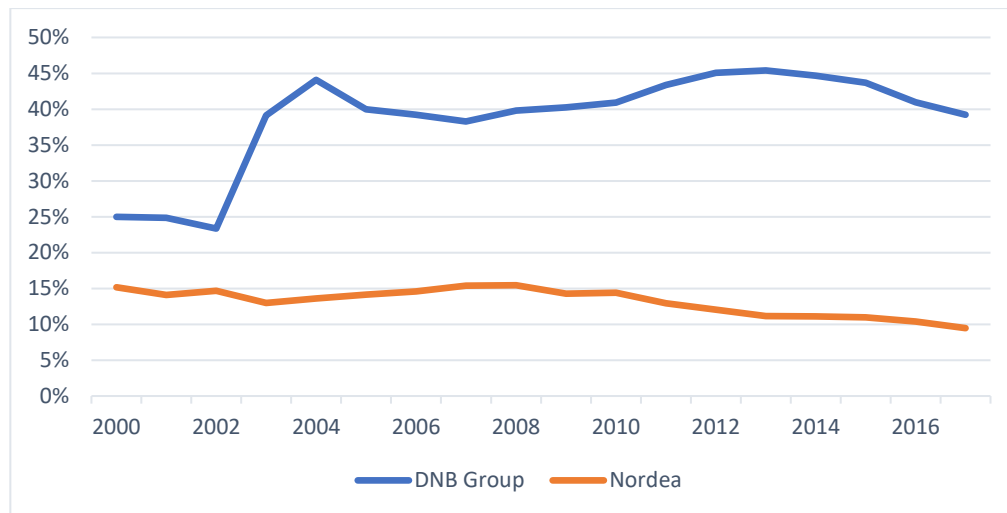


Figure 10 displays the market shares of the systemically important banks between 2000-2017.

In addition, the industry has been characterized by the increased presence of online banking and digital solutions (Bjerkan, 2016). These trends have led to the growth of new entrants who base their banking business in its entirety on such activities without any focus on physical branches. The ability to run a bank without a physical presence drives down the large start-up costs involved with banking and thus drives down the barriers to enter the market. These types of entrants, such as Sbanken and Komplet Bank, have grown quickly and been able to establish themselves in the market (Hopland, 2017) (Nysveen, 2018). This trend can be identified in part by examining the downwards movement in the number of physical bank branches which we have observed in the Norwegian banking industry. This can be traced back to the peak of physical branches in 1987, while the internet component of this trend can be traced back to the late 1990s. The number of physical branches has declined by 56,7 % since its peak (Finans Norge, 2017a).

Another long-term trend is the sharp decrease in the net interest spread, which clearly depresses the profit margin of the banks. Here, we have defined the net interest spread as the average spread between the deposit rate and lending rate in the market. This spread has been reduced from being consistently in the 5% range during the 1980s to 2,65% in 2017. Such a development has clear effects on the profitability of the sector. Even though we have seen a significant decline over this period, the last few years the spread has stabilized. The spread in Norway has over the last decades been higher than in the European Union, although we see a

trend towards parity in 2018 (World Bank, 2015). This is line with observation of a gradually more competitive Norwegian banking industry.

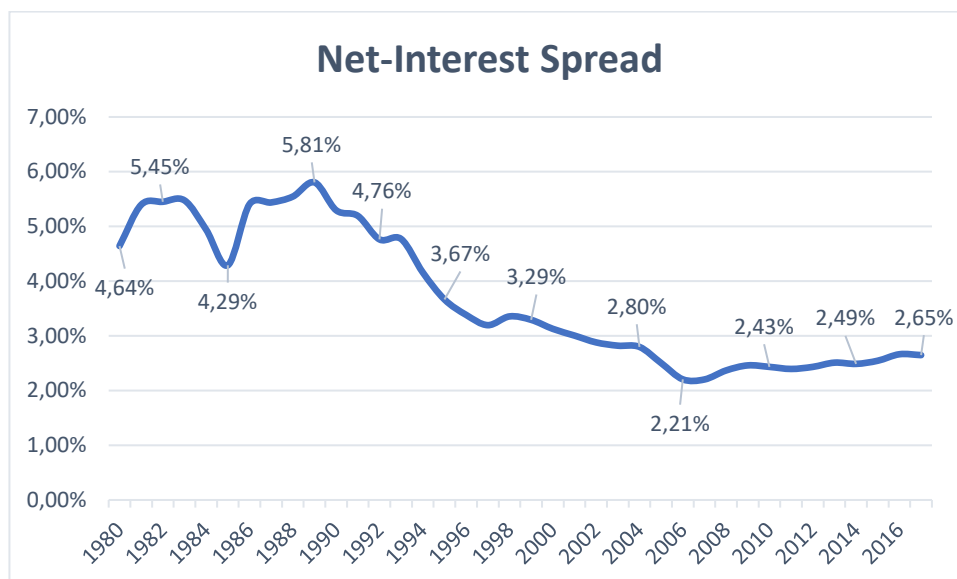


Figure 11 displays the development in the net-interest spread from 1980 to 2017.

These developments in the net-interest spread comes mainly due to the consolidation of previously local markets into a domestic market and the entrance of foreign institutions into the Norwegian market. This has increased the intensity of competition in the domestic market and hereby gradually reduces the net-interest spread.

The overall trend in the Norwegian banking industry has been a fairly strong growth rate over the period of 2005-2017. There have been some short-term variations, especially due to the financial crisis of 2008-09, during which the industry lending receded. The industry rebounded quickly in comparison to the rest of Europe and has experienced a steady growth since, it being notably high in the last few years. The growth of the industry exceeded that of the general economy measured by the gross domestic product over the period 2005-17, with the compounded annual growth rates being respectively 3,74% and 3,18%. The current banking industry has already seen some changes in their competitive environment due to Open Banking. We will now examine how the industry has adapted to the changing circumstances and how third parties are positioning themselves.

5. The Current State of Open Banking in Norway

This section aims to give a description of the current state of Open Banking in Norway by analyzing the incumbent banks readiness for PSD2, which includes the availability of data through open APIs. We examine the banks' strategic approach to PSD2 and the extent to which they go beyond compliance. Further, we consider how this approach differs between the industry players. We investigate the current entrepreneurial activity in the industry and how these firms are taking advantage of PSD2 and Open Banking. That includes examining their business model and strategy. This is done for both third parties as defined by PSD2 and other firms attempting to benefit from the directive. Consumer adoption of the services offered will be further discussed in section 6.

The largest banks have observed the coming changes in their landscape and hereby started to prepare for the opportunities and challenges which follows. As Norway's largest bank, DNB has understood the endangered position of the traditional industry and decided to take an active approach to Open Banking. They have created a developer portal which aims to aid developers in creating new services related to the banking industry. Their developer portal operates within a sandbox, which is a testing environment allowing the execution of software for isolated evaluation and monitoring (Rouse, 2018). Their APIs are not currently publicly available in production and only returns dummy data, so developers are unable to create services using actual customer data (DNB, 2018). DNB also has a group of employees working specifically on their Open Banking program to ensure their preparedness. Through these measures, DNB is going beyond compliance with PSD2 and have identified Open Banking as a strategic opportunity.

DNB's largest competitor Nordea are taking similar measures to position themselves as a competitive player for the future. This includes the creation of an Open Banking developer portal with many of the same characteristics. They offer access to dummy data through APIs, also enabling the developers to work in a sandbox environment. They have already launched publicly available production APIs in Finland and Sweden and are planning to expand these operations into Denmark and Norway. They actively market their portal to cooperate with the best entrepreneurs and developers. An important aspect of their strategy has been to create a community around their developer portal to ensure that the new services will be offered on top

of their infrastructure. By such an approach they attempt to gain a competitive edge in the market.

This approach is largely shared by Danske Bank, who offers a similar developer portal where sandbox APIs are at the center. Additionally, as the first bank in Norway, they offer an AISP-service which allows you to view transactions and balance from accounts in other banks as a part of Danske Bank's mobile banking application (Byberg, 2018). To offer this service they cooperate with the Danish FinTech Spiir and have also taken a multi-million Euro stake in the company. They focus largely on cooperation with entrepreneurs and invests in FinTech firms to enhance their strategic position.

The purely digital players have previously taken advantage of the changing landscape in the industry to gain ground in the market. Once again, they identify the changes largely as an opportunity to further increase their presence. Sbanken is a prime example of such a strategy. They were early advocates of Open Banking and have initiated cooperation with other banks to offer account information services (Hernaes, 2018). Further, they recently launched a collaboration with the Norwegian state educational loan fund which enables customers to view their outstanding student debt in the Sbanken platform. They also offer a developer portal to enable the creation of new services to their customers. However, currently one can only access basic personal data and transfer between own accounts. Sbanken arranges hackatons, API contests and open innovation programs to stimulate the next great idea. Their Chief Digital Officer Christoffer Hernæs is one of the most active advocates of Open Banking and he frequently shares his insight with the public. His opinions reflect the beyond compliance strategy adopted by Sbanken (Hernaes, 2018).

Norwegian saving-banks makes up a large share of the total players in the industry. However, their nature has led them to adopt a more conservative approach as they are mostly local institutions and aim to support the nearby communities. Therefore, they often lack the resources to pursue a large-scale Open Banking strategy. Their strategies are mostly characterized by compliance rather than innovation. However, there are some exceptions such as Sparebanken Vest and Sparebanken Sogn og Fjordane who participate in the account information cooperation with Sbanken.

The entrepreneurs have also identified the opportunity following the pending implementation of PSD2. There have been several interesting startups operating within the PISP or AISP sphere. These new firms for the most part focus on both account information and payment initiation services and hereby attempt to penetrate both markets. These are either startups which are created in Norway or firms expanding into Norway from abroad. Some of these have decided to take a cooperative approach to their operations and collaborate with banks in creating their services, where the banks typically take the role as partners or investors. Others are waiting for PSD2 to come into application in Norway before fully starting their operations.

Vipps is one of Europe's most successful innovative payment providers and have been able to gain close to a monopoly position in the Norwegian P2P payment market. This is in large part due to the backing from almost every Norwegian bank and hereby the banks' ability to market the product to their customers. They have also recently launched into a cooperative agreement with Alibaba, enabling AliPay to utilize their technological infrastructure for payments. This is specifically aimed at increasing the convenience of payments for foreign visitors (Trumpy, 2018). Vipps' market share and operations will be more closely examined in section 6.1.

Apart from Vipps, Payr is perhaps the startup that has gained the most attention. They are licensed as both an AISP and PISP by the European Commission. Their focus is on increasing the convenience of paying bills and enabling their customers to easily keep track of the payable bills. These bills can be paid through the application. Payr has chosen a cooperative approach where they are open to collaborating with incumbent banks and they recently agreed a deal with DNB where the bank has invested just below a 10% share in the company.

Google and Apple are making their first moves into the Norwegian payment market at the moment with their own payment solutions Google Pay and Apple Pay. They have gained some traction in the market but are still fairly new and thus the adoption of the product has been only moderate so far. A significant share of Norwegian banks has been resistant to offer the payment solution to their customers, driving down its current possibility for consumer adoption. Notably, it has been mainly the large shareholders in Vipps such as DNB, the SR-group and the Eika group that have been reluctant to offer the service.

Revolut is an example of another foreign provider who has recently expanded their operations to the Norwegian market. In comparison to the typical Norwegian providers, they have chosen

to supply a broader set of services. They offer payment solutions in the P2P market and personal financial management as an account information provider. Additionally, they offer the possibility to open a bank account and one can also invest in cryptocurrency through the application. They plan to expand into credit provision by supplying loans and currently cooperate with suppliers to offer insurance services. This range of services has made Revolut more of a direct competitor with the incumbent banks and thereby they take a more disruptive approach than many other providers.

The pending PSD2 directive has also inspired various new firms working to provide the systems which enable Open Banking. These firms often work with establishing systems for data sharing, the cooperation between banks and FinTechs, and the consultation of banks regarding the coming changes in the industry. One Norwegian startup that aims to take advantage of the demand for such operations is Neonomics, which was established in 2016. Neonomics brings forward a solution which tries to connect banks, FinTechs and financial institutions through a marketplace where they can both provide and extract value. This enables cooperation in providing new services to the consumers. Neonomics focuses largely on the cooperative aspect of Open Banking.

There are also some more established players who attempt to gain from the regulatory needs of the banks. Nets is an example of such a firm and is a Danish-Norwegian enterprise which previously has provided banks with innovative payment solutions. In the wake of PSD2 they have developed expertise in API solutions and they sell these APIs to the banks. They created the first functional API sandbox where third parties can test the connection of API just as if they were connecting to a bank. This is another example of a firm, in this case an IT-firm, who does not try to overtake the bank, but rather acts as an entity outside the bank's value chain as a regular supplier.

The description above shows that some banks have started to prepare for the directive and are taking some actions to encourage the creation of new services. However, the development has been slower than many expected prior to the original implementation date of PSD2. Albeit some of the banks have created developer portals, these are based on sandbox APIs and mainly generates synthetic data. In other words, their usage is very limited and especially from a corporate perspective. None of the banks are currently offering open APIs to third parties. The banks and third parties identify the main challenge in today's Norwegian Open Banking

environment as the uncertainty surrounding the directive's implementation in Norway. This uncertainty is related to both the content and the timeline of PSD2 implementation in Norway.

The uncertainty related to the content is largely a lack of clarity regarding the technical aspects of the directive. This entails the lack of specification around an API standard. This has led to confusion on the bank's part as to how they should develop their APIs which again leads to uncertainty for the TPPs. There have been some attempts to create a more standardized specification for bank APIs, as done by the Berlin Group for Central and Northern Europe. However, most Norwegian banks are creating their own hybrid APIs based on internal systems and only partly inspired by the Berlin Group standard. The consequence is that there will be no exact common API standard for the Norwegian banking industry, which somewhat decreases the efficiency of data sharing.

However, there are attempts to capitalize on the need for a single-access point to increase the efficiency of data sharing. Nordic API Gateway currently offers read access to a large and increasing number of banks, such that one can get a consolidated view of all bank accounts in one app. DNB, Nordea, the EIKA-group and Danske Bank are among the banks participating in this arrangement. This approach is shared by the previously mentioned Neonomics, who offer similar services in addition to their payment and account information services.

One of the components of the banks current aversion to fully open their platform are grounded in concerns regarding the potential problems caused by third parties. The banks would be responsible if they choose to share data with third parties before the directive becomes applicable. Breaches caused by third parties could potentially cost banks their license under the current rules and this leads the banks to adopt a very cautious approach to sharing real data until the regulation is fully implemented. An additional concern raised by Johnny Anderson at Sbanken is the customers' inability to fully realize what they are given their consent to (Open Banking Day, October 25, 2018). We have previously touched upon this risk of Open Banking in section 2.5 and it is a concern for the reputation of the banks.

Another source of concern is the uncertainty regarding the timeline of the PSD2 implementation in Norway. The government is yet to set an exact deadline for the implementation, and the expected date has been pushed back several times. This has been a source of frustration for the firms planning to operate as third parties. Part of the reason the

implementation is taking time is that Norway is implementing the directive voluntarily, which allows the government to take a more cautious approach. Payr CEO Espen Einn (Open Banking Day, October 25, 2018) highlights this as the largest current challenge for Open Banking in Norway. Another issue raised by the third parties is the rigidity in the authorization process at the FSA. This implies difficulties in getting the proper license to operate in Norway.

These issues have led to a shift in the behavior of some entrepreneurs which have found a collaborative strategy to be increasingly favorable. The postponing and uncertainty PSD2 implementation have led them to be more dependent on cooperation with the incumbent banks. These cooperative agreements have been initiated to ensure increased access to customers and their data while the third parties await the pending implementation.

The description of the Norwegian market for Open Banking displays a market characterized by some degree of adoption and investments. The incumbents recognize the potential impact on the industry and has started to take some measures to position themselves favorably. We also see some startups trying to exploit the opportunities brought forward by PSD2, but the current market is still one awaiting clarifications regarding the structure and timeline of the directive. This has implications for their current penetration and the potential for future growth.

6. Third Party Market Potential

In this section we aim to estimate the market potential for third party providers in Norway and their current penetration into the markets. This is to get a sense of the potential for Open Banking in Norway. The third parties are divided into two main categories, as done by PSD2, namely AISPs and PISPs. These are then examined separately. In this process, we proceed by defining the potential market and discuss the implications of such a definition. The potential market will be dependent on the current size of the traditional market along with the possibility for third parties to penetrate this market. The variables used to estimate these sizes are largely dependent on the data available, and we discuss the implications of the variables used in the estimation process. We also consider the importance of the time frame in the estimation. In addition, we include a discussion of the results' implications for third parties in the Norwegian market.

6.1 The Payment Initiation Service Provider Industry

We start by looking at potential markets to penetrate for PISPs. The PISPs will primarily look to make their mark in the digital payment services market. Norway is among the countries where non-cash payments are most frequently used, and this represents a strong opportunity for PISPs.

In Norway only 10-12% of the total number of transactions are executed with cash (Norges Bank, 2018b, s. 17). This is a small share in comparison to other EU countries and it is due to the widespread adoption of credit and debit cards. The decreases in cash usage has continued in recent times, but the trend appears to have somewhat stagnated lately. This suggests that the current share of cash transactions will not change drastically over the next few years. The additional benefits of the PISP will not be strongly appealing to the share of population who still largely use cash. Thus, we subtract the current share of cash transactions in the estimation of the market potential for PISPs.

In estimating the potential market for PISPs there are mainly two relevant parameters. These are the aggregated value of transactions and the number of transactions performed. Both parameters reveal insight into certain aspects of the market. The aggregate value of transactions provides insight on the total value of the market for PISPs. The number of

transactions performed treats each transaction as equal in magnitude and provides a perspective on the potential market shares of PISPs relating to the total number of transactions in the market. In other words, this measurement provides insight on the prevalence of the PISP adoption.

Previous observations have highlighted that the retail-and peer-to-peer payment markets are the most accessible markets for innovative payment systems. This has been exhibited by the creation and entry into this market by such firms as Vipps, Apple Pay, WePay and AliPay. Therefore, we see such a market as the first which will be entered by the PISPs. Defining this as the current market potential gives a conservative view of the PISPs market, which we address as the short-term PISP market. Data from SSB and Norges Bank are used in the estimation process.

We use values on the transactions in the retail- and peer-to-peer market and correct these for the transactions made in cash to estimate the total value of card payments in this market. Such mobile payment services as Vipps are integrated into the data as the cards are connected to the apps, implying that it is registered as a card payment. Thus, the following defines the short-term PISP market.

$$\text{Value of Transactions} = 488bn * (1 - 5\%) + 37bn = 500,6bn$$

All numbers are in NOK.

The value of transactions in the Norwegian retail market amounted to 488 billion NOK in 2017. This entails the revenues from goods and services sold for consumption to end-users (SSB, 2018f). We subtract 5% of this number as this is the value of cash transactions made at point of sale as a share of total transaction value (Norges Bank, 2018b, s. 17). 37 billion NOK is the value of peer-to-peer payments made with a mobile phone, which is by far the most popular choice when transferring money between private individuals. This gives us a short-term market potential for PISPs of 500,6 billion NOK.

The average value of card transactions in retail payment services were 397 NOK per transaction in 2017. The total value of retail payments was 488 billion in 2017, and we subtract cash from this value to isolate the value of card payments. This is then divided by the average value of card transactions to find the number of transactions in the retail market. For the

number of transactions in the peer-to-peer market, data is available from Norges Bank. This data only reflects the P2P payments made with a mobile phone. However, this constitutes no significant problems as mobile P2P payments will be the most relevant for PISPs. In 2017 the number of mobile phone P2P transfers were 75 million (Norges Bank, 2018b, s. 6). Thus, the total number of transactions for the short-term PISP market becomes:

$$\text{Number of Transactions} = \left(488bn * \frac{1 - 5\%}{397}\right) + 75mn = 1\,243mn$$

These estimates enable us to find the current value of the PISP market as a share of its short-term potential value. The current value of the PISP market can be approximated as the value of the mobile payment market. The PISP market currently consists of mainly mobile payment providers, and therefore such an approximation should be precise with regards to the actual value. The same approximation is used regarding the total transactions performed. Given this approximation, the current value of the PISP market is 40 billion NOK for 2017 (Norges Bank, 2018b, s. 6). The current total performed transactions in the PISP market for 2017 are 89,5 million, this includes both peer-to-peer and peer-to-business payments.

To get a sense of the opportunities for growth among the PISP-sector in the short-term potential market, we compare the current market penetration established above to the potential market. This is done by estimating the current PISP market share for the total value and number of transactions respectively.

$$\text{Market Share of Value} = 7,99\%$$

$$\text{Market Share of Transactions} = 7,2\%$$

These values are similar for the two estimation procedures which implies that the market shares are stable depending on which measurement that is used. The discrepancy arises due to the difference in average payment value between the retail and peer-to-peer market and the current PISP market. Since market share of value is greater than market share of transactions it implies that the average payment value of mobile payments is larger than that of the retail and peer-to-peer market. This is supported by the data from Norges Bank which finds an

average of 397 NOK for the general card payment market and 445 NOK for the mobile payment market (Norges Bank, 2018b, s. 4).

These market shares display that the PISPs are already an established part of their short-term potential market. The main PISP in Norway is Vipps who hold close to 100% of the current PISP market so the domestic competition is currently weak but improving. However, the potential for growth within our defined short-term market is substantial. The significant current market share implies that the PISP technology has already gained significant traction among the Norwegian population, so it is an indicator of the strong capabilities of Norwegians to utilize these technological innovations. However, Vipps is owned jointly by the banks of Norway, which gives it a strong competitive advantage regarding trust from the public. PISPs and third parties in general will not have this luxury and it remains to see whether the Norwegian population will be as willing to share their data with these firms. Considering the aspects above, it implies that the prospects of starting a new PISP could be difficult without any support from other organizations. However, given the nature of the Norwegian society with high level of trust in the financial and public institutions this might not constitute a significant problem (Kleven, 2016). The reasoning behind this is that the Norwegian government sets the conditions which must be complied with regarding the processes in Open Banking. This entails the data sharing processes, authorization and the general safe keeping of the customer data. This enhanced trust in the Open Banking activities should induce increased willingness to share the data with third parties, hereby enabling a more aggressive approach to obtaining the estimated market potential.

To look at the long-term potential of PISPs we define the long-term market to consist of the total value of all transactions in the market as well as total performed transaction. The third parties possess the potential to enter into every aspect of payment service, and therefore the entire market can be a long-term target for these providers. However, the reality of this potential must be assessed. Again, we use the same two parameters to estimate the potential long-term market, namely total value of transactions and total transactions performed. The data for these parameters is collected from Norges Bank (Norges Bank, 2018b, ss. 27-33) and the value and number of transactions for current PISP penetration are defined as for the short-term market. We can define the current PISPs market value to be equal for both these market estimations as no Norwegian PISP has any significant revenue from the giro market. The total

payment market mainly consists of card payments, account-to-account transfers and giro payments. As for the short-term market, cash is excluded for this estimation as well.

$$\textit{Value of Transactions} = 17\,559\textit{bn} + 823\textit{bn} = 18\,382\textit{bn}$$

All numbers are in NOK.

The debit and credit transfers constituted 17 559 billion and card payments 823 billion in 2017. The long-term market potential for PISPs measured in value thus becomes 18 382 billion NOK as calculated above.

Further, the estimation of the total value of transactions consist of Debit and Credit transfers performed and card payments performed in the Norwegian market in 2017, which constituted 738 million and 2 284 million respectively.

$$\textit{Number of Transactions} = 738\textit{mn} + 2\,284\textit{mn} = 3\,022\textit{mn}$$

The long-term market potential for PISPs measured in number of transactions thus becomes 3 022 million NOK as calculated above. Given these two estimations we can now calculate the PISPs current market share relative to the long-term market.

$$\textit{Market Share of Value} = 0,22\%$$

$$\textit{Market Share of Transactions} = 2,96\%$$

We observe that PISPs have a significant lower share of this total market compared to the more narrowly defined retail and peer-to-peer market. Since no Norwegian PISPs has a significant share of the giro payments market, these results are as expected. The results reflect the reality that giro payments in general are large and a lot bigger than the average card or mobile payment. The average transaction value in 2017 was 23 787 NOK, compared to 397 and 445 NOK respectively. These giro payments are mainly bill and wage payments. This drives the value of the transactions up, and consequently the PISPs' share of the market down.

In the analysis of the long-term total market for PISPs, we have defined the potential market as the total payment market within Norway. Thus, an uncertainty which must be addressed is the reality of the PISPs' prospects within such a large market. We have previously argued that

the retail and peer-to-peer market is the most attainable market for the new payment providers, and the evidence is in favor of this proposition. As previously observed, the total payments market is in large part made up of giro payments. Thus, we must examine the possibility of PISPs to enter the giro payment component of the total market.

The giro payment market consists of several segments which vary substantially in size. Some of these segments are more accessible than others and the PISPs' potential to gain market shares differ between the various segments. Data is not readily available for further exact decomposition of the segments, so their respective sizes will be based largely on general information from market players. A rough estimation from Norges Bank finds that 90% of giro payments are made by private households and 10% by businesses. However, the value of these payments is 50 % each. The main markets considered from the giro payment industry will be peer-to-business payments, salary payments and business-to-business payments.

The first market to consider is the peer-to-business giro segment and this market segment is where one would expect to find the lowest average payments. It is largely made up of loan, rent and various other bill payments. The payment of bills is often time-consuming and PISPs can decrease the inconvenience of this process. This market will also be easier to penetrate as its nature is close to that of the retail and P2P market. Based on this argument, the peer-to-business segment of the giro payment market appears to be the most accessible for PISPs.

The main problem arises with regards to the salary and business-to-business payment segments. To succeed within these segments the PISPs must convince the businesses and the government to adopt their technology by providing a more efficient and secure solution. The increased efficiency and ease of use which is offered to individuals might not be enough to gain traction among these players. Firms and governments have a much larger and more complicated set of transactions than individuals, and in this sense the adaption of PISPs will be a longer and more complex process. These institutions also have different needs in how the payment process is made more effective. The main needs of these institutions relate to the speed and cost of the transaction. The speed involves a faster and more comprehensive outlook for the firms regarding their finances. Further, the cost can be divided into two parts, the direct transaction costs and the administrative costs. Direct transaction costs relate to the fees that occur from the payments. Administrative costs involve the firms' costs of executing and surveilling payments. Thus, the key to break into these markets for PISPs will be how to solve

these challenges. Another obstacle facing PISPs in this regard is that Norway has a huge public sector. In the past, governmental agencies have been slower to act than their private sector counterparts when it comes to adopting new technology. Around 32% of Norwegians are employed in either the central, municipal or county municipal government (SSB, 2018e). This represent a large part of the salary market and therefore a large potential market for PISPs, but also a huge challenge.

Estimating the market potential for PISPs only estimates the potential value of transactions performed by PISPs, but do not provide any insight into the degree of which they can monetize these transactions. Thus, we analyze the PISPs ability to generate revenue from these activities by information gathered from various current players in the market. The main source of revenue for PISPs is fees charged from the execution of transactions. These fees vary with the size of the transaction. In Norway, the dominating PISP Vipps is charging 1% for transactions exceeding 5 000 NOK in P2P payments. For P2B payments the charging rate is 1,75% for all transactions. These differences and the lack of applied fees complicates the estimation of potential revenue for PISPs. To combat this problem, we approximate the average fee earned for card payments in the current payment market. This is done by calculating the card transaction revenue earned by banks as a share of total card transaction value. This approximation shows that total fees earned by banks amount to 0,59% per transaction. This percentage fee might seem a bit excessive at first, but one must keep in mind that this estimation is for both retail, peer-to-peer and business-to-business payments with payment cards. B2B payments are where the banks mainly earn their revenue, and this increases the average percentage fee (Hernaes, Personal Communication, November 7, 2018) (Wagenius, Personal Communication, November 13, 2018). First, we estimate the potential revenue for the short-term market, which considers retail and peer-to-peer payments.

$$\text{Potential Revenue} = 500,6bn * 0,59\% = 2,95bn$$

All numbers in NOK

This estimation constitutes some revenue opportunities for the PISP in the Norwegian market. However, the percentage fee approximated for this estimation is higher than what is typically found in the retail and peer-to-peer market. This is as consumer payments are most often below

the threshold where the applied fees become significant. Nonetheless, in lack of more specific data, this approximation provides some insight into the opportunities in the market.

Further, we estimate the revenue potential for the long-term market, which is defined by debit and credit transfers as well as card payments.

$$\text{Potential Revenue} = 18\,382\text{bn} * 0,59\% = 108,5\text{bn}$$

All numbers in NOK

The revenue opportunities in this market strongly exceeds the ones found in the consumer market, as previously argued. The approximated percentage fee is likely to be closer to the actual value in this market as it considers a mix of business and consumer payments. However, we have previously examined the realism of PISPs entering this market and argued that this might prove difficult. Furthermore, the average payment fee charged in the market could decrease due to the increased competition and the PISPs ability to streamline the payment chain. Thus, the estimates above could prove to be excessive.

The fee-based model of Vipps has not yet allowed them to generate enough revenue to break even and the shareholders are currently losing money. The problem of these business models is the ability to generate enough earnings to cover the costs of developing and promoting the technology. This is largely an issue of scale, and for such a model to generate profits one would need a large consumer base. This implies that the market would have to be large enough to reap the economies of scale which exist due to the nearly non-existent marginal costs.

The question then arises whether the Norwegian market is large enough for domestic PISPs to generate profit. The Norwegian market is already characterized by general low fees on payments in comparison to what one typically finds elsewhere in Europe (Norges Bank, 2014) (European Commission, 2015a). In particular, peer payments only have minor fees. This implies low revenue per transaction for the providers. Albeit the market is accessible due to the widespread adoption of technology, it might not be possible to earn enough on payments alone to cover the costs involved. This is supported by the banks low earnings on transactions and the negative result of Vipps, even given their significant market share. The banks mainly earn their payment revenue on business-to-business payments. Thus, it might be necessary for PISPs to penetrate the long-term market if they are to deliver sustainable results. The

discussion above suggest that PISPs must be able to operate across borders to achieve the necessary scalability and that we might not see providers focusing solely on the Norwegian market, especially in the short-term. The new international efforts made by Vipps emphasizes this argument (Christensen, 2018)

This has led other foreign PISPs to investigate other ways to generate earnings. It is natural to assume that Vipps and other PISPs that want to compete in the Norwegian market in the future will explore new revenue streams. One option which has been considered is the possibility of generating revenue through ads in the application. This is how many popular phone applications earn their revenue and could be a good complement to the revenue from transaction fees. This has been most relevant for peer-to-peer and peer-to-business payment providers as they are more receptive to the marketing of products and check the apps frequently.

The above discussion provides some insight into the operations of the PISPs and their possible revenue sources. There is some current penetration into the defined potential markets, but the majority of this stems from the peer-to-peer segment. Their revenue sources mainly relate to the fees earned and potential ad-revenue. However, the low margins on payment services in Norway, and the negative result of Vipps suggests that the PISPs might have to expand the services provided to become profitable.

6.2 The Account Information Service Provider Industry

First, we define the relevant market for the AISP industry in Norway. The AISPs are account information providers and aims largely to give its customers a more consolidated view of their finances and provide financial advice to increase the efficiency by which they manage their money. One encounters some problems in defining an exact market for AISPs as they are less closely related to services offered in the past in comparison to PISPs. The main domain of AISPs have been defined as financial advisory and personal financial management. However, the lack of data on the advisory market in Norway makes any meaningful estimation here unattainable. Therefore, we base the estimation on another service the AISPs are set to offer.

The AISPs are expected to aggregate the information related to deposits and loans, but initially do not grant these. One must keep in mind that AISPs only gets access to data for accounts

that are eligible to execute payments and thereby do not get direct access to product specifications regarding consumer loans and deposits. This provides a challenge for potential providers as it makes it difficult to customize products by themselves. However, the AISPs can observe transactions and thereby gain insight into the spending habits of the consumer. This entails the ability to observe the amount paid for various loans. A natural consequence of this ability will be the potential to provide alternatives for the customer to restructure his finances such as to improve his financial situation. This entails opportunities for banks to gain new customers by offering loans and deposits through the application. Such a price-comparison model has been adopted by the successful American AISP Mint, who earn their revenue partly through referrals (Gorton, 2018). The following estimation and discussion will be based on the potential revenue of the AISPs, as an estimation of market potential in the form of value or transactions does not yield significant insight due to the nature of their operations. The reason behind this is that the potential market value for AISPs by a price-comparison definition is equivalent to the loan market and therefore do not provide any further grounds for discussion.

Thus, as argued above, the most expedient way to define the AISP potential revenue is based on a commission-revenue model. Much like in other price-comparison businesses, the AISPs can earn commission from the product originators when a financial product is referred or sold through their application. Therefore, we can define the potential revenue as the average percentage commission earned on the loans in the market. Once again, we first look at the market for personal loans and regard this as a short-term estimate. This is based on the same reasoning as for the PISP market as consumers have historically shown larger willingness to adopt such services. The market commission rate for AISPs are hard to find exact data on as there are many start-up players within the market which do not offer available information on the specifications of their revenue model. The market is very early in its development, and this implies that the market rate is still uncertain. Therefore, we use data from other price-comparison industries and assume that the commission rate will be set reasonably close to the observed rate in these industries. We aim to use price-comparison industries where there exist homogenous products as we believe it to be more representative for the future of the AISP industry. Our observed estimate of the average commission within such industries are approximately 10% of the profit made by the originator (Kantar Public, CMA, 2017). We use the net-interest margin for 2017 as there are difficulties in finding exact data on the current margin. The relevant products sold are here defined as total personal loans. We define it as

loans only, based on that this is where the banks earn their spread. The total size of personal lending in 2017 is 3200 billion (Christensen, 2017). Thus, the short-term potential revenue estimation becomes

$$\text{Potential Revenue} = 3\,200\text{bn} * 10\% * 2,65\% = 8,48\text{bn}$$

All numbers in NOK

This market only considers potential revenue from referrals, while ignoring the potential for revenues from other sources such as advertising or premium options. However, the market estimation above is the most relevant in estimating the impact on the Norwegian banking sector. We will further discuss alternative earning strategies for AISPs as well as further implications of this estimation. To get a clearer image of their potential in comparison to current value we estimate the current market share of the AISPs. The current players which operate within the AISP related market in Norway mostly offer comparison of loans from different institutions. There is some ambiguity in PSD2 regarding how price comparison tools are treated. The dominating view is that such services operating within the financial industries will be part of the AISPs, but not as stand-alone entities. These sorts of services will likely be a complementary aspect of AISPs, but in addition the AISPs are expected to offer personal account information and a consolidated view of personal finances. In estimating the market share we use revenue from financial price comparison companies as we view this as the closest approximation given the current market situation. The largest operators in the defined market and their respective revenue for 2017 is displayed on the following page. The data on their yearly revenue is provided by Proff.no.

Firm	Yearly Revenue NOK
Minvoice	300 000
Lendo	193 000 000
Centum	153 000 000
Penger.no	58 000 000
Folkelånet Telefinans AS	73 500 000
Total	477 800 000

Table 1 illustrates the revenue earned among the current operators in the defined AISP market.

This data enables us to gain insight on the Norwegians' demand for such services, and as PSD2 defined AISPs will offer additional services, it appears natural that the demand for them will exceed that of the price-comparison providers. In addition, it provides insight into the opportunity for growth within the defined market. Based on the above data, the consolidated market share of the current players thus becomes

$$\text{Market Share} = \frac{477,8mn}{8,48bn} = 5,63\%$$

The current market share of the AISPs is 5,63% which indicates a moderate current penetration in the defined market. This is given our broad definition of AISPs and a short-term definition of the current market. As discussed previously, it is arguable that some of the defined players may not be considered AISPs given the limited spectra of services they provide. Nonetheless, we have included them to gain a broader perspective of the market share.

This current market share implies strong opportunities for growth among AISPs and we should expect to see a large number of entrants into this market over the coming years. The demand for such price-comparison services, as we have mainly considered in this first section, has seen a strong increase. We expect to observe the same in the financial markets as they are

characterized by complex products and asymmetric information, thus implying a strong need for direct comparisons between products.

As previously mentioned, AISPs can generate revenue from other sources as well. Advertising is generating revenue for apps and websites across different markets, and AISPs could also extract value from advertising. This obviously rely on factors such as number of customers, click-through-rates and so forth. The internet ad revenue generated in Norway during 2017 amounted to 9 017 million NOK (IRM, 2017). This industry has experienced strong growth over the previous years but is characterized by intense competition and a huge number of players. Nonetheless, given that the AISPs can gain a significant number of users it represents an excellent opportunity. Especially since the initial nature of these apps are that they are often free for the consumer. Another option, which has been implemented with success, is to offer a premium option. Mint offers an upgrade with supplementary services for a monthly fee if the customer feels the original service does not meet his preferences (Mint, 2018). There has been much discussion whether such a business model is sustainable. Some argue that the consumers are not willing to pay for such premiums due to their accommodation to ad-revenue models. Others have been more optimistic that the consumers are able to see the value of these services and are willing to pay directly for these. Christoffer Hernaes (Personal Communication, November 7, 2018) brings forward an important argument regarding the ability to charge premiums. He observes how the consumers are willing to initiate subscriptions for services, such as Netflix and Spotify, and often forget the cost afterwards, leaving the amount of subscriptions to accumulate. This is evidence in favor of the possibility for premium-based models, but it depends strongly on the heterogeneity of the products in the market. One would likely have to offer a differentiated service in comparison to other providers in order to sustain such a model.

In the previous market we defined individuals' deposits and loans as the main target for AISPs. However, there are other aspects of their business model which are important for the services provided. We have previously discussed their ability to provide a consolidated financial picture and give financial advice based on the data provided by banks. This opens a large market of additional users who aim to increase the understanding of their finances, generating more revenue from the sources discussed above. In addition, it is expected that financial advisory will be increasingly dominated by robo-advisors which fits the AISP business model well. We have seen an increase in investments into this concept in Norway and a report from

FinansNorge suggests that about one in four Norwegians trust robo-advisors' advice regarding financial products (Finans Norge, 2017d). The AISP's who will likely succeed in Norway are those who manage to consolidate information from several aspects of the banking world. This would include, among other things, information and comparisons on investments, retirement savings and insurance policies.

Another aspect which must be considered is the possibility of expansion into market segments other than the private individual market. Large firms often need a comprehensive, complex and specific analysis as well as a strong degree of flexibility in their decision-making process. The nature of AISP's and robo-advisors are not well fit for such challenges at the current state. Albeit the technology is progressing such analysis does not appear to be within reach in the foreseeable future. Based on this reasoning it appears that the market for small and medium sized enterprises (SMEs) is the one which it is the most natural for the AISP's to expand into.

Businesses are regularly looking for better organizational structures which enables them to have a better overview of their current financial situation. This is as to keep track of incoming payments from consumers and outgoing payments to suppliers. In addition, they are naturally interested in the best deals they can get for their finances. This implies the lowest rate on loans and the best rate on their cash. Therefore, the AISP's offerings are especially important for small and medium sized enterprises which regularly do not possess the capabilities to fully analyze their financial situation and may not have enough resources to keep track of all payments. The larger corporations have departments of experts within the different fields, such as finance and law, and are therefore capable of finding and negotiating better financial solutions. Thus, we define the market for managing finances among SMEs and personal consumers as the long-term market potential for AISP's in Norway. SMEs constitutes an overwhelming majority of firms in Norway, making up 99,5% of total Norwegian enterprises. This is based on the standard definition of SMEs which states that firms with less than 250 employees are small to medium sized businesses. However, in Norway it is common practice to define SMEs as firms with less than 50 employees, and with this threshold the share of firms in Norway categorized as SMEs drop to 97%. Despite this large share, the SMEs makes up a minority of outstanding business loans with their loans adding up to 515,15 bn NOK in 2016 (OECD, 2018). Based on the latter definition we can estimate the long-term potential revenue for AISP's in Norway. Thus, this becomes

$$\text{Potential Revenue} = (3\,200\text{bn} + 515,15\text{bn}) * 2,65\% * 10\% = 9,85\text{bn}$$

All numbers in NOK

Here, we assume that the commission to the AISP's remains the same for both personal and SME customers. We expect this assumption to hold although one could experience some factors which could affect this. One is that the commission percentage rate tends to vary with the value of the transaction, given that business loans are typically larger in value this could cause the rate to vary. However, as we are only considering SME loans the discrepancy in the value in comparison to personal loans should not be large enough for this to have a significant effect on our estimations.

Further, we estimate the current market share of AISP's in the long-term market. The current value is equal to that of the short-term market as there are no significant providers catering the SME segment. The current market share of the long-term market then becomes

$$\text{Market Share} = \frac{477,8\text{mn}}{9,85\text{bn}} = 4,85\%$$

This is still a moderate share of the market and suggests some penetration, although all of this comes from the personal segment. The market share of the long-term and short-term market is similar. This suggests that the potential for AISP's in the SME segment is secondary compared to the personal market.

The market estimation and discussion above provides insights into both the potential for third parties in Norway and the possibilities of their business model. The starting point for the AISP's will primarily be financial advisory and the ability to offer price comparisons on various financial products. Further, the AISP's could be able to expand into the wealth management and insurance domain as illustrated by Revolut and Mint. However, in Norway this is complicated by the legal aspects regarding licensing and authorization. PISP's mainly operate within the payment processing domain of the banks' value chain. As previously mentioned, it is common for third parties to be licensed as both payment and account information providers, implying that most third parties will operate within a combination of the identified domains. The impact on the banks' profitability increases as the third parties further expand into their value chain.

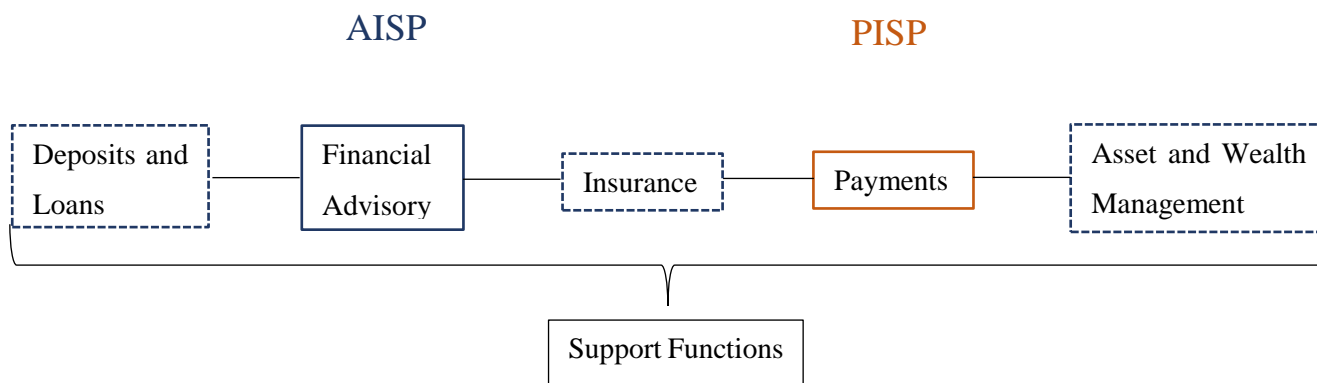


Figure 12 illustrates the domain of the banks' value chain where the third parties operate. The blue lines indicate AISP operations and the orange lines indicate PISP operations. The solid lines indicate the primary domain of the respective third parties, while the dashed lines indicated possible expansion of their models and indirect effects through price comparison activities.

7. The Impact on Profitability in the Norwegian Banking Industry

The impact of Open Banking on the profitability of the banking industry and its incumbents is perhaps the most discussed topic regarding Open Banking. Many experts have made their predictions and there are large differences in opinion about its potential effect on profit margins. Therefore, this section aims to provide a discussion of the potential loss to the incumbent banks in the Norwegian banking industry. This discussion is largely based on the value chain of banks and the competitive analysis in section 4. We proceed by separate analyses for the AISPs and PISPs of their direct effects on bank profitability. In addition, we investigate the potential indirect effects of third parties and increased competition on the industry. These analyses and discussions are supplemented by various estimations using data from Norges Bank. However, these estimations are mainly to facilitate discussion and give a sense of the magnitudes involved. Therefore, we do not aim to provide exact estimations for the losses, but rather let them vary over a range of possible values. The overall aim of this discussion is to provide an overview of the potential consequences of Open Banking and hereby give insight into the impact on the banking industry.

Our competitive analysis displayed that the Norwegian banking industry exhibits traits of a moderately concentrated market characterized by strong inequality between the players. Further, the industry has shown historical evidence of rigid market positions. This indicates the existence of abnormal margins in the market due to the exertion of market power. The aim of PSD2 has largely been to increase the competition through a further integration of the European financial markets and to make it easier for new entrants to enter the market. Thus, new entrants and increased competition should drive profit margins down.

The AISPs aim is to consolidate and aggregate information related to various accounts of the users. As previously discussed, these services are less closely linked to existing solutions which entails some uncertainty regarding their business model and operations. However, evidence from existing AISP operators displays that financial advisory and price comparison activities is a natural starting point. We have argued that the main market for AISPs are the personal segment, with possibilities to expand into the SME segment over time. As previously mentioned, complementary services have played a larger part in the banks' value chain, where financial advisory has become an important component of the value creation. Therefore, the

third parties' entrance into this market has direct implications for the profitability of the banks. To succeed in this market, the third parties must be able to deliver services which are of high enough quality to directly compete with the financial advice given by banks. This will not necessarily be straightforward as AISPs largely base themselves on robo-advisors and pre-defined processes. At the moment, this technology mainly allows them to provide simple advice on spending behavior and rates paid on financial products. This may not seem to constitute a large threat for the banks as of now, but even simple financial advice could reduce the need to interact with the banks' advisors. The reasoning behind this is that the more consolidated financial picture provided by the AISPs increases the user's ability to initially make better financial decision and enhances their financial literacy. Hereby, reducing the need for financial advice in the first place. Additionally, the progress in this field is rapidly moving forward, implying that the AISPs could substitute a larger share of the banks' financial advisory activities. As previously argued, this increased competition should drive down the margins in the market, which decreases the overall profitability. Further, the AISPs would also directly affect banks profitability by absorbing a share of the market. However, data on the margins and revenue from this market is not available and there is in general a lack of transparency among the providers, which has previously been a source of strong criticism. Nonetheless, evidence from similar countries and conversations with the market players suggests that this constitutes a significant share of the banks' overall earnings (Weisenthal, 2011).

In section 6.2, we argued the ability of AISPs to offer price comparison services based on the business model of existing AISPs. The direct impact on the banking industry from these operations will be the commission rate paid on the products which the AISPs have referred. A question then arises whether the commission earned by AISPs will reduce the banks' revenue or be paid by the consumers. In our further discussion we assume that the AISPs earnings primarily will come from a cut in banks' earnings. This is a fair assumption given the nature of AISPs as an information aggregator which should facilitate increased competition within the market. Thus, it seems unlikely that the banks will be able to raise its loan rates and hereby re-establish their margins to mitigate the loss from referral payments. Developments in other industries support this argument (The Economist, 2015).

The loss will only be incurred in the relevant markets defined for AISPs in the previous section. Here, we consider the broadly defined market to gain a better understanding of the

potential long-term effects of Open Banking on the industry. Thus, the profit loss incurred by banks will correspond to the earnings made by the AISPs.

$$\text{Bank Loss} = \text{AISPMS} * \text{CR} * \text{IS}(\text{SME loans} + \text{consumer loans})$$

where $\text{AISPMS} = \text{AISP market share}$

$\text{CR} = \text{Commission rate}$

$\text{IS} = \text{Net} - \text{Interest Spread}$

This is the total loss of earnings on the interest rate spread incurred by the banks, which largely determines their profits. This is only a rough estimate, and true loss depends on multiple additional factors. In this calculation, we have defined AISP market share as the share of total SME and consumer loans referred by the AISP. This market share times their earned commission rate determines the loss of the banks net-interest spread revenue. Thus, we can examine how the relative loss depends on the commission rate and the market share of the AISPs.

	Market Share AISPs				
Commission Rate	5%	10%	15%	25%	40%
5,0%	246	492	738	1231	1969
7,5%	369	738	1107	1846	2954
10,0%	492	984	1476	2461	3938
12,5%	615	1230	1846	3077	4923
15,0%	738	1476	2215	3692	5907

Table 2 displays the banks' loss in net-interest revenue for various AISP market penetrations and commission rates. The numbers in the table above are in million NOK.

Another consideration is the ability of the AISPs to affect the interest rate spread. Arguments have been made that Open Banking will induce a stronger focus on product attributes, such as the interest rate paid on loans, leading to a more homogenous consumer perception of the products in the market and stronger customer mobility. This logic implies that the intensity of competition in the industry will increase. Additionally, PSD2 lowers the barriers to entry into the financial services market which provides an opening into the banks' domain. This further

supports the argument for increased competition. It follows that this increased competition is likely to drive down the interest rate on loans and drive up the deposit rate, gradually decreasing the spread. This is expected if there exist current frictions in the market which AISPs will reduce and based on our competitive analysis we have argued that such exists in the Norwegian banking industry. The argument above is supported by Saunders & Schumacher (2000) who investigated the determinants of net interest margins in six developed economies, where five of these are in the EU region. They find evidence suggesting that more integrated market leads to lower interest rate spreads due to the increased competition. Thus, we should expect a gradual decrease in the Norwegian net interest spread over time due to the increased competition and integration which will hurt profitability in the banking sector. Based on the above reasoning, the following table only considers spread rates below the prevailing level. The influence on the interest spread is defined as an indirect effect of AISPs on the banking sector, and this potential outcome has much more severe consequences for the banks than the direct effects which is mainly commission paid to AISPs and the market share lost in financial advisory. This is in line with the predictions made from multiple industry experts upon the subject of the banks' profitability.

$$\text{Bank Loss} = (CIS - PIS) * (SME\ loans + Consumer\ loans)$$

Where CIS = Current Net – Interest spread

PIS = Potential Net – Interest Spread

Net Interest Spread	2,65%	2,60%	2,50%	2,40%	2,30%	2,15%	2,00%	1,85%
Bank Loss	0,00	1,86	5,57	9,29	13,00	18,58	24,15	29,72

Table 3 shows the loss of bank revenue from decreases in the net interest spread relative to their current profit at the 2017 spread of 2,65%. The numbers in the table above are in billion NOK.

The analysis of banks' losses due to the introduction of PISPs in the market is complicated by the nature of the payment service industry. This is mainly due to the complexity of the value chain and the entanglement of such services into the other bank operations. These services are often necessary to complement the core operations of the banks and is essential to attract and to provide consumers with a complete experience. This allows a sense of customer ownership and the bank can gain additional insight into the preferences of the consumer. This is typically insight which is not directly observable in the data. We seek to provide insight into the loss of

banks from the direct effects of the PISPs and then discuss their further implications for banks profitability. This is only as to gain an approximate understanding of the effects of PISPs. This estimation process uses the Norwegian banks' revenue from specific payment services and the potential market share of PISPs. We consider the entire card payment industry of banks to get a broader understanding of the potential impact on revenue, although we have previously argued that the PISPs will first look to make their mark in the retail and peer-to-peer market.

$$\text{Bank Loss} = CTV * PF * PISPMS + CTV * (CF - PF) * (1 - PISPMS)$$

where CTV = Total card transactions value

PISPMS = The market share of PISPs

CF = Current fee and PF = Potential fee

The data on banks' revenue from card payments are collected from Norges Bank (Norges Bank, 2018, s. 22) and contains both business and peer-to-peer payments. It is important to note that we only estimate banks' loss in revenue from card transactions, and this does not equal the loss in profits. However, as the payment services provided are so entangled into the other operations of the banks, it is difficult to find an exact estimate for the costs involved in these services and thus also the profits earned.

The revenue earned by banks in the payment market is mainly due to the fees collected from transactions, in the EU and EEA the interchange fee rate is capped at 0,3% for credit cards and 0,2% for debit cards. However, this only considers the interchange fee and there are several additional fees connected to payments which are entangled with other fees such as deposit management fees and loan servicing fees. Therefore, it is difficult to find an exact measurement of percentage fee earned by banks from card payments. In section 6.2 we approximated the percentage fee earned through payments by dividing the card transaction revenue earned by banks on the total card transaction value. This approximation showed that total fees earned by banks amounts to 0,59% per transaction. The majority of this fee comes from the business market, and as previously discussed there is uncertainty related to the PISPs ability to enter this market which suggests that the short-term impact on banks payment revenue will be less severe than the fee estimated above.

A potential effect of increased competition in the payment market is a reduction in total fees charged to retailers and consumers. This potential effect is mainly driven by technological

progress which enables the payment process to be more effective, possibly disintermediating certain steps in the process. This would likely drive the fee rate down, and if this were not the case it appears unlikely that it will exceed the current level.

In the context of the discussion above, there is mainly two factors we are interested in regarding the loss of Norwegian banks to PISPs, namely the market share of PISPs and the percentage fees earned on payment transactions in the market. Thus, we examine the magnitude of the loss to variations in these values

	Market Share PISP				
Transaction Fee	5%	10%	15%	25%	40%
0,60%	169	420	671	1173	1926
0,55%	539	749	959	1379	2008
0,50%	909	1078	1247	1584	2090
0,45%	1280	1407	1535	1790	2173
0,40%	1650	1737	1823	1996	2255
0,30%	2391	2395	2399	2407	2420

Table 4 displays the banks' loss in payment revenue for different PISP market penetrations and transaction fees in the market. The transaction fees considered are equal to or below the current level estimated for the market based on the previous reasoning that these are likely to drop. The numbers in the table are in million NOK.

This rough estimation does not consider the indirect effects on banks from losing customer ownership. This could have severe effects if the banks lose their position as an institution providing their customers with all their financial needs. This would damage the traditional close ties between banks and customers leading the latter to be more willing to seek other solutions. This could make them more inclined to hold accounts in multiple institutions, a situation which AISPs further facilitates by enabling information from these accounts to be consolidated. The high level of trust is one of the bank's most important assets, and if this were to change one might see the barriers to enter the market decline. Particularly Norway, who have a strong history of banks being perceived as local institutions which support activities in the community, could potentially see a large disruption in the traditional banking industry from the development described above. Especially the smaller Norwegian savings

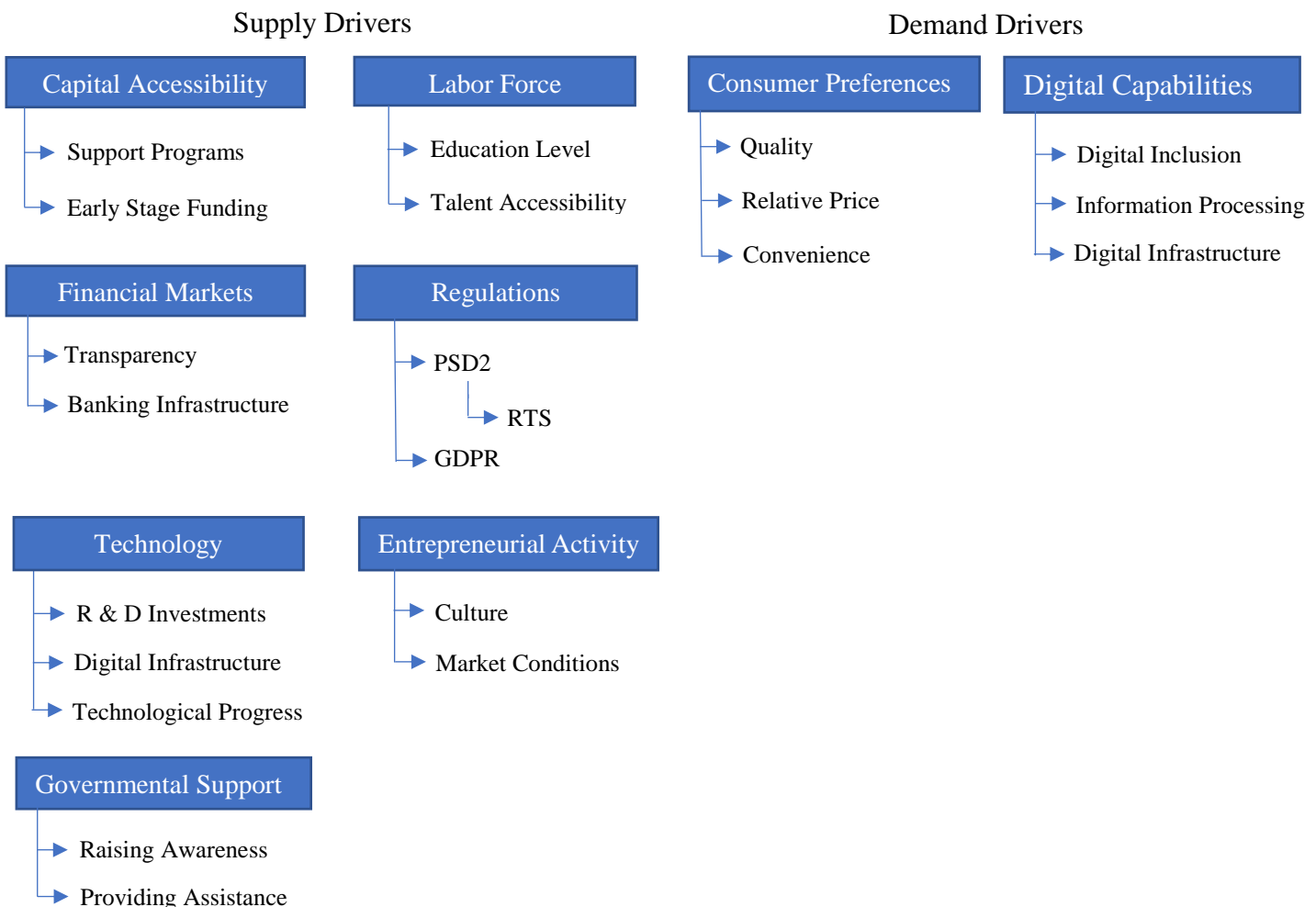
banks might be at risk as they do not possess the same economies of scale as the larger banks, making it harder for them to compete on product attributes alone. Additionally, it provides a weaker opportunity for banks to utilize insight from soft data to tailor products to individual customers. This puts a further dampening on the banks' profitability. This is highlighted as a large implication since about 80% of the customers' interactions with their bank happen through payments (Hernaes, Personal Communication, November 7, 2018). Implying that less payment interactions can have strong consequences for the consumers' personal connection to their banks and hereby the banks image in the market.

To summarize the above discussion, we expect the third party providers under PSD2 to have significant effects on the profitability of the Norwegian banking industry. Albeit the direct effects, in the form of commission paid to AISPs or revenue lost to PISPs, may not seem all that convincing by themselves. The main trouble for banks comes through the indirect effects and the potential for third parties to further expand into banking activities as the technology progresses. The potential effect of AISPs on the interest spread has strong consequences for banks' profitability. Additionally, the loss of customer relations and soft data decreases the banks' brand name and hurts their ability to tailor services and products. Given that these developments have such implications for the industry's profitability, we must closely examine the underlying potential for these third parties and Open Banking to gain traction in the Norwegian market. This is done by an evaluation of the previously defined framework in the context of Norway.

8. The Potential of Open Banking in Norway

To determine the ability of Open Banking to impact the Norwegian banking industry, one must examine its underlying potential in a Norwegian context. Therefore, this section aims to evaluate the suitability of the Norwegian market for services offered by Open Banking. Such an analysis provides insight into the third parties ability to establish themselves in Norway and their ability to grow within the market. It connects closely to the ability of third parties to obtain the market potential estimated in section 6, but also more thoroughly considers the macro-trends which will influence the Norwegian Open Banking development. The analysis is based on the drivers of Open Banking activity established in section 3. The insight provided by these drivers are coupled with observations regarding Norway as a country and an economy. This allows us to examine the advantages and disadvantages of Norway as a market for Open Banking. In addition, it provides insight into the future of Open Banking in Norway and its future competitiveness from an international perspective. We once again include the illustration of the drivers to allow for a consolidated view of the discussion that follows.

The Drivers of Open Banking



8.1 Demand Drivers in a Norwegian Context

Consumer Preferences

In general, the strong growth of the FinTech industry is evidence that the new technological services are meeting previously unmet preferences of the consumers (EY Global, 2017). For Norway, this is displayed by the rapid widespread adoption of the payment service provider Vipps. Vipps were founded in 2014 and by 2018 there was 2,9 million users of the application. This is approximately 75% of the bank customers in Norway (Finans Norge, 2018). More historically, in 2005 the share of the population with an online bank account was 62%, much higher than what one typically found in other countries at the time. Moving up to today, 65% of the population with internet access are using bank application on their smartphones to manage and transfer money. For the age group below 32 years old, this number rises to 84% (Finans Norge, 2017c). This is evidence that the Norwegians value the features found in financial technology services.

The main value proposition of these services has been to increase the convenience of banking and payments. The rapid growth of FinTech services and the population's adaption of these services has led to a change in consumer preferences. The consumers are increasingly demanding as they are getting used to products that offer convenience, simplicity and transparency across the banking value chain (EY, 2017, s. 5). These features naturally relate to the overall quality of the product compared to the current market solutions. The price of personal payment services in Norway are small suggesting little area to compete on relative price (Norges Bank, 2014, s. 13). This implies that the consumers are not likely to respond strongly to further decreases. Thus, the main competitive edge of third parties will be to increase the convenience of financial services. The services offered through Open Banking largely aim to enhance this aspect. This proposition coupled with the Norwegians' demand for increased convenience argues in favor of a strong consumer adoption of Open Banking services in Norway.

Digital Capabilities

The Norwegian society is characterized by high digital inclusion as approximately 98% of the population between 9-78 years has access to the internet (SSB, 2018a). Further, 92% of the population between 16-79 use a smartphone for private purposes (SSB, 2018d). This number

increases to 99% for the most active share of population, namely the ones between 12-49 (Futsæter, 2017). An issue discussed regarding Open Banking has been the risk of the elder share of the population being left out due to digital exclusion. The evidence above only covers the population up until 79 years, so we include the last available measure of the entire population. In 2013, 95% of the entire population had access to internet and this number is likely to have grown over the last years due to the trend observed in other measurements (MedieNorge, 2017). This suggests that digital access is distributed across the population, albeit it is likely less for elders than for the other inhabitants.

Digital inclusion is only one measurement of digital capabilities and does not provide information on the digital skills of the population. Open Banking services can be perceived as complicated products and thus the information processing ability of the Norwegian population must be assessed. SSB provides insights on information processing through a combination of their research and the EU's digital skills indicator. Their data is based on four aspects of digital skills, namely digital information searching, communication, problem solving and software skills.

The research is conducted for the age group 16-74 years and the statistics are considered for this group. In Norway, 45% is classified as having generally good digital skills, while 29% have basic digital skills. Only 25% of Norwegians have inadequate or no digital skills. A person who receives a score above "basic" on all four aspects is considered to have good general digital skills. In the EU, only Luxembourg and Denmark have populations with higher percentages of inhabitants with strong digital skills (SSB, 2017).

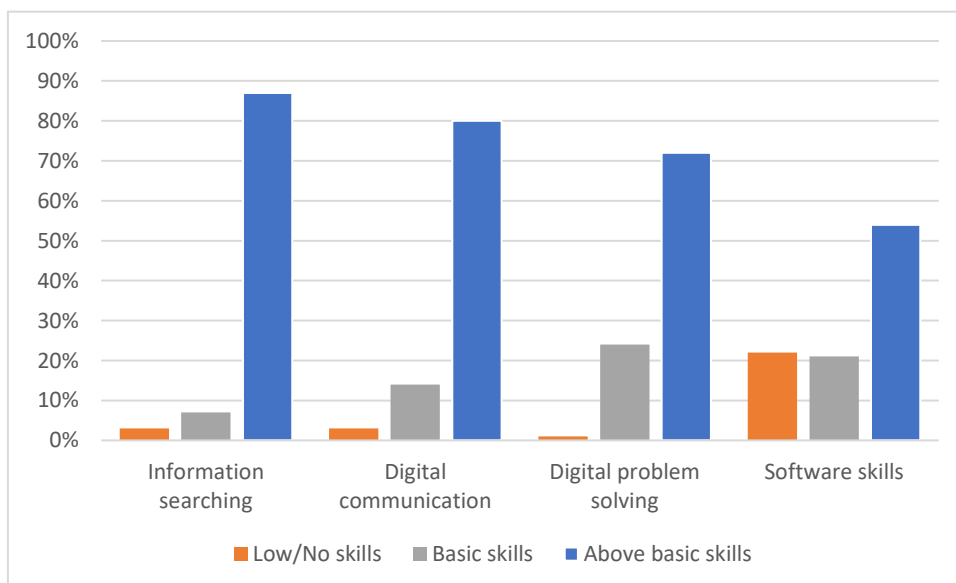


Figure 13 displays the digital skills of the Norwegian population measured by the four defined categories.

The digital infrastructure of Norway is the system which enables the consumers to store and exchange data. This relates to the trust of consumers in digital solutions. To approximate the level of the infrastructure we look at the share of the population with an online bank account as this portrays the trust in the digital systems of major institutions. 98% of the population with internet access had an online banking account in 2018 (Norges Bank, 2017). Additionally, the consumers have been willing to adopt the digital solutions provided by the government (Foley, Sutton, Wiseman, Green, & Moore, 2018, s. 73). This suggests high trust in the digital systems.

Norway scores strongly on all the features of digital capabilities, suggesting that the population is apt to adopt the services brought forth by Open Banking. In total, the information processing skills, infrastructure and preferences of the consumers favor Open Banking in Norway. Further, their demand for convenience suggests that the third party services are particularly favorable to the consumers which provides a prospect for rapid growth. However, the ability to create such third party services depends on the supply characteristics of the market.

8.2 Supply Drivers in a Norwegian Context

Capital accessibility

We defined capital accessibility as the ability of entrepreneurs and firms to raise funds for their projects. For Open Banking, this is characterized by the support programs of the government in providing capital to entrepreneurs and the available early stage funding in the market.

The Norwegian government aims to be active supporters of entrepreneurial activity by facilitating the supply of capital to such projects. This task has been largely delegated to Innovation Norway which is an organization financed by the government to enhance innovation. The organization operates through multiple channels to ensure funds to new projects. They supply funds directly as an investor, issue loans, consults the projects and connects potential investors and projects. In 2017, they delivered services for a total value of 7,3 billion NOK to the Norwegian business market which is an increase of 24% from 2014. The directly supplied funds constitutes 2,8 billion NOK and total issued loans constitutes 4 billion NOK. These are significant amounts and enables the entrepreneurs to undertake

projects which otherwise might not get funded. However, only a small share of these investments is channeled to the financial industry. This could be due to an unwillingness to invest in financial innovation but could also be due to a lack of projects to finance. Additionally, Innovation Norway have defined some areas to focus on and financial services are not among these. This suggests that albeit the entrepreneurial market is characterized by strong government support programs, only a small share of this accrues to financial innovation.

Above we discussed one source of early stage funding in Norway. Another aspect is the ability to raise capital in the private market. To focus on early stage funding, we mainly consider the venture capital market. The venture capital market in Norway, and generally in Europe, has been characterized by limited activity. Venture capital investments in Norway amounted to 103 million USD in 2016 (OECD, 2017c). These investments only constitute 31% of the directly supplied funds by Innovation Norway. The venture capital investments are spread out across multiple industries and only 4 million USD of these accrue to FinTechs (Deloitte, Global Fintech Hubs Federation, 2017), again displaying the lack of investments into the industry. This suggest little current ability to raise funds from the private market.

The presence of government support programs from Innovation Norway propose favorable conditions for entrepreneurs, but the favorability of these conditions is not apparent to the FinTech startups due to low allocation to this sector. Additionally, the ability to raise venture capital in Norway is characterized by a shortage of funds, where only a minor amount of these have been supplied to FinTech firms. Overall, the current conditions for capital access for financial services are uncertain due to the difficulties in separating issues relating to the funding itself and issues related to the quality of the new projects. However, the conditions for funding appear to be weak and the general allocation from venture capitalists are only minor.

Labor Force

The Norwegian labor force is characterized by a large share of individuals with education from higher institutions. In 2017, this share amounted to 43,2% of the active work force, defined as the population between 25 to 64 years. This share exceeds the average of the OECD countries, namely 36,9%, which suggests a wide accessibility of the educational system (OECD, 2017a). However, this share does not describe the composition of the education from higher institutions. We have argued the importance for Open Banking of accessible talent within technological and financial areas. 4,1% of the new students in 2016 enrolled in information

and communication technologies, while 17% enrolled in either business administration or law. Further decomposition is unavailable due to lack of data. This constitutes a significant share of the enrolled students, and even though the percentage within information technologies studies is relatively low, these studies have gained increased popularity over the last few years (Solberg, 2018).

Another aspect is the quality of the institutions and the returns to education. The quality of the institutions is measured by their resources, environment, connectivity and output. In the ranking based on these measures Norway's higher educational system ranks 12th. This is considered a strong result, even though it is lagging the other Scandinavian countries. The high ranking is largely driven by the resource factor and reflects Norway's large expenditures on education. This is further supported by the fact that Norway's rank falls to 28th when adjusted for GDP per capita. Overall, the score for Norway is about what can be expected for a country with such high levels of income (Williams & Leahy, 2018).

Returns to education is another aspect of the quality of the labor force. Badescu, D'Hombres & Villalba (2011) investigates this in 24 European countries by examining the effect of educational attainment on wage differentials controlling for individual and family specific characteristics. The findings for Norway suggest low returns to education for tertiary education and they score in the lowest range of the countries when comparing gross wages between secondary and tertiary education graduates.

The share of the population with higher education and the quality of institutions only partially determines the overall talent available for firms. Additionally, one must consider the ability to attract talent from foreign countries. To consider this aspect, we utilize insight from the global talent competitiveness index which measures the countries overall level of talent. This is based on market and regulatory characteristics, the ability to retain and attract talent and the prospects of growth. Norway scores highly in the ability to retain talent and is ranked as number two out of the 119 countries considered. However, the largest room for improvement is in attracting new talent, where Norway is ranked as 12th. A large part of this problem arises due to rigidity in the Norwegian labor market. Norway scores poorly in both ease of hiring and ease of redundancy, making the market less attractive to new entrants. (Lanvin & Evans, 2018, s. 209)

The wide distribution of higher education among the population suggests a strong availability of talent for the third parties. Further, this is supported by a significant share enrolled in the relevant fields of study and a strong ability to retain its talent. On the contrary, the weak returns to education and rigidities in the labor market constitutes a challenge to the creation of innovative services. Overall, Norway's labor force exhibits both positive and negative traits with regards to Open Banking activity.

Financial Markets

Norway's financial market are defined by its strong infrastructure and high level of transparency (Norges Bank, 2018a). This enables efficient exchange of data between parties operating in the market and it increases the ability to gather information and aggregate detailed data-sets. High transparency induces a stronger understanding among the public of the third party operations which again enables the public to make more informed decisions regarding their willingness to share data. This increases the efficiency of the third party screening process, which boosts long-term trust in such services. Both of these aspects of the market facilitate the operations of third parties and the adoption of their services by the public. However, the infrastructure currently lacks a centralized solution to offer real time payments, which is under development. The features above are attractive for a long-term adoption of Open Banking but finishing a real time payment infrastructure is key and constitutes a challenge.

Regulations

The regulations and directives which affect the Norwegian market for Open Banking are mainly PSD2 and GDPR. Additionally, the regulatory technical standards have been designed to further specify the technical aspects of PSD2. The introduction of these changes the framework for competition in the market. The content of such acts has previously been discussed in detail and here we will consider the state of these in Norway. PSD2 has yet to be implemented in Norway and there are several uncertainties related to its implementation timeframe. Especially as the expected date for implementation has been pushed back at multiple instances. The regulatory technical standards have set a later date for compliance and is therefore expected to be implemented in Norway gradually throughout 2019. GDPR entered application in the summer of 2018 and has been efficiently implemented. The PSD2 directive have been the main driver of Open Banking and thereby of the third parties' potential in Norway. As previously discussed, GDPR somewhat both complements and discourages Open

Banking, but at least it mitigates certain risks involved. Thus, these are considered as favorable features of the Norwegian market, however regarding PSD2 there are several uncertainties which must be resolved to fully reap the benefits.

Technology

While the changes in the Norwegian banking industry are largely driven by regulations, the technological level and development plays a key part in the customer value proposition of Open Banking. Norway is a society characterized by high levels of digitalization and technological knowledge. They rank 7th on WEF's competitiveness ranking when it comes to technological readiness, which is comprised of technological adoption and ICT usage (World Economic Forum, 2016). This is in line with observations made under the demand side drivers. The key for further technological progress is the investments made into the field. This is measured as the gross domestic spending on research and development. In Norway this amounted to 5961 million USD in 2016, or 2,032% of GDP. This was under the average spending in the OECD area which was 2,337% of GDP, and far below the biggest spenders (OECD, 2017b). This clearly shows that there is room for improvement in this area.

Digital infrastructure is strongly correlated with per capita income, and it is therefore no surprise that the digital infrastructure in Norway is regarded as one of Europe's best (Thierry Geiger, 2015) (Network Readiness Index, 2016). Norway scores high on the Business Technology Integration dimension in the EU survey Digital Economy and Society Index for 2018. The dimension measures businesses ability to absorb new technology and supports the argument for a strong Norwegian digital infrastructure (European Commission, 2018).

The high level of digitalization and strong infrastructure are favorable aspects of the Norwegian market. However, we observe that Norway's investment into R&D is low compared to their peers. This might have consequences for the long-term technological progress.

Governmental Support

Other regions have highlighted the importance of raising awareness among the consumers and banks to increase the adoption of Open Banking and ensure rapid compliance with PSD2. Such direct marketing and assistance are close to non-existent in the Norwegian market and no independent entity has been created to perform these activities. However, certain organizations

facilitate innovative clusters which aim to bring new services to the market. Examples of this are Oslo FinTech Hub and Finance Innovation, which link together FinTechs, established firms and investors. These clusters represent good opportunities for third parties to establish themselves in the market and at the same time provides established players the opportunity to access innovative solutions at an early stage. However, for inquiries regarding specifications of the directive, it is still the traditional government organizations one must address. This lack of a specialized unit can lead to inefficiency and confusion for involved parties. The third parties must deal with the Financial Supervisory Authority (FSA) regarding their licensing as PISPs or AISPs, and there has been discontent regarding the rigidity of these processes. Additional problems are caused as the FSA does not provide advice on how to meet the requirements, but only acts to check that the firm fulfills these.

The established FinTech clusters provides third parties with better connections and thus are a favorable feature of the market. On the contrary, the lack of a governmental entity and the rigid processes of the existing organizations are a negative aspect of the market and hampers the Open Banking development.

Entrepreneurial Activity

To assess the entrepreneurial culture of Norway we consider the perception of entrepreneurs, the risk attitude among the public and the desire for business ownership. The basis for this analysis is the Global Entrepreneurship Monitor for Norway (Global Entrepreneurship Monitor, 2015) and the report Entrepreneurship in Norway (Alsos, Clausen, Isaksen, & Åmo, 2014).

The perception of entrepreneurs in society are divided into two components, the share who view entrepreneurship as a good career choice and the share who believe that successful entrepreneurs have a high social status. About 58% of Norwegians view an entrepreneurial career as a good choice, and this is about the average when comparing to other countries. Additionally, a share of 83% believe successful entrepreneurs to have a high status in society. This is a large share of the population when compared to both their peers and the global average.

Risk attitude is measured by the fear of failure, where there exists an inverse relationship between the attitude and level of entrepreneurship. The fear of failure is low in comparison to

other well-developed countries as only 33,41% indicate that fear of failure prevents them from starting a business. However, this does not manifest itself in the share of Norwegians planning to become an entrepreneur, with only 4,78% stating intent to start a business within the next 3 years. This is far below the global average. This suggests that other factors affect this measurement, and these relate mostly to the market conditions for the entrepreneurs.

The entrepreneurial market conditions of Norway are defined by the public policy and the commercial infrastructure. The public policy is characterized by high taxes and bureaucracy. Furthermore, the entrepreneurs are not a highly regarded objective of the policymakers. Thus, the public policy is clearly a negative aspect of the market as higher taxes means less incentives for entrepreneurs and the bureaucracy creates slow and rigid processes in starting and operating a business. As further support of this, the CEO of Payr highlights that they spent 2000-3000 hours on regulatory aspects before being able to start developing the application (Bakken, 2018).

The commercial infrastructure is a measure of the presence of property rights laws and the enforcement of these. Norway has strong protection of both physical and intellectual property, and this is a positive aspect for the entrepreneurial activity as it ensures gains from developing new product and services (Heritage Foundation, 2018)

Overall, the entrepreneurial culture of Norway has some favorable traits, but only a small share of the inhabitants intends to start a business which indicates low activity. Further, public policy does not consider entrepreneurship as a primary objective and the high taxes hurts the monetary incentive to pursue entrepreneurial activities. Nonetheless, the property rights protection is strong, enabling sustained gains from innovation.

8.3 Market Characteristics

The characteristics of the Norwegian economy vary significantly in their favorability regarding the defined drivers. Certain aspects are identified as highly favorable for Open Banking, while others exhibit less favorable traits. However, each driver must be considered through their relative importance for the overall potential. Some drivers will have larger implications for the Open Banking activity than others. We have previously argued that the

consumer preferences and regulations in place are the most important drivers. This implies that highly favorable consumer preferences could outweigh many of the less favorable aspects of an economy. Another argument is that certain weaknesses can be more directly counteracted by strong scores on other aspects. An example of this is that a clear and unambiguous regulation can reduce the need for governmental support, implying that weaknesses in this aspect may not have a strong effect on the overall potential. Another aspect is that some of the considered drivers might need to reach a certain level to facilitate Open Banking activity, but that increases beyond that level might not result in further development. Thus, this would imply that there exist diminishing returns to Open Banking activity for some of the relevant drivers. A typical example of this is that the financial markets need to be at a certain level to facilitate efficient data sharing, but that increases beyond this level might not result in significant further Open Banking development.

Regarding Norway, the high demand for convenience and strong digital capabilities of the consumers are important aspects that facilitates Open Banking development. The rapid adoption of Vipps and mobile banking services highlights this as their main value proposition have been to increase the convenience of banking. Further, these applications require a satisfactory level of information processing ability from the users. The significant favorability of these drivers outweighs many of the less favorable aspects related to the economy. In addition, the banking infrastructure is advanced and characterized by high levels of trust and transparency. It is at a satisfactory level to facilitate large-scale data sharing but still lacks a real-time payment solution, which has negative implications for the value proposition of PISPs. The regulations in the economy are still characterized by some uncertainty and ambiguity which implies that they do not mitigate the challenges created by insufficient governmental support due to the lack of an independent entity. Nonetheless, the regulations are considered as favorable as they are a fundamental feature to facilitate Open Banking and are expected to be implemented in the near future. The development in other countries support this proposition as the regulations have been highlighted as a necessary aspect in driving Open Banking activity. The availability of capital is characterized by a lack of investments into the financial technology sector, which implies limited ability for the entrepreneurs to enter into Open Banking activities and hereby less startups into the third party domain. This has implications for the impact on the traditional banking industry as it implies smaller increases in competition from the introduction of Open Banking. This is further problematized by rigidities in the labor market, which prevents flexibility and the ability to attract foreign labor.

Additionally, the returns to educations are considered as weak and there are room for improvement in the quality of institutions. Nonetheless, the Norwegian labor force is characterized by a high share of inhabitants with higher education and a significant share of these are enrolled in studies relevant to Open Banking. Further, the level of the current technological state is strong, and the society is highly digitized. This entails good opportunities for third parties to create innovative solutions based on the existing technology. However, there is concerns related to R&D investments, and the low level of these could hamper further technological growth. This implies that the Norwegian Open Banking services might be less competitive from an international perspective in the future. Overall, considering the highly favorable demand drivers and the Open Banking facilitating regulations in place, the Norwegian market is considered as favorable from the drivers' perspective. In the figure below, we illustrate the drivers' respective favorability by dividing them into four groups. These groups are defined as favorable, somewhat favorable, somewhat unfavorable and unfavorable.

Favorable	Somewhat Favorable	Somewhat Unfavorable	Unfavorable
Consumer Preferences	Financial Markets	Entrepreneurial Activity	Capital Accessibility
Digital Capabilities	Technology	Labor Force	Governmental Support
Regulations			

Figure 14 illustrates the favorability of the drivers from a Norwegian standpoint.

To get a clearer view of Norway as a market for Open Banking services there are aspects that must be considered beyond the drivers. These drivers have enabled an evaluation of the suitability of the economy based on a defined framework. Thus, providing valuable insights into the opportunities and challenges related to Open Banking development in the Norwegian economy. However, there is a need to analyze aspects of the Norwegian market which goes beyond what is immediately identified through the drivers. These aspects relate to the Norwegian market in an international context and further considerations which are unique to Norway. The aspects affect the share of foreign third parties attempting to established themselves in the Norwegian market. Likewise, it affects the current Norwegian startups ability to expand their operations into international markets. It provides further insight into the

discussion of the market potential and the ability to generate profits from third party services in the Norwegian market. Therefore, it also relates to the impact on profitability among the incumbent banks.

We previously argued that the Norwegian financial markets are characterized by a high level of transparency and strong trust in financial institutions. The advanced financial market of Norway enables efficient data sharing between the parties involved and reinforces trust in third parties. The third parties are strongly dependent on gaining the trust of the public to be able to access the customer data. This diminishes the competitive advantage of the banks as consumer trust has historically been one of their main resources, which enables the third parties to offer their initial services and subsequently increase their presence in the banking value chain. A more general consideration regarding trust is the government's high level of transparency which has led to strong confidence in public institutions (Kleven, 2016). This is a specifically favorable aspect of the potential for Open Banking in Norway as the high level of trust in society induces confidence in the data sharing processes between parties since these are surveilled by the government. This strong trust in public institutions enables further development of the Open Banking concept as it provides opportunity to consolidate the various customer databases of the banks into a shared database controlled by the government. This would induce efficiency and security in the data sharing processes, and the consumer could be more inclined to share their data if it were largely controlled by the public institutions. This would also ensure a more rigid and standardized process of authorization and data sharing which provides the third parties with stability in the Open Banking processes. However, this increased rigidity in the processes could also lead to less efficiency due to increased bureaucracy. This should not constitute significant problems given the high technological abilities of the government and their well-developed digital infrastructure which should ensure strong competence in designing the system. Based on the arguments above, it is clear that the society's strong trust in institutions constitutes a significant competitive advantage for Open Banking in Norway compared to other regions with a lower prevailing level of trust.

PSD2 integrates the third party markets, meaning that a firm only needs to be PISP or AISP licensed in one country to operate within the entire EU. This decreases the regulatory barriers to entry between the national markets, hereby further integrating the European financial market. However, there are other barriers which still persists between the EU nations. These

relates to the distinctive features of the nation considered, such as language and culture. These features create barriers as they affect the possibility to easily scale a product across markets. We have previously argued that the ability for third parties to scale their services to international markets, or offer additional services and products, are necessary due to the minor revenue margins which prevail in the Norwegian market. The following implications are that the third parties need to either scale up their service to serve a larger set of markets or expand the set of services offered. This is supported by the current third parties operating in the market. The process to scale from the Norwegian market into the other European countries are complicated by the heterogeneity of these countries. The user's appreciate different specifications of the applications and their interfaces. Additionally, there exists strong language barriers to certain countries, and the domestic providers usually have superior insight into the local consumers' preferences. Many European countries are characterized by higher margins, implying that it is easier for a third party to focus solely on the domestic market and still turn a profit. This ability to specialize on one segment of the international market creates a competitive advantage for these domestic suppliers. This makes it tough for Norwegian providers to penetrate markets with such characteristics. Further, this implies that the Norwegian providers might not be able to turn a profit by focusing solely on one aspect of the banks' value chain and this would push them increasingly into the domain of the banks. Thus, an issue arises regarding the ability of third parties to enter further into such operations. There have been some suggestions that this is difficult due to the existing rigidities in authorization from the FSA. However, there still exists some opportunities here for the third parties, especially with regards to offering a combination of AISP and PISP services in one application.

The other aspect of scalability is the barriers for foreign third parties to enter the Norwegian market. The minor margins of the Norwegian market might be favorable as additional revenue for third parties who have already achieved strong economies of scale through their growth in other markets. A complementary aspect is the argued inability of domestic suppliers to achieve such scales. This implies that there is potential for foreign institutions to gain market share. A potential cultural barrier to such a development and scaling of a currently offered service is the Norwegian language, as it is unique and has limited reach. The fact that most Norwegians speak English might mitigate this aspect, but it is observed that they would prefer native options. This implies that some modifications will be necessary to expand foreign services into Norway.

Having established the conditions which drives the market potential and Open Banking development in Norway, we now consider the outlook of the banking industry by coupling the above discussion with our findings from previous sections of the thesis. This enables us to provide some insight into the likely consequences of Open Banking on the Norwegian banking industry.

9. Outlook for the Norwegian Banking Industry

This section aims to utilize the discussions and findings from the analysis of the current banking industry, the estimated market potential for third parties, the loss of profitability for incumbents and the analysis of the Norwegian market for Open Banking. This enables a discussion of the outlook of the financial services industry. The discussion is supplemented by knowledge gained in the interviews conducted with incumbent banks, market experts and FinTech players.

An analogy brought forward by Neonomics CTO Kenneth Wagenius (Personal Communication, November 13, 2018) and Payr CEO Espen Einn (Open Banking Day, October 25, 2018) to describe the outlook of the banking industry is the deregulation of the Norwegian Telecom industry. The Telecom market previously consisted of only two large players, Telenor and Netcom. The liberalization of the market was initiated in 1998 and continued in the following years. The liberalization enabled new providers access to the industry infrastructure allowing them to provide communication services to consumers. It took some time for the new providers to establish themselves in the market, but many experienced strong growth in the following years. This has created an industry where Telenor and NetCom have lost market share and power, but still holds important positions in the market. However, their position has partly shifted to more of an infrastructure provider rather than a service provider. Although it has decreased the margins on the traditional products in the industry, it has also enabled the creation of many innovative products and bundling methods. This has benefited the consumer and increased the total size of the market. The banking industry is not a duopoly, but the above development still provides insight into possible consequences of Open Banking. The incumbents provide an infrastructure for third parties to build their services, and this depresses their position in selling products directly to the consumers due to the structural changes in the market. Even though they probably will continue to sell products directly to consumers, their role will be more that of a facilitator. This infrastructure position of incumbents can open new sources of revenue despite the overall reduction in margins for traditional banking products. The lower barriers to entry enable an increased creation of new services and products on top of the infrastructure provided by banks. Thus, the biggest impact of Open Banking could come from the wide set of new services created and the changed role of the incumbent banks. However, multiple additional aspects must be taken into consideration

to assess the potential changes. These aspects relate to our findings and discussion from the previous sections in the thesis.

Previously, we have displayed how the current Norwegian banking industry is defined by moderately high concentration and high inequality between the players. Although these measurements have been somewhat decreasing, it still indicates the persistence of rigidities in the market. The high scores on these measurements is mainly due to the unique position of DNB, who holds close to 40% of the market. However, the market shares of the systemically important banks, DNB and Nordea, have been decreasing over the last few years. This has enabled more lean structured competitors to gain traction. Further, the consolidation of regional markets and increased presence of foreign competitors has driven the margins down significantly. PSD2 aims to facilitate and increase the competition further in this market by lowering the barriers to entry and encouraging innovation. There has been some investments and startups into the third party domain, but the uncertainties regarding the directive has left the market to adopt a cautious approach.

The estimation of the market potential for third parties has shown moderate current penetration and strong potential for growth, although the third parties' business model and ability to turn a profit is uncertain. The increased competition has expected negative impact on the profitability of the incumbent banks, much like what was observed after the previously considered consolidation of domestic markets. The indirect effects of more competition from third parties are found to be more severe than the direct loss of market share for incumbents. However, the largest bank players have identified this and have undertaken proactive measures. Others have seen the changes as a strategic opportunity by developing their ability to rapidly adjust to the market, while the smaller saving banks are taking a more cautious approach with focus mainly on compliance. We have argued that the drivers of Open Banking are favorable in a Norwegian context. Especially the strong digital capabilities and demand for convenience among the consumers are highly attractive aspects and suggest a strong consumer adoption. Further, the trust in financial and public institutions induces the consumer's willingness to share their data with third parties and creates possibilities to set up a shared database of the consumer data. This is a favorable aspect of the Norwegian economy in comparison to multiple other countries. However, there is uncertainty related to the size and scalability needs in the market. It is likely that third parties operating in Norway will need to expand either into foreign markets or offer a broader set of services to ensure profitability.

The future composition of the market relies strongly on the factors discussed above. For incumbent banks to stay relevant in the era of Open Banking it requires strong digital capabilities and ability to adapt. The observed measurements taken by the larger banks indicate their ability to fulfill these requirements. On the contrary, the large number of small saving banks are at risk due to their reluctance and inability to go beyond compliance with PSD2. They have focused largely on marketing their position as a local institution who supports the community. Open Banking services will likely lead to a larger focus on the objective attributes of the products offered, and in this sense make it harder to survive as an institution based on close relationships with the customers. This could have large implications for the local saving banks if they are not able to match the quality or prices offered by the larger institutions. An additional consideration is that the size and structure of the large banks hinders their ability to quickly react and adjust their operations. This creates opportunities for the smaller and more digitally based banks to increase their presence. This examination yields two impacts on the distribution of incumbents. The first suggests a decrease in the number of local saving banks, who do not have the capabilities to adapt. The second impact propose a stronger position for banks with a leaner structure. Combined these effects may lead to some smaller banks going out of business, while creating new opportunities for the ones who manage to take advantage of the changing conditions. Thus, we might see a market with fewer banks overall, but where the remaining players partially converge in size.

Overall, our analysis suggests that the move towards Open Banking in the Norwegian banking industry could propose challenges to the incumbents, who might have to reconsider their position in the market. Further, the conditions for consumer adoption of third party services are favorable which suggests strong potential for such services, but to be profitable the third parties must likely offer additional products or scale their services to foreign markets.

References

- Accenture. (2016). *Global Fintech Investment Growth Continues in 2016 Driven by Europe and Asia, Accenture Study Finds*. Retrieved from https://www.accenture.com/t20170411T170619Z__w__id-en/_acnmedia/PDF-15/Accenture-Fintech-Report-London-Lab-News-Release.pdf#zoom=50
- Adefeso, H. (2018, February 28). Corruption, Political Instability and Development Nexus in Africa: A Call for Sequential Policies Reforms. Retrieved from https://mpra.ub.uni-muenchen.de/85277/3/MPRA_paper_85277.pdf
- Afandi, E., & Habibov, N. (2013). Pre-Crisis and Post-Crisis Trust in Banks: Lessons from Transitional Countries. *MPRA Paper*. Retrieved from https://mpra.ub.uni-muenchen.de/46999/1/MPRA_paper_46999.pdf
- Ahmad, N., & Hoffman, A. (2007). *A Framework for Addressing and Measuring Entrepreneurship*. Paris: Entrepreneurship Indicators Steering Group.
- Ahmad, N., & Seymour, R. (2008). Defining Entrepreneurial Activity. *OECD Report*. Retrieved from <https://www.oecd.org/sdd/business-stats/39651330.pdf>
- Aisen, A., & Veiga, F. (2013, March). How does political instability affect economic growth? *European Journal of Political Economy*. doi:10.1016/j.ejpoleco.2012.11.001
- Alsos, G., Clausen, T., Isaksen, E., & Åmo, B. (2014). *Entreprenørskap i Norge*. Bødo: Handelshøgskolen i Bodø.
- Altunbas, Y., & Chakravarty, S. (1998). Efficiency measures and the banking structure in Europe. *Economics Letter*, 205-208. Retrieved from https://ac.els-cdn.com/S0165176598001086/1-s2.0-S0165176598001086-main.pdf?_tid=0ced5668-29ec-43d6-896f-93dfba26b497&acdnat=1543311679_aa0e57f31c92232379ef756c3305d279
- Anderson, J. (2018, October 25). Open Banking Day at The Factory.

- Anthony, S. (2018, April 13). Which banks support open banking today? Retrieved from <https://www.bankrate.com/uk/open-banking/which-banks-support-open-banking-today/>
- Arfvidson, L. (2017, April 27). *The Swedish Bankomat in the early history of the ATM*. Retrieved from ATM Marketplace: <https://www.atmmarketplace.com/articles/the-swedish-bankomat-in-the-early-history-of-the-atm/>
- Arner, D., Barberis, J., & Buckley, R. (2015). The Evolution of FinTech: A New Post-Crisis Paradigm? *University of New South Wales Law Research Series*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2676553
- Ávila, F., Flores, E., López-Gallo, F., & Márquez, J. (2012). Concentration indicators: Assessing the gap between aggregate and detailed data. *IFC Bulletin*. Retrieved from <https://www.bis.org/ifc/publ/ifcb36aj.pdf>
- Badescu, M., D'Hombres, B., & Villalba, E. (2011). Returns to education in European countries. *JRC Scientific and Technical Reports*. doi:10.2788/31157
- Bakken, J. B. (2018, November 12). *Payr-gründer: – Vi måtte bruke de første ni månedene på å skrive søknad*. Retrieved from Dagens Næringsliv: <https://www.dn.no/morgendagens-naringsliv/fintech/geir-olsen/liv-freihow/payr-grunder-vi-matte-bruke-de-forste-ni-manedene-pa-a-skrive-soknad/2-1-474222>
- Beardmore, D., May Del Pozo, C., Gomez Mont, C., Nti Asare, I., Ortiz, J., Smith, F., . . . Whitworth, G. (2018, April). *What is the potential for Open Banking in Mexico?* Retrieved from https://docs.wixstatic.com/ugd/7be025_3c32545fddcf4436ac2a4f9fd87c9a70.pdf
- Berger, A. N., & Hannan, T. (1989, May). The Price-Concentration Relationship in Banking. *The Review of Economics and Statistics*, 71, No. 2(2), 291-299. Retrieved from <https://www.jstor.org/stable/1926975>
- Bikker, J. A., & Haaf, K. (2002). Measures of Competition and Concentration in the Banking Industry: a Review of the Literature. *Central Bank of the Netherlands*. Retrieved from https://www.dnb.nl/binaries/Measures%20of%20Competition_tcm46-145799.pdf

-
- Bjerkan, L. (2016, February 4). Disse grafene forteller deg hvorfor filialer legges ned. *Aftenposten*. Retrieved from <https://www.aftenposten.no/okonomi/i/abPA/Disse-grafene-forteller-deg-hvorfor-filialer-legges-ned>
- Brodsky, L., & Oakes, L. (2017). *Data Sharing and Open Banking*. McKinsey & Company. Retrieved from <https://www.mckinsey.com/industries/financial-services/our-insights/data-sharing-and-open-banking>
- Broström, A., Mohammadi, A., & Saiedi, E. (2018, February 15). Distrust in Banks and Fintech Participation: The Case of Peer-to-Peer Lending. *Swedish House of Finance*, 18(6). doi:10.2139/ssrn.3124301
- Byberg, Ø. (2018, September 28). Samler konti fra ulike banker på ett sted. *Hegnar*. Retrieved from Hegnar.no: <https://www.hegnar.no/Nyheter/Personlig-oekonomi/2018/09/Samler-konti-fra-ulike-banker-paa-ett-sted>
- Carlton, D. W., & Perloff, J. (2015). *Modern Industrial Organization* (Global Edition ed.). Pearson Education Limited. Retrieved from <https://ebookcentral.proquest.com/lib/nhh-ebooks/detail.action?docID=5174991>.
- Cetorelli, N. (1999). Competitive analysis in banking: Appraisal of the methodologies. (F. R. Chicago, Ed.) Retrieved from <https://core.ac.uk/download/pdf/6793061.pdf>
- CFA Institute Research Foundation. (2018). *Latin American Local Capital Markets: Challenges and Solutions*. CFA. Retrieved from <https://www.cfainstitute.org/en/research/foundation/2018/latin-american-local-capital-markets>
- CFPB. (2017, October 18). *CFPB Outlines Principles For Consumer-Authorized Financial Data Sharing and Aggregation*. Retrieved from Consumer Financial Protection Bureau: <https://www.consumerfinance.gov/about-us/newsroom/cfpb-outlines-principles-consumer-authorized-financial-data-sharing-and-aggregation/>
- CGI. (2016). *How banks can create value from the rise of the open API economy in financial services*. CGI. Retrieved from https://www.cgi.com/sites/default/files/open_apis_banking_paper_ss_v3.pdf

- Chabrow, E. (2015, May 26). IRS: 100,000 Taxpayer Accounts Breached. *Bank Info Security*. Retrieved from <https://www.bankinfosecurity.com/irs-100000-taxpayer-accounts-breached-a-8261>
- Chironga, M., Cunha, L., De Grandis, H., & Kuyoro, M. (2018). *Roaring to life: Growth and innovation in African retail banking*. McKinsey & Company. Retrieved from <https://www.mckinsey.com/~/media/McKinsey/Industries/Financial%20Services/Our%20Insights/African%20retail%20bankings%20next%20growth%20frontier/Roaring-to-life-growth-and-innovation-in-African-retail-banking-web-final.ashx>
- Christensen, J. (2017, September 28). *Husholdningenes gjeld fortsetter å øke*. Retrieved from Dagens Næringsliv: <https://www.dn.no/makroekonomi/marius-gonsholt-hov/ssb/husholdninger/husholdningenes-gjeld-fortsetter-a-oke/2-1-175217>
- Christensen, J. (2018, January 19). Vipps lanseres internasjonalt i år. *Dagens Næringsliv*. Retrieved from <https://www.dn.no/teknologi/eu/facebook/bank-axept/vipps-lanseres-internasjonalt-i-ar/2-1-255272>
- Clements. (2015). *Why Political Instability in a Country Might Discourage Investors*. Retrieved from <https://www.clements.com/sites/default/files/resources/Why-Political-Instability-in-a-Country-Might-Discourage-Investors.pdf>
- Competition and Market Authority. (2017). *RETAIL BANKING MARKET INVESTIGATION*. Retrieved from <https://assets.publishing.service.gov.uk/media/5893063bed915d06e1000000/retail-banking-market-investigation-order-2017.pdf>
- Dagens Næringsliv. (2014, March 13). Vi vurderer at konkurransen i bankmarkedet nå er for svak. *Dagens Næringsliv*. Retrieved from <https://www.dn.no/bank/trond-bentestuen/konkurransetilsynet/-vi-vurderer-at-konkurransen-i-bankmarkedet-na-er-for-svak/1-1-5060929>
- Deloitte. (2017). *Global Mobile Consumer Study*. Retrieved from <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/technology-media-telecommunications/Global%20mobile%20consumer%20survey%20extended%20version.pdf>

-
- Deloitte. (2018). *CEE PSD2 Survey Voice of the Customer*. Retrieved from <https://www2.deloitte.com/content/dam/Deloitte/ce/Documents/financial-services/ce-psd2-voice-of-the-customer-survey-2018.pdf>
- Deloitte, Global Fintech Hubs Federation. (2017). *Connecting Global FinTech: Interim Hub Review 2017*. Deloitte.
- Demirguc-Kunt, A., Klapper, L., Singer, D., & Van Oudheusden, P. (2015, April). Measuring Financial Inclusion around the World. Retrieved from <http://documents.worldbank.org/curated/en/187761468179367706/pdf/WPS7255.pdf#page=3>
- Desjardins, J. (2016, April 12). Here's a look at the history of credit cards. *Business Insider*. Retrieved from <https://www.businessinsider.com/the-history-of-credit-cards-2016-4?r=US&IR=T&IR=T>
- Deutsche Bank, PPI AG. (2016). *Payment Service Directive 2*. Deutsche Bank. Retrieved from http://cib.db.com/docs_new/White_Paper_Payments_Services_Directive_2.pdf
- Dietz, M., Moon, J., & Radnai, M. (2016). *Fintechs can help incumbents, not just disrupt them*. McKinsey. Retrieved from <https://www.mckinsey.com/industries/financial-services/our-insights/fintechs-can-help-incumbents-not-just-disrupt-them>
- DNB. (2018). *DNB Developer*. Retrieved from DNB: <https://developer.dnb.no/#/Documentation>
- Dorfman, R. (1979). A Formula for the Gini Coefficient. *The Review of Economics and Statistics*. doi:10.2307/1924845
- Edelman. (2012, Jan 22). *2012 Edelman Trust Barometer: Global Deck*. Retrieved from https://www.slideshare.net/EdelmanInsights/2012-edelman-trust-barometer-global-deck/10-Technology_remains_on_top_in
- Edelman. (2018). *2018 Edelman Trust Barometer Financial Services Edition*. Retrieved from http://cms.edelman.com/sites/default/files/2018-03/Edelman_Trust_Barometer_Financial_Services_2018.pdf

- Einn, E. (2018, October 25). Open Banking Day, Presented at The Factory, Video File. Retrieved from <https://www.facebook.com/thefactory.no/videos/181714316051504/>
- Eitrheim, Ø., Klovland, J., & Øksendal, L. (2016). *A Monetary History of Norway 1816-2016*. Cambridge University Press.
- Eldridge, A., Wong, W., Tong, S., & Lim, Y. (2017). *The State of Fintech*. PwC, Startupbootcamp Fintech. Retrieved from <https://www.pwc.com/sg/en/publications/assets/fintech-startupbootcamp-state-of-fintech-2017.pdf>
- EU. (2010). Payment services in the EU. *European Union Law*. Retrieved from <https://eur-lex.europa.eu/legal-content/EN/LSU/?uri=CELEX:32007L0064>
- EU. (2017). *Revised rules for payment services in the EU*. Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM:2404020302_1
- EU GDPR. (2018). *GDPR Key Changes*. Retrieved from <https://eugdpr.org/the-regulation/>
- European Commission. (2015a). *Key Facts on Cross-Border Consumer Finance in Europe*. EU. Retrieved from <https://www.eesc.europa.eu/sites/default/files/resources/docs/key-facts-on-cross-border-consumer-finance-in-europe.pdf>
- European Commission. (2015b). *European Parliament adopts European Commission proposal to create safer and more innovative European payments*. Retrieved from http://europa.eu/rapid/press-release_IP-15-5792_en.htm
- European Commission. (2017a). *Commission Delegated Regulation*. EU. Retrieved from http://ec.europa.eu/finance/docs/level-2-measures/psd2-rtts-2017-7782_en.pdf
- European Commission. (2017b, November 27). *Payment Services Directive (PSD2): Regulatory Technical Standards (RTS) enabling consumers to benefit from safer and more innovative electronic payments*. Retrieved from http://europa.eu/rapid/press-release_MEMO-17-4961_en.htm?locale=en

-
- European Commission. (2018, October 26). *International Digital Economy and Society Index 2018*. Retrieved from European Commission: <https://ec.europa.eu/digital-single-market/en/news/international-digital-economy-and-society-index-2018>
- European Payment Council. (2018). *Understanding the Regulatory Technical Standards*. Retrieved from https://www.europeanpaymentscouncil.eu/sites/default/files/infographic/2018-04/rts-infographic_April%202018.pdf?fbclid=IwAR1yBNICG50BQG9g6s9wV9Emg6JD4DIfxuN7dFrjipcs8Rxa-sRvRQqf71M
- EVERY. (2016a). *Open Banking Transformation*. Retrieved from https://www.evry.com/globalassets/files/financialservices/final-open-banking-f170214_webb.pdf
- EVERY. (2016b). *PSD2 – Strategic Opportunities Beyond Compliance*. EVERY. Retrieved from https://www.evry.com/globalassets/bransjer/financial-services/bank2020/wp_psd2/psd2_whitepaper.pdf
- EVERY. (2018). *PSD2 - the directive that will change banking as we know it*. Retrieved from <https://www.evry.com/en/news/articles/psd2-the-directive-that-will-change-banking-as-we-know-it/>
- EY. (2017). *Fintech Adoption Index 2017*. Retrieved from [https://www.ey.com/Publication/vwLUAssets/ey-fintech-adoption-index-2017/\\$FILE/ey-fintech-adoption-index-2017.pdf](https://www.ey.com/Publication/vwLUAssets/ey-fintech-adoption-index-2017/$FILE/ey-fintech-adoption-index-2017.pdf)
- EY. (2018a). *A Vision for Platformed Based Banking*. EY. Retrieved from [https://www.ey.com/Publication/vwLUAssets/ey-a-vision-for-platform-based-banking/\\$File/ey-a-vision-for-platform-based-banking.pdf](https://www.ey.com/Publication/vwLUAssets/ey-a-vision-for-platform-based-banking/$File/ey-a-vision-for-platform-based-banking.pdf)
- EY. (2018b). *Do FinTechs see open banking as an opportunity*. Retrieved from [https://www.ey.com/Publication/vwLUAssets/EY-fintech-open-banking-snapshot/\\$FILE/EY-fintech-open-banking-snapshot.pdf](https://www.ey.com/Publication/vwLUAssets/EY-fintech-open-banking-snapshot/$FILE/EY-fintech-open-banking-snapshot.pdf)
- EY Australia. (2017). *EY FinTech Australia Census 2017*. EY. Retrieved from <https://fintechauscensus.ey.com/2017/Documents/EY%20FinTech%20Australia%20Census%202017.pdf>

- EY Global. (2017, August 1). *Four themes driving FinTech adoption by consumers*. Retrieved from EY : https://www.ey.com/en_gl/banking-capital-markets/four-themes-driving-fintech-adoption-by-consumers
- Federal Reserve System. (2014). *Fedwire Funds Transfer System*. Retrieved from https://www.federalreserve.gov/paymentsystems/fedfunds_coreprinciples.htm
- Financial Conduct Authorities, & HM Treasury. (2017). *Expectations for the third party access provisions in Payment Service Directive 2*. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/630135/Expectations_for_the_third_party_access_provisions_in_PSDII.pdf
- Finans Norge. (2014, February 27). *God konkurranse i bankmarkedet*. Retrieved from Finans Norge: <https://www.finansnorge.no/aktuelt/nyheter/2014/02/god-konkurranse-i-bankmarkedet/>
- Finans Norge. (2015, March 25). *Konkurransetilsynet om bankkonkurransen*. Retrieved from Finans Norge: <https://www.finansnorge.no/aktuelt/nyheter/2015/03/konkurransetilsynet-om-bankkonkurransen/>
- Finans Norge. (2017a). *Antall ekspedisjonssteder*. Retrieved from Finans Norge: <https://www.finansnorge.no/statistikk/bank/antall-ekspedisjonssteder/>
- Finans Norge. (2017b). *Bank Statistikk. Finans Norge*. Retrieved from Finans Norge: <https://www.finansnorge.no/statistikk/bank/>
- Finans Norge. (2017c, April 5). *De fleste bruker nettbank - også de eldre*. Retrieved from Finans Norge: <https://www.finansnorge.no/aktuelt/sporreundersokelser/forbruker-og-finanstrender/forbruker--og-finanstrender-2017/de-fleste-bruker-nettbank--også-de-eldste/>
- Finans Norge. (2017d, April 15). *En av fire har høy tillit til finansråd fra intelligent robot*. Retrieved from Finans Norge: <https://www.finansnorge.no/aktuelt/sporreundersokelser/forbruker-og->

finansrender/forbruker--og-finansrender-2017/en-av-fire-har-hoy-tillit-til-finansrad-fra-intelligent-robot/

- Finans Norge. (2018, March 23). *På bare tre år har tre av fire nordmenn tatt i bruk Vipps*. Retrieved from Finans Norge: <https://www.finansnorge.no/aktuelt/sporreundersokelser/forbruker-og-finansrender/forbruker--og-finansrender-2018/pa-bare-tre-ar-har-tre-av-fire-nordmenn-tatt-i-bruk-vipps/>
- Folcia, M., & Firnges, A. (2017). *Waiting until the Eleventh Hour: European banks' reaction to PSD 2*. PwC. Retrieved from <https://www.pwc.com/gx/en/financial-services/assets/pdf/waiting-until-the-eleventh-hour.pdf>
- Foley, P., Sutton, D., Wiseman, I., Green, L., & Moore, J. (2018). *International Digital Economy and Society Index*. European Commission. Retrieved from 10.2759/745483
- Futsæter, K.-A. (2017, January 2). *Nå har 99 prosent av alle mellom 12 og 49 år en smarttelefon*. Retrieved from Medier24: <https://www.medier24.no/artikler/na-har-99-prosent-av-alle-mellom-12-og-49-ar-en-smarttelefon/366987>
- Gjerstad, I. (2018, November 16). Personal Communication, Phone Interview.
- Global Entrepreneurship Monitor. (2015). *Entrepreneurial Behaviour and Attitudes*. Retrieved from Global Entrepreneurship Monitor: <https://www.gemconsortium.org/country-profile/94>
- Gohman, K. (2018, March 15). Open Banking: What U.S. Banks Need To Watch. *Forbes*. Retrieved from <https://www.forbes.com/sites/forbesfinancecouncil/2018/03/15/open-banking-what-u-s-banks-need-to-watch/#190cbc072af9>
- Gorton, D. (2018, October 14). *How Mint.com Makes Money*. Retrieved from Investopedia: <https://www.investopedia.com/articles/personal-finance/082216/how-mintcom-makes-money-intu.asp>
- Haddad, C., & Hornuf, L. (2016, October). The Emergence of the Global Fintech Market: Economic and Technological Determinants. *CESifo Working Paper*. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2830124

- Hannan, T. H., & Berger, A. (1991, September). The Rigidity of Prices: Evidence from the Banking Industry. *The American Economic Review*, Vol. 81(4), 938-945. Retrieved from <https://www.jstor.org/stable/2006653>
- Heritage Foundation. (2018). *2018 Index of Economic Freedom*. Retrieved from Heritage Foundation: <https://www.heritage.org/index/country/norway>
- Hernaes, C. (2018, August 8). *Banker i Finance Innovation-klyngen starter PSD2 i forkant av hva som er påkrevd*. Retrieved from Hernaes.com: <https://hernaes.com/2018/08/08/banker-i-finance-innovation-klyngen-starter-psd2-i-forkant-av-hva-som-er-pakrevd/>
- Hernaes, C. (2018, November 7). Personal Communication, Personal Interview.
- History.com, E. o. (2010, April 20). Automated Teller Machines. *History*. Retrieved from <https://www.history.com/topics/inventions/automated-teller-machines>
- Hogan Lovells Payments. (2018). *Interactive Timeline*. Retrieved from <http://www.hoganlovellspayments.com/timeline>
- Holden, M. (2017, June 27). *World's first ATM machine turns to gold on 50th birthday*. Retrieved from Reuters: <https://www.reuters.com/article/us-japan-economy-boj/exclusive-boj-eyes-tweaks-to-bond-buying-program-but-wont-rush-changes-sources-idUSKCN1N30KV>
- Hopland, S. (2017, 11 10). Vil utfordre Rune Bjerke på forbrukslån. *E24*. Retrieved from <https://e24.no/boers-og-finans/bank/komplett-bank-boersnotert-vil-utfordre-rune-bjerke-paa-forbrukslaan/24183925>
- Husz, O. (2017, April 7). *När plastpengarna kom till Sverige*. Retrieved from Centrum För Näringslivshistoria: <https://naringslivshistoria.se/bizstories-nyheter/naringslivshistoria/nar-plastpengarna-kom-till-sverige/>
- India Stack. (2018). *What is India Stack?* Retrieved from <http://indiastack.org/about/>
- IRM. (2017). *Net advertising revenue in Norwegian media*. Retrieved from MedieNorge: <http://medienorge.uib.no/english/?cat=statistikk&medium=avis&queryID=362&aspekt=oppdatering>

-
- Jackson, W. E. (1997, February). Market Structure and the Speed of Price Adjustments: Evidence Of Non-Monotonicity. *Review of Industrial Organization*(Industrial Organization Topics in Banking), 37-57. Retrieved from <http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=1&sid=2073a410-755f-4caa-b54e-f96a6b73c6fa%40sessionmgr101>
- Jens, C. E. (2017). Political uncertainty and investment: Causal evidence from U.S. gubernatorial elections. *Journal of Financial Economics*. doi:10.1016/j.jfineco.2016.01.034
- Jones, B. (2018, August 24). Will FI's be ready by March 14 2019 for PSD2 open banking. *FinExtra*. Retrieved from <https://www.finextra.com/blogposting/15699/will-fis-be-ready-by-march-14-2019-for-psd2-open-banking>
- Kantar Public, CMA. (2017). *Digital Comparison Tools: Consumer Research*. Competition and Market Authorities UK. Retrieved from <https://assets.publishing.service.gov.uk/media/58e224f5e5274a06b3000099/dcts-consumer-research-final-report.pdf>
- Kantox. (2014). *The Rise of Fintech in Finance*. Kantox. Retrieved from https://cdn2.hubspot.net/hub/310641/file-1445626583-pdf/Rise_of_Fintech_in_Finance/Fintech_DEF.pdf
- Kirk, J. (2017, March 20). McShame: McDonald's API Leaks Data for 2.2 Million Users. *Bank Info Security*. Retrieved from <https://www.bankinfosecurity.com/blogs/mcshame-mcdonalds-api-leaks-data-on-22-million-p-2426>
- Kleven, Ø. (2016). *Nordmenn på tillitstoppen i Europa*. SSB. Retrieved from https://www.ssb.no/kultur-og-fritid/artikler-og-publikasjoner/_attachment/269579?_ts=1555305a1f0
- Konkurransetilsynet. (2006). *Competition in Nordic Retail Banking*. Retrieved from https://www.kkv.fi/globalassets/kkv-suomi/julkaisut/pm-yhteisraportit/nordic_retail_banking.pdf

- KPMG. (2017). *The Pulse of Fintech Q3 2017*. Retrieved from <https://assets.kpmg.com/content/dam/kpmg/de/pdf/Themen/2017/pulse-of-fintech-q3-2017.pdf>
- Kredittkort Listen. (n.d.). *Historien om kredittkort*.
- Lanvin, B., & Evans, P. (2018). *Global Talent Competitiveness Index*. Insead, The Adecco Group, Tata Communications. Retrieved from <https://www.insead.edu/sites/default/files/assets/dept/globalindices/docs/GTCI-2018-report.pdf>
- Leopold, A. (2016). *Asia Pacific leads the world in mobile payments in latest study by Kantar TNS*. Retrieved from Kantar TNS: <http://www.tnsglobal.com/asia-pacific/intelligence-applied/asia-pacific-leads-world-mobile-payments-latest-study-kantar-tns>
- Lloyds Bank. (2018). *UK Consumer Digital Index 2018*. Retrieved from https://www.lloydsbank.com/assets/media/pdfs/banking_with_us/whats-happening/LB-Consumer-Digital-Index-2018-Report.pdf
- Lyons, E. (2018, January 11). *Open banking: Brexit effects*. Retrieved from Holland Fintech: <https://hollandfintech.com/2018/01/open-banking-brexit-effects/>
- Marous, J. (2018, June 21). The Future of Banking Depends On Open Banking APIs. *The Financial Brand*. Retrieved from <https://thefinancialbrand.com/65975/open-banking-api-fintech-partnerships/>
- McKinsey. (2017). *API Models*. Retrieved from <https://www.mckinsey.com/industries/financial-services/our-insights/data-sharing-and-open-banking#0>
- McLeary, J. W. (1969, July). Banking Structure and Deposit Concentration in the Southeast. *Fraser*. Retrieved from https://fraser.stlouisfed.org/files/docs/publications/frbatlreview/pages/64444_1965-1969.pdf
- MedieNorge. (2017). *Andel som har smarttelefon*. Retrieved from MedieNorge: <http://www.medienorge.uib.no/statistikk/medium/ikt/379>

-
- Merch, Y. (2018, February 22). Reaping the benefits of payment services in a new regulatory environment. *European Central Bank*. Retrieved from <https://www.ecb.europa.eu/press/key/date/2018/html/ecb.sp180222.en.html>
- Mint. (2018). *How Mint Works*. Retrieved from Mint Homepage: <https://www.mint.com/how-mint-works>
- Mishra, P., & Rao, U. (2014, August). Concentration vs Inequality Measures of Market Structure: An Exploration of Indian Manufacturing. *Economic and political weekly*. Retrieved from https://www.researchgate.net/profile/Pulak_Mishra/publication/266897040_Concentration_vs_Inequality_Measures_of_Market_Structure_An_Exploration_of_Indian_Manufacturing/links/57375d1708aea45ee83db2a4/Concentration-vs-Inequality-Measures-of-Market-Structure
- NACHA. (2017). *16 APIs That Will Transform the Financial Services Industry*. Retrieved from <https://www.nacha.org/system/files/resources/Overview-16-APIs-that-Will-Transform-the-Financial-Services-Industry.pdf>
- Network Readiness Index. (2016). *Network Readiness Index*. Retrieved from World Economic Forum: <http://reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/>
- Neumark, D., & Sharpe, S. (1992). Market Structure and the Nature of Price Rigidity: Evidence from the Market for Consumer Deposits. *The Quarterly Journal of Economics*, *107*(2), 657-680.
- Nordvik, H. W. (1993). The banking system, industrialization and economic growth in Norway, 1850–1914. *Scandinavian Economic History Review*, *41*(1). doi:10.1080/03585522.1993.10415860
- Norges Bank. (2014). *Costs in the Norwegian payment system*. Norges Bank. Retrieved from https://static.norges-bank.no/contentassets/c6ed2ec861034f47afb5ea233363a5d3/norges_bank_papers_5_2014.pdf

Norges Bank. (2014). *Costs in the Norwegian Payment System*. Norges Bank. Retrieved from https://static.norges-bank.no/contentassets/c6ed2ec861034f47afb5ea233363a5d3/norges_bank_papers_5_2014.pdf

Norges Bank. (2017). *Norway's Financial System 2017*. Norges Bank. Retrieved from https://static.norges-bank.no/contentassets/b61eb85db69a4a5aaf298f57cea0972b/norways_financial_system_2017.pdf?v=10/03/2017102933&ft=.pdf

Norges Bank. (2018a). *Financial Infrastructure Report*. Norges Bank. Retrieved from https://static.norges-bank.no/contentassets/234480bf59cf4c02a5b2f7b18c97008f/financial_infrastructure_report_2018.pdf?v=05/25/2018091303&ft=.pdf

Norges Bank. (2018b). *Retail payment services 2017*. Norges Bank Papers No 2. Retrieved from https://static.norges-bank.no/contentassets/acf2fe440bc6483393bda6d66acc29fa/nb_papers_2_18.pdf?v=05/24/2018083314&ft=.pdf

NPCI. (2018). *UPI Product Overview*. Retrieved from NPCI: <https://www.npci.org.in/product-overview/upi-product-overview>

Nysveen, E. A. (2018, August 15). Økte renteinntektene med 200 mill. *E24*. Retrieved from <https://e24.no/naeringsliv/bank-norwegian-oekte-renteinntektene-med-200-mill/24415776>

OBIE. (2016). *About Us*. Retrieved from <https://www.openbanking.org.uk/about-us/>

OBIE. (2017a). *Meet the regulated providers*. Retrieved from <https://www.openbanking.org.uk/customers/regulated-providers/page/2/>

OBIE. (2017b, 11 17). *Open Banking*. Retrieved from <https://www.openbanking.org.uk/wp-content/uploads/Proposed-Amendments-to-Agreed-Arrangements.pdf>

OBIE. (2018). *Open Banking Glossary*. Retrieved from Open Banking Implementation Entity: <https://www.openbanking.org.uk/about-us/glossary/>

-
- OECD. (2016, December). *Skills for a Digital World*. Retrieved from <https://www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf>
- OECD. (2017a). *Adult education level*. Retrieved from OECD Data: <https://data.oecd.org/eduatt/adult-education-level.htm>
- OECD. (2017b). *Gross domestic spending on R&D*. Retrieved from OECD Data: <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm>
- OECD. (2017c). *Venture capital investments*. Paris: OECD Publishing. doi:10.1787/entrepreneur_aag-2017-25-en
- OECD. (2018). *Financing SMEs and Entrepreneurs 2018*. doi:10.1787/fin_sme_ent-2018-en
- OECD/CAF/ECLAC. (2018). *Latin American Outlook 2018: Rethinking Institutions for Development*. Paris: OECD Publishing. doi:<https://doi.org/10.1787/leo-2018-en>
- Olowe, A. (2018, September 25). Personal Communication, Email Interview.
- Omreng, S., & Gjendem, I. (2017). *FinTech in Norway*. Retrieved from <https://brage.bibsys.no/xmlui/bitstream/handle/11250/2487336/masterthesis.PDF?sequence=1&isAllowed=y>
- Ong'ayo, A. (2008, January). Political instability in Africa: Where the problem lies and alternative perspectives. *ADPC*, 2-9. doi:10.13140/2.1.2585.0241
- Open Banking Nigeria. (2018). *About Open Banking Nigeria*. Retrieved from Open Banking Nigeria: <https://openbanking.ng/about/>
- Oxford Dictionary. (2018). Retrieved from <https://en.oxforddictionaries.com/definition/api>
- Palframan, M. (2018, August 1). *Three quarters of Britons haven't heard of open banking*. Retrieved from YouGov UK: <https://yougov.co.uk/news/2018/08/01/three-quarters-britons-havent-heard-open-banking/>
- Patel, N. (2015, January 16). 90% Of Startups Fail: Here's What You Need To Know About The 10%. *Forbes Magazine*. Retrieved from <https://www.forbes.com/sites/neilpatel/2015/01/16/90-of-startups-will-fail-heres-what-you-need-to-know-about-the-10/#5feb21eb6679>

- Porter, M. E. (1979, March). How Competitive Forces Shape Strategy. *Harvard Business Review*. Retrieved from <https://hbr.org/1979/03/how-competitive-forces-shape-strategy>
- Pozo, C. D. (2018, September 24). Personal Communication, Email Interview.
- ProgrammableWeb. (2018). *WeChat API*. Retrieved from ProgrammableWeb: <https://www.programmableweb.com/api/wechat>
- PwC. (2016). *Overview AISP*. Retrieved from <https://www.pwc.com/it/en/industries/banking/assets/docs/psd2-nutshell-n03.pdf>
- PwC. (2016). *Overview PISP*. Retrieved from <https://www.pwc.com/it/en/industries/banking/assets/docs/psd2-nutshell-n03.pdf>
- PwC. (2017). *Who are you calling a "challenger"? How competition is improving customer choice and driving innovation in the UK banking market.*
- PwC; Financial Service Institute. (2018). Retrieved from <https://www.pwc.com/us/en/financial-services/publications/viewpoints/assets/pwc-fsi-what-is-fintech.pdf>
- Reynolds, F. (2017). Open Banking: A Consumer Perspective. *Barclays*. Retrieved from <https://www.home.barclays/content/dam/barclayspublic/docs/Citizenship/Research/Open%20Banking%20A%20Consumer%20Perspective%20Faith%20Reynolds%20January%202017.pdf>
- Rhoades, S. A. (1995, December). Market Share Inequality, the HHI, and Other Measures of the Firm-Composition of a Market. *Review of Industrial Organization*. doi:10.1007/BF01024300
- Rodríguez, F. (2003). The Political Economy of Latin American Economic Growth. *World Bank's Global Development Network Research Project*. Retrieved from http://web.worldbank.org/archive/website00894A/WEB/PDF/F_RODRIG.PDF
- Rothwell, G. (2018, June 21). *OPEN BANKING FRAMEWORK COMES TO AUSTRALIA*. Retrieved from Banking Blog Accenture: https://bankingblog.accenture.com/open-banking-framework-comes-to-australia?lang=en_US

-
- Rouse, M. (2018). *Definition: Sandbox*. Retrieved from Search Security: <https://searchsecurity.techtarget.com/definition/sandbox>
- Royal Bank of Scotland. (2018). *What's a Third Party Provider (TPP)?* Retrieved from https://help.bankline.rbs.com/help/other_services/third_party_providers/whats_a_TP_P
- Ruddenklau, A., & Pollari, I. (2018). *The Pulse of Fintech 2018*. KPMG. Retrieved from <https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2018/07/h1-2018-pulse-of-fintech.pdf>
- Samila, S., & Sorenson, O. (2011, February). Venture Capital, Entrepreneurship and Economic Growth. *The Review of Economics and Statistics*, 338-349. Retrieved from https://www.jstor.org/stable/23015937?seq=1#metadata_info_tab_contents
- Sarreal, R. (2018, October 4). *GoBankingRates*. Retrieved from <https://www.gobankingrates.com/banking/banks/history-online-banking/>
- Saunders, A., & Schumacher, L. (2000). The determinants of bank interest rate margins: an international study. *Journal of International Money and Finance*, 813-832. doi:10.1016/S0261-5606(00)00033-4
- Schaus, P. (2018, February 2). How U.S. can avoid U.K.'s mistakes in open banking. *American Banker*.
- Skodje, M., Friestad, M., & Otterdal, Ø. (2017, June 27). Minibanken er 50 år. *NRK*. Retrieved from <https://www.nrk.no/rogaland/minibanken-er-50-ar-1.13578681>
- SNL. (2018, Februar 9). *Nettbank*. Retrieved from Store Norske Leksikon: <https://snl.no/nettbank>
- Solberg, E. (2018, April 19). «Alle» vil til it-studier. *Dagens Næringsliv*. Retrieved from <https://www.dn.no/utdannelse/samordna-opptak/uio/samordna/alle-vil-til-it-studier/2-1-317669>
- SSB. (2017, May 19). *Norge i Eurotoppen på digitale ferdigheter*. Retrieved from Statistisk Sentralbyrå: <https://www.ssb.no/teknologi-og-innovasjon/artikler-og-publikasjoner/norge-i-eurotoppen-pa-digitale-ferdigheter>

- SSB. (2018a). *Andel med tilgang til internett*. Retrieved from Medie Norge: <http://www.medienorge.uib.no/statistikk/medium/ikt/347>
- SSB. (2018b). *Banker og kredittforetak*. Retrieved from Statistisk Sentralbyrå: <https://www.ssb.no/bank-og-finansmarked/statistikker/banker>
- SSB. (2018c, October 12). *Banks and mortgage companies*. Retrieved from Statistisk Sentralbyrå: <https://www.ssb.no/en/bank-og-finansmarked/statistikker/banker>
- SSB. (2018d). *Bruk av IKT i husholdningene*. Retrieved from Statistisk Sentralbyrå: <https://www.ssb.no/statbank/table/12344/>
- SSB. (2018e, March 8). *Employment, register-based*. Retrieved from Statistisk Sentralbyrå: <https://www.ssb.no/en/arbeid-og-lonn/statistikker/regsys/aar>
- SSB. (2018f, April 27). *Netthandelen opp 13,5 prosent*. Retrieved from Statistisk Sentralbyrå: <https://www.ssb.no/varehandel-og-tjenesteyting/artikler-og-publikasjoner/netthandelen-opp-13-5-prosent>
- Statista. (2018). *Online banking penetration in Norway from 2005 to 2016*. Retrieved from Statista: <https://www.statista.com/statistics/380892/online-banking-penetration-in-norway/>
- Su, X. (2018). *Banking and Financial Innovation Module*. Retrieved from Canvas: https://nhh.instructure.com/courses/219/files/23947?module_item_id=6717
- SWIFT. (2017). *Strong Customer Authentication under Payment Service Directive 2*.
- Swinton, S., & Roma, E. (2018). *Coping with the Challenge of Open Banking*. Bain & Company. Retrieved from <https://www.bain.com/insights/coping-with-the-challenge-of-open-banking/>
- The Economist. (2015, 09 07). *Costly Comparison*. *The Economist*. Retrieved from <https://www.economist.com/finance-and-economics/2015/07/09/costly-comparison>
- The Open Banking Hub. (2017, July 19). *Screen scraping 101: Who, What, Where, When?* Retrieved from The Open Banking Hub: <https://openbankinghub.com/screen-scraping-101-who-what-where-when-f83c7bd96712>

-
- The Treasury. (2018, May 9). *Government Response to Review into Open Banking*. Retrieved from Australian Government The Treasury: <https://treasury.gov.au/publication/p2018-t286983/>
- The World Bank. (2012). *Who are the Unbanked? Uncovering the Financial Inclusion Gap*. The World Bank. Retrieved from https://siteresources.worldbank.org/EXTGLOBALFIN/Resources/8519638-1332259343991/world_bank3_Poster.pdf
- Thierry Geiger. (2015, April 15). *The top 10 nations for bridging the digital divide*. Retrieved from World Economic Forum: <https://www.weforum.org/agenda/2015/04/which-nations-are-top-for-digital/>
- Trumpy, J. (2018, 12 11). Vipps-sjef Berit Svendsen hjelper Kina-gigant inn i Norge. *Dagens Næringsliv*. Retrieved from <https://www.dn.no/marked/vipps/sparebanken-vest/mobilbetaling/vipps-sjef-berit-svendsen-hjelper-kina-gigant-inn-i-norge/2-1-497597>
- Tsosie, C. (2017, February 9). *The History of the Credit Card*. Retrieved from Nerdwallet: <https://www.nerdwallet.com/blog/credit-cards/history-credit-card/>
- U.S. Department of Justice and the Federal Trade Commission. (2010, August 19). *Horizontal Merger Guidelines 5.3 Market Concentration*. Retrieved from The United States Department of Justice: Antitrust Division: <https://www.justice.gov/atr/horizontal-merger-guidelines-08192010#5c>
- Wagenius, K. (2018, November 13). Personal Communication, Phone Interview.
- Weisenthal, J. (2011, May 12). How a Bank Makes Money. *Business Insider*. Retrieved from <https://www.businessinsider.com/chart-of-the-day-how-a-bank-makes-money-2011-5?r=US&IR=T&IR=T>
- Williams, R., & Leahy, A. (2018). *Ranking of National Higher Education Systems*. Universitas 21. Retrieved from https://universitas21.com/sites/default/files/2018-05/U21_Rankings%20Report_0418_FULL_LR%20%281%29.pdf

World Bank. (2015). *Bank's Net Interest Margin for Euro Area* . Retrieved from FRED:
<https://fred.stlouisfed.org/series/DDEI01EZA156NWDB>

World Bank. (2018). *Global Financial Inclusion*. Retrieved from The World Bank DataBank:
<http://databank.worldbank.org/data/reports.aspx?source=1228>

World Economic Forum. (2016). *Competitiveness Rankings*. Retrieved from World Economic Forum:
<http://reports.weforum.org/global-competitiveness-report-2015-2016/competitiveness-rankings/#indicatorId=GCI.B.09>

Zachariadis, M., & Ozcan, P. (2017). The API Economy and Digital Transformation in Financial Services: The Case of Open Banking. *SWIFT Institute Working Paper, Working Paper 2016(001)*. doi:10.2139/ssrn.2975199