

UNIVERSITY OF LJUBLJANA
SCHOOL OF ECONOMICS AND BUSINESS

MASTER'S THESIS

**THE MARKET STRUCTURE AND REGULATION OF OVER-THE-
TOP MESSAGING SERVICES**

Ljubljana, July 2021

ADAM WILSON

AUTHORSHIP STATEMENT

The undersigned Adam Wilson, a student at the University of Ljubljana, School of Economics and Business, (hereafter: SEB LU), author of this written final work of studies with the title The Market Structure and Regulation of Over-The-Top Messaging Services prepared under supervision of Red. Prof. Dr. Nevenka Hrovatin

DECLARE

1. this written final work of studies to be based on the results of my own research;
2. the printed form of this written final work of studies to be identical to its electronic form;
3. the text of this written final work of studies to be language-edited and technically in adherence with the SEB LU's Technical Guidelines for Written Works, which means that I cited and / or quoted works and opinions of other authors in this written final work of studies in accordance with the SEB LU's Technical Guidelines for Written Works;
4. to be aware of the fact that plagiarism (in written or graphical form) is a criminal offence and can be prosecuted in accordance with the Criminal Code of the Republic of Slovenia;
5. to be aware of the consequences a proven plagiarism charge based on the this written final work could have for my status at the SEB LU in accordance with the relevant SEB LU Rules;
6. to have obtained all the necessary permits to use the data and works of other authors which are (in written or graphical form) referred to in this written final work of studies and to have clearly marked them;
7. to have acted in accordance with ethical principles during the preparation of this written final work of studies and to have, where necessary, obtained permission of the Ethics Committee;
8. my consent to use the electronic form of this written final work of studies for the detection of content similarity with other written works, using similarity detection software that is connected with the SEB LU Study Information System;
9. to transfer to the University of Ljubljana free of charge, non-exclusively, geographically and time-wise unlimited the right of saving this written final work of studies in the electronic form, the right of its reproduction, as well as the right of making this written final work of studies available to the public on the World Wide Web via the Repository of the University of Ljubljana;
10. my consent to publication of my personal data that are included in this written final work of studies and in this declaration, when this written final work of studies is published.

Ljubljana, __July 7th 2021

Author's signature: Adam Wilson

TABLE OF CONTENTS

INTRODUCTION	1
1 OVER-THE-TOP MESSAGING MARKET	2
1.1 Definition of the Market for Over-the-Top Messaging	3
1.2 Similar but Distinct Markets to Exclude	4
1.3 Market Participants and Their Offerings	6
1.4 Inherent Properties of the Messaging Market	8
1.4.1 Network Effects and Metcalfe’s Law	9
1.4.2 Payment Structure and Transparency	9
1.4.3 Consumer Lock In	10
2 COMPETITIVE STRUCTURE OF THE OVER-THE-TOP MESSAGING MARKET	12
2.1 Traditional Measures of Market Concentration.....	12
2.1.1 Market Share.....	12
2.1.2 Herfindalh-Hirschman Index	14
2.1.3 Barriers to Market Entry and Network Effects.....	15
2.2 Novel Measure for Advertiser Funded Markets	16
2.3 Behaviour of Participants in the Over-the-Top Messaging Market	20
2.3.1 Cross Subsidizing	20
2.3.2 Blocking Entry into the Market	23
2.3.3 Predatory Behaviour	25
2.4 Summary of Findings by Competition Authorities on the Existence of Significant Market Power	27
3 POTENTIAL REMEDIES FOR SIGNIFICANT MARKET POWER.....	29
3.1.1 US Based Transatlantic Telegraph Regulation.....	30
3.1.2 Roaming SMS Messaging Regulations in the EU.....	32
3.1.3 Liberalization of Electricity Market in the EU	35
3.1.4 Software Platform Competitive Remedies in the US and EU	37
3.2 Actions and Remedies Proposed by Contemporary Authorities in the OTT Messaging Market	39

3.2.1	U.S. House Judiciary Committee	39
3.2.2	US Federal Trade Commission	40
3.2.3	German Federal Cartel Office	41
3.2.4	UK Competition and Markets Authority	42
3.2.5	European Commission and the Digital Services Act Package.....	43
4	PROPOSED REGULATORY FRAMEWORK FOR THE OTT MESSAGING MARKET	44
4.1	Critical Analysis of Existing Proposals.....	44
4.2	Framework for Competitive Actions and New Regulations.....	48
4.3	Proposed Remedies to Reintroduce Competition Between Existing Firms ..	49
4.4	Proposed Remedies for Lowering Barriers to Entry for New Firms.....	51
4.5	Proposed Methods for Monitoring and Enforcing Compliance.....	54
	Conclusion.....	55
	Reference List	57
	APPENDIX	67

LIST OF FIGURES

Figure 1	Visualization of the connection of a roaming call to a domestic number.....	33
Figure 2	Change in Price Caps for Roaming Service.....	34
Figure 3	Proposed Price Focused Privacy Policy Comparing Two Firms’ Products.....	50
Figure 4	Current Market Structure	53
Figure 5	Proposed market structure	53

LIST OF TABLES

Table 1	Categorization of Distinct Social Services.....	6
Table 2	Major Competitors in the OTT Messaging Market.....	7
Table 3	Monthly Active Users for Major Messaging Services	13
Table 4	Proposals of various authorities for the OTT messaging market	47

LIST OF ABBREVIATIONS

de. – German

AOL – America Online

ATC – Average Total Cost

AVC – Average Variable Cost

BEREC – Body of European Regulators for Electronic Communication

CMA – Competition and Markets Authority

EU – European Union

FCC – Federal Communication Commission

FTC – Federal Trade Commission

FCO – (de. Bundeskartellamt) Federal Cartel Office

GDPR – General Data Protection Regulation

HHI – Herfindahl–Hirschman Index

IC – Incremental Cost

MMS – Multimedia Messaging Service

MNO – Mobile Network Operator

MSN – Microsoft Network

NRA – National Regulatory Agency

OTT – Over-the-Top

SEC – Securities and Exchange Commission

SMP – Significant Market Power

SMS – Short Messaging Service

SSNIP – Small but Significant Non-Transitory Increase in Price

VPN – Virtual Private Network

INTRODUCTION

Digital markets are an increasingly important part of daily life as more people turn to digital services for entertainment, communication, and commerce. Recently competitive investigations by authorities around the globe have found that some of these markets are not competitive and controlled by a small set of firms with significant market power. These firms have used their power to block competitors in adjacent markets and remove threats to their control.

Competition authorities have rightly focused their investigations on the largest digital markets, such as online shopping, app stores, and social networking. However, there is anticompetitive behaviour also occurring in smaller markets that are important to investigate and address. This thesis will investigate the competitive structure of one of these smaller digital markets. It will investigate the over-the-top messaging market (hereafter OTT) which is similar but distinct from other markets such as social media and social networking markets.

The OTT messaging market is the market for services that allow consumers to message and interact with people online in private conversations. These conversations are within groups that users identify and are assisted in setting up based on their various identities (Nadler et al., 2020). The defining features of the OTT messaging market are that users' conversations are private and they can connect with contacts who they already know. Users exchange messages, in a variety of different media ranging from text to short videos, to a targeted group of contacts. These groups are managed by the user and all members of the group can communicate with each other in the same format. Examples of services in the market include WhatsApp, Messenger, and Viber (Bundekartellamt, 2019a; Competition & Markets Authority, 2020; Nadler et al., 2020). This is a distinct market from the online social media and social networking markets, which will also be defined (*Federal Trade Commission v. Facebook*, 2020). As of 2018 over 145 billion OTT messages were sent daily worldwide with over 4 billion users around the world participating in OTT messaging (Dobrilova, 2019).

The research problem that this thesis will address is that the OTT messaging market may not be competitive. Its purpose will be to critically analyze the market structure for OTT messaging and the proposed competitive remedies by authorities in the European Union (hereafter EU) and United States (hereafter US) to propose a package of remedies that would ensure free competition in the messaging market

The methodology will follow the standard analysis of market structure suggested in the theoretical literature and applied by competition and regulatory authorities around the world (Rogerson & Holmes, 2010; Stumpf, Martins, Alexiadis, Dillon & Cole, 2018). The first step will be to define the boundaries of the market for OTT messaging applications

and how they differ from social media and social networking. This thesis will follow the Federal Cartel Office (FCO) in Germany, the Competition and Market's Authority (CMA) in the UK, and the US Federal Trade Commission's (FTC) definitions of the OTT messaging market.

Once the market is defined, the thesis will determine if a single provider holds significant market power (SMP) in any market. This will initially be evaluated using traditional measures of market concentration such as market share and the Herfindahl-Hirschman Index. Network effects, which are of great importance in the mobile communication markets, will also be explored. However, since almost all OTT messaging services are offered for free in exchange for the user's data, many traditional tests such as the Lerner Index cannot be used. Instead, the thesis will propose a novel application of a modified small but significant non-transitory increase in price test (SSNIP) for markets dominated by pay-with-data services. The next step in the market analysis is to analyze the behaviour of the market participants to observe if they are acting in an anti-competitive manner. This thesis will investigate if firms are cross-subsidizing their services in the market to offer service at below marginal cost or if they are buying out or blocking competitors in the market. Finally, it will investigate barriers to entry into the market for new firms to find the challenges that a new entrant would have entering the market. These investigations will show that the current market for OTT messaging in the EU and US lacks free competition and is currently dominated by a monopolistic firm.

Finally, the thesis will review regulation and competitive remedies in selected EU and US markets that have similar properties to the OTT messaging market. The markets that will be reviewed are the contemporary market for SMS messaging in the EU, the US terminating transatlantic telegraph, the regulation of electricity transmission systems in the EU, and the market for computer operating systems in the US and EU. It will also analyze the proposed competitive remedies for digital markets and OTT messaging from authorities in the US, UK, Germany, and EU. It will combine these proposals to create a structure for how free competition could be restored in the OTT messaging market. This will include remedies to reignite competition in the OTT messaging market as well as longer-term recommendations for how competition can be protected

1 OVER-THE-TOP MESSAGING MARKET

Before analyzing the competitive structure of the OTT messaging market, it is important to understand exactly what defines the market and the firms competing in it. This section will start by outlining the OTT messaging market along with a description of the major competitors in the market. It will also include a brief taxonomy of markets that share some similarities to the OTT messaging market but are not part of it. Finally, this section will briefly discuss selected properties of the OTT messaging market that are critical to a complete understanding of its functioning. This section should provide the reader with an

understanding of the OTT messaging market before diving further into the analysis of its competitive structure.

1.1 Definition of the Market for Over-the-Top Messaging

The market that this thesis will focus on is the OTT messaging market, which is the market for services that allow consumers to message and interact with people online in private conversations. These conversations are within groups that users identify and are assisted in creating based on their various identities (Nadler et al., 2020). This is a distinct market from the online social media and social networking markets, which could also be referred to as OTT services but are distinct and defined in section 1.2.

A product is defined as Over-the-Top communication if the message transmission occurs through a network without the participation of the network owner (Kotterink et al., 2015). For example, the WhatsApp service offered by Facebook allows users to communicate either over the cellular data network or a home internet connection without the cooperation of the internet service provider (Helyer, 2016). The Short Message Service (hereafter SMS) is an example of a messaging service that offers similar features to WhatsApp but requires the input of the network owner. Where WhatsApp messages are routed by Facebook's servers without the knowledge of the underlying internet network, SMS messages are routed by the cellular network and require the participation of both the sender and receiver's wireless carrier (Helyer, 2016; Triggs, 2019). Until December 2020 the OTT and traditional messaging markets were distinct and regulated entirely separately by the EU. However, in December 2020 OTT messaging services were moved into the same category as traditional telecom and messaging services for privacy regulation in the EU (Stankey, 2019). At the same time, OTT and traditional messaging services are still regulated separately in the US (Dortch, 2018).

At a technological level, OTT messaging is a substitute for traditional messaging products and traditional messaging is only an imperfect substitute for OTT messaging. Traditional messaging always requires a connection to the host network, where OTT messaging can work anywhere there is an internet connection, without network support (Kotterink et al., 2015). However, surveys of consumers in the EU have found that while some consumers treat OTT messaging as a substitute for SMS messaging, the majority use OTT messaging as a compliment to SMS messaging. This might be by using SMS for one-off communication and OTT messaging for long-running group chats or using OTT messaging for media sharing which is not supported in SMS messaging (Arnold, Schneider & Hildebrandt, 2016). US legislators, the German FCO, and the US FTC agreed with this finding in their research, stating in separate reports that SMS messaging and OTT messaging are similar but distinct markets (Bundekartellamt, 2019b; *Federal Trade Commission v. Facebook*, 2020; Nadler et al., 2020). For this thesis, SMS messaging will be considered a distinct market to match the findings of these authorities. However, SMS

messaging will be included in some calculations of market power, as it provides an interesting point of comparison.

The defining feature of the OTT messaging market compared to other OTT social services markets, such as social networking or social media, is that users' conversations are private and they are connected with contacts that they already know. Users exchange messages, in a variety of different media ranging from text to short videos, to a targeted group of contacts. These groups are managed by the user and all members of the group can communicate with each other in the same format (Bundekartellamt, 2019b; Nadler et al., 2020).

One of the first examples of an OTT messaging product was the MSN messenger application which allowed users to exchange messages with friends, family members, and colleagues. The conversations could be between 2 or more users, depending on their preferences. Contacts were suggested by the application but managed by the user. Only other people who were specifically added to the contact or 'buddy' list could start a conversation with a user. (Microsoft, 1999). More modern examples of OTT messaging services include WhatsApp, Messenger, and Viber (Bundekartellamt, 2019b; Competition & Markets Authority, 2020; Nadler et al., 2020).

The market for OTT messaging is not restricted by many of the geographic limitations that impact traditional firms, such as the distance to customers. Any person with access to the internet is a potential user of an OTT messaging service (Facebook Inc., 2020). However, there are political barriers that prevent the entire world from being a single market for messaging applications. Countries with strict censorship or distrust of external firms tend to have an internal market for OTT messaging services. For example, Russia's VK Messenger and China's WeChat are both used by the majority of the domestic population but virtually unknown externally (Gershkovich, 2020; Sapra, 2019). As this thesis is focused on the EU and US markets, it will ignore these local services. Although they have a massive market share in the home countries, import restrictions prevent external services from competing in their home markets and they have not shown interest in competing internationally. We are therefore focusing on the international OTT messaging services market.

1.2 Similar but Distinct Markets to Exclude

Apart from the OTT messaging market, there are a few similar markets that might be confused as being part of the OTT messaging market. These include the market for specific messaging services, social networking services, and social media services. This section will outline the differences between the OTT messaging market and these other markets and explain why they are considered unique markets.

Specific messaging products that do not enable general messaging behaviour are excluded from the more general market for OTT messaging products. Examples of context-specific messaging products include Slack and Zoom. These platforms enable private messaging between users or groups of users, but they do not enable general communication with other users on the platform or the construction of a network of contacts. Slack or Zoom messages are limited to the instance you are in, such as a corporate Slack group or a Zoom meeting. Users cannot message other users on the platform who are not a part of the same group, even if they know each other and would like to communicate (DesMarais, 2016; Mykhoparkina, 2020). Thus, while users might substitute context-specific services for some of their messaging needs, context-specific services lack all the features required to fulfill all a user's messaging needs. However, a context-specific messaging product can move from the context-specific messaging market to the OTT messaging market. Discord is currently transforming context-specific messaging to a general messaging service (Citron, 2020).

OTT messaging is a separate market from the social networking and social media market. Services in all three markets enable users to communicate and connect online, but with a different focus. A social network, as defined by the German FCO and US Congress facilitates:

“their users finding, interacting, and networking with other people they already know online, and by providing a “rich social experience” through features on their products. People regularly use social network platforms to exchange “experiences, opinions and contents among specific contacts which the users define based on identity.” (Bundekartellamt, 2019a, as cited in Nadler et al., 2020, p. 91)

A typical user of a social network might be looking to share their vacation photos with friends or ask for advice from a group of expatriates about the immigration procedures in their new home. In these cases, the user is looking to communicate with many people, potentially numbering in the hundreds, without necessarily targeting an individual as the subject of their communication (Competition & Markets Authority, 2020; Nadler et al., 2020).

Social media services are instead focused on the distribution and consumption of entertainment content. Users of these services are looking for entertainment, such as a video, and may interact with other users of the platform by leaving comments or other messages. These users are connected not by a previous relationship, but by their relationship with the content being consumed (Competition & Markets Authority, 2020; Nadler et al., 2020). YouTube is a classic example of a social media service, as it enables millions of people to share and engage with content, leaving comments and reviews on almost every video. However, there is no way to message other users on the platform or communicate away from the context of a piece of content (Perez, 2019). Table 1 shows a

comparison between OTT messaging, social networking, and social media services, highlighting the differences between them.

Table 1: Categorization of Distinct Social Services

Category	OTT Messaging	Social Network	Social Media
Conversation Scope	1:1 or small group	1:1 up to 1000+ person groups	1:many
Default Privacy of Conversation	Private	Public or private to a set group (e.g. Friends or Friends of Friends)	Public
Example Use	Planning where to meet a friend	Sharing photos of a recent vacation with friends and family	Publishing a video review of bars in Paris
Example Application	WhatsApp, Viber	Facebook Blue, LinkedIn	YouTube, Reddit

Sources: Bundekartellamt (2019a, 2019b); Competition & Markets Authority (2020); Nadler et al. (2020).

It is important to note, that while almost all social networks and social media products offer some form of messaging, this does not mean they are in the OTT messaging market. For example, YouTube offers an extremely limited option for creators to interact with their audience outside of a video. This does not mean they are competing in the OTT messaging market as users are not able to create private conversations among themselves (Perez, 2019). As well, many video games include messaging options for players in the game but these are not considered competitors in the messaging market as users are unable to communicate outside of the context of the game (Kotterink et al., 2015).

Firms however may enter one or more of the markets listed above, even within the same service family. For example, users accessing facebook.com from the browser have access to social media, social networking, and OTT messaging all in a single webpage. It is instructive to note however that this is browser-specific behaviour. Mobile users are presented with different apps, all published by Facebook, for OTT messaging, social networking, and social media services.

1.3 Market Participants and Their Offerings

This section will provide a brief overview of the messaging market, including OTT and SMS messaging services. All estimates for the number of users will be using monthly active users, which is the number of users that sent a message using the application over the previous month. Due to the difficulty in sourcing up-to-date information about the various products and the rapidly changing technology landscape all values should be considered broad estimates.

Table 2 lists the largest OTT messaging services along with their primary markets and the controlling firm. An interesting note about the messaging market is that beyond corporate ownership, there are a few key individuals who have been heavily involved in multiple companies identified here. Brian Acton founded both Signal and WhatsApp while VK and Telegram were both founded by the Durov brothers (Shu, 2013; Singh, 2021).

The OTT messaging services listed in Table 2 all provide the same basic functionality of sharing messages to a user’s contacts, group messaging, and the sharing of media. Some also include the option for voice or video calling, money transfer, or messages which are deleted after a limited lifespan. Users typically interact with the services through a client application on their mobile device, however some firms offer a website where users can send and receive messages (Bundekartellamt, 2019b). SMS on the other hand is limited to 1:1 messages between mobile devices, with some media sharing support if the carrier also supports an additional protocol called Multimedia Messaging Service and the user purchases an additional data allowance.

Table 2: Major Competitors in the OTT Messaging Market

App	Controlling Firm	Primary Markets	Restrictions
WhatsApp	Facebook Inc	Worldwide	Blocked in China
Messenger	Facebook Inc	Worldwide	Blocked in China
WeChat	Tencent Holdings	China	
QQ	Tencent Holdings	China	
Telegram	Telegram LLC	Eastern Europe and Russia	
Snapchat	Snap Inc	Worldwide	Blocked in China
Skype	Microsoft Corporation	Worldwide	
Viber	Rakuten	Worldwide	
VK	Mail.ru	Russia	
Signal	Signal Technology Foundation	Worldwide	
SMS Messaging	N/A	Worldwide	
iMessage	Apple Inc	Worldwide	Requires both participants have an iPhone

Sources: China Internet Watch (2020); Deibert (2020); Facebook Inc. (2020); Nadler et al. (2020); Potuck (2020); Russell (2019); Sapra (2019); Schroede (2021); Shu (2013); Snap Inc. (2019); WhatsApp (2020); Zucchi (2019).

Since iMessage replaces SMS messages when an iPhone user attempts to SMS message another iPhone user, it might be better classified as a traditional messaging product. An iPhone user who wanted not to use iMessage would have to navigate multiple menus to revert to SMS messages (Helyer, 2016). Thus, although iMessage does offer OTT messaging capabilities, the US Judicial committee ruled that iMessage is not an OTT messaging product (Nadler et al., 2020), and this master's thesis will follow their ruling.

Some nations place legal restrictions on the market for OTT communication services. This divides the world into a few distinct markets for OTT messaging services. The largest isolated market is China, which has two major messaging apps and does not allow Facebook or Snap owned products in the country (Zucchi, 2019). The reverse of this trend is that Chinese owned apps do not compete outside of China and their foreign user base typically uses them to communicate with friends and family in China. (Deibert, 2020). Russia also restricts the operations of foreign communication in their domestic communication market with limited success. Russia does however have two domestic products in VK and Telegram, that are mostly used inside of the Russian sphere of influence. The rest of the world operates as a single market for OTT messaging, as the internet allows for products to be shipped around the world instantly (Bundekartellamt, 2019b; Competition & Markets Authority, 2020).

1.4 Inherent Properties of the Messaging Market

The messaging market has some inherent properties that all entrants to the market are going to face. These include the positive externalities that are generated by a user joining a network, the opaque payment structure and consumer lock-in. Each of these properties provides unique challenges and opportunities for market participants. These factors combine to make the messaging market different from many other market structures. The factors favour large firms with massive networks and the resources to acquire competitors as opposed to smaller firms. Antitrust scholars describe the competition between social networking and OTT messaging firms as *for* the market rather than *in* the market (Kades & Morton, 2020).

These market properties are not caused by a single competitor or the current state of the market. The properties outlined below were present 22 years ago when MSN messenger was released to challenge the incumbent AOL Instant Messenger and continue to impact the choices of WhatsApp and Viber management. Authorities looking to manage the OTT messaging market need to be aware of the different properties of the market, otherwise their actions are doomed to fail.

1.4.1 Network Effects and Metcalfe's Law

For the user of an OTT messaging app, the most fundamental value that a product offers to them is the ability to communicate with anyone they would like to – from friends and family to businesses and government services. A new messaging application with interesting chat features, or an improved visual appearance, is not helpful if a user cannot contact their friends with it. Thus, the primary value of a messaging service is the number of connections in its network and the relevance of the network to the user. As new users join an existing network, it increases the number of possible connections for existing users, increasing the value of the network to them. In economic literature this is called a network effect when the current users of a good or service gain when more consumers purchase the compatible goods or services (Gandal, 2018). The firm controlling the network also benefits when new connections are created, as users with more connections in a network send more messages and are more valuable to network owners (Facebook Inc., 2020).

A user switching to a new messaging network with n users then has two immediate effects. First, they generate n new connections for themselves, one with each of the users in the existing network, improving their welfare. The second impact is they generate 1 new connection for each existing user, improving their welfare slightly. This increase in connections is modelled as Metcalfe's Law, where the number of connections created by adding a new user is $2n$ bringing the total number of connections to $(n + 1)^2$ (Metcalfe, 2013).

Therefore, assuming firms all generate the same revenue per connection, a larger network has a greater incentive to attract new customers. Incumbent firms with existing large networks can afford to pay more than smaller firms to acquire customers, either by encouraging new users to join their network or acquiring smaller firms with their network. It also gives incumbent firms a greater incentive to prevent users from leaving for a competitor as those users are more valuable to the larger network than they would be to their smaller competitor.

1.4.2 Payment Structure and Transparency

Currently there are no major OTT messaging apps that charge users for their service, instead firms generate revenue by selling advertisements, in-app features such as stickers, and user data (Ashwini, 2018). SMS messages are billed through the user's mobile cell phone service, either by the message or a fixed rate for an allowance of messages (Chartier, 2008). There was a single case where an OTT messaging service tried charging its customers directly. WhatsApp charged customers \$1/year with the first year of service free. This payment structure was discontinued after 2 years and since then no major service has attempted charging for access (Scott, 2016).

The price that users pay for an OTT service is primarily determined by the amount of data that the service collects on them and how that data is monetized (Bundekartellamt, 2019a). How user data is used and sold is disclosed to users through the service's privacy policy and users are never given a full accounting of how much revenue the firm is generating through their usage of the service. This makes it challenging for a new entrant to compete on price, as they first must convince users how much they are paying in data for their current app and then explain how the alternative would cost less. This is significantly more complicated than a conventional market where customers can compare the price in a common currency between alternatives (Bundekartellamt, 2019a).

A current example of how challenging this can be is outlined in the Italian Data Protection Authority's lawsuits against WhatsApp. It alleged that WhatsApp misleads customers about how much data was being shared, and thus the price of the app. For the duration of this behaviour, it would have been impossible for other firms to compete on price in the market as WhatsApp's true price was not available to consumers for them to make an informed choice (Reuters, 2021).

Since the services are free to users, most consumers will be members of multiple networks. Being a member of an OTT service does not cost anything to the user unless they begin to interact with it. Firms are not competing on the number of registered members, but for the number of active members who are generating data and viewing ads. The importance of active users can be seen clearly in the financial reporting of Facebook Inc and Snap Inc. Both firms report detailed information on the number of active users on their financial disclosure forms for investors along with their income statements and balance sheets (Facebook Inc., 2020; Snap Inc., 2019).

1.4.3 Consumer Lock In

Since the value of a network to a user depends on who the user can contact on the network, it means that it is extremely challenging for a user to switch to another network unless their contacts are already using it. As a single user it is impossible to stop using a product without first convincing your contacts to also join and actively use the competing service. For a new firm entering the market this is a major challenge, as users may sign up for your product but will not use it unless their contacts are also actively using it (Bundekartellamt, 2019b). This property of a market is called lock-in and it can result in small differences in initial technology leading to one provider or service cornering the market. If the service has increasing returns to scale or scope, as is true in OTT messaging, the initial advantage will be increased as consumers adopt the more advanced technology leaving others behind (Arthur, 1989).

This property of the market is reinforced in the OTT messaging market and other software markets by many users' inability or unwillingness to change from a default behaviour with a product or service. The United States Department of Justice has alleged that being a

default service on a device results in de facto exclusivity. While users are technically able to switch providers, the difficulties involved mean that most users do not (*US v Google*, 2020). This strengthens the lock-in effect and makes it harder for a competitor to convince users of a competing product to switch.

Another force causing consumer lock-in is if a communication medium is considered the societal default for new communication between strangers in a region or a country. Once a service hits this critical mass, all consumers in the country become obligated to join the network to communicate with new contacts. This increases the demand price, as more consumers look to join, and decreases the supply price, as suppliers leverage economies of scale, benefiting the controlling firm (Allen, 1988). The classic example of a default communication method would be a telephone number at the end of the 21st century. Two individuals looking to communicate could be certain that both would have a phone number and access to the phone network (Zagorsky, 2019). In some regions OTT messaging has achieved that status, such as in Brazil and India where over 90% of the internet users use WhatsApp regularly (eMarketer, 2019).

Once a service is considered the societal default these users will use this service for new conversations. When a market hits this point it is said to have passed the tipping point and tipped into a different structure. At this point there is no longer strong competition for the market, rather there is concentration around a single, dominant, provider. The provider might begin to collect monopoly rents associated with their market power and increase the barriers to entry (Lancieri & Sakowski, 2020).

There have been some innovations for breaking consumer lock-in by offering a product that is interoperable with the network of another provider, such as MSN messenger's compatibility with AOL Instant Messenger (AIM). This allows users to switch to a new product while continuing to communicate with their existing contacts without the contacts having to change (Microsoft, 1999). However, since that strategy was shown to be effective firms now protect their networks aggressively. Facebook has litigated aggressively to shut down any competitor that interoperates with their network even though Facebook uses a public communication interface and could allow for interoperation (Ruddock, 2015; Schenck, 2018).

With the boundaries and the basic structure of the market in mind, section 2 will cover the competitive structure of the market. It will consider traditional measures of market concentration while also examining the OTT messaging market through the lens of the unique properties of the market from this section. The properties outlined above demonstrate that there is a possibility of anti-competitive actions by a dominant firm, but it is important to examine if it is engaging in anti-competitive behaviour.

2 COMPETITIVE STRUCTURE OF THE OVER-THE-TOP MESSAGING MARKET

This section will look at the OTT messaging market and examine various measures of the competitive structure of the market to determine if any participant has SMP. This section will first cover the traditional measures of market concentration that have been used in past investigations by competition authorities to show that a firm has SMP. Next, it will investigate a measure of market concentration that is focused on the unique properties of the OTT messaging market, specifically that users do not pay directly for the service. Finally, it will investigate the behaviour of the largest firms in the market to see if they are using their market power in anti-competitive ways. This methodology was picked as it follows the standard analysis of market structure from the theoretical literature and used by competition authorities around the world (Rogerson & Holmes, 2010; Stumpf et al., 2018).

2.1 Traditional Measures of Market Concentration

While the market for OTT messaging services may be different than many industrial sectors, some traditional measures of market concentration are still useful to analyze the market structure. Since most products are provided to end-users without direct payment, measures such as the SSNIP do not work. However, measures of market share and externalities are still valuable to indicate if there is a firm with SMP. This follows with the analysis methodology of authorities in the US and UK who both used these measures as an alternative in the case of advertiser funded markets (Competition & Markets Authority, 2020; Nadler et al., 2020).

This section will look at the messaging market through the lens of two measures of market concentration, market share and the Herfindalh-Hirschman Index, as well as the impact of network effects on concentration. These measures will show that Facebook controls a significant share of the market for OTT messaging products and their market position warrants further investigation.

2.1.1 Market Share

One of the simplest measures of market power is the market share controlled by different participants. While there is some disagreement by competition authorities over what market share indicates SMP, both US and EU competition authorities agree that a market share above some threshold warrants investigation. The US FTC policy states that market share above 50% is sufficient to warrant investigation while European case law states that between 40% - 55% share of the market indicates a dominant position depending on other structural factors (EPRS, 2019; FTC, 2013).

Table 3: Monthly Active Users for Major Messaging Services

Service	Monthly Active Users (millions)	Global Market Share	All Messaging Market Share Excluding China and Russia	OTT Market Share ex-China and Russia
WhatsApp	2,000	17.8%	24.9%	39.8%
Messenger ¹⁾	1,500	13.4%	18.7%	29.9%
WeChat	1,210	10.8%	N/A	N/A
QQ	807	7.2%	N/A	N/A
Telegram	500	4.5%	6.2%	10.0%
Snapchat ²⁾	440	3.9%	5.5%	8.8%
Skype ³⁾	300	2.7%	3.7%	6.0%
Viber ⁴⁾	260	2.3%	3.2%	5.2%
VK	73	0.7%	N/A	N/A
Signal	20	0.2%	0.2%	0.4%
SMS Messaging ⁵⁾	Global: 3,200 Ex-China: 2,100	28.5%	26.2%	N/A
iMessage ⁶⁾	900	8.0%	11.2%	N/A

Notes:

- 1) Messenger last reported user numbers separately from Facebook in 2018.
- 2) Snap Inc only reports daily active users, this value was estimated by the US House Judicial Committee from Snap's ad platform analytics.
- 3) Skype last reported user numbers in 2015. This number is expected by industry observers to be much lower today.
- 4) Viber last reported user numbers in 2014. The user count is expected to be unchanged by industry observers.
- 5) There is no unified reporting of SMS usage globally. The number is estimated from the total worldwide mobile subscriber count (5 billion) and the estimated share of subscribers that use SMS monthly (64%). Global subscribers outside of China estimated by removing the number of cellular subscribers reported by the Chinese Telecommunication industry from the global count.
- 6) Apple does not report usage numbers on iMessage. This number is estimated from the number of iPhones in use worldwide.

Sources: CIW Team (2019); GSMA (2020); GSMA Insights (2020); Mail.ru Group (2020); Nadler et al. (2020); Protalinski (2020); PYMNTS (2016); Schroeder (2021); Singh (2021); WhatsApp (2020).

Measuring market share in OTT messaging is challenging, as users can register and use multiple services, or register for a service without using it. This master's thesis will follow the lead of US legislators and the firms themselves by measuring the market share in monthly active users. These are users who have actively used the product in the last 30 days and excludes users who have accounts that were inactive during that period. A single person may use multiple services in a month and thus count towards two or more services' totals, but this is appropriate as all the services would have profited from the user's interactions.

Table 3 shows the number of monthly active users for each of the major messaging services with more than 100 million monthly active users. Signal and VK are included in the list despite their low user numbers as they are controlled by the founders of WhatsApp and Telegram, respectively. The table also includes two apps that are exclusive to the Chinese market, as well as iMessage and SMS messaging for comparison.

Combining the market share from Messenger and WhatsApp, as they are both owned by Facebook Inc. (hereafter Facebook), the combined product has a share of 43.6% in all messaging outside of China and Russia, including SMS and iMessage. Narrowing down our analysis to just OTT messaging products outside of China and Russia, as seen in column 6 of Table 3, and Facebook's market share is 69.7% of the OTT messaging market. Market share alone is not enough to conclude that Facebook has SMP or that Facebook has abused their market power. However, their market share is well above the threshold for investigation in both the EU and US to see if Facebook holds SMP or has engaged in abuse of their power.

Looking at the data in aggregate however misses some important variations in the market structure around the world. According to Facebook's internal data, WhatsApp is actively used by 99.9% of the smartphone owning population in Spain (Nadler et al., 2020). This is not an isolated case either, as part of the acquisition of WhatsApp, then Facebook CFO Javier Oliver noted that "in markets where [WhatsApp does] well, they literally reach 100% of smartphone users—which is a big part of the population." (Nadler et al., 2020). In these selected markets where WhatsApp controls close to 100% of the market for OTT messaging, Facebook holds SMP. However, the market for OTT messaging is global and the remainder of the analysis will then be focused on the larger EU and US aggregate markets to show that Facebook holds SMP over the entire market in these regions.

2.1.2 Herfindalh-Hirschman Index

The Herfindalh-Hirschman Index (HHI) measures the level of concentration in a market. Much like market share, it is used by competition authorities not as a final arbiter of if a market has competitive concerns but rather to indicate if a market requires further investigation (Shepherd, 1987). It is calculated as the sum of the square of market share for the firms in the industry:

$$HHI = \sum_{i=1}^N s_i^2 \quad (1)$$

An industry with a perfectly competitive environment, where there are many small firms would have an HHI value approaching 0 whereas a monopolistic market would have an HHI score of 10,000 (Shepherd, 1987; The United States Department of Justice, 2018).

Different competition authorities use different standards to judge if a market is concentrated and needs further investigation. In the US the FTC states that a score of 1,500 – 2,500 means the market is moderately concentrated and over 2,500 is a highly concentrated market (FTC, 2013). The EU commission uses HHI primarily to investigate mergers, where it looks at the change in HHI due to the proposed merger. However, it also considers any market with an HHI above 2,000 where one of the participants has greater than 50% market share to be an indicator of competitive concerns (European Commission, 2004a). As shown in section 2.1.1 Facebook does have a market share above this threshold, thus an HHI above 2,000 would be a concern by EU standards.

Using the data from Table 3 the HHI index for the OTT messaging market is 5100. The FTC would classify this market as highly concentrated and under EU Commission Guidelines this should be considered an initial indicator of competition concerns (EPRS, 2019). Under the guidelines of both agencies, the market requires further investigation to ensure there are no harmful effects from the high level of concentration. The competition authorities in both the US and EU also state that in highly concentrated markets mergers are presumed to increase market power and require persuasive evidence to the contrary before they could be approved.

As well, if Messenger and WhatsApp were considered separate products, even though they are owned by the same firm, the HHI is reduced to 2,719. This would still be considered a highly concentrated market by the FTC standards. This is important to note as some of the remedies proposed by competition authorities discussed in section 3.2 propose splitting up WhatsApp and Messenger. However, this split would not move the market from highly concentrated to moderately concentrated according to this indicator.

2.1.3 Barriers to Market Entry and Network Effects

Competition agencies looking at concentrated markets must consider the barriers to entry for a new firm in the market of interest. Markets may be concentrated, but the threat of new entrants means that firms will still act in a pro-competitive manner. FTC (2013) and EU Commission Guidelines (European Commission, 2004a) require that investigators consider the possibility of new entrants who can enter the market in a timely and sufficient way to disrupt any anti-competitive behaviour. Significant barriers to entry, such as network effects, mean that firms are unlikely to enter the market in a timely manner to

disrupt anti-competitive behaviour (Gandal, 2018). In the case where there are significant barriers to entry, both institutions state that there are likely to be anti-competitive effects as firms already in the market can act in an anti-competitive manner without facing new competition (European Commission, 2004a; FTC, 2013).

In the case of the OTT messaging market, there are network effects that favour larger firms. As a firm grows and has more users, these users can message more of their contacts and the network becomes more valuable to them. This is discussed in section 1.4.1, where Metcalfe's Law shows that the number of connections in a network grows with the square of the number of members of the network (Metcalfe, 2013). These network effects provide a massive barrier to entry for new firms who are looking to compete in the OTT messaging market. A new messaging firm would have a hard time competing as a niche player, as without many customers potential customers would not find their network to be valuable (Nadler et al., 2020).

An instructive example of this is the progress of Signal in the OTT messaging market over the past few years. Signal was started with \$50 million of funding from a founder of WhatsApp after he left the company during a dispute with Facebook management (Singh, 2021). While the app has many of the same features, and even some of the same staff, like WhatsApp, it has not been able to generate the same success. Currently, it has about 30 million monthly active users and the founder has continued to invest his own money in the project to keep it solvent (Singh, 2021). Without an existing network of users, customers are unwilling or uninterested in switching to another messaging product, even one that is offered for a lower price due to the lack of data collection. Users expect to be able to contact their friends and family from their OTT messaging app, and Signal does not have the user base to enable that.

The strong network effects in the OTT market create a barrier to entry for a new firm looking to enter the market and begin competing with existing players. This means that existing players can act in anti-competitive ways without the threat of a new player entering the market. While neither the market shares, HHI or the network effects alone are strong enough to indicate that the market is anti-competitive, they each show that there is a risk of anti-competitive behaviour. Combined however, this market structure shows that there is a high risk of anti-competitive behaviour and competition agencies would be well served to investigate the market further.

2.2 Novel Measure for Advertiser Funded Markets

As discussed in section 1.4.2, all the major players in the OTT messaging market provide their service for free to end users. Instead, they generate revenue through the users' interaction with the app, either by selling some in-app products, such as personalized images to use in conversations or by selling advertisers access to their user base (Russell, 2019). This presents a problem for many types of traditional market analysis as they

analyze price effects that are not visible in a market where products are commonly offered for free.

There have been several attempts by competition agencies and scholars to find a way to adapt traditional metrics to these new advertiser funded markets. Some have looked at the prices that firms are charging advertisers, however that is unsatisfactory as it ignores the consumer experience. Qualitatively, users understand there has been a price increase in the app when they see more advertisements in it, but it is hard to find a quantitative measure of ‘advertisements value shown per interaction’ (Stumpf et al., 2018).

This section will use an alternative measure that has been adapted for the OTT messaging market. It is a modification of the SSNIP for markets where users are selling their data rather than paying directly for a product. This test is not currently in use by competition authorities, but it provides some insight into the tests that might be run by competition authorities in the future.

The traditional SSNIP test is used to define the relevant market for a firm’s product during a merger review. It works by creating a hypothetical monopolist in a market and imagining they increase the price by some amount. Typically, the price increases modelled are 5% or 10%, which is enough to impact consumer behaviour (Ivaldi & Verboven, 2005). If the hypothetical monopolist increases their profit from the higher prices, then the complete market must be identified. If the hypothetical monopolist was not able to profit from the price increase, then the market definition must be expanded to include other possible substitutes. This process continues until the monopolist generates a profit by raising prices. At this point the relevant market is properly defined and the analysis can continue (Stumpf et al., 2018). Applying this test to the OTT messaging market is a challenge, as the products are typically offered for free with other ways of generating revenue. Instead, this thesis will apply a proposed variation to the SSNIP test and demonstrate the challenges with applying the test through two examples from WhatsApp.

Two issues must be addressed before applying the SSNIP test to any analysis in the OTT messaging market. The first is that there are no services on the market that charge consumers directly. Instead, consumers pay for access with their data and attention which is challenging to price and compare (Lancieri & Sakowski, 2020). Consumers are also generally unaware of what data is being collected, as the exact details are included in lengthy Terms of Service agreements and two different firms will generate different amounts of value from the same user’s data based on their capabilities and pre-existing data set (Bundekartellamt, 2019a). Thus, there needs to be a standard way to define the price that users are paying for their messaging service before any analysis can be done.

The second issue that must be resolved is to define what constitutes a price increase. Since the firms that collect data are constantly improving their data analysis, they constantly generate more value from previously collected data. While this might seem like a price

increase, there is no action that the consumer could reasonably take to prevent it as the data has already been collected as payment for previous usage (Bundekartellamt, 2019b). Instead it has been proposed that a change in the terms of service or in the app that enables more data collection would be a price increase, as the consumer will provide more data to consume the same service (Lancieri & Sakowski, 2020).

Without the price information, it is impossible to apply the traditional SSNIP tests to the OTT messaging market. However, scholars have proposed alternatives using modified measures. The modified SSNIP would define a price increase as any increase in the amount of data collected or in the usage of the users' attention to generate revenue for the firm, such as by showing more advertisements. From there, consumers behaviour could be modelled using similar logic to a traditional SSNIP test (Mandrescu, 2018). While this modified test has never been applied by a competition authority it is instructive to apply it to two different situations, as it highlights the challenges that authorities face in evaluating the OTT messaging market.

The first application of the modified SSNIP will leverage the market structure outlined in section 2.1.1. Since Facebook holds a dominant position in the EU market, we assume that it is the hypothetical monopolist. If the firm can increase the cost of their service to consumers by gathering more data while not reducing the number of people that use the product, then it will inform two important points about the OTT messaging market. First that the definition of the market is correct in the EU and the structure of the market is worth investigating.

For this test, I will focus on the change in the WhatsApp privacy policy in 2018 that came along with the new General Data Protection Regulation (GDPR) in the EU. The act required changes to how data was handled, but Facebook also used the opportunity to increase the amount of data collected. The changes made include collecting "profile photo, about information, whether you are online, when you last used our services, and when you last updated your information". It also expanded the data collection to include "identifiers unique to Facebook Company Products associated with the same device or account" which enable Facebook to connect user data across all products they offer (WhatsApp, 2016, 2018). While measuring the exact percentage change in the amount of data collected is not possible, the changes do make it clear that significantly more data is going to be collected from users, especially users who also have a Facebook account, thus increasing the cost of the service to them.

This change in the data collection policy was non-transitory, as made clear by the text and the actions of Facebook after it was published. The policy states that no changes will be made without notifying consumers, and no changes have been made in the three years since (WhatsApp, 2018). Thus, it can be safely assumed that consumers understood the changes to the policy were not transitory and would constitute the new, long-term, price of the service.

Finally, it is important to show that after subtly increasing the “price” of their service Facebook did not see a reduction in the number of users. Firms in a competitive market that increase the price of their products should experience a decrease in the quantity sold. In this case, to simplify, the quantity sold could be considered as the number of monthly users of the WhatsApp service. The total number of monthly active users of Facebook services in Europe increased from 370 million in December 2017 to 377 million in December 2018, and Facebook made no disclosures about a decrease in WhatsApp usage during that time frame (Facebook Inc., 2018).

While this appears to be an example of a monopolist raising prices while not reducing the quantity sold, the issue is that it relies on consumers accurately and consistently valuing their data. Behavioural studies have shown that users are highly inconsistent in how they value their data, with consumers stating their data is important and they would pay to protect it before trading their data for a much smaller discount on a purchase later in the same study (Acquisti, Taylor & Wagman, 2016; Competition & Markets Authority, 2020). It could then be argued that the price increase from gathering more data in the minds of consumers is much smaller than the 5%-10% threshold that is required for the SSNIP test.

This hypothesis is confirmed by a second case involving WhatsApp and their attempts to increase the price that consumers pay through another method – embedding display advertisements in the client app. In 2018 WhatsApp announced that it was studying adding display advertisements into the app, which up until that point had never had them. This was major news as the two founders of the app resigned in protest, forfeiting over \$600 million in unvested stock (Grind & Horwitz, 2020; Singh, 2021). For the SSNIP test, this is another opportunity to study consumer behaviour, as adding display ads to the product would represent a significant increase in the indirect price that consumers pay for the service without changing any other features of the app.

Facebook studied various ways to embed advertisements into the app for two years, testing for different places and ways to show the new ads to users. These tests were run as part of a series of A/B tests, where a single change is made to the app. In this case, ads were added, and users’ behaviour with the change in compared to a control group with no other changes to their app. After two years of attempts, Facebook announced in 2020 that it was disbanding the efforts to add advertisements in WhatsApp as the team had not found a satisfactory way to do so (Grind & Horwitz, 2020). Under the logic of the modified SSNIP, this is another case of attempting to increase the price that consumers faced for using the product. In this situation however, consumers were unwilling to accept the price increase and continue using the app in the same way. This would imply that Facebook does not have sufficient market power to unilaterally raise the price that consumers pay for messaging services. It could also be argued that adding advertisements to WhatsApp is more than a 10% price increase in the eyes of consumers, especially after WhatsApp’s pledge to never have advertising only two years prior (Scott, 2016).

These two examples demonstrate the challenges of applying traditional market analysis tools to the OTT messaging market. While there have been attempts to apply modified versions of the SSNIP test to markets with zero prices, there has yet to be a satisfactory solution. While the first case in this section seems to be a clear case of the price increases to consumers while the quantity sold continued to grow, it is hard to quantify how much of that change was understood as a price increase by consumers. This is confirmed by the second case where Facebook was unable to increase the price through the addition of display ads without reducing the quantity sold, which is a far more visible change for consumers. These two cases do not show anything conclusive about the state of the messaging market but are important to consider when thinking about applying traditional market analysis tools to any market with zero pricing.

2.3 Behaviour of Participants in the Over-the-Top Messaging Market

Moving beyond the quantitative measures of the OTT messaging market, it is important to also investigate the qualitative indicators that a firm might have SMP. Firms with SMP can work outside of market forces and engage in behaviour that harms competitors and consumers in the market (Wu, 2018). The following section will investigate three different actions by market participants that have prevented free competition or demonstrate the lack of free competition in the OTT messaging market.

2.3.1 Cross Subsidizing

Cross subsidization is the process of using revenue from one area or line of business to offer products in another market for less than their cost would be otherwise. This includes sharing of fixed costs, transfers between outputs, or transfers between classes of output (Faulhaber, 1975). This section will cover basic background information about relevant tests for cross-subsidization used in the EU and apply them to WhatsApp. It will find that WhatsApp is charging sub-competitive prices and Facebook is engaging in cross-subsidization to benefit the service.

Not all cross-subsidization is harmful, such as in cases where policies are put in place to ensure universal prices for all consumers at the cost of high-cost users being subsidized by lower cost ones. This can be seen in the postal market, as rural mail recipients are subsidized by cheaper urban mail delivery (European Regulators Group for Postal Services, 2019). However, cross-subsidization can be harmful when it is used to foreclose competitors from entering a market or to force competitors to leave a market by driving prices below the cost of service (FTI Consulting, 2016).

The challenge for regulators and competition scholars is detecting when cross-subsidization is harmful to competition and when it is not, or when the subsidies are even welfare increasing (Faulhaber, 1975). This is made especially challenging as subsidized

prices are typically lower than unsubsidized ones, even though subsidy-free prices are considered better than subsidized ones from a competitive standpoint. This is because subsidy-free prices protect a competitive market in the long run and ensure that no firms are forced out of the market by competitors selling below cost. (European Regulators Group for Postal Services, 2019).

The method that this thesis will use to detect cross-subsidization is to compare the cost of delivering a product or service compared to the price that is being charged to consumers. The cost of delivering a product can be measured by looking at the stand-alone costs, the fully distributed costs, or the incremental costs. The stand-alone cost is the cost of delivering the product by a separate firm, not including any cost-sharing with other outputs. The fully distributed cost is the cost of delivering the product by sharing the fixed costs across all outputs the firm produces. The incremental costs ignore the fixed costs entirely and only include the incremental costs (hereafter IC) of delivering the product to an additional customer (Faulhaber, 1975). Due to the difficulty in correctly allocating fixed costs to each customer, the Faulhaber rule was established that states:

“as long as a dominant firm prices its services somewhere between incremental costs (seen in an adequate time scale) and stand-alone costs, overall welfare should not be adversely affected, on account either of excessive pricing, predatory pricing or cross-subsidization” (Larouche 2000 in FTI Consulting 2016, para. 2.13).

Or stated more simply, a price is considered competitive if:

$$IC < Price < Stand\ Alone\ Cost \quad (2)$$

This offers firms a wide range of options on how to allocate costs so any efficiencies from being a multi-product firm can be fully exploited, by charging only the incremental cost or the firm could fully cover their fixed costs from the price of service (Larouche, 2000). However, with this wide range of options for firms, any price that is charged outside of this range should be considered concerning from the viewpoint of competition authorities as it means firms are most likely engaging in anti-competitive practices. Any price outside of this range is likely to be welfare reducing for customers (FTI Consulting, 2016).

Another way to investigate cross-subsidization is to use the same pricing tests that are used in the case of predatory pricing cases. In predatory pricing cases, EU authorities use the test that was put forth in the AKZO case. If the price is below the Average Variable Cost (AVC), then the price is considered abusive. Whereas if the price is below Average Total Cost (ATC) it can only be considered abusive if there is intent to eliminate the competition (FTI Consulting, 2016; Lenz, 1991). While some authorities consider this to be too generous of a standard in some cases it is still a valuable baseline for evaluating if there is cross-subsidization (Lowe, 2003).

Given the structure of the market for OTT messaging apps, the focus of the test will be on whether WhatsApp is charging less than the incremental costs for their service. This analysis will focus only on WhatsApp due to the challenges with gathering revenue information for all the OTT messaging services on the market. While other firms may be engaging in the same behaviour as WhatsApp, such an analysis would require non-public information about market participants.

Since there is limited public information available about the costs that WhatsApp faces, this analysis focus on costs that are provably per-user and required for WhatsApp to add another user to their network. It will mean ignoring the network and server costs that WhatsApp faces to host their messaging service and any expenses faced in distributing the app and registering new users around the world. Instead, the only cost that will be included in the IC is the cost to send a single message to a new user. When a user installs the WhatsApp client application on their device, the app must register for a push notification subscription to allow it to receive incoming messages. This is true no matter the operating system that the device uses or the country of origin. Without this registration, the new user would be unable to receive messages and thus not be included in their active user statistics (Microsoft, 2021).

While the cost of a single new push notification registration is quite low, there is some cost to registering a new user and sending them a message. WhatsApp does not publish the specific cost structure that it faces, but it can be estimated by the third parties who offer a similar service. Surveying 3 of the largest push notification registration services, from Microsoft, Amazon, and OneSignal, the prices for a single subscription range from \$0.003 per message to \$0.0000005 per message for their cheapest offerings (Amazon, 2021; Microsoft, 2021; OneSignal, 2021). Given that other large firms are likely to face similar cost structures to what Facebook faces, taking the lowest cost of the 3 firms is a fair estimate of the IC for adding a single user. Thus, it is estimated that the IC for WhatsApp is \$0.0000005/user.

Given that the estimated IC is quite small, almost any revenue generated by WhatsApp from adding a new user would be enough to exceed the IC. Other firms competing in the OTT messaging market, who face a similar cost structure, generate revenue through a variety of methods. The most common method is by placing display ads alongside a user's messages. Other methods include selling user's stickers to use in conversations, selling users calling to external phone networks or charging businesses for priority access to messaging potential customers (Russell, 2019). Finally, before 2016 WhatsApp charged \$1 to download the app and \$1/year to continue using it (Scott, 2016). Any of these methods would be enough to generate revenue well over the IC.

According to Facebook's annual filings with the Securities and Exchange Commission (SEC) and reporting by new outlets, WhatsApp does not currently generate any revenue

(Facebook Inc., 2018, 2019, 2020; Grind & Horwitz, 2020). With each annual filing with the SEC since 2018 Facebook has added the language stating that

“We have historically monetized messaging in only a limited fashion, and we may not be successful in our efforts to generate meaningful revenue or profits from messaging over the long term” (Facebook Inc., 2020, p. 17).

While there have been efforts in Facebook’s other messaging app, Messenger, to show display ads, sell stickers, and generate commissions from money transfers, this has not happened in WhatsApp. Most tellingly in 2018, along with the added language in the annual report, Facebook announced it would soon bring advertisements to WhatsApp. However almost 3 years later this has yet to happen, and the company has halted any efforts to follow through on the statement. The reason given for halting efforts to generate revenue from WhatsApp was that Facebook executives feared adding advertisements would drive users to use other messaging products (Grind & Horwitz, 2020).

Cross-subsidization is harmful to competition because it prevents the operation of a competitive market. If one actor in the market can work outside of market forces and the need to generate revenue, then it prevents other firms from competing (FTI Consulting, 2016; Wu, 2018). In the case of OTT messaging WhatsApp is operating, and has been operating for years, without the need to generate revenue due to subsidies from other parts of Facebook’s business. While there is room for argument about the specifics of the cost structure that WhatsApp faces, a product that does not need to generate revenue is at a substantial advantage compared to its competitors. This stance is reinforced by Facebook’s admission that it has been unable to generate revenue from WhatsApp without losing customers. The cross-subsidization is anti-competitive as a newcomer into the market without the benefit of cross-subsidization would be forced to generate revenue immediately, something that WhatsApp was unable to do even after years in the market.

2.3.2 Blocking Entry into the Market

One of the competitive pressures that incumbent firms must consider is the threat of new entrants entering the market. Even the threat of new competitors can be enough to act as a check on the behaviour of market participants (Federal Trade Commission, 2013; Goolsbee & Syverson, 2008). The largest barrier to entry for a new competitor in the OTT messaging market is building the network of users that customers demand. Facebook has used its market power as the dominant player in the social networking market to block the entry of new players into the OTT messaging market, and thus protected their market power in that market (Competition & Markets Authority, 2020). This section will cover two actions by Facebook where it used its market power in the social networking market to block the entry of potential competitors into the OTT messaging market.

As the largest barrier to entry for new firms is the creation of a network of users that a new customer could contact, new firms have come up with several different ways to build that network quickly. MSN Messenger famously allowed new users to contact users of AOL Instant Messenger by mimicking their networking protocol. This allowed MSN to build a large user base so that when AOL finally blocked MSN users from connecting with AOL Instant Messenger, Microsoft had created their network of users (Warren, 2014). WhatsApp used a different approach. Instead, it compares all the phone numbers of a user's contacts with a list of known users. Any matches would be automatically added to the WhatsApp network, giving users a list of contacts who were available to message from the first time they used the service (Anglano, 2014; Bundekartellamt, 2019b). With the rise of social networking and Facebook, many consumers now have their largest and most complete list of contacts stored in Facebook Blue, Facebook's social networking product. OTT messaging apps recognized this pattern and started to promote various ways for users to import their contact list from Facebook Blue (Constine, 2013; Murphy, 2013).

Facebook executives recognized that allowing users to export their contacts to another firm's messaging app would pose a competitive threat. An example of this is the app Voxer which was founded in 2011 and enabled users to communicate with voice and text messaging. Users could give Voxer permission to import their contacts list from Facebook Blue to quickly add them to Voxer. In early 2013 Facebook introduced voice messaging to Messenger and less than a month later blocked Voxer's access to users' contact lists (Constine, 2013). By June that year, Voxer had fallen off the app store charts as a top downloaded app and announced it would no longer focus on consumer OTT messaging. It would attempt to compete in the enterprise communication market (Constine, 2018). Facebook management was aware of the importance of importing contacts to a new OTT messaging product, and based its choices about which apps could have access to user's contact lists on if the company was a "competitive threat" or if "they could extract other concessions from the other firms" (Nadler et al., 2020).

In some cases, Facebook has found it easier to prevent a firm from growing to become a threat by tracking their development and blocking access after they are released. In the case of MessageMe, the Facebook team detected that it was growing quickly after release and could pose a threat to Messenger. The team reacted quickly and blocked users from importing their contact list from Facebook Blue into MessageMe (Solon & Cyrus, 2019). At the time this behaviour was standard procedure from Facebook and was referred to in the press as getting 'Vine'd'. The name came from a video-sharing site that Facebook blocked from importing contacts after it began to grow quickly (Murphy, 2013). Emails from the Facebook team show that they were aware of the risk MessageMe presented to their business and that blocking users from importing their contacts would slow or prevent MessageMe from growing. Executives noted that MessageMe was more enjoyable to use than their own offering. They asked for an internal data scientist to create a list of all similar OTT messaging apps who used contact lists from Facebook Blue so they could be

blocked at once to reduce the amount of negative press. (Solon & Cyrus, 2019). MessageMe was shut down one year later and the team was acquired by Yahoo (MessageMe, 2014).

The actions outlined above are clear cases where Facebook used its market power in another market, social networking, to block competitors in OTT messaging. While Voxel and MessageMe might have not ever grown larger than Messenger and WhatsApp for a variety of reasons, this does not excuse Facebook's deliberate actions to block their growth. Due to the greater potential for abuse, dominant companies are subject to stricter obligations and controls to ensure they will not abuse their position in the market. This is true if the power is used in the same market where the firm holds a dominant position or if the firm uses its power to restrict competition in another market (Bundekartellamt, 2019a).

2.3.3 Predatory Behaviour

While the zero pricing in the OTT messaging market prevents firms from engaging in traditional predatory pricing to protect their market position, firms can still engage in other predatory practices to protect their market power. One way to protect their market position is to purchase competitors, especially maverick competitors who play a disruptive role in the market to the benefit of consumers (Owings, 2019). Another option is to clone or copy the distinctive features of a potential competitor to remove the incentive for consumers to use the competitive product. While offering a similar product as a competitor is not inherently anti-competitive, it can become anti-competitive when a dominant firm uses its market power to force a nascent competitor out of the market (Nadler et al., 2020).

This section will cover two different predatory actions by Facebook to protect their market power in the OTT messaging market. The two actions concern Facebook's copying competitors' features after they were identified as competitive threats. In one case Facebook cloned Snapchat's signature features after a refused acquisition offer. Facebook also used acquisitions to protect their market power, such as its acquisition of WhatsApp after it was identified as a competitive threat to Facebook's existing Messenger product. The pattern of actions will demonstrate that Facebook has used its market power to discourage and remove potential competitors in the OTT messaging market and to reinforce its market power.

In late 2013 Snapchat was a rising competitor for Facebook in the OTT messaging market, as it has grown to 400 million messages a day in a little under two years (E. M. Rusli & MacMillan, 2013). It offered different features from Messenger that were attractive to younger users, such as disappearing picture messages, stories, and filters over their images. These features encouraged young people to share more content and engage with the app for longer, which was a direct threat to Facebook's business. Facebook offered \$3 billion in cash to acquire Snapchat, but the offer was declined as Snapchat's ownership believed that Snapchat could grow significantly larger (E. M. Rusli & MacMillan, 2013).

After the acquisition fell through, Facebook instead copied some of the central features of Snapchat into its products, including adding nearly identical stories to its two largest products – Instagram and Messenger – before adding them to WhatsApp following its acquisition the following year. At the time of Snapchat’s initial public offering, about one year after the introduction of stories, Instagram had more users of stories than Snapchat and had cloned additional features such as geofilters that show local art (Yurieff, 2017). Due to the consumer lock-in that is inherent in the OTT messaging market, cloning a firm’s feature is an effective way to block their growth. As consumers face large switching costs, they may choose to stick with their existing product, even if the competing product is better, to avoid having to move conversations to a new network (Nadler et al., 2020).

Internal documents obtained by the US Judicial Committee show that Facebook was aware of the impact of their actions on Snapchat’s business. Facebook executives used private data obtained from a Virtual Private Network (VPN) that monitored internet traffic to track the impact of their actions. They monitored changes in Snapchat, WhatsApp, and Messenger usage, and developed models to track how they would grow in the future. The results from this modelling effort pushed Facebook to engage in a “strategy to acquire, copy, or kill competitors” (Nadler et al., 2020).

The data gathered from the VPN was critical to Facebook’s acquisition of WhatsApp in 2014. Before the acquisition offer, Facebook used the private data model to predict the growth of WhatsApp relative to their product, Messenger. Internal data scientists developed a model that showed WhatsApp was “killing Facebook Messenger” and growing faster than Facebook in some markets (Nadler et al., 2020). In response to this competitive threat, Facebook acquired the firm for \$19 billion to protect its market position which at the time was the largest ever purchase of a venture capital backed firm (A. Rusli, MacMillan & Rusli, 2014). This purchase was referred to by Facebook executives as a land grab to maintain and grow their market share (Nadler et al., 2020).

This same VPN data was used in other cases to model the growth of potential competitors, and clone features if the competitors refused acquisitions. A famous example of this tactic was used against the Houseparty app that was released in 2016. Called the ‘living room of the internet’, Houseparty subsequently rejected an acquisition offer by Facebook. Later that same year Facebook added the central features from Houseparty into Messenger with the branding of a Virtual Living Room (Seetharaman & Morris, 2017). Within a year of this happening, Houseparty had lost approximately half its users (Nadler et al., 2020).

While a single merger or cloning parts of competitors' products are not anti-competitive actions on their own, they rise to that level when they become a pattern by the dominant firm in the market (Nadler et al., 2020). Facebook has used their market power to block, purchase, or clone competitors to prevent them from disrupting their dominance in the OTT messaging market. These actions have the effect of not only blocking the firms

directly impacted but also discourage other firms who might be considering entering the messaging market.

This is not a full analysis of every case of anti-competitive behaviour in the OTT messaging market, as it focuses on only one player, but the findings should be concerning to any competition authority. The OTT messaging market has a market leader, with a 69.7% share of the market, who is engaging in anti-competitive behaviour such as cross-subsidizing and preying on nascent competition. These actions should be grounds for review by competition authorities, and there are some competition and regulatory authorities who are currently reviewing Facebook's position in the market. Section 3 will cover the current competition and regulatory proposals to manage the OTT messaging market along with some historical examples of remedies that have been used to manage similar markets.

2.4 Summary of Findings by Competition Authorities on the Existence of Significant Market Power

As mentioned in Section 2.3, many different competition authorities and legislatures around the world have investigated the OTT messaging market, along with similar markets, and found that Facebook Inc holds SMP. This section will summarize the findings of the OTT messaging market from four of the largest investigations in the EU and US, along with some discussion of their findings in other markets. The reports will come from the US House Judicial Committee, the UK Competition and Markets Authority, the German FCO, and the US FTC.

US House Judicial Committee Investigation of Competition in Digital Markets (US House Report):

This report was written by members of the US Congress, along with leading antitrust scholars, to guide legislation and future antitrust actions by authorities in the US. The investigation and report focused on four firms that were suspected to have SMP in a digital market: Apple, Amazon, Facebook, and Google. As the investigation was carried out by members of the US Congress it had broad powers to compel testimony and documents from the four firms in question (Nadler et al., 2020).

The report found that Facebook holds monopoly power in the social networking and OTT messaging markets. It states that Facebook “competes more vigorously among its products—Facebook, Instagram, WhatsApp, and Messenger—than with actual competitors” (Nadler et al., 2020). The investigation of Facebook's business practices found that it had protected its monopolies through a variety of anti-competitive practices. These include some of the practices listed in Section 2.3, such as acquiring competitive threats and blocking new entrants. The committee found that Facebook's monopoly was

further protected by Facebook's substantial lead in its data collection practices, which enables it to react to potential threats before they can materialize (Nadler et al., 2020).

Facebook was granted the opportunity to counter the claims made in the report. Facebook claimed that the market definition used by the committee was too narrow, as Facebook competes in the market for human attention. In this market, it competes against products such as video games and films and does not hold a monopoly position or SMP. The commission rejected these claims, but as this was an advisory document the disagreement was not resolved (Nadler et al., 2020).

UK Competition and Market Authority's Report on Online Platforms and Digital Advertising:

This report was written by the UK CMA to study the market dynamics of social networking and display advertising (Competition & Markets Authority, 2020). While it was not the primary focus of the investigation, the authority did briefly investigate the OTT messaging market as it is closely related to the social networking market. It found that Facebook rose to prominence in the social networking market based on a superior product offering but a similar firm today would be blocked from growing due to Facebook's market power. The CMA found that Facebook currently commands 73% of the time spent by UK consumers on social networking products, giving it a dominant position in the market (Competition & Markets Authority, 2020). It noted that Facebook uses its family of apps to insulate itself from competitive threats, as users who wish to stop using Facebook Blue often switch to other Facebook services such as Instagram or WhatsApp.

German FCO's Administrative Proceedings Against Facebook:

Based on their joint report with the French Autorité de la Concurrence the FCO initiated proceeding against Facebook based on their collection and use of user data across their family of products (Bundkartellamt, 2019b). It was focused on the intersection between new privacy laws and competition law, specifically if Facebook's collection of data from third-party sites that contain a Facebook 'like' button constituted exploitative business terms. Before the proceedings, Facebook required any German user of their products to consent to be tracked across any site that contained a like button, without an option to opt-out from the tracking (Bundkartellamt, 2019a).

The FCO defined the market of social networking to be distinct from the market for OTT messaging. OTT messaging apps were found to be complements rather than substitutes for social networking products. It also dissented with the European Commission's finding that OTT messaging products should be grouped with consumer communication services such as SMS messaging and email. It investigated the WhatsApp terms of service and found that it was unclear on what the data was being combined with data from other Facebook products and third-party websites. This further highlights the challenges for privacy conscious consumers as they are unaware of how their data is being used. The FCO also

questioned whether Facebook was being truthful about the reasons for sharing data between services – Facebook claims it was for security reasons however it was not made clear why such a large volume of data needed to be shared (Bundekartellamt, 2019b). The FCO required Facebook to make changes to its operations due to the violations listed above. These changes will be outlined in full in section 3.2.3.

US Federal Trade Commission (FTC) versus Facebook Inc:

The FTC, the US federal competition authority, filed a lawsuit against Facebook alleging anti-competitive conduct and unfair methods of competition. The FTC claims that Facebook has monopoly power in the social networking market and has protected its market position by blocking or buying potential competitors. The FTC’s complaint centers around Facebook’s acquisition of two major competitors, WhatsApp and Instagram, and Facebook’s use of its market power to block potential competitors from overcoming the barriers to entry into the social networking and OTT messaging market.

The complaint notes that the acquisition of WhatsApp was discussed by Facebook employees as a move to eliminate a competitive threat from the market. Facebook employees celebrated the acquisition saying they had neutralized “probably the only company which could have grown into the next [Facebook].” (*Federal Trade Commission v. Facebook*, 2020). Internal company communication and data had shown that WhatsApp was beating Messenger in the OTT messaging market. This acquisition secured Facebook’s continued dominance in both the OTT messaging and the social networking markets. The FTC also notes that Facebook’s pattern of blocking users from exporting their contact lists has anti-competitive effects on the market. This has prevented several potential competitors from entering the market, including in August 2013 when Facebook blocked multiple apps from exporting user’s contact lists in an anti-competitive move against potential competitors (*Federal Trade Commission v. Facebook*, 2020).

It is important to note that the current filing by the FTC is a complaint and thus has not had any of the allegations proven nor does it require examination of the evidence presented. Some of the evidence is made available in the complaint or from previous reports by the US or international authorities, but the rest will be examined during the trial (United States Courts, 2015).

3 POTENTIAL REMEDIES FOR SIGNIFICANT MARKET POWER

Authorities in both the US and Europe have found that Facebook holds SMP in the OTT messaging market, and this was confirmed by my analysis of their key findings in section 2, so it is important to analyze potential competitive remedies. The following section will analyze five different historical actions or remedies by competition authorities in similar markets, or markets with some similar properties. This will provide context on how

markets have responded and how successful they were at restoring competition. Finally, this section will critically examine five different proposals by various legislative bodies and competition authorities on how the OTT messaging market can be restored to a competitive state. Relevant Examples of Competitive Actions or Regulations in Selected Markets

Before considering contemporary proposals on the OTT messaging market, it is helpful to understand historical competitive actions and regulations in markets with similar properties. This section will cover competitive actions and regulations in four markets that share some properties with the OTT messaging market. First, it will discuss the market for transatlantic telegraphs, one of the first international telecommunication products offered, which quickly consolidated around a single cartel. Secondly, it will discuss the market for roaming SMS messages in the EU which demonstrates how effective regulation of a communication market can improve consumer welfare. Thirdly, the example of the liberalization of the electricity market in the EU will demonstrate how a market with a vertical monopoly can be split to allow competition where it is possible and a regulated natural monopoly where the economies of scale exist. Finally, the US and EU cases against Microsoft will demonstrate how enforcing open access to software can allow for a competitive market without reducing consumer welfare or stopping the current monopolist from innovating in the newly competitive market. The learnings from these four separate actions and regulations, spread over the past 200 years, will provide a base for understanding how any competitive actions will impact the OTT messaging market and help to inform my recommendations for the market.

3.1.1 US Based Transatlantic Telegraph Regulation

The telegraph was the first way for almost real-time communication around the globe, and the market for transatlantic communication was one of the first cases of telecommunication regulation. Understanding the regulatory and market failures in this market is critical to understanding the OTT messaging market. Many of the discussions happening today about social networking and OTT messaging echo discussions in the late 19th century. The transatlantic communication market was considered critical to the economic development of the United States. Firms argued they should be allowed to merge or form cartels to guarantee some profit in exchange for the social good they provided (Headrick & Griset, 2001). Facebook argues the modern version of this position, saying that their merger activity is to maximize the social good they can provide (Nadler et al., 2020). This section will provide historical context on the structure of the transatlantic telegraph market and analyze the failed attempts at regulation by US authorities. The actions taken by the lawmakers were reasonable attempts to restore competition in the market, but they ultimately failed and provide an important lesson for modern competition authorities.

The first electrified telegraph networks were introduced in Europe in the 1830s and it took over 30 years until the first transatlantic cable was successfully laid. Initially, it was believed that laying wires across the ocean would be impossible, and the British government secured the rights to an overland route through Russia to Alaska and across the continent (Headrick & Griset, 2001). However, in 1866, following the end of the US civil war, the first successful transatlantic cable was completed by Telegraph Construction & Maintenance (TC&M). In what would become a trend, Western Union purchased the rights to distribute all messages coming into the firm's US landing. This meant that while TC&M remained a separate firm from Western Union all its messages would have to pass through Western Union's network and Western Union would provide all its incoming traffic (Headrick & Griset, 2001). This pattern was repeated for other firms who built their cables as the industry for US domestic telegraphs consolidated around Western Union (Headrick & Griset, 2001).

One of the biggest risks for a transatlantic cable operator was that their cable would break or suffer some damage that prevented it from carrying messages. In this case, the firm would be unable to generate any revenue until a repair ship was hired and the repairs were completed. Since firms typically financed the massive fixed costs involved in the construction of a cable with debt, a service interruption could bankrupt the firm (Headrick & Griset, 2001). To mitigate the risk of bankruptcy from a cable breaking and strengthen their bargaining position with Western Union the earliest transatlantic telegraph firms formed a joint purse. All the firms would pool their earnings at the end of the month and then be paid according to the proportion of messages it would typically expect to carry. In the case that a firm had its wire break, the firm would still receive a revenue share even though it might not have carried any messages that month. This would provide the firm with a damaged cable with enough revenue to pay their debts for the month with the understanding it will assist other firms in the case their cables break (Headrick & Griset, 2001).

While this behaviour initially increased the number of firms in the market, as the reduced risk encouraged investors to build new wires, it eventually resulted in market failures. Some firms, especially those who serviced an area the rest of the joint purse could not service did not wish to join the cartel. On occasions where new firms refused to join the purse, members of the cartel used predatory pricing to force the reluctant firms to join the purse (Headrick & Griset, 2001). By 1887 all transatlantic messages were under the control of the joint purse. The purse demonstrated its power by forcing a German National wire, running through Portuguese territory to the Caribbean, to join the purse and share messages revenue at both ends of the cable (Headrick & Griset, 2001).

While antitrust law had yet to be established in the United States, legislators recognized that the consolidation in the market was a concern. In 1866 they passed the Post Roads Act which attempted to lower the barrier of entry for new firms into the telegraph cable market by offering free access to install telegraph cables in the waters of the United States. The

law also included a provision to nationalize the telegraph industry, if it was deemed in the national interest, and enforced maximum prices that the government would pay for telegraph service (An Act to aid in the Construction of Telegraph Lines. Pub. L. No. 575, § 230, 221 14 221, 1866). Lawmakers hoped that additional competition would enter the market and could push out the cartel.

Despite the strength of the legislation passed, legislators took no further action against the telegraph firms. The firms used their market power to create and support other monopolies, such as the Associated Press, and to favour political candidates such as Rutherford Hayes (Wu, 2009). By the end of the First World War, telegraph companies were beginning to use their influence in the government to protect their monopoly from foreign competition. This was highlighted by the US Navy's action in 1920 to block a Brazilian ship from laying a telegraph cable that would compete with the cartel (Headrick & Griset, 2001).

In the century following the 1866 Post Roads act, the only competitors to challenge the transatlantic cartel were the wireless and telephone services. No separate transatlantic telegram firms emerged in the wake of the lawmaker's efforts. The lack of wires needed for shortwave radio service meant that firms faced much lower fixed costs and would be profitable at prices 80% lower than the prices charged by firms with cables (Headrick & Griset, 2001). The volume of telegraph messages peaked in 1930 and never recovered following the depression. Instead, consumers began to choose phone calls as the price of long-distance service steadily dropped. However, the cartel merged with Western Union and never lost their monopoly control of the telegraph market. The combined firm continued to operate a profitable service until 1988 (Nonnenmacher, 2001).

The important lesson from the telegraph market is that the ex-post threat of antitrust action or nationalization is not enough to change the behaviour of market participants in a market already lacking competition. The regulations must be backed up by actions in the case of repeated violations. In the case of the transatlantic telegraph market, the US government had the legal basis to seize the assets of any firm that was seen to not be acting in the public interest since 1866. However, Western Union controlled over 90% of the long-distance communication market in the US for the next 50 years and no action was taken against it (Nonnenmacher, 2001). This enabled the cartel to charge monopoly rents to users and to protect their market power in other, tangentially related, markets (Wu, 2009).

3.1.2 Roaming SMS Messaging Regulations in the EU

While the market for OTT messaging and SMS messaging are separate markets, it is valuable to consider the regulatory environment for roaming SMS services. The European Commission began regulating roaming SMS messaging with the first directive on roaming public mobile communication networks in the union in 2003 and passed a series of regulatory packages in the decade following (Spruytte, Van der Wee, de Regt, Verbrugge & Colle, 2017). These packages have helped create a single digital market for the EU,

simplify inter-union travel, and ensure fair competition in the market (Forge & Blackman, 2018). These regulations provide an example of how digital communication markets can be successfully regulated to increase consumer welfare and ensure competition between firms facing different market conditions.

Before analyzing the regulation, it is important to understand how roaming SMS messages work. A consumer will have a mobile subscription with their domestic mobile network operator (MNO) who provides service through their network in some region. Typically, an MNO offers service in a single country although some offer mobile services in smaller or larger areas (Spruytte et al., 2017). If the subscriber travels outside of their domestic MNO coverage area, their phone will connect with a foreign or visited MNO. The foreign MNO will notify the domestic MNO that the subscriber has joined their network (GSMA, 2012).

Figure 1: Visualization of the connection of a roaming call to a domestic number



Source: GSMA (2012).

At this point, the subscriber and their domestic MNO have the option to request roaming service. The domestic MNO can forward their messages and calls, through the foreign MNO, to the subscriber. Figure 1 shows the process when a subscriber connects to a roaming provider to make a phone call back home. This process requires some work by the foreign MNO so they charge a fee to the domestic MNO for forwarding the call (GSMA, 2012). This fee, along with some markup, is then passed to the consumer as a roaming fee. The fee that consumers ended up paying before the regulatory package was opaque and varied greatly. A survey found that pricing could vary by up to 112% depending on which foreign network the consumer connected to, despite the foreign MNOs facing similar cost structures to support roaming customers (Sutherland, 1999). The excess charges could only be avoided by users updating the frequencies their phone used, which was challenging or impossible for most consumers (European Commission, 2004b).

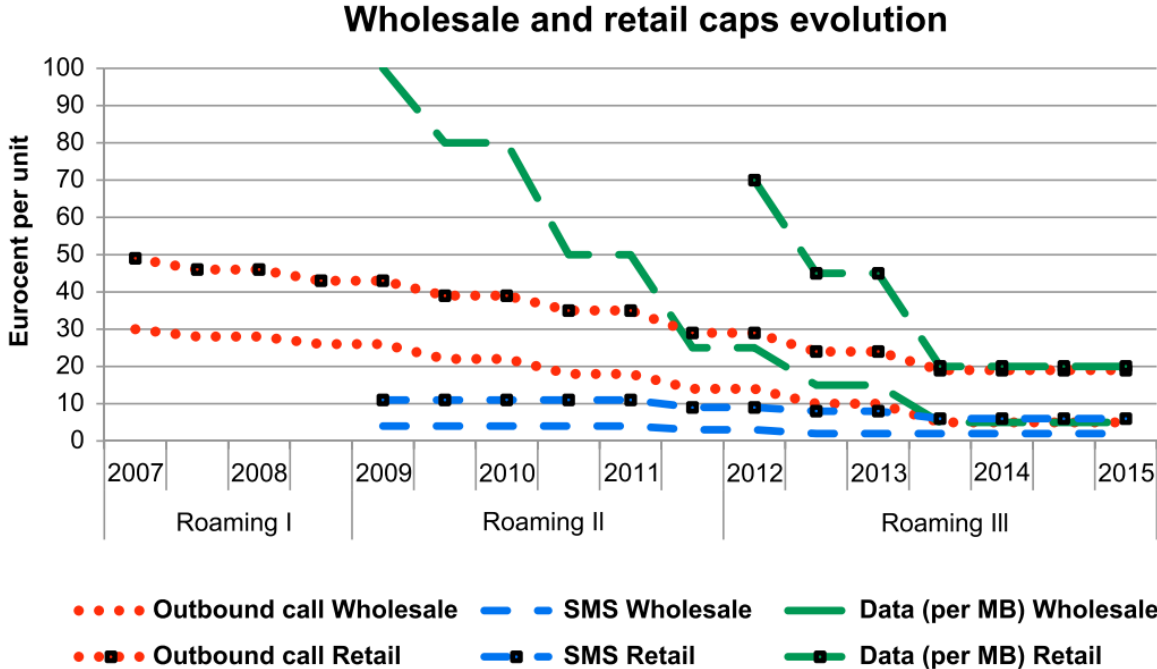
The first attempt at roaming SMS regulation by the EU was in 2003 when the European Commission recommended that National Regulatory Authorities (hereafter NRA) carry out an analysis of their domestic market and apply regulations as needed (European Commission, 2004b). However, this approach was quickly recognized as ineffective as any roaming market spans the scope of at least two NRAs, the domestic and foreign one. In a

recognition of this, the European Commission passed a package of roaming regulations in 2007 (Roaming I) that spanned the entire European Economic Area (Spruytte et al., 2017).

Roaming I created price caps at two points in the roaming market, on both the retail and wholesale prices that MNOs charged. The price caps on the wholesale market limited the prices that MNOs could charge other MNOs for forwarding calls or messages to roaming customers. The retail price caps limited the markups that MNOs could charge their customers for roaming services. It also required MNOs to notify customers when they were roaming and of the prices for service to ensure that customers were informed before using the service (Spruytte et al., 2017).

The European Commission passed two more regulatory packages in 2009 and 2012 that continued to lower the price caps in the wholesale and roaming market (Spruytte et al., 2017). The price caps were maintained in both markets as research showed that regulating only the wholesale market was insufficient for the benefits to be passed on to consumers (Infante & Vallejo, 2012). Figure 2 shows the evolution of price caps over the first three regulatory packages passed by the European Commission. The regulatory packages also included other changes to increase the transparency of prices, such as requiring that consumers be notified when their roaming charges exceeded €50 (Spruytte et al., 2017).

Figure 2: Change in Price Caps for Roaming Service



Source: Spruytte et al. (2017).

In 2015 the legislative process was completed for the most recent regulatory package that went into effect in 2017, with the Roam Like At Home provision. Under this package, roaming charges within the EU would be eliminated for all consumers, assuming they comply with the fair use provisions (European Commission, 2018). The wholesale prices were capped to ensure that MNOs could profit while ensuring that retail consumers did not pay more for roaming services than for domestic (Forge & Blackman, 2018). MNOs were still offered the option to work with national regulatory agencies in the case where roaming costs would result in a price increase for domestic consumers. This option has been rarely used demonstrating the success of the regulatory procedure (European Commission, 2018).

The Roam Like at Home provision has been a success for consumers and businesses in the EU, as well as for MNOs. In the first quarter after implementation roaming, SMS messaging grew by 92.2% compared to 32.7% growth in the quarter before. As well there was an increase of 6% of consumers who used SMS messaging as often while roaming as when they were at home. The new regulations gave consumers the confidence to use SMS messaging while travelling without fear of a large phone bill (Forge & Blackman, 2018). For businesses in the EU, surveys found that the regulation brought significant productivity gains. Employees were more likely to use their phones for work while abroad without the fear of large bills later. The fixed package prices without roaming markups have also simplified budgeting for smaller firms (European Commission, 2018; Forge & Blackman, 2018). For MNOs, only a few smaller providers in the EU have had to request exemptions from national regulatory authorities due to the new regulations on prices. This indicates that MNOs are not being negatively impacted by the regulations, and since users are using their phones more some have increased their sales (Forge & Blackman, 2018).

The SMS roaming market in the EU shows two important points for the OTT messaging market. First, it is important to regulate a product or service that spans multiple countries at an international level. The first regulation on roaming costs failed as national regulatory agencies were unable to effectively regulate firms that operated outside their borders. Secondly, it shows that effective regulation of digital communication products is possible using existing regulatory models. Regulation of roaming SMS prices effectively lowered the prices for consumers while still ensuring a competitive and profitable market for MNOs. This demonstrates that similar, effective, regulation in the OTT messaging market is possible.

3.1.3 Liberalization of Electricity Market in the EU

The regulation of the electricity transmission and distribution network in the EU provides an important area of comparison for potential regulations on the OTT messaging market. The entire liberalization process is too broad to consider here so this thesis will focus only on the separation of generation from transmission. The electricity transmission and generation market and the OTT messaging market both contain submarkets where there is

a natural monopoly and other submarkets where there is a potential for competition. In the case of the electricity generation and transmission markets, transmission was found to have a natural monopoly and was unbundled from the generation market where firms can compete effectively (Rotaru, 2013). As the OTT messaging market is currently made up of vertically integrated firms which handle all parts of the messaging process including the client app and the messaging network, it is helpful to understand how regulators can enforce unbundling successfully. This section will briefly outline a few key features of the liberalization process in the EU, moving from vertically integrated monopoly providers to the current market structure with competition where it is economically justified. Understanding how the split was made and enforced will clarify the proposals for how to ensure competitive behaviour in the OTT messaging market going forward.

Before the first European regulatory package on electricity market liberalization in 1996 the market for electricity in the EU primarily consisted of vertically integrated national monopolies. These monopolies were responsible for all parts of the electricity market including generation, transmission, and distribution, and were not operated as competitive businesses. Instead, they operated like branches of the civil service (Léautier & Crampes, 2016). Generation is the process of creating electricity for sale to consumers, and the market does not have a natural monopoly. Assuming sufficient technical infrastructure many different generation firms can compete to provide electricity for a consumer (Hrovatin, 2020; Pepermans, 2019). Transmission is the process of transporting electricity in bulk long distances between locations where it is generated and areas with many consumers. This typically requires high-voltage equipment that can span across an entire country (Pepermans, 2019). There is a natural monopoly in the transmission and distribution of electricity as it requires only a single path to connect a point to an electricity network, and there are significant fixed costs involved in the creation of a new electricity transmission line (Rotaru, 2013; Trevino, 2008).

Throughout 3 major regulatory packages, passed in 1996, 2003, and 2009, the European Commission identified parts of the electricity market that could be liberalized and began enforcing the process (Pepermans, 2019). In the case of transmission and distribution, this started first by separating the services from generation into separate accounting and then management entities (Hrovatin, 2020). During the partial unbundling, the transmission and distribution networks were obligated by the national regulatory agency to allow new generation firms to connect with the electricity network. Finally, the 2009 regulatory package set out strict conditions for the unbundling of transmission firms from producers, as far as enforcing divestment by integrated firms (Hrovatin, 2020).

One of the major benefits of the liberalization process is that despite there being a natural monopoly in creating a network for transmission of electricity, there is still competition in the market to supply electricity. A consumer has the option to choose their supplier of electricity, and suppliers can compete on price or other dimensions such as environmental impact (Léautier & Crampes, 2016). In the case of OTT messaging, there is clear evidence

from Metcalfe's Law that larger networks are more valuable to users. It is not clear however that the endpoint which a consumer uses to connect with an OTT network must be included in this natural monopoly. It may be possible to use the logic from the regulation of electricity networks in the regulation of OTT messaging services, enforcing the separation of the areas of business with a natural monopoly from those where competition is possible

3.1.4 Software Platform Competitive Remedies in the US and EU

The final example of a competitive action that this thesis will consider is the actions of the EU and US competition agencies against Microsoft due to its SMP in the personal computing market. Competition authorities on both sides of the Atlantic observed that Microsoft held a dominant position in the market for operating systems for personal computers and was using its market power to restrain competition. The case provides an example of how competitive actions can be used to encourage competition in a software market. This section will first provide a brief technical background on operating systems before briefly outlining the outcomes of the EU and US cases against Microsoft. Finally, it will discuss the important lessons for competition authorities to consider when investigating the OTT messaging market.

A computer operating system provides the basic platform for a user to interact with their computer by interpreting inputs, such as from a keyboard, and providing outputs back to the user, through options such as a display or speakers. It also provides a controlled environment for the user to run applications in, and to give those applications access to the inputs and outputs as needed (Arpaci-Dusseau & Arpaci-Dusseau, 2018). Common examples of operating systems include Microsoft Windows, Apple's iOS, and Google's Android. When a developer wishes to create a new application that will run on a particular operating system, they must use the application programming interface (hereafter API). The API is created by the operating system developer and defines how an application can interact with the operating system. For example, there is a set of APIs on Windows that allow an application to track when the user has taken a picture with their camera (Wilson, 2016). In the case when a user would like to access an application running on another computer, their operating system will communicate with the other computer's operating system using a network protocol. A protocol is functionally very similar to an API, only it is focused on cross-machine communication (Arpaci-Dusseau & Arpaci-Dusseau, 2018). One of the most well-known examples of a protocol is the HTTP protocol which is used to connect to websites running on another computer, such as Facebook (Blumenthal & Wu, 2018). One of the key points of issue in the Microsoft cases was how much information Microsoft was required to disclose about the APIs and protocols available in the Windows operating system. The full case against Microsoft also included allegations of predatory conduct and bundling, but for this section only the rulings surrounding APIs and protocols will be discussed.

The competition case against Microsoft in the EU was initiated by a complaint from a rival firm. They complained that Microsoft was illegally withholding protocol information to block competition. During their investigation into the complaint, the European Commission uncovered other troubling conduct and expanded their investigation to include other parts of Microsoft's business such as their internet browser and media streaming products (Ahlborn & Evans, 2009). The Commission and The Court of First Instance found that Microsoft held a 90% market share in the market for client operating systems and was the *de-facto* standard. Due to their SMP Microsoft was obligated to provide protocol details so other firm's products could communicate with computers using the Windows operating system (Vesterdorf et al., 2007). This move by the Commission enabled other firms to build products that would work alongside Microsoft's products. Currently, there is a thriving market for products that use the protocols included the Commission's decisions, giving potential customers many options when sourcing software (EM360 Tech, 2020).

As the market for client operating systems is global, the findings in the US antitrust case against Microsoft were similar to the findings in the EU. The primary difference was that the US case focused on the treatment of app developers who wanted to use the Windows APIs, instead of the focus on protocols in the EU case. It was found that Microsoft was deliberately withholding API details from developers who built competing products. Microsoft was also retaliating against firms that purchased products or services from these targeted developers (Kollar-Kotelly, 2002). While the ruling initially called for Microsoft to be broken into two separate companies it was modified on appeal to only require Microsoft to provide API documentation fairly to all developers and to not retaliate against firms who purchase a competitive product (Blumenthal & Wu, 2018; Kollar-Kotelly, 2002).

The combination of the two competitive actions against Microsoft opened the door for a thriving market of apps that use the information they disclosed. Firms including Google used the information to build competing products, such as Google Chrome, which have now surpassed Microsoft's products in the same space (Blumenthal & Wu, 2018). In the OTT market, there is the potential for a similar competitive action as in the Microsoft case. OTT messaging apps communicate with a protocol back to a service hosted by the controlling firm. As in the Microsoft case, requiring open protocols would allow for other firms to offer their client apps to communicate back to the OTT messaging network. For example, there was a firm that offered a different client app that used WhatsApp protocol to offer a different messaging experience on the same network. However, it was quickly shut down after Facebook took legal action against the firm (Perez, 2019). The next sections will discuss proposed competitive actions that can apply the learning from the Microsoft case to the OTT messaging market.

3.2 Actions and Remedies Proposed by Contemporary Authorities in the OTT Messaging Market

As discussed in section 2.4 there have been investigations into the market for OTT messaging by authorities in the EU and the US. Throughout their investigations, they have proposed a variety of remedies and regulations to ensure fair competition in the market. This section will outline the proposals made by the authorities before critically reviewing them in section 3.3. The proposals that will be reviewed come from EU and US legislators, and US, German, and UK competition authorities. These proposals will provide the basis for the set of actions that will be proposed by this thesis in section 4

3.2.1 U.S. House Judiciary Committee

In its report, *Competition in Digital Markets*, the US House Judiciary Committee included recommendations for actions the chamber could take to restore competition in various digital markets (Nadler et al., 2020). It is important to note that as a legislative body, the committee cannot initiate antitrust proceedings. They can recommend that the appropriate executive agencies begin investigations. The recommendations of the committee about the OTT messaging market are to (Nadler et al., 2020):

1. increase forceful antitrust enforcement in affected markets;
2. introduce structural separations blocking dominant firms from operating in adjacent lines of business;
3. Introduce non-discrimination requirements requiring dominant firms to offer equal terms for equal products and services;
4. require dominant firms to make their services compatible with other networks;
5. modify section 2 of the Sherman Antitrust Act to clarify the prohibition on denial of essential facilities.

The first point acknowledges that the committee felt that antitrust laws had not been enforced correctly in the US for the past few decades. Members of the investigation Khan, Wu, and Teachout wrote separately noting that the Bork standard used in the US for evaluating antitrust cases made it impossible for plaintiffs to win antitrust cases against a product that was being offered for free to consumers (Khan, 2017; Teachout, 2020; Wu, 2018, 2020). Since the committee did not have the authority to act upon their belief that antitrust action was warranted, they instead called for an increase in funding for competition authorities and new legislation to aid the authorities and private parties in antitrust lawsuits (Nadler et al., 2020).

The committee proposed both structural and functional separations for dominant firms depending on the market structure found by competition authorities. Firms operating in two adjacent markets would either be split into two legal entities or have a prescribed organizational structure. If a dominant firm wanted to enter an adjacent market it would be

obligated to follow a prescribed structure. The committee found that dominant firms had used their market power in one market to fund unprofitable entries into other markets. This prevented competition on the merits of the products involved in these adjacent markets (Nadler et al., 2020).

The non-discrimination proposal is intended to prevent a dominant firm in one line of business from picking the winners in other lines of business. The example used by the committee was the case of Google prioritizing their products in search results even when other firm's products might be a better match. By promoting their products Google reduced revenue for competitors and provided consumers with a worse service compared to a fair search engine (Nadler et al., 2020). The committee aims to prevent this sort of self-dealing in all digital markets covered by the report.

The proposal for interoperability was put forth by the committee in response to the behaviour of Facebook in the OTT messaging market. They note that Facebook has blocked interoperability as Facebook recognized that competition in the market for OTT messaging would be *for* the market rather than *in* the market. They note that while interoperability will not immediately revert the market to a competitive one, without it any future antitrust action will fail due to competition reverting to competition *for* the market (Nadler et al., 2020). They also cite recent scholarship from Kades & Morton (2020) demonstrating how interoperability could be implemented as a part of a larger antitrust action against Facebook.

The committee made a series of suggestions about how to improve the Sherman Antitrust Act, but there was one suggestion relevant to the market for OTT messaging. The committee proposed an addition to the act to make it illegal to block a competitor from entering an adjacent market using your power in another market. The proposed law would recognize a refusal to deal by a firm with a dominant position as equivalent to denying an essential input for a market participant (Nadler et al., 2020). The change would empower regulators and private firms to initial effective antitrust actions against dominant firms who misused their market power to eliminate competition.

3.2.2 US Federal Trade Commission

In December 2020 the FTC, the US federal competition authority, sued Facebook for anticompetitive conduct and unfair methods of competition. The FTC citing both Facebook's social networking and OTT messaging monopolies as justification for taking competitive action against them. As the competition authority, it can request the court take competitive actions against Facebook, including the divestiture of assets and financial penalties. The relevant sections of the FTC's requested the actions are (*Federal Trade Commission v. Facebook*, 2020):

1. divestment or reconstruction of Facebook's businesses, including Instagram and WhatsApp;

2. a new requirement that all Facebook’s mergers receive prior approvals from the FTC;
3. new controls to prevent Facebook from imposing anticompetitive conditions on access to APIs or data, including compliance reports and monitoring.

It is important to note that these requests are subject to an ongoing court case. There is the potential for a settlement by the FTC and Facebook that does not include all the penalties listed above. The final competitive actions will not be known until the court case is resolved, which is likely to take years.

The first requested action was made in acknowledgement of Facebook’s use of acquisitions to maintain and increase its market power. The FTC noted that the acquisition of WhatsApp and Instagram both built a ‘moat’ around Facebook’s core business of social networking. It prevented two potential competitors from ever threatening its core business (*Federal Trade Commission v. Facebook*, 2020). This is combined with the second proposed competitive action, which aims to prevent Facebook from continuing this pattern of behaviour in the future (*Federal Trade Commission v. Facebook*, 2020).

The third proposal from the FTC echoes the fourth proposal from the US House Judicial Committee. In the filing, the FTC notes that

“Facebook has made key APIs available to third-party apps only on the condition that they refrain from providing the same core functions [as]... Facebook Messenger” (*Federal Trade Commission v. Facebook*, 2020, para. 23).

The final proposal would require Facebook to have consistent conditions of access, not based on the line of business that the accessing firm is in (*Federal Trade Commission v. Facebook*, 2020). The FTC also alleged that Facebook has only recently opened API access as an attempt to evade the further scrutiny of competition authorities. The FTC states that they believe Facebook will revert to more blatant anticompetitive behaviour again once the investigations into its actions have finished.

3.2.3 German Federal Cartel Office

The investigation by the German FCO was focused on Facebook’s use of the Like button to gather data from users on third-party websites without the users having an option to opt-out of the data collection. They found that since Facebook has a dominant market position, they cannot offer terms of use that mandate collection of data from 3rd party websites as a condition for using any of their products (Bundekartellamt, 2019a). The tracking happens automatically when the webpage is visited by the user, so they are unable to opt-out of the tracking by not using the Like button. As well, users do not know if a webpage has a Like button before opening the webpage, thus they are unable to make an informed choice to opt-out of the tracking by not visiting the page at all (Bundekartellamt, 2019a, 2019b).

The final ruling was that Facebook needed to offer German users the choice if their browsing data from third-party sites would be combined with data collected from Facebook products. Facebook was still allowed to combine data from its products together on a single user without a change to the privacy policy (Bundekartellamt, 2019a, 2019b). This case was unique as it focused on the combination of privacy and competition law, using provisions from both in their findings (Rancati, 2019). They had previously found that firms conduct in how they handle data can give rise to the need for enforcement actions (Bundekartellamt & Autorite de la Concurrence, 2016). They also mandated changes to WhatsApp and Facebook Blue's privacy policy to better represent how data was being handled by the firm (Bundekartellamt, 2019a, 2019b).

3.2.4 UK Competition and Markets Authority

The investigation by the Competition and Markets Authority in the UK found that Facebook and Google have SMP in their primary markets. They found there were barriers to entry, including network effects, unequal access to data, and vertical integration that prevents the entry of rivals into the impacted markets (Competition & Markets Authority, 2020). They proposed a series of actions to restore competition, including the following which is relevant to the OTT messaging market are to (Competition & Markets Authority, 2020):

1. create a pro-competition regulatory regime to encourage competition;
2. create an enforceable code of conduct for platforms with market power;
3. implement a range of pro-competitive interventions to tackle the current sources of market power.

The first proposal is the creation of a new unit to better manage competition in digital markets. They found that the current tools available to the CMA are not sufficient to restore competition to digital markets. The dominant firms were found to have created self-reinforcing entry barriers that would not be stopped by a one-time action. Instead, a new unit would be in a better position to monitor the ongoing behaviour of market participants (Competition & Markets Authority, 2020).

The code of conduct would apply to firms who are designated with Strategic Market Status, a new term for digital firms with a dominant position in a market. The code of conduct will address the harmful effects of the application of market power. It would not have specific rules for the firms to follow, as the market moves too quickly for a regulatory body to manage prescriptive rules, but instead would lay out a set of high-level principles for firms. The code would follow the three high-level principles of fair trading, open choices, and trust and transparency, and would be tailored to each firm identified to have Strategic Market Status (Competition & Markets Authority, 2020). Following the lead of the German FCO, the code would include elements from both competition and privacy law

to cover the full range of concerns that the Competition and Markets Authority identified (Competition & Markets Authority, 2020).

The new unit was also advised to take several pro-competitive actions immediately to restore competition to markets where it is currently lacking. In the OTT messaging market, they recommended that the new unit mandate interoperability to reduce the barriers to entry due to network effects. The first step in this process would be to mandate that Facebook restore the ability for other firms to access a user's contact list, with other actions following at the discretion of the new unit (Competition & Markets Authority, 2020). Should these actions fail they also recommended the new unit be given the authority to implement ownership and operations separation in firms with Strategic Market Status. However, they recognize that the UK would not be in a position to act unilaterally to enforce the separations and sets forth a proposal for how to coordinate with other competition authorities around the world (Competition & Markets Authority, 2020).

3.2.5 European Commission and the Digital Services Act Package

In December 2020 the European Commission introduced a two-part legislative package that would include new provisions for firms in the OTT messaging market. The first act in the package, the Digital Services Act, is focused on the hosting of illegal content, abuse prevention, and data collection transparency. While this will impact firms operating OTT messaging services, it is not targeted at addressing the current market structure (European Commission, 2020b). The second act, the Digital Markets Act, is focused on ensuring a level playing field for online services and lowering the barriers to entry for new firms in digital markets. The provisions are scaled to the size of the firms, with firms reaching more than 10% of the EU population being considered gatekeepers and thus subject to additional regulations (European Commission, 2020a). While there is a wide range of regulations proposed by the act, covering most major digital markets, there are a few provisions that will have a significant impact on the market for OTT messaging. These provisions are (European Commission, 2020a):

1. restrictions on sharing data across services within the same firm;
2. require gatekeepers to put in place targeted measures for 3rd parties to properly function and interoperate with their services;
3. sanctions for non-compliance ranging from financial penalties to structural measures in the case of repeated non-compliance.

The first condition will impact firms that own multiple OTT messaging apps, such as Facebook or Tencent. The firms must not combine data from unrelated services that they own. The data collected must be siloed to the service that the user was interacting with while the data was being collected (European Commission, 2020a; Penfrat, 2020). The second provision will require firms to allow competitors in other fields to interoperate with

their products. The provision follows directly from the recommendations of the UK Competition and Markets Authority (European Commission, 2020a).

The provisions for sanctions are the strictest of all the proposals discussed in this section. In the case of a first violation, the firm would be fined 10% of its annual worldwide turnover along with ongoing fines until the illegal behaviour is resolved. If the firm does not make the required changes or repeatedly violates the regulations in different ways the law includes provisions for the EU to enforce structural measures against the firm, including divestment and legal separation (European Commission, 2020a).

4 PROPOSED REGULATORY FRAMEWORK FOR THE OTT MESSAGING MARKET

Section 4 will critically examine the proposals of competition authorities through the lens of the market evidence and facts presented above. The analysis will also bring in my personal experience working for Microsoft on the Windows engineering team and complying with EU and US requirements. After reviewing the proposals this thesis will propose a set of competitive actions along with a new regulatory environment to ensure effective competition in the OTT messaging market. These will include a combination of existing proposals along with improvements and novel proposals based on my own experience in the software industry. This package would reintroduce sustained competition in the OTT messaging market and reduce the risk of the market once again consolidating around a single firm.

4.1 Critical Analysis of Existing Proposals

This section will compare the proposals across all five different authorities and discuss various strengths and weaknesses of their proposals. It will compare the proposals considering the market structure of OTT messaging outlined in section 1.4 and section 2.1.3. While the recommendations outlined in section 3.2 were all released separately, there was some coordination between the various authorities and thus similarities in their proposals. Table 4 compares the proposals and actions of the authorities across various dimensions. The similarities in the proposals are important as international cooperation will be critical to enforcing the proposals.

Most of the proposals also address the need for increased scrutiny into the competitive structure of digital markets, including the OTT messaging market. The introduction of the Digital Markets Act in Europe would add new tools for European competition authorities. The FTC's request for merger reviews on all Facebook's acquisitions would help prevent market consolidation through mergers. However, new powers to review mergers and the actions of market participants will be ineffective unless the underlying standards are changed as well. Both EU and US competition authorities allowed the 2014 merger of

WhatsApp and Facebook. Their merger is now seen as having contributed directly to the level of market concentration that currently exists in the OTT messaging market. The DMA in the EU, along with the success of roaming SMS regulations give hope that new standards will be applied to increase competition. The US Judicial committee noted that the FTC needs to update their standards for reviewing mergers. This process would include a change to the Bork standard which allowed the merger of Facebook and WhatsApp to pass uncontested. Without this change, further merger reviews by the FTC are unlikely to prevent market consolidation, as their past reviews under this standard did not prevent consolidation.

All the proposals discussed call for some form of separation for dominant firms to decrease their market power. However, the nature of the separation requested varies depending on where the authorities saw the major problem. In the case of the German FCO, they focused on ensuring that data was siloed between lines of business, and this is echoed in the Digital Markets Act. The European Commission also included structural separation and divestment as a last resort in the case of repeat offenders, echoing the views of the other authorities. Structural separation is an important tool for competition authorities to have, as demonstrated in the liberalization of electricity transmission. Splitting former monopolies into separate firms introduced competition in markets that had previously lacked it. However, simply the threat of structural separation cannot be used on its own to force a market to become competitive. There must be actions taken by authorities such as requiring separation or other remedies, as demonstrated in the case of the transatlantic telegraph market. In that market lawmakers granted themselves the power to separate or even nationalize firms if they engaged in anti-competitive behaviour, but the power was never used. This led to almost a century of domination by a cartel of cable owners who forced out any potential threat to their power. The threat of structural separation must be enforced should the firms in the OTT messaging market fail to comply with the requests, otherwise the market may remain uncompetitive for the foreseeable future.

In the case that structure separation or divestment is enforced, this cannot be seen as the final action that authorities need to take in the market. As noted in section 2.1.2 separating Messenger and WhatsApp into different firms would not reduce the HHI below the FTC standard for a highly concentrated market as outlined in section 2.1.2. Competition authorities would still need to take further actions to encourage new firms to enter the market. Authorities would also need to engage in ongoing monitoring of the market since the market can tip in favour of one firm, as demonstrated in section 1.4.3.

Along with structural changes most of the competition authorities called for some form of interoperability and non-discrimination requirements for dominant firms in the market. They agree that some combination of interoperability and non-discrimination can be used to break the lock-in effects discussed in section 1.4.3. The cases against Microsoft offer a clear example of how effective interoperability and non-discrimination requirements can be used to introduce competition into a market. In the case of OTT messaging, the

requirements must be introduced in a way to leverage Metcalfe's law to increase consumer welfare. Any requirements that reduce the number of users in the network that consumers can contact will reduce consumer welfare. Instead, competition authorities should use interoperability requirements to maximize consumer welfare while reintroducing competition.

Finally, only the FCO and UK CMA directly addressed the privacy policies that these firms present to their users. Privacy policies are a critical part of restoring competition to the market and they must be addressed by competition authorities. One of the barriers to entry for new firms, as discussed in section 1.4.2, is that consumers are often unaware of the price of their current service. Currently the details of what data is being collected and how it is used hidden behind a complex privacy policy making it almost impossible for firms to compete on price. Consumers cannot make an informed choice that allows them to balance privacy and cost based on their personal preferences without easy-to-understand information about data usage. Requirements on how privacy policies are presented, along with the other changes mentioned above, would make it possible for new firms to compete with incumbents on price.

While the proposals are very thorough, I believe they are still missing some critical components to maintaining fair competition. The first concern is that there is no mention of how interoperability will be required. The Microsoft cases in the EU and US showed that requesting open APIs versus open protocols results in a different outcome for competing firms. Other services could integrate with an API provided on a user's device by the messaging service or using their app and a public protocol. Both of these are possible ways to integrate with WhatsApp, however Facebook has litigated to shut down firms that have tried to interoperate (Ruddock, 2015; Schenck, 2018). From a careful reading of the reports, it seems likely that protocol interoperability is what the competition authorities are intending to enforce, however this must be specified. Software systems must be meticulously specified to work properly together and this is true for regulations concerning them. Authorities must carefully account for exactly what parts of a system they would like to be interoperable and how they should be documented for use by other firms.

Along with the interoperability requirements, there should be price and privacy controls in place for messages that would be sent using interoperable protocols. With interoperability between services, content could move between services and there needs to be a baseline privacy requirement on how data is treated. Much like how there is an expectation that foreign MNOs do not store the contents of a roaming customer's message, there should be similar expectations of privacy in the OTT messaging market. This should be matched with price controls on how much firms can charge for access to their OTT messaging network. This way operators would not be forced to pass messages for free without the option to gather data for later resale. If network owners were assured of revenue for routing messages, they would not be dependent on data collection for revenue. These concerns will be addressed in the proposed competitive actions and regulations in section 4.4.

Table 4: Proposals of various authorities for the OTT messaging market

Area	US House Judicial Committee	US FTC	German FCO	UK Competition and Markets Authority	Digital Markets Act proposed by the European Commission
Investigative investment and enforcement by competition authorities	Increase antitrust enforcements and actions. Encourage private parties to file antitrust lawsuits	Future mergers by Facebook require FTC approval		Create a new regulatory body to exclusively monitor digital markets	Assuming the legislation is passed and enforced, this would be a significant increase in competitive scrutiny in the EU
Structural and functional separation for dominant firms	Structural separation for dominant firms operating in adjacent lines of business	Divestment of WhatsApp by Facebook	Separation of data between distinct businesses unless there is explicit user consent	Structural separation and divestment should other measures fail to generate fair competition	Immediate restrictions on data sharing within a firm, structural separations in the case of repeat violations of other requirements
Interoperability	Interoperability requirements for dominant firms			Interoperability requirements for firms with strategic market status	Targeted measures requiring dominant firms to interoperate with their services
Non-discrimination requirements for dominant firms	Non-discrimination requirements for dominant firms	Fair access to APIs and protocols for 3rd parties		Code of conduct for firms requiring fair trading behaviour	Fair access to interoperable APIs for competitors
Privacy and terms of service requirements			Clear privacy policy laying out exactly what data is collected by the firm	Code of conduct for how firms should disclose their data gathering practices	

Source: Bundeskartellamt (2019a, 2019b), Competition & Markets Authority (2020), European Commission (2020a, 2020b), Federal Trade Commission v. Facebook (2020), Nadler et al. (2020).

4.2 Framework for Competitive Actions and New Regulations

The remainder of this thesis will propose a package of competitive actions and regulations to reintroduce competition in the OTT messaging market. There are important details of how the package would be enforced and monitored to address before addressing the details of the proposal. These include the scope of the package and the authorities that would be responsible for it.

As demonstrated by the initial attempts to regulate the price of SMS roaming in the EU, it is important to pick the correct level of government for competitive actions and regulation. As OTT messaging and the firms that offer it are transnational then the regulation must also come from a transnational body. The best possible situation would be to coordinate the responses from the EU, US, and UK authorities as well as others who have shown interest in regulating OTT messaging such as Australia. By implementing similar rules around the world, it would make it simpler for firms who must comply with the new restrictions while also limiting their ability to shift operations to avoid unfavourable regulations. Unfortunately, this level of coordination is unlikely to occur and may not even be possible given the differences in competition law.

In the EU, the package of regulations should be monitored by a transnational regulatory organization, such as the Body of European Regulators for Electronic Communication (BEREC) board which is made up of various national regulators. The board consists of the national regulators from each member country along with an appointed supervisor. This way national regulators can be heard while the EU would present a unified front to the dominant firms. The body would be responsible for monitoring the OTT messaging market and would hear concerns raised by the national regulatory authorities. The body must be empowered with the authority to enforce penalties against firms for non-compliance without legislative oversight. Finally, the body does not need to be exclusively focused on the OTT messaging market. In the interest of efficiency, the body should also be responsible for competition in other, similar, digital markets. These markets are beyond the scope of this thesis so they will not be further considered.

In the United States, a similar body should be created to monitor the market, but the exact structure of the body will depend on the particulars of how it is created. If it is created through the FTC's current lawsuit against Facebook, then most likely the body will fall under the purview of the Federal Communications Commission (FCC) which currently regulates telecommunication products. This would be my preferred option as the FCC has expertise in working with digital markets as a regulator. However, in the case that the body is created through the legislative process then congress may create a new regulatory or competition agency focused exclusively on digital products given congress's typically broader focus.

Having a body that is focused and specialized on digital markets, empowered with the authority to enforce competition in the market, would put both the EU and US on the right track to having a competitive market for OTT messaging.

4.3 Proposed Remedies to Reintroduce Competition Between Existing Firms

The first part of the proposed package to restore competition is targeted at firms already in the OTT messaging market. The goal is to ensure that firms currently in the market can compete effectively with each other. Introducing new competitors is important but it can take years for a new firm to enter the market. Increasing competition between existing firms can have benefits far sooner as these firms are in the best position to take advantage of any changes introduced. Action should be taken immediately by the new bodies to:

1. enforce standardized disclosures for privacy and data collection policies so users can compare data collection practices across competing services
2. require functionality for data import and export from all major OTT messaging services so consumers can move between services seamlessly
3. consider any software bugs in the implementation of the above requirements by OTT messaging apps to be anti-competitive actions.

Currently, consumers are often unable to understand how their data is being used and thus the price of the OTT messaging service that they have chosen. Without this information, they cannot make an informed choice when comparing two alternative services. GDPR already requires that privacy policies be clear to read, however the focus is on protecting user privacy not enabling price comparisons between services (Wolford, 2018). A price-focused privacy policy, as shown in Figure 3, would give users a way to quickly compare the different data collection practices of various services and choose the one with the right mix of features and price for their needs. Figure 3 shows a proposed price-focused privacy policy from two firms that offer OTT messaging services. The Blue firm's product collects more data, but it could use that information to provide a better product by prompting customers when one of their friends is celebrating a birthday. The Orange firm could not provide this service as they do not collect users' birthday information, but a customer may choose Orange as they collect less information about messages being sent.

Initially, only gatekeeper firms as identified in the Digital Markets Act would be required to have the new privacy policy in place, to reduce the burden on new competitors. Gatekeeper firms are defined as firms with a market capitalization above €65 billion or revenue above €6.5 billion and more than 45 million users in the EU for 2 of the last 3 years (European Commission, 2020a). The US should adopt a similar standard with revenue and user numbers scaled to its market size. The requirement for price-focused privacy policies should be reviewed as the market develops and the requirements expanded as needed.

Figure 3: Proposed Price Focused Privacy Policy Comparing Two Firms' Products

Blue OTT Messaging Firm		Orange OTT Messaging Firm	
Contact Information	Name, Address, Email, Date of Birth	Contact Information	Name, Address, Email
Friend Data	Phone numbers, common contacts	Friend Data	Phone numbers, common contacts
Interaction Data	Message contents, URLs sent	Interaction Data	None
Interaction Metadata	Dates and times of messages, messaging patterns, frequently messaged	Interaction Metadata	None
Location Data	GPS location when messaging	Location Data	GPS location when messaging
Diagnostic Data	Crash logs, device identifier	Diagnostic Data	Crash logs, device identifier
Search Data	Message search history	Search Data	Message search history

Adapted from WhatsApp (2018).

Once users can compare the prices of various services, there must be a way for them to move between OTT messaging services should they choose to switch. Without the option to switch between services easily, firms could increase the price while relying on the high cost of switching to prevent users from switching. The new regulations should require that gatekeeper firms provide a method to import and export all the data from their service that users may have generated. This includes the contact list, active conversations, and conversation histories. This will allow consumers to move their data from one service to another service more easily without losing their past messages. However, for privacy reasons, there may be restrictions placed on how much information consumers can export about their contacts from the service without the consent of those contacts. Basic identifiers to match with the same user on the new service, such as name and telephone number are acceptable, but more detailed information such as location should not be exportable. Should a user wish to export more data from an OTT messaging app, all conversation participants must give consent via an in-app prompt. There will still be some friction in moving services, as users may have to confirm their contacts are on the new service, but it should lower the barriers enough to encourage some switching between services.

Finally, failures by the firms to implement the above requirements in software due to minor software issues, commonly called bugs, should be considered anti-competitive actions by the firms. This issue has not been raised by any of the regulatory bodies and comes instead from my own experience in complying with EU protocol disclosure requirements while working at Microsoft. The range of functionality that would be impacted by the above two requirements would span across the entire organization working on the service. It is almost impossible for a regulatory agency to identify all, even

unintentional, anticompetitive behaviour. For example, the functionality for exporting messages from WhatsApp might replace đ with d in exported messages. It would be an entirely unsurprising mistake for a product mostly used in languages without both those symbols. However, such an issue would degrade the experience of a Croatian consumer using the exported data in a new messaging service. The consumer may believe that the new service is of lower quality through no fault of the new service. This transposition would also be almost impossible for a regulator to catch before consumers had found it and avoided changing to the new service. Thus, such failures must be treated as important anti-competitive actions, as they block consumers from using a competing product, and must be punished accordingly. This will incentivize firms to fix such issues in their testing before they seriously impact the market.

These proposed measures would allow for the firms currently in the market to compete more effectively. It would put them on even footing when competing on price, neutralizing the current market failures due to opaque prices as discussed in section 1.4.1. The introduction of data export options would be a first step in reducing the consumer network lock-in, discussed in section 1.4.3. Finally, training would help to ensure that the engineers responsible for implementing these requirements would understand the logic of the requirements to maximize compliance. However, these measures will do little for firms who are looking to enter the market and overcome the barriers to entry. Section 4.4 will cover measures to reduce the barriers to entry for new firms into the market.

4.4 Proposed Remedies for Lowering Barriers to Entry for New Firms

To ensure that the market for OTT messaging will remain competitive in the long term, the barriers to entry for new firms into the market must be lowered. The pressure of new firms entering the market, or even threatening to enter the market, can push incumbent firms to become more competitive. I propose lowering the most significant barrier to entry, the challenges in building a network, through a package of two new regulations for gatekeeper firms. These two regulations would lower the barrier to entry for new firms while still ensuring that incumbents can compete and generate a profit. The two proposed regulations are to:

1. require gatekeeper firms to allow open access to their messaging protocols for 3rd party apps without discrimination
2. allow gatekeeper firms to charge a fair price for access to their protocols based on price controls set by the regulatory body.

The primary source of value that customers receive from an OTT messaging service is the ability to message their contacts. The network effect outlined in Metcalf's Law shows how a larger network is significantly more valuable to its users. Thus, by mandating open access to the networks of gatekeeper firms, new entrants can start competing by leveraging the existing networks of gatekeeper firms. Over time, as these new products grow, they

could start their open network to compete with the incumbents or simply to continue offering a unique messaging experience to consumers on an existing network. By allowing more client apps, with different features, to connect to the same network the value of the network will increase for all consumers as there will be more connections created. This should benefit all market participants including incumbents, the new entrants, and consumers.

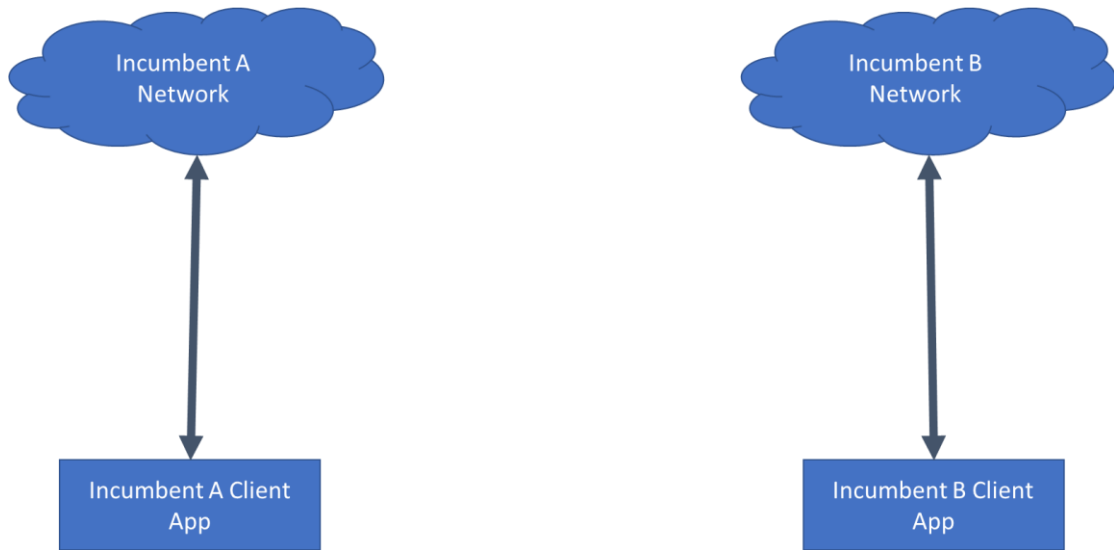
The gatekeeper firms can and should be encouraged to continue to compete in the market with their apps on their network. However, the gatekeeper firm cannot discriminate in favour of their products on the network. Following the model of the Microsoft settlement, any protocol features offered by the gatekeeper firm to their client apps must be made publicly available for all other client apps. Having their product or products competing in the market will encourage the gatekeeper firms to maintain a high-quality network. A low-quality network will immediately disadvantage their client app as well as lose their business in the long term. The regulator should also allow for the gatekeeper firms to be covered under the existing common carrier protections extended to MNO so the firms are not held liable for the messages that users send, but are also not allowed to discriminate against messages.

The current technical market structure is shown in Figure 4. To communicate with a user of Incumbent A's network, a consumer must use the client app offered by that firm. The only other option would be to convince their contact to also switch networks. The proposed market structure is outlined in Figure 5, showing how an entrant could join an existing network, or set of networks, to compete with the incumbent firm. The figure demonstrates a case where a consumer looking to communicate with someone on Incumbent A's network could use either the incumbent A's client app or choose to use Entrant C's client app. This would be independent of the client app choice of the person they wish to message. Consumers might choose client app B as it also offers the option to communicate with users of Incumbent B's network. However, entrant C is likely to be more expensive than the alternatives as it would have to pay both Incumbent A and B for access to their networks. This is like the model that Apple uses for its Messaging application on iOS. The user picks who they want to message from their contacts and the app finds which network the recipient is using, either iMessage or SMS, and then forwards the message through the correct network.

Figure 4 also shows that firms have the freedom to not make connections as they choose. For example, client app D does not allow its users to connect with incumbent A's network even though it would be technically possible to have them connect. The owners of client app D might have decided that they wanted to focus their effort on a high-quality connection with one network rather than spreading out their effort over two networks. As well incumbent A and incumbent B could connect their networks via the open protocols, however in this example, they chose not to make this connection. Some messaging firms view their message traffic as a key indicator of their performance and thus might be

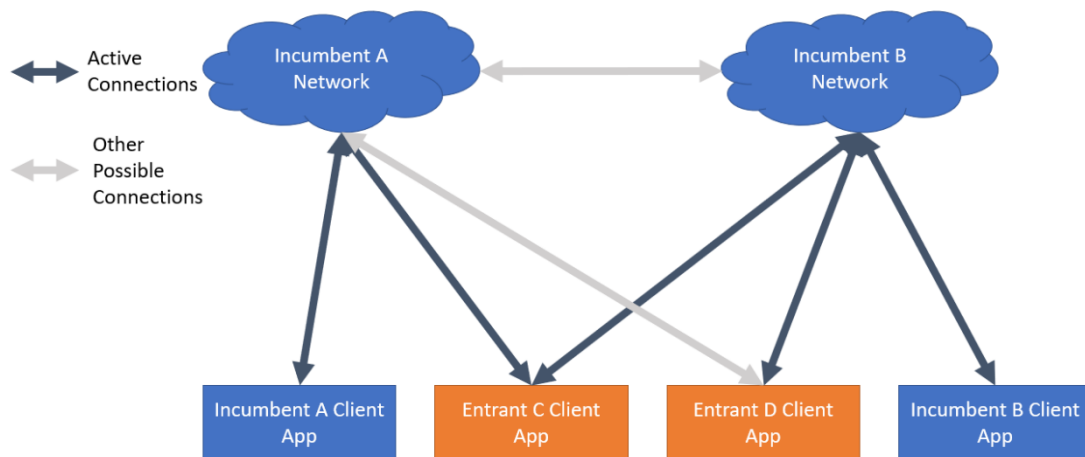
unwilling to share traffic with a competitor. However, with the new regulations, a single firm could unilaterally make the connection between the two networks simply by paying the standard fee per message passed.

Figure 4: Current Market Structure



Source: Own Work.

Figure 5: Proposed market structure



Source: Own Work.

As there are expenses associated with maintaining an OTT messaging network, the gatekeeper firms must be allowed to collect fees from firms that connect to their network. This could be in the form of either per-message fees or per user fees depending on what the gatekeeper firm feels is appropriate and under a price cap set by the bodies outlined in

section 4.2. However, these fees must be consistent for all market participants and cannot be discounted to favour certain firms. The starting price caps can be set at the highest price currently charged by a firm for a single push message delivery, using the price list outlined in section 2.3.1. This price can be adjusted by authorities at a regular schedule set by legislators to reflect changes in the market and technology like what was done in the roaming SMS market.

Much like the liberalization of the electricity market in the EU, this would require splitting the functions of existing firms and allowing interconnection. However, OTT messaging firms already must have some level of separation, like those introduced in Figure 5. They have different client apps for different platforms such as web, iOS, Android, and PC. This means that gatekeeper firms will not have to create a new product to allow for interoperation, they use an existing separation. Allowing 3rd party products to interoperate with the networks will introduce competition at both the network and the client app level. Consumers will have the choice between the app they use to access a network and could choose to use the same app for multiple networks. This will encourage competition between firms in the market, reduce the barriers to entry for new entrants, and benefit consumers.

4.5 Proposed Methods for Monitoring and Enforcing Compliance

As mentioned in section 4.1 a new regulatory body must be formed to enforce compliance with the new regulations, along with updating regulations and ruling on disputes. To monitor the compliance of gatekeeper firms with the regulations, I propose a few methods for the regulators to follow based on the results of the competitive actions against Microsoft. The goal is that the regulator can detect cases where firms are failing in their requirements before they have an impact on the market. These methods are:

1. The new regulatory body will maintain their own OTT messaging client used by the agency and agency members and using the open protocols of gatekeeper firms
2. Gatekeeper firms will be regularly audited for compliance with their published privacy policies and terms of service
3. Onerous financial penalties will be levied by the regulator in the case of a breach by gatekeeper firms.

The first requirement is a novel restriction and comes from personal experience attempting to maintain correct protocol documentation in line with the EU's requirements of Microsoft. Protocols are rules and procedures of communication implemented by complex pieces of software and their specifications can run hundreds of pages of dense technical details. Protocol specifications must describe every possible action that can be taken by a communicating party to minute detail. Even in the case of a group of engineers making a good faith effort to publish a correct protocol specification, there will be errors and omissions that make it impossible for another firm to use that protocol. Requiring the

newly created body to use the documents published by the gatekeeper firms, and for the members of that body to use the resulting client app, it will ensure that other firms looking to create their app are more likely to be successful. While it would be impossible to eliminate all potential for software errors, having the regulators putting close security on the published documents it would help to find errors sooner. In the software industry having the responsible parties use a product is referred to as dogfooding and is standard practice in all major firms.

Section 3.3.3 discusses changes that firms will be required to make to their privacy policies and terms of service so consumers can compare the prices of the products they are purchasing. Since the advertised prices must match the prices that are being paid by consumers, in the form of data collection, gatekeeper firms must be audited regularly for their data usage and collection practices. As demonstrated in the Italian case against WhatsApp, firms can easily change their practices without consumers knowing, thus changing the price they pay for service. Having regulatory oversight on the data policy should ensure that consumers are paying the advertised prices for the OTT messaging services.

Finally, it is important to discuss the penalties for firms that do not comply with the regulations. The proposal made in the Digital Markets act fits well for violations in data handling and major interoperability violations. The fine would be up to 10% of worldwide annual turnover with continuing penalties of 5% of daily turnover for ongoing violations. If the firm does not remedy their behaviour the body would have the ability to institute structural remedies as a last resort. Depending on the findings of the regulator there might need to be smaller, more regular, fines in the case where a firm makes an error or omission in their interoperability requirements that negatively impact a competitor without impacting themselves. Working on the example from section 3.3.4, if Incumbent A has a software failure with their network that impacts Entrant C without impacting their client app, then there should be a smaller fine for that behaviour. Failures that impact all network users equally however should not be punished further, as consumers can choose to use another network instead. This would ensure that network providers do not deprioritize competing firms to push them out of the market. The transatlantic telegraph market demonstrated the importance of having a regulator who is willing to apply penalties and remedies to restore competition in the market and the new body would be well-positioned to do so for the OTT messaging market.

CONCLUSION

This thesis finds that the market for OTT messaging is not competitive, based on the analysis of the market structure and the behaviour of participants. Facebook holds SMP in the OTT messaging market, a position that it has protected through anticompetitive actions such as purchasing competitors and cross-subsidizing their products in the market. It finds

that while purchasing WhatsApp was critical to Facebook gaining this market position, they have since secured it through anticompetitive actions to block competition.

From a broader analysis of the market structure, this thesis finds that the OTT messaging market is unlikely to remain competitive, even after a competitive action by authorities. Network effects, combined with the high level of consumer lock-in, mean that the market means that competition is likely to be for the market, rather than in the market. This mirrors the findings of competition authorities and competition scholars. To promote sustained competition in the OTT messaging markets authorities must institute a regulatory regime that protects competitors and mitigates the barriers to entry caused by the network effects.

A critical analysis of proposals by competition authorities around the world found that they are mostly aligned on their broad goals to restore competition in digital markets. However, the proposals lacked specific actions that would promote long-term competition in the market. Specifically, while many proposed forcing Facebook to divest from WhatsApp and promote general goals of interoperability, that would still not restore the market to a competitive state. This thesis proposed a set of eight actions, that when coupled with a transnational regulatory body, would restore competition to the market. Some of these actions match the existing proposals, such as creating a new regulatory body with expertise in digital markets. However, there are significant differences, as the proposals mentioned in this thesis do not include the forced divestment of WhatsApp by Facebook and instead, this thesis calls for protocol interoperability. The combination of protocol interoperability and monitoring will restore and maintain competition in the market for OTT messaging for years to come.

REFERENCE LIST

3. Acquisti, A., Taylor, C. & Wagman, L. (2016). The Economics of Privacy. *The Journal of Economics Literature*, 52(2). <https://dx.doi.org/10.2139/ssrn.2580411>
4. Ahlborn, C. & Evans, D. S. (2009). The Microsoft Judgement and its Implications for Competition Policy Towards Dominant Firms in Europe. *Antitrust Law Journal*, 75(3), 887–932.
5. Allen, D. (1988). New telecommunications services. *Telecommunications Policy*, 12(3), 257–271. [https://doi.org/10.1016/0308-5961\(88\)90024-9](https://doi.org/10.1016/0308-5961(88)90024-9)
6. Amazon. (2021). *Amazon Simple Notification Service (SNS) Pricing*. Retrieved February 10, 2021, from: <https://aws.amazon.com/sns/pricing/>
7. Anglano, C. (2014). Forensic Analysis of WhatsApp Messenger on Android Smartphones. *Digital Investigation Journal*, 11(3), 201–212. <https://doi.org/10.1016/j.diin.2014.04.003>
8. Arnold, R., Schneider, A. & Hildebrandt, C. (2016). *All Communications Services Are Not Created Equal – Substitution of OTT Communications Services for ECS from a Consumer Perspective* (SSRN Scholarly Paper No. ID 2756395). Rochester, NY: Social Science Research Network. <https://doi.org/10.2139/ssrn.2756395>
9. Arpaci-Dusseau, R. H. & Arpaci-Dusseau, A. C. (2018). *Operating Systems: Three Easy Pieces* (1.00). Arpaci-Dusseau Books. Retrieved from <https://pages.cs.wisc.edu/~remzi/OSTEP/>
10. Arthur, W. B. (1989). Competing Technologies, Increasing Returns, and Lock-In by Historical Events. *The Economic Journal*, 99(394), 116–131. <https://doi.org/10.2307/2234208>
11. Ashwini, A. (2018, March 13). *How do these messaging apps earn money?* Retrieved January 29, 2021, from: <https://amitashwini.medium.com/how-do-these-messaging-apps-earn-money-53e38fbbc418>
12. Blumenthal, R. & Wu, T. (2018, May 18). What the Microsoft Antitrust Case Taught Us. *The New York Times*.
13. Bundeskartellamt. (2019a). *Background information on the Bundeskartellamt's Facebook proceeding* [FAQ]. Retrieved from https://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Pressemitteilungen/2019/07_02_2019_Facebook_FAQs.pdf;jsessionid=61EFACCB961E129B874DEE239DE946B9.1_cid362?__blob=publicationFile&v=6
14. Bundeskartellamt. (2019b). *Facebook, Exploitative business terms pursuant to Section 19(1) GWB for inadequate data processing* (Case Summary No. B6-22/16; p. 12).
15. Bundeskartellamt & Autorite de la Concurrence. (2016). *Competition Law and Data*. Retrieved from https://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Big%20Data%20Papier.pdf;jsessionid=2A65F52E53E4E8D7951CB06AB30BA85D.2_cid381?__blob=publicationFile&v=2

16. Chartier, D. (2008, September 10). *Senator to cellular carriers: UR TXTS R 2 XPENSIV*. Retrieved January 29, 2021, from: <https://arstechnica.com/uncategorized/2008/09/senator-to-cellular-carriers-ur-txts-r-2-xpensiv/>
17. China Internet Watch. (2020, November 13). *Tencent highlights for Q3 2020; WeChat MAU +5.4% over 1.21 billion*. Retrieved January 22, 2021, from: <https://www.chinainternetwatch.com/31054/tencent-quarterly/>
18. Citron, J. (2020, June 30). *Your Place to Talk*. Retrieved January 20, 2021, from: <https://blog.discord.com/your-place-to-talk-a7ffa19b901b>
19. CIW Team. (2019, August 15). *WeChat MAU up 7% to 1.13 billion in Q2 2019; QQ MAU 808 mn*. Retrieved January 22, 2021, from: <https://www.chinainternetwatch.com/29611/tencent-social-apps-q2-2019/>
20. Competition & Markets Authority. (2020). *Online platforms and digital advertising* [Market study final report]. Competition and Markets Authority.
21. Constine, J. (2013, January 18). *Facebook Is Cutting Off Find Friends Data To “Competing” Apps That Don’t Share Much Back, Starting With Voxer*. Retrieved February 16, 2021, from: <https://social.techcrunch.com/2013/01/18/facebook-data-voxer/>
22. Constine, J. (2018, April 13). *Facebook shouldn’t block you from finding friends on competitors*. Retrieved February 16, 2021, from: <https://social.techcrunch.com/2018/04/13/free-the-social-graph/>
23. Deibert, R. (2020, May 7). *WeChat users outside China face surveillance while training censorship algorithms*. *Washington Post*.
24. DesMarais, C. (2016, March 29). *How to Use Slack Outside Your Company*. Retrieved January 21, 2021, from: <https://www.inc.com/christina-desmarais/how-to-use-slack-outside-your-company.html>
25. Dobrilova, T. (2019, May 13). *35+ SMS Marketing Statistics Every Marketer MUST Know* [2020]. Retrieved November 20, 2020, from: <https://techjury.net/blog/sms-marketing-statistics/>
26. Dortch, M. H. (2018). *FCC FACT SHEET: Wireless Messaging Service Declaratory Ruling* (Declaratory Ruling No. WT Docket No. 08-7; p. 28). Washington D.C.: Federal Communication Commission. Retrieved from: <https://docs.fcc.gov/public/attachments/DOC-355214A1.pdf>
27. EM360 Tech. (2020, October 13). *Top 10 Active Directory Management Tools*. Retrieved March 21, 2021, from: <https://em360tech.com/top-10/top-10-active-directory-management-tools>
28. eMarketer. (2019, September 23). *WhatsApp Is Becoming a Key Driver of Mobile Messaging Growth*. Retrieved January 29, 2021, from: <https://www.emarketer.com/content/whatsapp-is-becoming-a-key-driver-of-mobile-messaging-growth>
29. EPRS. (2019). *EU competition policy: Key to a fair single market : in depth analysis*. LU: Publications Office. Retrieved from <https://data.europa.eu/doi/10.2861/143082>

30. European Commission. (2004a). *Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings* (Information No. 2004/C 31/03). European Commission. Retrieved from: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52004XC0205%2802%29>
31. European Commission. (2004b). *International Roaming*. Retrieved March 14, 2021, from: https://ec.europa.eu/commission/presscorner/detail/en/MEMO_04_198
32. European Commission. (2018). *Report from the Commission to the European Parliament and the Council on the implementation of Regulation (EU) 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union, as amended by Regulation (EU) 2015/2120 and Regulation (EU) 2017/920* [COM(2018) 822 final]. Brussels: European Commission. Retrieved from: <https://ec.europa.eu/transparency/regdoc/rep/1/2018/EN/COM-2018-822-F1-EN-MAIN-PART-1.PDF>
33. European Commission. (2020a, December). *The Digital Markets Act: Ensuring fair and open digital markets*. Retrieved March 23, 2021, from: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/digital-markets-act-ensuring-fair-and-open-digital-markets_en
34. European Commission. (2020b, December). *The Digital Services Act: Ensuring a safe and accountable online environment*. Retrieved March 23, 2021, from: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/digital-services-act-ensuring-safe-and-accountable-online-environment_en
35. European Regulators Group for Postal Services. (2019). *ERGP Report on the cross subsidisation* (p. 42). ERGP.
36. Facebook Inc. (2018). *Facebook Inc. Form 10K* [Form 10-K]. Menlo Park, California: SEC.
37. Facebook Inc. (2019). *Facebook Inc. Form 10K* [Form 10-K]. Menlo Park, California: SEC.
38. Facebook Inc. (2020). *Facebook Inc. Form 10K* [Form 10-K]. Menlo Park, California: SEC.
39. Faulhaber, G. R. (1975). Cross-Subsidization: Pricing in Public Enterprises. *The American Economic Review*, 65(5), 966–977.
40. Federal Trade Commission. (2013, June 11). *Competitive Effects*. Retrieved February 16, 2021, from: <https://www.ftc.gov/tips-advice/competition-guidance/guide-antitrust-laws/mergers/competitive-effects>
41. *Federal Trade Commission v. Facebook*. , (United States District Court for the District of Columbia 2020).
42. Forge, S. & Blackman, C. (2018). *Roaming: One Year After Implementation*. Brussels: Policy Department for Economic, Scientific and Quality of Life Policies.
43. FTC. (2013, June 11). *Monopolization Defined*. Retrieved February 1, 2021, from: <https://www.ftc.gov/tips-advice/competition-guidance/guide-antitrust-laws/single-firm-conduct/monopolization-defined>

44. FTI Consulting. (2016). *Testing for Cross-Subsidisation* (p. 32). Royal Mail. Retrieved from: https://www.ofcom.org.uk/__data/assets/pdf_file/0024/90780/FTI-Report-on-Testing-for-Cross-Subsidisation.pdf
45. Gandal, N. (2018). Network Goods (Empirical Studies). In Macmillan Publishers Ltd (Ed.), *The New Palgrave Dictionary of Economics* (pp. 9432–9436). London: Palgrave Macmillan UK. https://doi.org/10.1057/978-1-349-95189-5_2036
46. Gershkovich, E. (2020, August 19). *The uneasy coexistence of Yandex and the Kremlin*. Retrieved January 21, 2021, from: <https://www.technologyreview.com/2020/08/19/1006438/yandex-putin-arkady-volozh-kremlin/>
47. Goolsbee, A. & Syverson, C. (2008). How do Incumbents Respond to the Threat of Entry? Evidence from the Major Airlines. *Quarterly Journal of Economics*, 123(4), 1611–1633. <https://doi.org/10.1162/qjec.2008.123.4.1611>
48. Grind, K., & Horwitz, J. (2020, January 16). Facebook Backs Off Controversial Plan to Sell Ads in WhatsApp. *Wall Street Journal*.
49. GSMA. (2012). *International Roaming Explained* (p. 20). London: GSMA. Retrieved from: <https://www.gsma.com/latinamerica/wp-content/uploads/2012/08/GSMA-Mobile-roaming-web-English.pdf>
50. GSMA. (2020). *The Mobile Economy*. Retrieved January 22, 2021, from: <https://www.gsma.com/mobileeconomy/>
51. GSMA Insights. (2020). *The Future of Mobile Communication*. Shanghai: GSMA. Retrieved from: https://www.gsma.com/newsroom/wp-content/uploads/18083_GSMA_Report_for_Shanghai_LR.pdf
52. Headrick, D. R. & Griset, P. (2001). Submarine Telegraph Cables: Business and Politics, 1838–1939. *Business History Review*, 75(3), 543–578. <https://doi.org/10.2307/3116386>
53. Helyer, D. (2016, April 1). *What is iMessage and how is it different to normal text messages?* Retrieved January 20, 2021, from: <https://appletoolbox.com/imessage-basic-guide/>
54. Hrovatin, N. (2020). *Liberalisation and Regulation of the EU Electricity Industry*. Presented at the Ljubljana. Ljubljana.
55. Infante, J. & Vallejo, I. (2012). Regulation of international roaming in the European Union—Lessons learned. *Telecommunications Policy*, 36(9), 736–748. <https://doi.org/10.1016/j.telpol.2012.06.014>
56. Ivaldi, M. & Verboven, F. (2005). Quantifying the effects from horizontal mergers in European competition policy. *International Journal of Industrial Organization*, 23(9), 669–691. <https://doi.org/10.1016/j.ijindorg.2005.08.004>
57. Kades, M. & Morton, F. S. (2020). Interoperability as a competition remedy for digital networks. *Working Paper*.
58. Khan, L. M. (2017). Amazon’s Antitrust Paradox. *Yale Law Journal*, 126(3), 564–907.
59. Kollar-Kotelly, C. United States of America v. Microsoft Corporation. , No. 98-1232 (United States District Court for the District of Columbia November 12, 2002).

60. Kotterink, B., Godlovitch, I., Marcus, J. S., Nooren, P., Esmeijer, J. & Roosendaal, A. (2015). *Over-the-Top players: Market dynamics and policy challenges*. DIRECTORATE GENERAL FOR INTERNAL POLICIES.
61. Lancieri, F. & Sakowski, P. M. (2020). Competition in Digital Markets: A Review of Expert Reports. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3681322>
62. Larouche, P. (2000). *Competition Law and Regulation in European Telecommunication (Digital)*. Oxford, England: Hart Publishing.
63. Léautier, T.-O. & Crampes, C. (2016, April 27). *Liberalisation of the European electricity markets: A glass half full*. Retrieved March 19, 2021, from: <https://fsr.eui.eu/liberalisation-european-electricity-markets-glass-half-full/>
64. Lenz. *AKZO Chemie BV v Commission of the European Communities*. , 1991 European Court Reports I-03359 (Fifth Chamber 1991)
65. Lowe, P. (2003). *EU Competition Practice on Predatory Pricing*. Presented at the Pros and Cons of Low Prices, Stockholm, Sweden. Retrieved from https://ec.europa.eu/competition/speeches/text/sp2003_066_en.pdf
66. Mail.ru Group. (2020). *Quarterly Presentation (Q1 2020)* [Quarterly Presentation]. Moscow. Retrieved from https://corp.imgsmai.ru/media/files/1q20-presentation_RAFspKG.pdf
67. Mandrescu, D. (2018). The SSNIP Test and Zero-Pricing Strategies: *European Competition and Regulatory Law Review*, 2(4), 244–257. <https://doi.org/10.21552/core/2018/4/4>
68. MessageMe. (2014, October 4). *MessageMe | Fun, FREE, messaging :)*. Retrieved February 15, 2021, from: <https://msg.me/>
69. Metcalfe, B. (2013). Metcalfe’s Law after 40 Years of Ethernet. *Computer*, 46(12), 26–31. <https://doi.org/10.1109/MC.2013.374>
70. Microsoft. (1999, July 21). *Microsoft Launches MSN Messenger Service*. Retrieved November 16, 2020, from: <https://news.microsoft.com/1999/07/21/microsoft-launches-msn-messenger-service/>
71. Microsoft. (2021). *Pricing—Notification Hubs*. Retrieved February 10, 2021, from <https://azure.microsoft.com/en-us/pricing/details/notification-hubs/>
72. Murphy, D. (2013, March 17). *MessageMe Gets Vine’d; Facebook Pulls Access to Friend-Finding*. Retrieved February 15, 2021, from: <https://www.pcmag.com/news/messageme-gets-vined-facebook-pulls-access-to-friend-finding>
73. Mykhoparkina, O. (2020). *Discord vs Slack – Gaming, Working or Both? (Our Team’s Feedback)*. Retrieved December 15, 2020, from: <https://www.chanty.com/blog/discord-vs-slack/>
74. Nadler, J., Cicilline, D. N., Bond, S., Khan, L., Lewis, A., Berenbroick, P., ... Van Wye, J. (2020). *Investigation of Competition in Digital Markets* [Majority Staff Report and Recommendations]. Washington D.C.: US House Subcommittee on Antitrust, Commercial, and Administrative Law. Retrieved from: https://judiciary.house.gov/uploadedfiles/competition_in_digital_markets.pdf

75. Nonnenmacher, T. (2001). *History of the U.S. Telegraph Industry*. In R. Whaples (Ed.), *Economic History Association*. Retrieved from <http://eh.net/encyclopedia/history-of-the-u-s-telegraph-industry/>
76. OneSignal. (2021). *OneSignal Pricing*. Retrieved February 10, 2021, from: <https://onesignal.com/pricing>
77. Owings, T. M. (2019). Identifying a Maverick: When Antitrust Law Should Protect a Low-Cost Competitor. *Vanderbilt Law Review*, 66(1). 323-254.
78. Penfrat, J. (2020, December 18). *The EU's attempt to regulate Big Tech: What it brings and what is missing*. Retrieved March 23, 2021, from: <https://edri.org/our-work/eu-attempt-to-regulate-big-tech/>
79. Pepermans, G. (2019). European energy market liberalization: Experiences and challenges. *International Journal of Economic Policy Studies*, 13(1), 3–26. <https://doi.org/10.1007/s42495-018-0009-0>
80. Perez, S. (2019, August). *YouTube is closing its private messages feature...and many kids are outraged*. Retrieved March 17, 2021, from: <https://social.techcrunch.com/2019/08/21/youtube-is-closing-its-private-messages-feature-and-many-kids-are-outraged/>
81. Potuck, M. (2020, January 28). *Apple hits 1.5 billion active devices with ~80% of recent iPhones and iPads running iOS 13*. Retrieved January 22, 2021, from: <https://9to5mac.com/2020/01/28/apple-hits-1-5-billion-active-devices-with-80-of-recent-iphones-and-ipads-running-ios-13/>
82. Protalinski, E. (2020, March 30). *Microsoft announces Teams for consumers, Skype daily active users up 70% to 40 million*. Retrieved January 22, 2021, from: <https://venturebeat.com/2020/03/30/skype-passes-40-million-daily-active-users-up-70-due-to-coronavirus/>
83. PYMNTS. (2016, December 21). *Viber Launching One-Touch Video Messaging*. Retrieved January 22, 2021, from: <https://www.pymnts.com/mobile-applications/2016/viber-launching-one-touch-video-messaging-to-stay-ahead-of-pack/>
84. Rancati, L. (2019). The intersection between Antitrust and Data Protection. Lessons from the Facebook/ Whatsapp merger and the Bundeskartellamt's decision on Facebook's terms and conditions. *Faculté Des Sciences Économiques, Sociales, Politiques et de Communication*.
85. Reuters. (2021, January 21). *Italian data authority takes aim at Whatsapp's privacy disclaimer*. Retrieved January 29, 2021, from: <https://financialpost.com/pmn/business-pmn/italian-data-authority-takes-aim-at-whatsapps-privacy-disclaimer>
86. Rogerson, D. & Holmes, J. (2010). *Market Definition and Analysis for SMP: A practical guide*. Incyte Consulting.
87. Rotaru, D. V. (2013). A Glance at the European Energy Market Liberalization. *CES Working Papers*, 5(1), 100–110.
88. Ruddock, D. (2015, January 20). *WhatsApp Is Killing Popular 3rd Party WhatsApp+ Client By Temporarily Banning Users Until They Switch To The Official App*. Retrieved March 26, 2021, from:

- <https://www.androidpolice.com/2015/01/20/whatsapp-is-killing-popular-3rd-party-whatsapp-client-by-temporarily-banning-users-until-they-switch-to-the-official-client/>
89. Rusli, A., MacMillan, D. & Rusli, E. M. (2014, February 20). Facebook to Pay \$19 Billion for WhatsApp. *Wall Street Journal*.
 90. Rusli, E. M. & MacMillan, D. (2013, November 14). Messaging Service Snapchat Spurned \$3 Billion Facebook Bid. *Wall Street Journal*.
 91. Russell, J. (2019, February 22). *Rakuten's Viber chat app plans to charge to operate chatbots in controversial move*. Retrieved February 11, 2021, from: <https://social.techcrunch.com/2019/02/22/viber-chatbot-charge/>
 92. Sapra, B. (2019, December 21). *This Chinese super-app is Apple's biggest threat in China and could be a blueprint for Facebook's future. Here's what it's like to use WeChat, which helps a billion users order food and hail rides*. Retrieved January 21, 2021, from: <https://www.businessinsider.com/chinese-superapp-wechat-best-feature-walkthrough-2019-12>
 93. Schenck, S. (2018, July 4). *WhatsApp legal threats target 3rd party apps interfacing through standard Android APIs*. Retrieved January 29, 2021, from: <https://www.androidpolice.com/2018/07/04/whatsapp-legal-threats-target-3rd-party-apps-interfacing-standard-android-apis/>
 94. Schroeder, S. (2021, January 13). *Telegram hits 500 million active users amid WhatsApp backlash*. Retrieved February 8, 2021, from: <https://mashable.com/article/telegram-500-million/>
 95. Scott, M. (2016, January 18). *WhatsApp, the Internet Messenger, to Become Free*. Retrieved January 29, 2021, from: <https://bits.blogs.nytimes.com/2016/01/18/whatsapp-the-internet-messenger-to-become-free/>
 96. Seetharaman, D. & Morris, B. (2017, August 9). The New Copycats: How Facebook Squashes Competition From Startups. *Wall Street Journal*.
 97. Shepherd, W. G. (1987). Herfindahl Index. In *The New Palgrave Dictionary of Economics*. London: Palgrave Macmillan UK. https://doi.org/10.1057/978-1-349-95121-5_711-1
 98. Shu, C. (2013, October 28). *Meet Telegram, A Secure Messaging App From The Founders Of VK, Russia's Largest Social Network*. Retrieved February 1, 2021, from: <https://social.techcrunch.com/2013/10/27/meet-telegram-a-secure-messaging-app-from-the-founders-of-vk-russias-largest-social-network/>
 99. Singh, M. (2021, January 13). *Signal's Brian Acton talks about exploding growth, monetization and WhatsApp data-sharing outrage*. Retrieved January 22, 2021, from: <https://social.techcrunch.com/2021/01/12/signal-brian-acton-talks-about-exploding-growth-monetization-and-whatsapp-data-sharing-outrage/>
 100. Snap Inc. (2019). *Snap Inc. Form 10-K* (p. 153) [Form 10-K]. Santa Monica, California.
 101. Solon, O. & Cyrus, F. (2019, November 6). *Leaked documents show Facebook leveraged user data to fight rivals and help friends*. Retrieved February 15, 2021, from:

<https://www.nbcnews.com/news/all/leaked-documents-show-facebook-leveraged-user-data-fight-rivals-help-n1076986>

102. Spruytte, J., Van der Wee, M., de Regt, M., Verbrugge, S. & Colle, D. (2017). International roaming in the EU: Current overview, challenges, opportunities and solutions. *Telecommunications Policy*, 41(9), 717–730. <https://doi.org/10.1016/j.telpol.2017.01.009>
103. Stankey, R. (2019, June 5). *OTT VoIP Calling Apps are Telecom Services under EU Law*. Retrieved January 20, 2021, from: <https://www.lexology.com/library/detail.aspx?g=7a97d031-9e76-4eee-acdd-2a0bf7965575>
104. Stumpf, D. U., Martins, D. S. S., Alexiadis, P., Dillon, D. & Cole, M. (2018). *Methodologies for market definition and market analysis* (p. 92). ICP-ANACOM.
105. Sutherland, E. (1999). *INTUG Europe Report on GSM Roaming Prices—1999*. Brussels: International Telecommunications Users Group Europe.
106. Teachout, Z. (2020). *Break 'em Up: Recovering Our Freedom from Big Ag, Big Tech, and Big Money* (Audiobook). New York: Il Points Book/St. Martin's Publishing Group.
107. The United States Department of Justice. (2018, July 31). *Herfindahl-Hirschman Index*. Retrieved February 4, 2021, from: <https://www.justice.gov/atr/herfindahl-hirschman-index>
108. Trevino, L. (2008). *Liberalization of the Electricity Market in Europe: An overview of the electricity technology and the market place* (p. 27). Lausanne, Switzerland: Ecole Polytechnique Federale De Lausanne.
109. Triggs, R. (2019, February 19). *What is RCS messaging and why is it important?* Retrieved January 20, 2021, from: <https://www.androidauthority.com/need-know-rcs-messaging-726687/>
110. United States Courts. (2015). Civil Cases. Retrieved February 22, 2021, from: <https://www.uscourts.gov/about-federal-courts/types-cases/civil-cases>
111. *US v Google.*, (United States District Court for the District of Columbia 2020).
112. Vesterdorf, B., Jaeger, M., Pirrung, J., Garcia-Valdcasas, R., Tiili, V., Azizi, J., ... Labucka, I. *Microsoft v Commission.*, T-201/04 (The Court of First Instance September 17, 2007).
113. Warren, T. (2014, April 21). *Inside Microsoft's '90s chat war with AOL*. Retrieved February 16, 2021, from: <https://www.theverge.com/2014/4/21/5635488/msn-messenger-vs-aol-aim-chat-wars>
114. WhatsApp. (2016, August 25). *Privacy Policy—EEA - Revisions*. Retrieved February 5, 2021, from: <https://www.whatsapp.com/legal/privacy-policy-eea/revisions/20160825/?lang=en>
115. WhatsApp. (2018, April 24). *Privacy Policy—EAA*. Retrieved February 5, 2021, from: <https://www.whatsapp.com/legal/privacy-policy-eea/?lang=en>

116. WhatsApp. (2020, February 12). *Two Billion Users—Connecting the World Privately*. Retrieved January 22, 2021, from: <https://blog.whatsapp.com/two-billion-users-connecting-the-world-privately>
117. Wilson, A. (2016, December). Universal Windows Platform—File System Monitoring in Universal Windows Platform Apps. *MSDN Magazine*, 31(13).
118. Wolford, B. (2018, July 11). *Writing a GDPR-compliant privacy notice*. Retrieved March 26, 2021, from: <https://gdpr.eu/privacy-notice/>
119. Wu, T. (2009). A Brief History of American Telecommunications Regulation. *OXFORD INTERNATIONAL ENCYCLOPEDIA OF LEGAL HISTORY*, 5.
120. Wu, T. (2018). *The Curse of Bigness* (Audiobook). Penguin Random House.
121. Wu, T. (2020). Antitrust & Corruption: Overruling Noerr. *Columbia Public Law Research Paper*, 14(663).
122. Yurieff, K. (2017, April 13). *Instagram's Snapchat clone is more popular than Snapchat*. Retrieved February 15, 2021, from: <https://money.cnn.com/2017/04/13/technology/instagram-stories-snapchat/index.html>
123. Zagorsky, J. L. (2019, March 14). *Rise and fall of the landline: 143 years of telephones becoming more accessible – and smart*. Retrieved January 29, 2021, from: <https://phys.org/news/2019-03-fall-landline-years-accessible-smart.html>
124. Zucchi, K. (2019, October 22). *Why Facebook Is Banned in China & How to Access It*. Retrieved February 1, 2021, from: <https://www.investopedia.com/articles/investing/042915/why-facebook-banned-china.asp>

APPENDIX

Appendix 1: Povzetek (Summary in Slovene language)

Trg povrhnjih storitev oziroma OTT (Over-the-Top) storitev je trg storitev, ki potrošnikom omogočajo sporočanje in interakcijo z ljudmi v spletu v zasebnih pogovorih. Vključuje storitve, s katerimi milijarde ljudi dnevno komunicirajo po vsem svetu, vključno s WhatsAppom, Facebook Messengerjem in Viberjem. V magistrskem delu najprej preučujem opredelitev trga povrhnjih storitev, pri čemer se omejujem na vključitev samo sporočilnih storitev za splošne namene, pri čemer so izključene nekatere storitve, ki namesto tega ponujajo storitve družabnih omrežij ali socialnih medijev. Opisane so tudi nekatere značilne lastnosti trga, na primer omrežni učinki, zaradi katerih so večje storitve za nove stranke bolj dragocene, krepijo svojo obstoječo tržno moč in postavljajo pomembno oviro za vstop.

Za opredelitvijo trga magistrsko delo analizira konkurenčno strukturo trga povrhnjih storitev v EU in ZDA in ugotovi, da ima Facebook pomembno tržno moč. O tem je moč soditi na podlagi tradicionalnih mer tržne koncentracije, nove mere razvite za trge, ki jih financirajo oglaševalci, in analiza vedenja udeležencev na trgu. Facebook je s svojo tržno močjo preprečil vstop potencialnim konkurentom, medtem ko je navzkrižno subvencioniral lastne storitve pošiljanja OTT sporočil z dobičkom iz njihovega podjetja za socialno mreženje.

Obnašanje Facebooka ni ostalo neopaženo in oblasti po vsem svetu so ga preiskale zaradi njegovih dejanj na trgih socialnih omrežij, sporočil OTT in družbenih omrežij. V tej tezi so predstavljeni rezultati preiskav ameriškega kongresa, ameriške Zvezne trgovinske komisije, Evropske komisije, nemškega zveznega urada za kartele ter britanske uprave za konkurenco in trg. Medtem ko se je fokus njihovih preiskav razlikoval, so se vsi organi strinjali s tezo, da ima Facebook pomembno tržno moč. Ameriški FTC in kongres gredo dlje, saj sta ugotovila, da imajo ukrepi Facebooka razsežnosti protikonkurenčnih ukrepov in da bi bilo treba proti podjetju uvesti pravna sredstva. Evropska komisija in UK CMA (Competition and Markets Authority) sta se strinjali, da je treba sprejeti ukrepe, vendar sta se namesto tega osredotočili na pomen širših reform za spopad z vsemi digitalnimi trgi z zakonodajo in novimi regulativnimi strukturami.

Preden predlaga novo ureditveno strukturo za trg povrhnjih storitev, to magistrsko delo proučuje konkurenčne ukrepe in predpise na štirih trgih, ki imajo določene podobnosti s proučevanim trgom povrhnjih storitev. Čezatlantski telegrafski trg je bil eden prvih telekomunikacijskih trgov in neučinkovita ureditev v ZDA je dovoljevala monopol za Western Union, ki traja do danes in je pomemben primer neuspeha organov, pristojnih za konkurenco. Trg gostujočih sporočil SMS v EU je od leta 2003 močno urejen in je povzročil regulativno okolje, ki potrošnikom omogoča konkurenco in poštene cene. Liberalizacija trga za električno energijo v EU kaže, kako lahko oblasti razdelijo vertikalno integrirana podjetja, da omogočijo konkurenco, kadar je to smiselno, in ohranijo regulirane monopole, kadar obstaja naravni monopol. Končno konkurenčna pravna sredstva, ki so jih

Microsoftu naložili organi EU in ZDA, podajajo predloge, kako zagotoviti konkurenco na programski platformi. Pridobljene izkušnje iz teh primerov so združene v končno priporočilo.

Po kritični analizi zgoraj naštetih predlogov preiskav to magistrsko delo priporoča kombinacijo dveh konkurenčnih ukrepov, ki jih morajo sprejeti organi v EU in ZDA za spodbujanje konkurence na trgu povrhnjih storitev. Te ukrepe bi izvajali obstoječi organi, Zvezna komisija za komunikacije v ZDA in Organ evropskih regulatorjev za elektronske komunikacije v EU skupaj z ustreznimi nacionalnimi regulatorji. Ti organi bi bili odgovorni za spremljanje skladnosti z novimi predpisi in po potrebi za odmero glob. Prvi predlagani predpisi bi ponovno uvedli konkurenco na trgu povrhnjih storitev, tako da bi strankam olajšali prehod med omrežji za OTT sporočanje in primerjali politike zbiranja podatkov konkurentov. Druga skupina predlaganih predpisov bi novim konkurentom omogočila vstop na trg z znižanjem vstopnih ovir z uveljavljenimi odprtimi protokoli za podjetja, za katera je bilo ugotovljeno, da imajo pomembno tržno moč. Kombinacija interoperabilnosti protokolov, enostavnega gibanja strank in spremljanja bo v prihodnjih letih obnovila in ohranila konkurenco na trgu povrhnjih storitev.