BACHELOR THESIS

COMPETITION BETWEEN SOCIAL NETWORKING SERVICES: IS IT EFFICIENT?

A LITERATURE REVIEW

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Introduction

Technology firms are currently the world's leading firms in terms of (social) impact, revenues and client base. Particularly firms that offer social networking services (SNS for simplicity) often have millions or even billions of users. There is much variation in the offered content, but there are few instances of multiple large internet-related technology firms that provide highly substitutable services or products. For example, Google (in search engine market) and Facebook (in social media platforms) are market leaders with at least 70% market share across different devices[1]. Some important underlying factors that likely contributed to these monopoly positions are switching costs and network effects, especially in the case of Facebook. From a standard economic theory point of view, a monopoly tends to be an inferior market structure considering its economic efficiency (mainly allocative and productive). If the threat of entry is absent and the demand elasticity is low, the monopolist can easily set a market price above the marginal costs and achieve an increase in profits (Motta, 2004). In other words, the monopolist has a lot of market power. Since a price increase leads to a demand decrease (perfect inelastic demand exempted), this induces foregone sales. However, it is outweighed by the additional markup that the firm will generate over its future sales following the price increase. This happens at the expense of the consumer and entails an inefficient allocation of surpluses (Motta, 2004; Shy, 1995). In fact, monopolists are often said to abuse their dominance to engage in rent-seeking activities (Krueger, 1974); activities that further strengthen their position. Posner (1975) pointed out that potential costs incurred by monopolists that behave in an entry-deterring manner, should also be assigned to rent-seeking activities.

Thus, from the starting point of a monopolist, introducing competition will in many cases improve allocative efficiency (Motta, 2004; Shy, 1995). Assuming that there's no opportunity to collude, entrants will behave competitively. That is, they will choose a strategy by which means their payoff is maximized. Depending on market and product specifications, such a strategy could imply increasing output at the expense of the competitor (Cournot competition) or directly undercutting the incumbent's price (Bertrand competition). If the incumbent is efficient enough and the traded goods or services are homogenous, its best response is then to also behave more competitively. In case the goods or services are to some degree heterogeneous, differentiation is a profit maximizing outcome (Curtis & Lipsey, 1989). In either instance, competition is highly desirable in terms of social welfare, since the consumer surplus increases. Analogously, this could hold for all parties that want to advertise through a SNS. If advertisers are thought

[1] https://www.netmarketshare.com/search-engine-market-share.aspx?qprid=4&qpcustomd=0

of as the parties who buy advertisement space on SNSs, the idea should hold that an increased number of platforms to channel advertising, lowers the price paid by the advertisers. Yet, the nature of SNS firms like Facebook is quite distinct: agents interact by means of a platform, making it a two-sided market. In such a market structure the dynamics of economics don't work like in standard economic theory, as this paper will reveal. Since there are few cases of increased competition within SNS-related markets (competition between Google+ and Facebook is perhaps the only example) to study empirically, the aim of this paper is to gather insights from multiple economic disciplines and to construct a holistic framework that illustrates the effect of competition on the SNS market. The accompanying research question will then be as follows:

> *"To what extent does competition between SNS-firms improve the economic[2] efficiency of the SNS market?"*

In order to achieve a coherent structure throughout this paper, all relevant aspects will be primarily discussed in isolation. First of all, I examine switching costs and network effects, and the manner in which the presence of these market failures affects the efficiency effects of competition. Next, I will elaborate on the market structure that a platform like Facebook has; that of a two-sided market. Its adjunct economic section is that of platform economics, which I will use as a basis to investigate further effects of competition on SNSs. To complete the holistic perspective of this paper, additional attention is given to advertising economics. In this section, the prevalent advertising revenue models and their respective effects on competition are discussed. Finally, the conclusion intertwines the central findings from the reviewed literature and the discussion contains scientific as well as practical recommendations. Summarizing, the theoretical framework will be a guiding section that combines several economic theories. The section thereafter considers the conclusion and discussion, in which the prior findings will be directed towards the central research question and the implication of the findings will be discussed.

[2] Besides allocative efficiency, a short section is devoted to dynamic efficiency. Since innovation is of critical importance in the technology sector, it is necessary to consider how it could be affected by competition.

Two-sided markets: learning costs and network effects

Introduction

A straightforward starting point for this literature review is a description of the market structure that prevails in the SNS sector. Below, a variety of economic papers are studied in order to discern the unique features of a platform like Facebook. The major role of platforms is to reduce the transaction costs for two parties to find each other (Evans & Schmalensee, 2007). In particular, advertising-supported media (to which SNSs belong) are highly suitable for building and reaching audiences. Moreover, platforms avoid the duplication of targeting costs relative to old-fashioned types of advertising. By means of a digital distribution network, platforms allow firms to contact multiple customers simultaneously (Evans & Schmalensee, 2007). A complicating feature that platforms usually possess, is two-sidedness. This is the case when there are two distinct sides present in a market that mutually benefit from interacting through a shared platform. The following definition of two sided platforms was proposed by Rochet & Tirole in 2006:

"A market is two-sided if the platform can affect the volume of transactions by charging more to one side of the market and reducing the price paid by the other side by an equal amount; in other words, the price structure matters, and platforms must design it so as to bring both sides on board."[3]

Intermediaries (the platforms) in two-sided markets differ from those traditional (or one-sided) markets in the sense that agents on one side of the platform get rewarded based on the success the platform has with agents that are active on the other side (Rysman, 2009). Rysman (2009) illustrates this distinction by a farmer who sells his yield to a wholesaler, collects the wholesale price, and subsequently is indifferent about the wholesaler's ability to resell the products. In such instance, Rysman argues, the market is one-sided. Would the farmer's payoff be in fact determined by the wholesaler's ability to resell the products (which has been studied by Armstrong (2006)), then there's a case of two-sidedness. Moreover, a two-sided market often goes hand in hand with switching costs and network externalities. Switching costs occur whenever it is costly for a consumer to switch from one product or service to another. Such costs can be of very different nature, as for example transaction costs and learning costs (Klemperer, 1995). Learning costs rise with the time one needs to gain knowledge in software or to obtain a specific good or service, which is particularly relevant for social networking services. Many end-users as well as advertising parties

[3] Rochet & Tirole, Two-sided markets: a progress report, 2006

spend time getting acquainted with all the features such an SNS has to offer. If the switch to an incompatible substitute is made, the agent has to reinvest time and effort (e.g. building a friend base). As such, users are inhibited to switch and the firm is able to exert some market power. This is in general detrimental to (social) welfare and thus public policy should aim at reducing switching costs (Klemperer, 1987; Klemperer, 1995). According to Klemperer (1987) the reduction of learning costs can be achieved by increasing the compatibility between products or services. In the context of this paper, one could think of a friend base that a user can export from one social network to another.

Network externalities

The second and more important market failure that often occurs in the SNS sector is that of network externalities. Katz and Shapiro (1985) explain that network externalities (or network effects) arise when the utility of a consumer increases with the number of other users of a specific good or service. In application to two-sided markets, network effects arise as follows; 'sellers' gain from an increased number of 'buyers' because their potential target market grows (direct network externality), and 'buyers' gain from an increased number of other 'buyers' because more 'buyers' attract more 'sellers' (indirect network externalities). In existing literature on the topic of two-sided markets, the question which one of the two network effects initiates platform growth is commonly referred to as the chicken-and-egg problem (Caillaud & Jullien, 2003). Although the chicken-and-egg problem indeed occurs in platforms where the interests of both parties are mutual, it's likely not to hold for SNSs. For example, a user is likely to value Facebook much more if he can connect with more friends or family members rather than less. Dickinger et al. (2008) empirically verified the idea that people join social media platforms primarily to interact with peers rather than with advertisers. The resulting pricing pattern on platforms like Facebook is therefore often skewed, with one side (the user) paying nothing and the other side (advertising firm) paying too much (Tirole, 2015). The next chapter is devoted to an analysis of this pricing pattern, its source and how it influences the effects of competition.

Empirical research by Dickinger et al. (2008) has demonstrated that in markets with network externalities, the future degree of adoption is a central antecedent for consumers to switch. That is because consumers form expectations about the potential of a specific technology or platform to become a future success. If consumer preferences are for example heterogeneous, chances for a platform to obtain a large market share shrink. Katz & Shapiro (1985) proved that firms indeed have a large advantage if consumers believe that others will adopt their product or service too. The advantage could be so large, that firms are willing to make inefficient expenditures to influence these customer's expectations (Katz & Shapiro, 1985; Haucap

& Heimeshoff, 2014). Once a firm manages to settle as a market leader an increasing number of consumers forms positive expectations about the firm (e.g. Facebook) and start using it. This self-enforcing trend is referred to as market tipping (Katz & Shapiro, 1985) and has greatly contributed to Facebook's success, as will be explained below.

Network effects and competition

To study the impact of increased competition under the premise of network effects, we shall next depart from a single firm experiencing network effects to multiple firms. Katz & Shapiro (1994) find that in markets with strong network externalities, the prospect of high future profits (due to market tipping) intensifies competition particularly in emerging markets, before market shares are established. Excessive penetration pricing[4] is a form of such competition between platforms. It is debatable whether SNSs often engage in such over-competitive behavior, since users are rarely charged. Facebook in particular, was initially created with the sole purpose of becoming a platform for Ivy-league students to rate their peers from the opposite gender. In fact, it has been the strict enforcement of homogeneity within the user-group that maximized the network effects and in essence boosted the users' surplus[5] as well as the potential users' expectations. For example, a couple of years before Facebook was publically available throughout the world, it was released to all US university students. Again, user homogeneity was preserved as much as possible in order to maximize the network effects. In comparison to other (at the time) popular social networking services (e.g. MySpace (*international*) and Hyves (*Dutch*)) there was no significant difference in pricing structure from which Facebook could benefit (Haucap & Heimeshoff, 2014). However, the homogeneity of the users allowed adverts to be much more efficiently targeted, increasing the advertisers' willingness to pay. The additional revenues could be invested in R&D to further enhance user satisfaction and to expand into new (geographic/ demographic) markets.

In short, it is unreasonable to accept Posner's (1975) theory and state that market leaders/ monopolists in the SNS-industry engage in rent-seeking activities at the expense of allocative efficiency. Rather, the platform of interest has managed to accurately delimit its user group and to secure its homogeneity. This resulted in excess surplus on behalf of the user-side of the platform. By setting an ambitious tipping point (e.g. all US students), the platform ensures that there are solid enough network effects in place to attract potential users overseas (e.g. global student population). Introducing competition in a comparable setting

[4] Charge below marginal cost (lower markup) in earlier stage of business cycle to gain market share.
[5] Let user surplus in this setting be defined as the difference between the reserve price, which is determined by the utility a user derives from a platform, and the actual price, which in approximation is zero (free usage) and constant.

with network effects yields paradoxical results. With the prospect of having to share the market amongst competitors, firms face a lower expected profit (compared to the monopoly scenario). The platforms subsequently exert less effort to conquer the market and ex-ante competition weaken. Amongst others, this might induce the competing platforms to overlook adequate and appropriate business strategies. Even if two platforms adequately identify a specific user group and manage to settle as differentiated market-(co)leaders, they don't outperform a monopolist in terms of allocative efficiency. The next chapter will explicate other underlying reasons besides suboptimal network externalities. Before that, the effects of competition on dynamic efficiency are briefly touched upon.

As was indicated before, network externalities don't affect the allocative efficiency within a market only. That is to say, network externalities can also cause dynamic inefficiency. A firm is said to be dynamically efficient if it innovates with the aim of remaining competitive in the future (Motta, 2004). Without the threat of entry, it is simple to recognize that the incumbent has very little incentive to innovate. Since network externalities lock-in customers and thus create natural entry barriers, economic theory predicts that SNSs rarely innovate. If competition is hypothetically introduced, the incumbent platform suddenly has incentive to protect its market share. Whereas competing in prices is ineffective, which will be explained later, optimizing user experience is a much more feasible method of retaining customers. This can be achieved by means of investing in R&D and engage in related innovative activities. Yet, the presence of competition isn't a flawless premise for dynamic efficiency to increase. Farrell & Saloner (1985) designed a model in which they establish another determinant of dynamic efficiency: the overall inclination of firms towards innovation. For the sake of relevance, it should be assumed that the technology (e.g. a new advertisement targeting model) has been developed exogenously and increases total welfare. In the unique case where competing firms are unanimously positive about a specific innovation and information is complete, all will adopt the new technology. If these strong assumptions (complete information and unanimity) are relaxed, excess inertia may arise due to coordination problems (Farrell & Saloner, 1985). This implies that even if the new technology is beneficial to the society as a whole, individual firms might not favor it strong enough to be a first-mover. The accompanying costs can be regarded as too high if the technology is not adopted by all agents in the market. If on the other hand a couple of firms choose to adopt the innovation or bring the 'bandwagon' in motion, chances increase that the bandwagon starts to roll and the remainder of the market will follow. In general, the SNS sector is considered to be strongly inclined towards innovation (Haucap & Heimeshoff, 2014). Thus, it seems plausible that the bandwagon effect occurs under competition. This is advantageous with respect to dynamic efficiency. The question that subsequently arises is whether innovation in the SNS market is caused by progressive businesses

policies or by competition. Common knowledge (see Fjell, 2010 and Goldfarb, 2014) would suggest the prior, to which this paper agrees. Based on this premise the marginal effect of competition on dynamic efficiency in a SNS setting is mitigated.

Recapitulating, this section has examined the efficiency effects of competition in the presence of network effects. A key finding has been that under network effects, the prospect of monopoly profits instigates ex-ante competition. To such a platform, the preservation of user homogeneity is also vital in the process of enlarging its respective market share. The direct network externalities are maximized, which locks-in existing users even more and makes the platform increasingly attractive to potential users. With respect to social welfare, it is beneficial to have users whose derived utility from usage is as high as possible. This mechanism is endangered if competition is introduced. The prospect of sharing the market has a mitigating effect on ex-ante competition. A lower expected payoff in the future implies a lower effort to gain market share on the user side of the platform. Thus, the platforms are less likely to innovate and develop adequate business strategies initially. Even when multiple platforms (e.g. A and B) are able to settle and divide market shares amongst each other, a pure heterogeneous group of users (e.g. all agents like either A or B) is required to ensure maximized network effects. With a fair amount of certainty, one can infer that users of social networking services are not heterogeneous, in the sense that all users join a SNS to interact with peers. Hence, competition induces a setting in which direct network effects aren't maximized and as such it is detrimental to the user's surplus.

The next chapter augments the previous analysis by examining the relationship between the agents on either side of a SNS platform, being users as well as advertisers. The way in which these groups interact largely determines the unique pricing pattern that platforms practice. Moreover, the cross externalities they impose on each other have far-reaching consequences for the efficiency effects of competition. To preserve the widespread applicability of the theory, several assumptions will be altered. If any alteration yields a diverging outcome, this might be reason to relativize the forthcoming conclusions.

Pricing structure of SNSs: platform economics

So far, the impact of competition on economic efficiency has been studied under the premise of network externalities amongst users. From here, more attention is paid to the relationship between the two sides of the platform, being users on one side and advertisers on the other. This is often studied in the field of platform economics, which focuses on the pricing structure of two-sided markets. This section builds upon existing literature about platform pricing and theorizes what the effects of competition are under changed circumstances. In the previous chapter it was explained that a skewed pricing pattern may arise on a platform. Wright (2004) and Haucap & Heimeshoff (2014) argue that at the root of such a pricing mechanism lies the setting in which platform agents interact. A common example which is used to illustrate the setting, is that of the nightclub. When men and women both go to the same nightclub, the externality that women impose on men is larger than vice versa. In other words, men value the presence of more women more than the other way around. To obtain an outcome that is in line with the guests' preferences, the nightclub should ask an entry fee to men which is higher than for women (Wright, 2004; Haucap & Heimeshoff, 2014). Although it isn't a Pareto improvement compared to a fixed entry fee, it is economically efficient. The relationship to SNSs may appear rather vague, but it perfectly represents what drives the pricing structure on platforms. The price for one group of agents on a platform (e.g. advertisers) is determined by the value the other group of agents (e.g. users on Facebook) yields to the prior (Wright, 2004; Armstrong, 2006). For example, Bolt and Tieman (2005) find that under a corner solution, the platform's profit maximization problem is solved by having the socially optimal fee levied on one side adjusted by a fee that reflects the positive externality of the other side on the prior. In other words, if agents on either side of the platform account for the platform's full profit, then that group isn't just charged the full private optimal price. Additionally, it is surcharged a fee that represents the value of the positive externality the other group imposes on the first (Bolt & Tieman, 2005).

Single- & multihoming

As it has become clear how prices theoretically should be imposed on platform agents, we could apply it to reality. Since users don't pay any monetary price and advertisers pay prices that reflect their interests in users, a skewed pricing pattern emerges. In the introduction, competition was proposed to sooth this excessive price discrimination. Even if competition occurs, it is questionable to what extent the parties on both sides of a platform can switch between the competing platforms (think of network effects) and thus impact economic efficiency. The ability to switch is referred to as the ability to multi-home, as opposed to

single-homing. An agent is said to single-home if it is active on one platform only. If the agent is active on multiple platforms, then it is engaging in multi-homing. For the sake of simplicity, the setting in which both sides of the platform single-home, is examined first. Second, the effects are considered of one side being able to use multiple platforms, which inherently implies platform competition. Regarding the first paragraph below, the reader should mind the incentive of SNS-users to interact with advertising firms. Although it isn't the primary reason to join a platform like Facebook, for at least 50% of the users, relevant advertising is of at least some importance to them (Curran, Graham & Temple, 2011). For practical matters, the relationship between users and advertisers is isolated to abstain from the interference with network effects.

In a single-homing setting, the platform is a monopolist; it has both monopolist access to the end-user as well as the advertiser. Under the assumption of a platform monopoly, Gabszewicz and Wauthy (2004) prove that the platform profit is maximized when the 'demand' side is charged nothing, while de 'supply' side is charged the monopoly price. Bolt and Tieman (2007) showed that it is the elasticity of demand which is of great importance in determining the pricing pattern. More precisely, the high-elasticity side of the market (e.g. Facebook's end users, of whom many will quit using Facebook if it would charge any usage fee) is used by the platform to generate maximum demand (equivalently; maximum number of users). The platform achieves this by providing its services at the lowest possible price, which is often equal to zero. Participation from the low (or zero)-priced side attracts supply from the other side (Gabszewicz & Wauthy, 2004; Bolt & Tieman, 2007). In case of SNSs, the other side consists of firms that wish to advertise. As for most types of platforms, this less elastic side can be exploited by the platform to extract high revenues. Even if competition is introduced, a similar outcome will arise. Only in the case of both platform sides having heterogeneous preferences, there's an equilibrium solution where both platforms achieve nonnegative profits as well as networks because the agents will diffuse over the platforms. Yet, for any distribution of agents amongst the competing platforms that is not fifty-fifty (Bertrand outcome), there exists a 'dominant firm' equilibrium. In such an equilibrium, the dominant firm initially grants free access to one side of the platform (e.g. the users) to obtain full market share. Then, the dominant platform retrieves the full profit by asking monopoly prices to the other side of the platform (e.g. the advertisers) (Gabszewicz & Wauthy, 2004).

In an earlier model, Gabszewic et al. (2001) illustrated the effect of single-homing versus multi-homing agents on one platform. The model, which resembled a simplification of the newspaper industry, assumes that advertisers multi-home and readers single-home. In application to SNSs, it isn't unlikely to believe

that advertisers (especially firms with large advertising budgets) engage in multihoming more often than end-users (e.g. caused by network effects). The fact that advertisers can multihome, implies the existence of multiple platforms and thus the existence of competition. Again, due to user heterogeneity, the co-existing platforms own monopoly access to a unique customer group and can thus impose monopoly prices on the advertisers, implying an underprovision of advertisements (Gabszewicz, Laussel & Sonnac, 2001). A similar result was obtained by Gal-Or & Gal-Or (2005), who found that total surpluses are maximized when the platforms practice monopoly prices. The fundamental difference with the single-homing models, is that in the latter the users are indifferent with respect to the other side of the platform (in SNS-terms, advertising). In other words, users value the platform itself (e.g. newspaper or SNS) instead of what is on the other side of it (for either newspapers or SNSs: advertising). Also under this drastic change of assumptions, one can infer that the outcome is the same: hitherto, the inclusion of competition induces any platform to still levy monopoly prices on advertising parties.

Advertising aversion

Above it has been demonstrated that on a SNS platform, end users form a large potential clientele and are thus valuable to all sorts of firms. The firm should be then asked an appropriate price to interact with users, for example by means of advertising fees. What is unique about SNSs however, is that the other way around, for at least a significant percentage of users, this relationship doesn't hold. It has been mentioned already that users come to Facebook with the primary aim to interact with other users. As a matter of fact, Dickinger et al. (2008) empirically found that the presence of too much advertising is by many users perceived as bothersome. Armstrong (2006) developed a model (similar to Gabszewicz et al., 2001) in which he allowed the user's attitude towards advertising to vary. He found that if users dislike platform advertising, both advertising pricing and platform profit are higher under a lump-sum charging pattern compared to per-reader charging. If the end-user is ad averse, a trade-off arises between the amount of ads the platform can channel to its users and the number of declined views as a result of nuisance from the ads. This implies that competition between platforms, in terms of pricing, is ineffective because lower advertising fees enlarge the quantity of ads, but also impair on the number of views. As such, price-undercutting on the advertisers' side is not a competitive outcome. In fact, one can infer that lump-sum monopoly prices can be imposed on advertisers without loss of profits. Since the marginal user isn't targeted efficiently, the lump-sum structure allows platforms to partially overcome the trade-off mentioned earlier. The additional surplus is then transferred from the advertisers to the platform (Armstrong, 2006). In reality however, Facebook's revenue model largely depends on per-reader charging.

According to Armstrong, per-reader charging is only preferable if users like advertising. This theory could be the source of Facebook's enormous efforts to improve its advertising models (Curran, Graham, & Temple, 2011).

In short, this chapter has illustrated that irrespective of many assumptions about the market structure, it is the cross externality that one platform group imposes on the other (and vice versa) that determines how prices are levied. Yet, even if users value the presence of ads, Bolt and Tieman (2007) predict that they're exempt from usage fees. Since user demand is more price elastic (in absolute terms) than advertisers' demand for advertising space, the price imposed on the first group is minimized, at the expense of the second group. When platforms compete and users diffuse across them, the users' price elasticity of demand is likely to remain unchanged. If users can't multihome, a possible strategy for platforms in terms of pricing could then be to levy negative prices on users. In other words, the platform could pay a fee to its users and by these means obtain full market share. To recover its losses, the SNS has to increase its advertisement fees again. This strategy can be pursued as long as the cost of attracting an additional user is below the additional advertising revenue. Yet, it has been this paper's primary goal to rebalance the skewness of a SNS pricing pattern, and as such the strategy of further lowering the user price is in conflict with this paper's aim. The following chapter explores a more plausible opportunity to increasingly align the interests of advertisers, platforms and users; the improvement of advertising models. Several frequently used models are discussed as well as their respective impact on efficiency effects of competition between platforms.

Advertisement pricing: PPM, PPC & PPA

In contradiction to the theoretical arguments above, SNSs and other online portals that rely on advertising as their primary source of income, conduct price patterns that hinge on per-viewer charging. The next section revises these charging models and their respective roles in the efficiency effects of competition.

Introduction: PPM & PPC

The theoretical approach to pricing structure provides valuable insights in what might be socially optimal for the SNS industry. Yet, there's more to advertisement pricing that might help explain the existence of SNS monopolists. The following section analyses several relevant factors and incorporates them into the previous literature. An initial problem occurs when the grounds on which advertisement fees are levied, are defined. Is the aim of the ad to inform potential customers? Or is the ad's intention to generate additional sales? This question has had major implications for further research and has complicated analysis for quite some time. Recently, the Cost-Per-Action (CPA)/ Pay-Per-Action (PPA) charging scheme (Nazerzadeh, Saberi, & Vohra, 2008; Mahdian & Tomak, 2008) has been introduced to resolve this problem. Before the CPA method was fully established, the prevalent revenue models were the Pay-Per-Impression (PPM) model and the Pay-Per-Click (PPC) model. In the PPM model the advertising party pays whenever the ad is viewed by a user, which makes it suitable for raising brand awareness. Unfortunately, the advertiser faces the risk of paying for views from consumers who are not in its target audience (Mahdian & Tomak, 2008). Online advertisers have been therefore increasingly opting for the PPC method of charging, which heavily reduces this risk. Most of Facebook's revenues (as well as other SNS's revenues) are based on the PPC charging scheme, as is illustrated by its revenue function[6]:

> *Monthly average users (MAU) * average revenue per user per month (ARPU)*

The average revenue per user per month (ARPU) can be roughly divided into several components;

> *Number of newsfeed items viewed in a month (think time user spends on Facebook) * ad load * price per ad*

In the formula above, the *ad load* is defined as the amount of ad-based content on one's newsfeed relative to non-ad content[7]. Furthermore, the *price per ad* largely depends on the *Click-Through-Rate* and the

[6] https://www.quora.com/How-does-Facebook-make-money
[7] http://theonlineadvertisingguide.com/online-advertising-glossary/a/ad-impression/

advertisement bid (the price that advertisers offer for an advertising slot). The structure of the function roughly resembles the PPC pricing structure. Fjell (2010) derived a model[8] that compares the profit maximizing quantities of adverts under PPM- and PPC-pricing structures. Under either of the two extremes (only PPM or PPC) and all possible compositions in between, the optimal amount of advertising is negatively correlated to market power (Fjell, 2010). To explain why, Fjell (2010) defines the amount of advertisement on a platform as the implicit price a user has to pay for having access to the platform. As the quantity of adverts decreases (and thus the implicit price), the number of views increases and the elasticity of these views with respect to adverts becomes lower. This is in congruence with the user's actual perception of adverts: a few are acceptable, but above a certain quantity they are regarded as disturbing. If the (absolute[9]) elasticity of views with respect to adverts increases, the optimal level of adds straightforwardly should be lower. Put differently, the abler the platform is to raise its advertising fees without losing too much clients (more market power), the higher the advertising price, the lower the resulting advertisement quantity and the higher the number of users/ visits (ceteris paribus). Again, the end-users' surplus is preserved (subsidized) at the expense of the advertisers.

In short, the negative direct effect of increased prices on advertisement revenue is offset by the indirect effect of increased visits. In equilibrium, these two effects should mitigate each other. This can be observed in the ARPU-formula on the previous page; the *number of newsfeed items viewed in a month* and the *price per ad* are positively correlated and move in the opposite direction of the *ad load*. One can infer that under increased competition, the market power of platforms shrinks and the number of advertisements increases while the number of views/ users declines. Thus, more competition on the advertisers' side might in fact be harmful to the allocative efficiency within this market.

PPA: resolves many deficiencies

Recently, advertisers have taken it a step further by gratifying the platform's fees only if the targeted customer actually executes the desired action (Nazerzadeh, Saberi, & Vohra, 2008). This charging scheme was titled Cost-Per-Action (CPA)/ Pay-Per-Action (PPA). The 'action' is traceable by the advertiser and can be of various natures (e.g. filling out a form or purchasing a product). The largest advantage of the PPA method over the traditional PPC scheme is its relative insensitivity regarding click fraud (Nazerzadeh, Saberi, & Vohra, 2008; Kshetri, 2010). Click fraud is committed when a party generates clicks with no

[8] Specific set of assumptions which makes Fjell's analysis very applicable to this paper's theory; imperfect competition, the ad publisher is a price setter (implies monopoly or differentiated oligopoly), number of views decreases in advertising and a constant click-through-rate.

[9] Number of users/ views is negatively correlated to adverts.

intention of further engagement with the advertiser. Sources of such click fraud include agents that wish to obtain a larger share of the advertising revenue (the platform) or agents that wish to harm the specific advertiser (the advertiser's competitors). Over the past years, Facebook has received many allegations of 'facilitating' click fraud at the expense of (primarily smaller) advertising firms[10]. The adoption of the PPA charging scheme has helped many online-based platforms (including Facebook) to at least partially overcome this problem, making it costlier for malefactors to exercise click fraud (Nazerzadeh, Saberi, & Vohra, 2008). Click fraud could be considered as a faulty means of extracting surpluses from a specific side of a platform which hurts the market's allocative efficiency. In this respect, the introduction of platform competition would have substantial positive effects, if users as well as advertisers are allowed to multihome. Assuming that there's no possibility of collusion and that the platforms commit click fraud to any different extent, it is easier for advertising parties to observe suspicious patterns in click-to-success conversion.

Another improvement entailed by the PPA model is the lower trust requirement (Mahdian & Tomak, 2008). Since in the older models (in particular the PPM) the end-user activity statistics (impressions and/or clicks) are measured by the ad publisher (=platform), the platform has much incentive to manipulate the numbers in order to maximize its profits. The PPC setting does in fact mitigate the scope for platforms to deceive the advertisers to some extent already. The PPA pricing scheme takes it a step further by completely eliminating this problem, whereas the advertiser accounts for the actions and only pays after the action has taken place. Alas, the fact that the advertiser has to report to the platform brings about another issue: the advertiser now has an incentive to report untruthfully (Nazerzadeh, Saberi, & Vohra, 2008; Mahdian & Tomak, 2008).

Agent's truthfulness preserved in PPA-structure

However, Nazerzadeh et al. (2008) proposed a mechanism that safeguards the advertisers' truthfulness. The mechanism concerns a specific form of auction[11] to sell advertising slots to advertisers, as happens with many adverts that we see on our Facebook wall. In such an auction, competing agents bid for slots. These 'bids' are based on the expected value an advertiser derives from having the add published. If the advertiser has the winning bid, its add is published (Goldfarb, 2014). The advertiser can subsequently choose to misreport the effectiveness of the publishing and pay a lower price to the platform. In a one-

[10] http://thesocialmediamonthly.com/startup-ceo-alleges-massive-click-fraud-on-facebook/

[11] An advertising fee/ price, as has been referred to throughout this paper, can be defined as the reserve price the platform uses to approximate its desired revenue.

shot auction, this could save the advertiser advertisement budget. Hereto, it must be noted that such auctions take place continuously. By approximation this implies an infinite auction. Thus, a party that chooses to successively report a low action rate would be expected to place low bids after a few rounds. If on the other hand, this advertiser maintains high bids, he could be easily identified by the platform and exempted from the auction. When Nazerzadeh et al. (2008) incorporated the stochastic process of learning (i.e. agent's expectations are conditioned on complete history of actions), they indeed found that an advertiser doesn't maximize its own payoff if misreporting, assuming that other agents also act truthful. A final solution the platform has to solve this problem is to use monitoring software (Mahdian & Tomak, 2008). Next, we could consider a case in which there are multiple platforms and theorize what effect this has on the likelihood of misreporting. In various sections above, it has been explicated that it is the market power of social networking services that enables them to exempt end users from any fees and compensate for this through higher advertisement prices. If market power breaks down (through increased competition) the advertising fees shrink and the ad load per viewer will increase. As such, the number of advertisement slots as well as the number of the corresponding auctions grow, in particular when the end-users can multihome. The platform now has more opportunities to screen the reporting behavior of the advertisers, which might have a deterring effect on misreporting. A second effect is that an ad's effectiveness decreases as its numbers increase. This increasingly unifies the actual amount of actions that result from an advert and the minimum amount of adverts the advertiser could potentially misreport (which is still reliable). The way in which the scope for misreporting under the PPA-mechanism decreases as an effect of increased competition is thus twofold.

To sum up this section, the transition from the PPM to the PPC to the PPA pricing mechanism has shifted the allocation of advertising profits from the platform to the advertisers. The cost-effectiveness of advertising increased, enhancing the advertisers' willingness to pay. Price competition between platforms then has less effect on the distribution of advertisers amongst the intermediaries. Another factor that softens the impact of price competition on the advertisers' side, is the user's aversion with respect to adverts. If platforms compete by means of undercutting each other's advertising prices (i.e. increasing ad quantity), this inherently induces a declining number of users or views. An alternative way for platforms to compete could be on the users' side, through decreasing the implicit price they pay for usage of a platform: a lower number of advertisements. The concomitant loss of revenues can subsequently be retrieved by increasing advertising fees. Concluding, even under the presence of competition, the users are free of charge and advertisers pay monopoly prices.

Conclusion & Discussion

Conclusion

This literature review set out to investigate whether increased competition can improve the economic efficiency of SNS-markets. In line with standard economic theory, it was initially assumed that competition between platforms indeed should be able to do so. By offering lower advertising fees than its rival, a platform can attract firms that wish to advertise. A second platform can subsequently react by undercutting the price asked by the first platform. In the end, a market outcome is established in which the number of advertisers is equally divided amongst the platforms and the advertisers regain surplus. However, one important aspect is overlooked in this theoretical approach: the other side of the platform, or the end-user in Facebook's case. Such two-sidedness is a unique feature of a platform. The primary task of a platform is to employ a pricing pattern amongst the two platform sides whilst keeping them both onboard. Social networking services form an unusual case, since end-users experience strong switching costs and network externalities. Particularly direct network externalities have far reaching consequences with respect to competition between platforms like Facebook.

In the first place, network externalities contribute to locking-in customers. SNS-users derive utility from interacting with one another (Dickinger, Arami & Meyer, 2008). Indeed, the utility a specific user derives from entering the platform is, at least to some extent, positively correlated with the number of users in his/her near environment that are also active on the platform. Once a platform has many users that impose a positive externality on a specific user, switching to another platform induces an artificial cost barrier to this specific user. Although such artificial cost barriers are often a reason for competition authorities to scrutinize the market in which they occur, this paper has provided several reasons to why in case of SNSs such barriers are harmless. For instance, the prospect of becoming market leader or monopolist in a market where users are locked-in, heavily stimulates ex-ante competition. One can, rightly so, argue that in such a premature market, larger firms are incentivized to predate on smaller competitors. This paper however, has revealed another, more decent, reason for why one firm may succeed and the others may fail: user homogeneity. By means of identifying its target group very well, Facebook managed to maximize the direct network effects amongst its users and it has continued to do so ever since. The introduction of competition would damage this seemingly optimal market structure in two ways. Firstly, the prospect of having to share future platform profits with a competitor might have adverse effects on platforms' intentions and efforts to develop cutting-edge business models and growth strategies. Secondly, if users

diffuse over multiple platforms and they're not perfectly heterogeneous, the direct network effects within each user group aren't as high as in the monopoly case. Thus, there will be foregone user surplus when competition between social networking services exists. Summarized, network effects between users on social networking services induce a negative, rather than positive, effect of competition between platforms on economic efficiency.

In addition to strong network effects, the pricing structure of platforms gives a solid indication of why increased competition in two-sided markets doesn't yield the same results as competition in a one-sided market. The main source of this divergence is that of cross-group externalities. End-users are more valuable to advertisers than vice versa (Dickinger, Arami & Meyer, 2008). In reaching optimal participation, a platform should set prices such that the excess surplus of the advertisers is internalized by the mediator. In other words, the advertisers pay higher fees than end-users. Since the majority of users attach little value to ads on SNSs (perhaps more on Instagram than on Facebook) and any (increase in) usage fee would encourage many of them to quit, the monetary price for users is in fact zero. A platform then retrieves profits by imposing monopoly prices on the advertisers, which are more price inelastic (Bolt & Tieman, 2007). Even if competition between platforms is assumed, the platforms are likely to stick to monopolist pricing on the advertisers' side. A SNS's primary aim is to maximize its market share of users. If users single-home, the competing platforms have monopoly access to a customer group and will straightforwardly impose monopoly prices on advertisers. If users multihome, they're not perfectly heterogeneous and the platforms should aim at obtaining maximum market share as to maximize direct network effects amongst the users. Whereas usage fees are already zero, it can choose to differentiate through superior technology or less advertisement. In either way, asking monopoly prices contributes to the strategy of maximizing the user base.

The conclusion that competition between platforms doesn't improve economic efficiency is also supported by theory from advertising economics. A more detailed study of Facebook's advertising revenue formula reveals that its constituents '*newsfeed items viewed per month*' and the '*price per ad*' are positively correlated with each other, but negatively correlated to the '*ad load*'. Assuming that users and advertisers can to some extent multihome effectively, one can hypothesize that competition implies less market power on both sides of the platform. If the result is a lower advertising fee (contradicts to earlier theories, but is considered to be isolated) the ad load on the platforms increases, but the number of views and the prices per ad decline. The marginal increase in advertisers' surplus is at the expense of the user's as well

as the platform's surplus. This paper tends to believe that in this setting, the positive prior effect is more than offset by the loss of surplus to the latter groups.

All in all, this literature review has provided an extensive overview of theory that illustrates the effect of competition on the SNS-industry. Most of the aspects have been treated in isolation for practical matters. The overwhelming majority of evaluated theory pointed out that in case of social networking services, a monopoly isn't as harmful as in regular markets. By connecting the theories of network effects, platform competition and advertising economics, one should encourage the presence of a monopolist rather than to disregard it. In terms of allocative as well as dynamic efficiency, a monopoly tends to be a superior market structure compared to any other and thus there's little reason to claim that competition should be promoted in the SNS-market.

Discussion

First of all, it would be a valuable contribution for existing economic theory to design a model that incorporates aspects of network-, platform- and advertisement-economics. So far, virtually all relevant literature concentrates on either of these three sections of economics, without drawing upon knowledge from the others. The segregated treatment of network economics and platform economics separates the effects of direct network externalities (amongst end-users) and indirect network externalities (amongst end-users and advertisers, and vice versa). Whilst it has been demonstrated that both mechanisms invalidate the efficiency effects of competition on social networking services, it would be interesting to mathematically support the joint effect. Unfortunately, it was beyond the scope of this paper to study the interrelationships from a mathematical point of view. Nevertheless, the discussed literature provides great insights into many practical aspects of social networking services and that of Facebook in particular.

For example, the intuition that network externalities amongst users is maximized when their homogeneity is maintained, can be helpful for platform startups to perform better. Facebook managed to turn a possible threat, i.e. not being able to serve the average user's interests, into a unique opportunity. Because interacting with peers is the key reason for someone to join Facebook, the company ensures that there are always enough peers for any target user. If users are more heterogeneous and could diversify over multiple platforms, the question arises what one should define as heterogeneity. In the setting of social networking services, heterogeneity has numerous forms. For instance, a teenage user on Facebook who likes sports has probably a certainly a different profile than a pensionary that is into cats. One would argue that these are heterogeneous users and thus experience little or no mutual network effects. But what if these two persons are a grandmother and her grand-son? In that case, both derive much utility from

interacting through Facebook. This example illustrates that a large pool of seemingly heterogeneous accounts may still convey a high level of network externalities. A potential idea for Facebook to internalize the network effects more efficiently, would be to incorporate a feature that is based on their general interests (such as hobbies), in which users can interact with people from outside their friend zone.

Many other platforms target a much more specific group of users (e.g. LinkedIn and Instagram) and thus experience less risk of non-optimal network effects. Such platforms are then 'protected' in the early stages of their business cycle against substitutable competitors. However, in terms of firm size, a more general platform has straightforwardly more potential to grow to a 'billion-user' size. A simple explanation stems from the fact that in the latter direct externalities between users are more important, while on a platform like *LinkedIn* the indirect externalities between users and firms/ advertisers serve at least an equally important purpose, which is more restrictive. Therefore, it is not surprising that a people who go online, are often active on multiple platforms. The extent to which the platforms are substitutable, determine whether a user is multihoming or not. This paper has chosen to mainly focus on direct substitutes (e.g. Facebook and Google+) because by doing so, one minimizes interfering noise. It might well be that a comparison between Instagram and Facebook yield different results, but that doesn't contribute to the core of this research.

Finally, it is interesting to observe that platform competition in terms of pricing is ineffective. The consequences with respect to innovation are large: competition in terms of platform quality is key to outperforming rivals. There's a twofold advantage to platform innovation. On one hand, users derive utility from an increasing service level. For instance, Facebook users receive anniversary notifications, highlights of long-lasting friendships and since recently Facebook also offers a function that should prevent people from committing suicide. On the other hand, Facebook explores and exploits opportunities to increase its advertising revenues. By innovating in the field of advertising, they've managed to increase indifference of users with respect to ads. In line with Armstrong's (2006) theory, that predicts a higher platform profit under a per-viewer charging scheme when users are less ad averse, Facebook's efforts have been (and still are) profitable. Since the innovation enhances the effectiveness of ads, the advertising parties' willingness to pay increases. Perhaps the exact reason that Facebook can demand monopolist prices is because it offers the most effective means of targeting. In fact, competition between social networking services might be welfare detrimental after all.

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