[DRAFT] Regulation of competition among information aggregators in multi-sided markets *

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Abstract

The emerging and rapidly growing online multi-sided platforms have recently become a widely discussed issue for both the academic society and the policymakers. This growth is intensifying within the increased penetration of the Internet and other digital technologies in our life. One of the questions concerning online multisided platforms is whether there exists a necessity of policy changes. That question is driven by the fact that newly emerged business models that use network effects as a source of profit do not fit into the existing regulation. Moreover, the methods of antitrust analysis do not work in the application to online–to–offline and online–to–online business models. In this kind of interactions information aggregators provide aggregated information online to enable offline and online consumption of goods and services. Apart from this, the transformation of existing competition regulation presents additional risks to the society as it may cause regulatory mistakes and pose additional antitrust risks to companies when they are deciding a merger. Furthermore, the development of a harmonized framework for regulatory interventions into the multisided markets may be of vital importance for policy makers as it will build ground for future regulatory impact assessment for changes in Russia competition law in context of digitalization. Moreover, digitalization is said to be one of the priorities for all government departments in Russia, as well for the Federal antitrust service.

Keywords: two- and multisided markets, platforms, aggregators, competition, antitrust, enforcement errors.

1. Introduction

The fast penetration of the Internet and digital technologies in our lives has led to the boom in so called aggregators. They are a type of online multisided platforms that deal with gathering, analysing and aggregating information from different sources to enable the interaction of two or more groups of users with each other. Of course, that sort of a business model is not new: it has been around for a while. However, in the context of a rapid digitization such companies as Amazon, Google, and eBay have grown enormously over the last two decades. It has also promoted transformation in many industries that now provide online-to-offline and online-to-online services: they integrate offline and online consumption and online operations. An example of such a service the recently gained much popularity taxi apps. This service provides an online match of passagers and drivers who then meet offline to transact (to give and get a ride).

These digital platforms have different from traditional business model physical capacity constraints so that they can quickly enable a huge number of interactions between groups of users who join it. The enormouse growth of digital platforms is mainly caused by the supply-side and demand-side scale effects that lay in the core of their business. Unlike in the industrial economics with the focus on production and physical assets, digital platform models are based primarly on the demand-side scale effect. Its driving force is network effects.

There exists two main types of network effects: direct and indirect. The direct network effects may arise, for instance, in the traditional telecommunications where the more users engage in the communication on the platform, the more value gets the communication. The other type of network effects is indirect. It can appear when a platforms brings two or more distinct groups of users together who benefits from the presence and number of users on the other side. One example is software platforms that enable the contact of programmes users and their developers. The more users join the platform,

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the more benefit can the developers obtain using the platform and vice versa. This network effect may be positive as well as negative. In this paper we will concentrate on the aggregators that deal with the possitive indirect network effects. Negative indirect network effects usually appear on the third side of the platform: for example, when a platform invites advertisment providers. That happens when there are already many users that join the two-sided platform, usually that does not work for a new one as it levies costs on some users and may prevent them from using the platform.

Emergence of an aggregator on a two-sided market is possible when it reduces average transaction costs [Shastitko, Markova, 2017]. For the consumer side an aggregator significantly reduces search costs, because users can find there information on different goods and services. Moreover, an aggregator can offer consumer just one option. At the same time, the more producers of goods and services are connected to the platform, the higher is the consumer surplus due to the existence of indirect network effects. Producers, in turn, may shift costs of searching the clients to the aggregator. The reduction of transaction costs for the aggregator's clients reflects a way to internalize positive indirect network externalities.

There are also several instruments the aggregators may use to manage the number of users joining it and the volumes of transactions that take place on the platform. This includes price and non-price ones. In particular, the aggregator may engage one particular group of users to use it. That is a way to extract revenues from another group of users joining it. Managing users participation and the volume of transactions on the platform depends on the ability of platforms to persuade users to join the platform. Users may cater their own past decisions or forsee other users' decisions. That is why, for example, taxi aggregators use discounts to attract new users.

Information aggregators is a type of multisided platforms [Shastitko, Markova, 2017]. There are several angles to define multisided markets. The first one is price structure. [Rochet, Tirole, 2006, Kaiser, Wright, 2006] suggest that two-sided platforms have an noneutral price structure, so that the platform can change the number of transactions on the platform by changing the price for both groups of users. That implies that the price of the platform on the two-sided market can not be seen as a sum of two prices. The other way to separate multisided markets from other economic agents is indirect network externalities [Armstrong, 2006, p. 668; Evans, Schmalensee, 2007, p. 151; Rysman, 2009, . 127]. [Rochet, Tirol, 2003, p. 990] highlites that almost all markets with network externalities "are characterized by the presence of two distinct sides whose ultimate benefit stems from interacting through a common platform". [Weyl, 2010] suggests three main features of a two-sided platform: multiple products, cross network effects, and bilateral market power. [Hagiu, Wright, 2015] advice to add direct contact of two or more groups of users whom the platform brings together and their affiliation with it.

All in all, an information aggregator is a multisided platform that gathers, analyzes and aggregates information from different sources to enable the interaction of two or more groups of users with each other. Its business model is built upon supply-side and demand-side scale effects, whose driving force is indiret network effects, and involves price (that are nonneutral) and non-price instruments to draw new users on the platform. The possible regulation necessity of information aggregators appears within the development of multisided markets.

This research is motivated by the changes on the markets with competing aggregators for odering a taxi in Russia. The aggregators for odering a taxi have appeared on the Russian taxi market in October 2011 when Yandex, a big company specializing in the Internet-related services and products, started an online service for ordering a taxi. Yandex.Taxi has enabled online connection of drivers to passagers so that the algorithm provided taxi drivers with orders and the passengers could faster get a ride. Later two more taxi aggregators have entered the russian taxi market: Gett in 2012 and Uber in 2013. There were and still are several regional aggregators. In May 2017 two taxi companies, Fasten and Ru-taxi, have decided to merge in order to jointly create an information aggregator for ordering a taxi that will be able to compete with the other big aggregators.

Untill the end of 2017 there were 4 big information aggregators for ordering a taxi in russian cities (this refer primarly to taxi market in Moscow and other big cities). And in november 2017 Federal antitrust service has endorsed the merger of Yandex.Taxi and Uber. The companies will not consolidate the brands instead of this they are intended to pool taxi drivers into a single platform. The Analytical Center for the Government of the Russian Federation reports that in 2017 the joint share of Yandex.Taxi and Uber was 10,4% of Russian taxi market (compared to 32,8% - the share of online taxi ordering) and the pool of Yandex.Taxi and Uber databases of taxi drivers, according to the experts, will result in the growth of their share in the online taxi ordering market up to 80%. Credit Suisse experts expect this will reach the level of 75%. In the context of decreasing share of offline taxi services and undocumented taxis the later changes in service for ordering a taxi may potentially lead to cornering the market by Yandex.Taxi and Uber. A theoretical explaination of competition and the consequences of taxi aggregators mergers may provide guidance for future government regulation of multisided platforms and informarion aggregators.

2. Regulation of information aggregators in two- and multisided markets

There are several research areas that study multisided markets. This theme can be found in the papers on different topics from industrial organization studies, game theory and management to network economics, market design and social science. There are two main directions of research of multisided markets in antitrust and industrial economics: price setting and competition between multisided platforms and above this regulatory issues.

2.1 Competition in two- and multisided markets

This paper adds to a the body of literature on two- and multisided markets which starts from the seminal papers of Rochet and Tirole (2003, 2006), Caillaud and Jullien (2003) and Armstrong (2006). They describe new competition models that occure on two-sided markets in presence of indirect network externalinies and other specific features (multihoming and tying [Armstrong and Wright, 2007, Amelio and Jullien, 2007, Choi, 2010], information asymmetry [Halaburda and Yehezkel (2013)].

Two- and multisided platforms bring together distinct groups of users. The way they cope with this lies in the price structure they set to both sides. As the platform should take into account the interdependence of the connected sides on price when deciding on the price structure. From a one-sided point of view the price charged by a company should at least cover its marginal costs. That does not always work for multisided markets. A platform may decide to attract one group of users charging a price that does not cover the costs incurred to serve this group. Instead of that it receives additional profit, on the one hand, from the emerging indirect network effect, and on the other, from the other group of users. In fact sometimes multisided platforms work in the following way: they subsidize one group of users and charge fee for the other. For example, joining the job search platforms companies have to pay the platform for the membership and/or for posting vacancies (usage fee) whereas the jobseekers are offered free access to the search.

Apart from price setting issues, models of competition are studied as well in the literature. Two basic models that lie in the core of most later model on competition in multisided markets are those developed in the papers by Armstrong (2006) and Rochet and Tirole (2006). They employ fairly parallel approaches: they assume there are two groups of users who decide whether to join one or several platforms. The later papers add new assumptions to the models to make it more externaly valid. For example following on from the [Armstrong, 2006] model with Hotelling specification, [Wang, Chen and Wu, 2017] examine the effects of different types of government regulation on competition in two-sided markets. In the same way [Peitz and Valletti, 2008] analyse competing media platforms. [Jullien, 2011] considers Stackelberg interactions between two-sided platforms.

The way two- and multisided markets are organized suggest that competition on prices is much more likely. Sometimes multisided platforms instead of charging a price use discounts or subsidies to attract users. There is not much research of this type of price setting on multisided platforms. [Amelio and Jullien. 2012] account tying as an implicit of subsidizing one of the sides. [Wang, Chen and Wu, 2017] show how platforms to order a taxi in the Hotelling model can use coupons to attract passengers.

Later works tackle special features of multisided markets. For example, [Armstrong and Wright, 2007] build a model fo two-sided market with different degrees of product differentiation and the possibility of multihoming. Different types of market clearing are also investigated. [Weyl, 2010] adds to the general theory of monopoly platform in the two-sided market where platform users differ in income or scale. [Azevedo and Leshno, 2014] explore the two-sided matching market where two groups of users with complex heterogeneous preferences meet. [Rietveld, Joost and Eggers, 2018] explore the dinamic competition on video games platforms where consumers have heterogeneous preferences.

Despite this mass of the research on two- and multisided platforms, to the best of my knowledge, there are a few papers that compare mechanizms of competition in two- and multisided markets in terms of social welfare that is needed to analyze the alternatives of competition regulation.

2.2 Mergers in two- and multisided markets

Regulation is the other direction of two- and multisided markets research. There are several papers that present an overview of possible implementation of multisided considerations into the antitrust analysis [Evans, 2002, Hesse and Soven, 2006, Hesse, 2007, Rysman, 2007, Evans and Schmalensee, 2013, Auer, Petit, 2015, Grkaynak, et al., 2017] and collusive practices on two- and multisided markets [Evans and Schmalensee, 2008, Ruhmer, 2010, Dewenter, Haucap and Wenzel, 2011]. However, less papers are related to the analysis of merger effecting competition in two- and multisided markets. Nevertheless, as [Sidak, Singer, 2008] highlight, there exist much debate on horisontal mergers in high–technology industries and competition authorities should take a closer look on such cases.

Most of the papers that investigate merger effects concern markets with negative indirect network effects [Budzinski and Katharina Wacker, 2007, Affeldt, Filistrucchi and Klein, 2013, Ambrus, Calvano and Reisinger, 2016]. For example, [Filistrucchi, Klein and Michielsen, 2012, Affeldt, Filistrucchi and Klein, 2013] advice different tests and methods to

analyze possible merger effects in such two-sided markets. [Jeziorski, 2014] studies a wave of mergers that occured in the US radio industry in 1996-2006 and their influence on the consumers an advertices. These cases are quite far from the competition between the aggregators for ordering a taxi.

There is also an analysis of the effects of merger in two-sided market resulting in monopoly. [Chandra, Collard–Wexler, 2009] study the effects of mergers on two-sided markets with two platforms: so that after the merger in the newspaper industry there turns out to be a monopoly in the market. They investigate how the merger is going to change prices for the users and show that it may "not necessarily lead to higher prices for either side of the market".

Nevertheless, I assume, these cases can not be viewed as analogous to the current situation on Russian market for online ordering a taxi, because, on the one hand, there is no monopoly in this market, and on the other, all market agents deal with positive indirect network effects.

3. The model

The first question in modelling the market with the aggregators for ordering a taxi is ti indentify the relevant market. That is somewhat challenging in multisided markets [Gurkaynak et al., 2017]. One approach for that is to define the relevant market based on the paying or subsidized side [Filistrucchi et al., 2014]. The other approach, that seems to be more appropriate in terms of outlined in the previous part of the paper characteristics of multisided platforms and can potentialy help to avoid some errors, is to define the relevant market considering all user groups that the platform brings together [Filistrucchi et al., 2014, Auer and Petit, 2015]. What is more, applying in the SSNIP test the price structure instead of the price on the one side may provide additional information on market [Filistrucchi et al., 2014].

However, [Gurkaynak et al., 2017] claim that "it [is not] possible (at least at the current stage of the multisided markets theory) to come up with a SSNIP test model that can be applied uniformly in multisided markets". That is why in the model I will use a composite good as an alternative to the sevrice provided by the aggregators for ordering a taxi in the two-sided market.

There are several common ways in literature to specify the model of competition in a two- or multisided market:

- In the paper [Rochet and Tirole, 2003] the model describes platforms that enable transactions between pairs of end users of two types: "byuers" and "sellers". They decide whether to join the platform comparing their surplus, price and costs associated with using the platform. The authers allow multihoming on one side of the platform.

- In the paper [Armstrong, 2006] competition in the multisided market is viewed in terms of a Hotelling functional form for the consumer market share function. On the taxi market there can be from 3 to 4 different aggregators for ordering a taxi at the same time. The results are sensitive to the cost assumptions. And as the only cost that the consumer faces is the price of joining the platform (in form of usage or membership costs) and there are sometimes 3 platforms in the market, there can be problems while searching the equilibrium.

In this section the assumptions for a model of two-sided market with three platforms competing with each other will be formulated. For the choice function of consumers I will use the approach of [Rochet and Tirole, 2003]. There are two types of agents in the model: buyers (consumers or passengers $i \in i, B$) and sellers (producers or taxi drivers $j \in i, S$). They are served by the platforms in the market in terms of enabling a transaction between pairs of them. In the model the passengers and taxi drivers singlehome: they can choose just one option in a moment of time. That does not mean that they can not install and use two or more apps of the aggregators (platforms), but they are able to use just one app at a time to order a taxi or to give a ride.

The passengers may download an app for free so that they do not face membership fees. The same situation is with the taxi drivers: they don not face membership fees in terms of the model. However in Russia taxi drivers have to pay a fee to get a licence and, in case of Yandex.Taxi who works with taxi companies, taxi drivers sometimes have to pay for joining the company, especially I am referring these to the case of shadow companies. Moreover I do now look at taxi companies in the market that join the platform: they are viewed as alternatives in a composite good.

In the model I assume that the platform pricing is linear. That does not correspond with the actual pricing strategy in the taxi market although it simplifies the analysis.

3.1 Passengers

Economic value is created by transactions between the pairs: a driver and a passenger. Buyers (passengers i) are heterogenous in their gross surplus $b_{k,i}$ of joining the platform k. This can be asociated with their preferences, their utility from the ride and their loyalty to the aggregator. The only cost of transactions that the passanger faces is the price of a ride that the taxi aggregator (the platform k) bids $p_{k,i}$.

The passengers' demand depends only on the price $p_{k,i}$ of the aggregator, gross surplus $b_{k,i}$ and the inderect network externalities: the utility of the passenger depends on the number of taxi drivers on the platfork k: $N_{k,j}$. This indirect

network externality can be also seen as the speed of the taxi arrival. The utility of the passenger i to join the platform k is: $U_{k,i} = (b_{k,i} - p_{k,i})N_{k,j}$

The buyers' "quasi-demand function" for the platform k [Schmalensee, 2002] is the probability of the passenger to join the platform k: $N_{k,i} = Pr[(b_{k,i} - p_{k,i})N_{k,j} \geq max_{-k}\{G; (b_{-k,i} - p_{-k,i})N_{-k,j}\}]$, where G is the net surplus from the best composite good.

3.2 Drivers

The drivers are similarly heterogenous in their marginal costs $_{k,j}$ of enabling the transaction on the platform k which can be asociated with their technological differences and preferences (for example the costs of learning to use the app). The drivers face the price of a ride that the taxi aggregator (the platform) bids $p_{k,j}$.

The drivers' demand depends only on the price $p_{k,j}$ of the transaction (marginal profit), marginal costs $_{k,j}$ of enabling the transaction and the inderect network externalities: the profit of the taxi driver j depends on the number of passengers on the platform k: $N_{k,i}$. This indirect network externality can be also seen as inverse to being idle.

The profit of the driver on the platform k is: $\pi_{k,j} = (p_{k,j} - c_{k,j})N_{k,i}$

The drivers' "quasi-demand function" on the platform k [Schmalensee, 2002] is his (her) probability to join the platform k: $N_{k,j} = Pr[(b_{k,j} - p_{k,j})N_{k,i} \geq max_{-k}\{G; (b_{-k,j} - p_{-k,j})N_{-k,i}\}]$

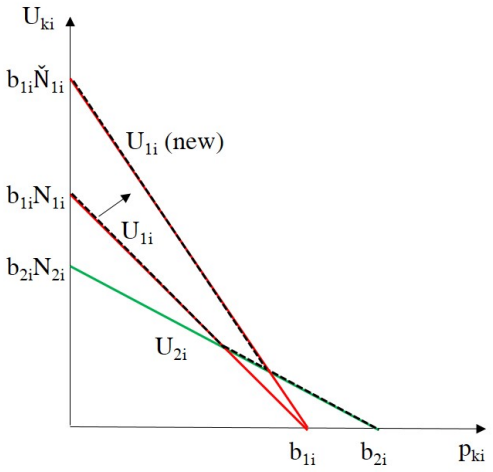
3.3 Platforms

There are platforms (aggregators $k \in 1, N$) in the market. The platform k marginal costs of a transaction are $c_k > 0$. It chooses the price level for both sides of the transaction:

$\Pi_k = \sum_{i=1}^{B}\sum_{j=1}^{S}\{p_{k,i} - p_{k,j} - c_k\}N_{k,j}N_{k,i}$, where $N_{k,j}N_{k,i} = Pr\{i$ joins the platform k, j joins the platform $k\}$ – is the joint probability of two decisions [Schmalensee, 2002].

3.4 The choice of the platform

The Figure 1 shows the effect of the growth in the number of taxi drivers on the choice of an aggregator by a passenger.



The growth in the number of taxi drivers leads to the growth of probability of choosing the aggregator with more drivers.

Figure 1: The number of taxi drivers growth and the choice of an aggregator ($N = 2$).

4. Conclusions

I am looking forward to see the effect of the merger of two aggregators in the two-sided market. The Federal antitrust sevice suppose that in terms of the market growth. If it does not grow, then the anticipated effects of the merger may be not clear. This is now a draft of the ongoing research incomplete and progressive one.

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