

The Development of Digital Business Platforms as a Challenge for Regulation

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Abstract

The technological developments of 'digitisation' during the recent years gave rise to new models of value creation such as digital business platforms and a new dynamics of markets, in which at least one side of the market can get services 'free of charge'. This development challenges traditional economical approaches based on market failure and/or anti-competitive actions. This paper will start with the hypothesis that the current digitisation is a development far from equilibrium with constantly changing competition of firms and competition of business models. Three developments can illustrate this 'digital paradigm'. The so-called internet browser war is an example for a competition over time with 'winner takes it all' for limited periods. A browser is an example for a digital product free of charge, but with a high value for consumers: from the beginning with the first browser Mosaic via the 'war' between Netscape Navigator and Internet Explorer and an interim phase with Firefox and Safari to the current partial dominance of Chrome. The dynamics of open markets can be illustrated by the development of search engines, which started with (today nearly forgotten) AltaVista, Yahoo, Lycos & Co., matured with Google's approach of Page Rank and Sponsored Links, reorganised today with Amazon as a product search engine and is going to change with voice-based assistants like Amazon's Alexa, Google Assistant and Microsoft's Cortana. Those developments lead to a new generation of world-leading firms by market capitalisation with business models based on the analysis of aggregated data and triggered the discussion about (potential) obligations to 'share data'. Finally, digital business platform provide a new type of 'reverse' value creation (matching in two-sided markets, with consumers 'paying' with data and monetarisation towards producers and/or advertisers). However, business platform compete on different levels: from global BigTech firms via tier-2 and tier-3 platforms to individual companies with own platforms. This paper concludes that these examples illustrate the current market dynamics of digitisation far from equilibrium and the challenges for regulation including the problem, when services are provided 'for free' to consumers. Nevertheless, there is no evidence for a market failure (according to traditional definitions), but there is a danger of pretence of knowledge to apply old concepts of equilibrium markets. For such a dynamical development, this paper proposes that clear ownership rights including ownership rights on data, unimpeded freedom of contract, responsibility of business platforms not to discriminate third parties, and technology-agnostic regulation, legislation and taxation are key factors for sound regulation in the era of digitisation

Introduction

A fully efficient and competitive market is a simplification - with assumptions - in economic theory, as real-world open markets are always 'surprised' by the non-equilibrium dynamics of new progresses. The technological developments of 'digitisation' during the recent years gave rise to new models of value creation such as digital business platforms and a new dynamics of markets, in which at least one side of the market can get services 'free of charge'. This development challenges traditional concepts, how to define markets and market power - usually based on market failure in an economic equilibrium and/or anti-competitive actions such as 'active' monopolies or cartels in a steady state.

The persistently ongoing innovations in the digital economy support the hypothesis that digitisation is a development far from equilibrium with constantly changing competition of firms and competition of business models. It is without the scope of this paper to discuss this hypothesis in general, but two questions will be discussed based on empirical evidences:

- What facts are observable about the dynamics of digital markets and is there an answer to the question about a 'tipping point' (with a 'shift from a competitive market to a monopolistic situation especially due to information asymmetries)?
- Which models of value creation can be applied to 'platforms' (with a differentiation between 'internal' value creation for the firm versus 'external' value creation for the users - on both sides of the market - and all stakeholders) and how does competition between 'platforms' look like in the present digital economy?

Digitisation is characterised by the availability of global information in the internet and by a tremendous reduction of transaction costs (transaction costs in the sense of the theory of O.E. Williamson, 1981). More than half of the top10 companies by market capitalisation are typically 'digital' firms - existing less than twenty years – with unconventional business models. These models combine nearly zero transaction costs with 'free of charge' services for consumers and challenge traditional economic approaches including Baumol's 'Contestable Markets' (Baumol, Panzar and Willig, 1982; concerning 'natural' monopolies, but with non-zero prices) and Coase's 'Social Costs' (Coase, 1960; discussion harmful effects of a firm on other ones in an improvement of Pigou's 'Economics of Welfare' of 1920, but without any idea about the effect of products offered for free to enhance network externalities).

Three examples will be used to illustrate the digital economy from an empiric perspective: the internet browser war as quantitative example for the development over longer time scales, the case of search platforms as a qualitative proxy for the dynamics of open markets, and the value creation by digital business platform on different scales (global, regional, specific).

One result of digitisation, for example, is a transparency of information never seen before. Search engines and comparison portals returned '(market) power to the people'. Of course, no real economy will ever achieve full information symmetry – and if, this situation will just remain for a logical second. The transparency of market information comes along with a new market power of intermediaries in the form of digital business platforms, which could cause (harmful? - see the question of Coase, 1960) collateral effects on other players. For example, the current book market provides unprecedented benefits to consumers (due to tremendous availability) and to niche publishers (due to visibility for the first time). Of course, these benefits come along with the dominance of Amazon – as the second firm ever to leapfrog the one billion U.S. Dollar market capitalisation hurdle – but is this actual development a market failure or a proof for an 'unveiled' efficiency of digital markets? Such a judgement is beyond the scope of this paper. However, the three already addressed examples will be used to illustrate the development of digitisation, which are unpredicted by 'non-digital' concepts, and the new ways of value creation for firms and stakeholders.

The internet browser 'war' as example for intertemporal competition in the era of digitisation

The so-called 'browser war' of the graphical internet browsers from 1994 on - is characteristic for the danger to use simple models for dynamic developments too fast. The facts are (i) the development of market share of the browsers and (ii) the chronological list of events. Both progresses can be correlated. The events do not represent the consumer reaction, and a causal link between the events and the market share would be speculative. Nevertheless, some conclusion can be derived from both datasets. The development of market share is shown in Fig. 1 and the list of events in Table 1.

As insight from this 'browser war' as a prototype software 'for free' one can summarize a couple of observations:

- Instead of a competition in an equilibrium of a steady-state competition, browsers exhibit a 'winner takes it all' behaviour at a given time, but with an intertemporal and path-dependent dynamics of competition on a global scale (from Mozilla and Netscape via Internet Explorer to Firefox and Chrome).
- There is no evidence for a tipping point (with a final transition from a 'competitive' to a 'monopolistic' market) or for a lock-in to a particular technological product. In the past, the competition developed in multiple waves, but it is an open issue, whether this could serve as a blueprint for future developments.

- New technological developments (mobile browsers, voice-based digital assistants and potentially 'wearable devices' in the future) could trigger further developments with continuously changing competitors.
- Although there were two actions against anti-competitive behaviour of Microsoft, no clear effects are obvious from the development of market shares (U.S. Antitrust Suit before the phase of dominance of the Internet Explorer and EU adoption of Microsoft's commitment after beginning decline of the dominance of the Internet Explorer).

With due regard to a very cautious treatment of correlations, the case of browsers - as a prototype for 'free of charge' software/services accessible to all consumers - indicated a strong voice of the customers. Although this analysis is much too coarse to reveal details and implicit impacts of strong market positions, there are no evidence for a market failure, as long as everybody can download some software (or access a service online) free of charge. Consumers seem to decide for the most convenient selection from their point of view independent of the vendor, its size or its legacy, which includes the convenience of using a 'bundled' software.

The example of search platforms and 'the winner takes it all'

Twenty years ago, nobody would have even thought of Google, its innovations and its success. In the early years of the World Wide Web, Yahoo was a very popular internet portal with the approach to provide links to the internet via manually edited yellow pages, which failed due to the unpredicted growth of the internet. First search engines like AltaVista, Infoseek, Excite, and Lycos (names all long forgotten) tried to help users to find content in the internet, but also failed after some time.

AltaVista was established in 1995 and became one of the most popular early search engines due its high speed. At the beginning, it was created by researchers at Digital Equipment Corporation (DEC; in the 1980s the second largest computer company in the world) as a technical showcase for DEC's new 64-bit processor 'Alpha' computer series. Yahoo licenced AltaVista as exclusive provider of search results in 1996. After the acquisition of DEC by Compaq in 1999, AltaVista was sold and later ended up at Yahoo (using the brand, but not the technology). In an influential paper 'Graph structure in the web' (Broder et al., 2000) researchers from AltaVista, IBM and Compaq gained insight into the macroscopic structure of the web.

Year	Event
1993	First graphical internet browsers released Cello, Arena, Lynx, tkWWW, and Mosaic
1994	'Don't look now, but Prodigy, AOL, and CompuServe are all suddenly obsolete - and Mosaic is well on its way to becoming the world's standard interface.' (quote; Gary Wolfe in Wired)
1994	Launch of Netscape Navigator (free of charge for non-commercial use only)
1995	Release of Microsoft's Internet Explorer 2.0 (for free, even for commercial companies)
1997	Launch of Internet Explorer 4 integrated into Microsoft Windows
1998	U.S. Justice Department Files Antitrust Suit Against Microsoft for Unlawfully Monopolizing Computer Software Markets ('bundling' of Internet Explorer with Windows)
2001-2005	Stagnation of development with (dominating) Internet Explorer 6 with few new features
2003	Apple's Mac OS shipped with the Safari browser
2004	Mozilla Foundation and Opera Software started to develop new browsers based on open technology standards which more capability (Firefox and Opera)
2006	Release of Internet Explorer 7 with features already implemented in Firefox and Opera
2008	Launch of Google's Chrome browser for Microsoft Windows (and in 2009 as open-source version also for other operating systems with a concept of rapid releases)
2009	Legally binding commitments of Microsoft to provide a browser choice screen (for selection of different browsers) for five years adopted by European Commission
2010	Beginning of 2010, Firefox 3.5 head to head with Internet Explorer
2012	Google's Chrome head on head with Firefox, but strongly growing
2013	European Commission fines Microsoft €561 million for non-compliance with browser choice commitments (failed to roll out the choice screen from May 2011 until July 2012)
2014	Significant increase of browsers on mobile devices (at the cost of PC browsers)
2016	Starting proliferation of voice-based digital assistants like Amazon's Alexa, Microsoft's Cortana, Google Assistant, Apple's Siri and Sony Assistant
2017	Internet Explorer, Firefox and Safari together below 30% market share

Table 1: Chronological list of events in the 'browser wars' for PC-based internet browser software (based on the authors' own experience with no claim for completeness)

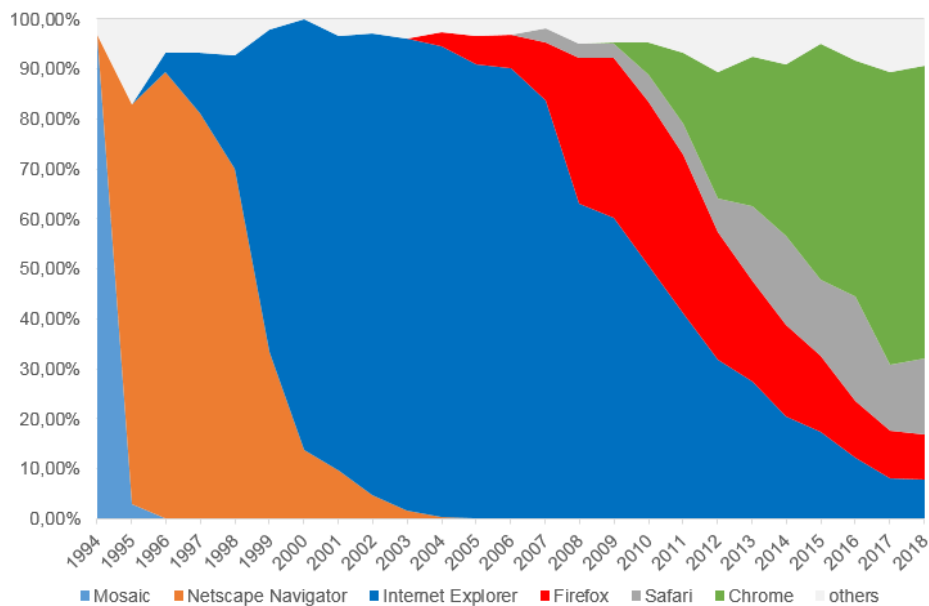


Figure 1: Usage share of internet web browsers with data as aggregated by Wikipedia (see 'Wikipedia' with: W3Counter: 2007 to 2018, TheCounter.com: 2000 to 2007, GfK WWW user survey: 1994 to October 1998/1999). Due to the different sources for the raw data, there are inconsistencies on a minor level, but the general trend is consistent across all available sources. This dataset does not include dedicated browsers for mobile phones. In addition, it does not extend to the current development of voice-based assistants (incl. internet access) such as Amazon's Alexa, Google Assistant and Microsoft's Cortana.

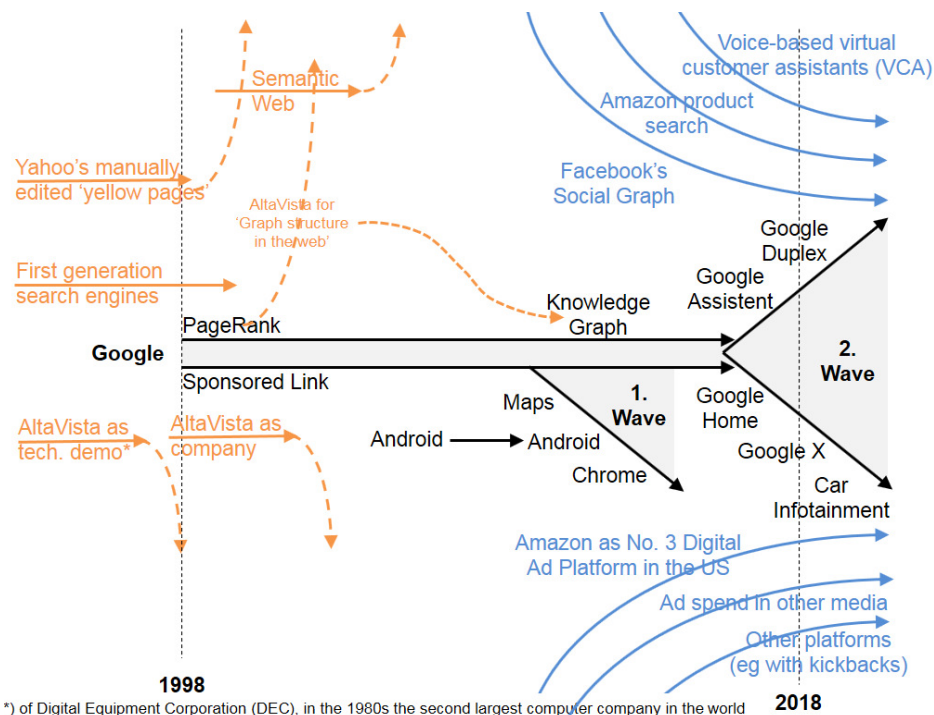


Figure 2: Evolution of internet search and development of Google in comparison to the original search engines (1998, in red) and with the current competitors and/or alternative models (2018, in blue). The upper part shows the technical developments and the lower part the developments of business models. The double arrow in the middle indicates the developments of Google's search functionality and business models. The two opening triangle indicated the two waves of vertical expansion to or, respectively, vertical integration of new activities: a first wave with products 'for free' and a second wave with commercial business models. The latter includes a recently announced global multiyear agreement that Google will equip Renault, Nissan and Mitsubishi vehicles with intelligent infotainment systems (Renault-Nissan-Mitsubishi, 2018).

At this time, many companies tried to 'boost' their web pages (e.g. to manipulate the ranking in a search table) with 'dark pages', which contained the whole English dictionary in a non-visible way to achieve a top position in the search lists. Also the idea of a 'semantic web' by the inventor of the World Wide Web, Tim Berners-Lee, et al. (2001) with an explicit description of the pages by the author was not successful, as he has to admit later (Shadbolt, Hall, and Berners-Lee, 2006). At the end of the 1990s, the organisation of web pages was on the edge of unusability, and web search with an automatic search engine was regarded as nearly senseless.

The first breakthrough of Larry Page and Sergey Brin – as explained in their seminal papers (Brin and Page, 1998; and Page, Brin, Motwani, and Winograd, 1998) – was the invention of 'Page Rank' based on the importance of pages evaluated by the links pointing to them. A further development was the 'Knowledge graph' later in 2012, which links searched objects and [quote] 'enables you to search for things, people or places that Google knows about [...] and instantly get information that's relevant to your query.' (Singhal, A., 2012). The second breakthrough of Page and Brin was the development of a sustainable business model financed by digital advertisement with 'Sponsored Links'. In contrast to the web banner ads before, 'Sponsored Links' matched users' searches with fitting 'Adwords' (targeted advertisement of producers).

As illustrated in Fig. 2, Google developed a dominant position as search engine soon after its start due to the entrepreneurial combination of (i) technology and (ii) business model. Maybe the best indication is that 'to google' is now a standard term – not only in English, but also in many languages around the world. This exemplifies the 'voice of the customer' for an outstanding service free of charge, which is typically used repeatedly by the consumers, i.e. any economic models for a one-time 'single selection' of a service do not fit. As shown by the example of U.S. search engine market share (Statista, 2018), the market share of Google remained constantly over 60% from 2008 until today, while large and financially powerful competitors shifted places: Yahoo/Oath declining from 22.2% to 11.5% and Microsoft Bing raising from 9.8% to 24.2%. Google's huge success was also driven by the attractiveness to producers due to the targeted advertisement (including a fee model with payment merely for active 'clicks' of users). In 2017, 61% of the global online ad spend went to Google (with 44%) and Facebook (with 18%) – equivalent to 25% of the global media ad spend in total (Google with 18% and Facebook with 7%) according to Richter (2017). Google achieved a significant but, nevertheless, far from dominant market share of global advertisement spending. In parallel to Facebook (as second in class in online ad spend), Amazon grew to the no. 3 digital ad platform in the US (Perrin, 2018). TV ad is still important, but head on head with mobile advertisement based on data from the US (Bertwitz and Letang, 2018). As a remark, one can state that there is an oligopoly of manufacturers of jet airplanes in the world, which developed from a much broader number some decades ago to the present market of Boeing and Airbus plus minor niche competitors, although they sell to airlines ('B2B') and not to consumers ('B2C').

In the technological development (fig. 2, bottom part), new competition for Google emerged in the recent years, as Amazon became the primary source for online product searches (Murga, 2017 and Levy, 2018). Additionally, the already mentioned voice-based digital assistants are going to mature into a primary tool for web access, which will challenge traditional search tools and the revenue model based on the presentation of advertisement. However, Google has a development into this direction with 'Google Assistant' (see fig. 2, top part). The development for search engines was *ex-ante* rather unpredictable. It followed the market dynamics with winners, losers and new / unexpected competitors and has to be analysed from a long-term perspective, as any snapshot at a randomly selected point in time cannot provide an insight into such a digital development far from equilibrium.

On July 18, 2018, [quote] *'The European Commission has fined Google €4.34 billion for breaching EU antitrust rules. Since 2011, Google has imposed illegal restrictions on Android device manufacturers and mobile network operators to cement its dominant position in general internet search. [...] Google's practice has therefore reduced the incentives of manufacturers to pre-install competing search and browser apps, as well as the incentives of users to download such apps. This reduced the ability of rivals to compete effectively with Google.'* (EU, 2018)

It can be debated, whether pre-installation of software and/or mobile apps should be seen as a convenient offer for consumers or an anti-competitive restriction. For example, Andreas von Bechtolsheim, co-founder of Sun Microsystems, said in a recent interview (von Bechtolsheim, 2018) that he cannot comprehend these arguments, as anybody is free to select any available software and download those apps on a mobile device depending on his/her decision.

Both cases – browsers and search – illustrate the challenges for regulation of digitisation': There was an intertemporal competition, but between the global internet juggernauts such as Google, Microsoft and Yahoo. The current success of Google seems to illustrate the 'digital paradigm' that at given points in time a 'winner takes it all' but, in parallel, will be challenged by new digital developments and new competitive situations, which questions traditional definition of a 'market'. Finally, digital products or services 'for free' require a development of theory beyond 'Contestable Markets' and insight into preferences of consumers.

Digital business platforms and the status-quo at the beginning of the 21st century

Platforms economies have been discussed for more than two decades with different types of examples, such as (references as a selection of existing literature only):

- **Systems** such as videogame consoles e.g. Sony PlayStation, Microsoft Xbox, Nintendo (see e.g. Schmalensee and Evans, 2007; Eisenmann, 2011; and Van Alstyne, Parker, and Choudary, 2016)
- **Schemes** for credit card and especially "four-party" schemes like VISA or MasterCard (see e.g. Rochet and Tirole, 2003; Rochet and Tirole, 2006)
- **Service** portals with 'subcontracting' of third-party resource providers such as Uber as taxi service operator but also Flixbus in Germany as a hub of bus line and trains provided by third party operators (see e.g. Balliester. and Elsheikhi, 2018; but also the discussion about 'Platform Cooperativism' by Trebor Scholz, 2014).

As shown in Fig. 3, those platforms can be classified in two dimensions by (i) identifiability of the customers and (ii) model to link the two-sides of the market, i.e. 'production' and 'consumption'. The latter can be a wholesale-like model (procurement of services and re-selling to consumers) or a matching model (linking producers and consumers).

As fourth model, **business platforms** in *sensu stricto* actively match identified/registered consumers on the one side of market with providers on the other side, whether this is e.g. search query versus individualised advertisement or product order versus product sale. In reality, all actual examples will represent some hybrids between those abstract classifications (e.g. Amazon providing logistics).

On a detailed scale, business platforms can be distinguished according to their reach on three plus one levels: global, functional/sectoral, and selected. As Minor et al. (2011) analysed experimentally, business platforms shows a general tendency to develop into monopolistic structures (see also: Noe and Parker, 2005 and Thiel, 2014) or, respectively, into oligopolies, if the platforms address different client groups (e.g. diverse regions, communities, special interest groups et cetera).

While the top-tier 'GAFA' (Google/Alphabet, Amazon, Facebook, Apple) and 'BAT' (Baidu, Alibaba, Tencent/WeChat) are global players, the second-tier functional/sectoral platforms include examples such as comparison sites or travel or hotel portals (typically with a business model based on provisions). The third-tier platforms focus on selected products or services (like brokerages of financial products mortgages or savings, but without taking them on the own books). Nevertheless, the some kind of vertical competition as, for example, a hotel may be searched for in a (second-tier) travel portal and the best car insurance on (third-tier) comparison side. Nonetheless, there are also individual firms – especially large retailer merchants – which are going towards own platforms e.g. as hubs for certain 'life domains' of the consumers with an integration of other third parties and/or smaller merchants.

The situation and the complication

The situation of digitisation as described above are discussed from two rather different positions, which can be illustrated by the following quotes:

- Nick Srnicek, (Srnicek, 2017) wrote in The Guardian in 2017 [quote]:
'We need to nationalise Google, Facebook and Amazon [...] A crisis is looming. These monopoly platforms hoovering up our data have no competition: they're too big to serve the public interest.'

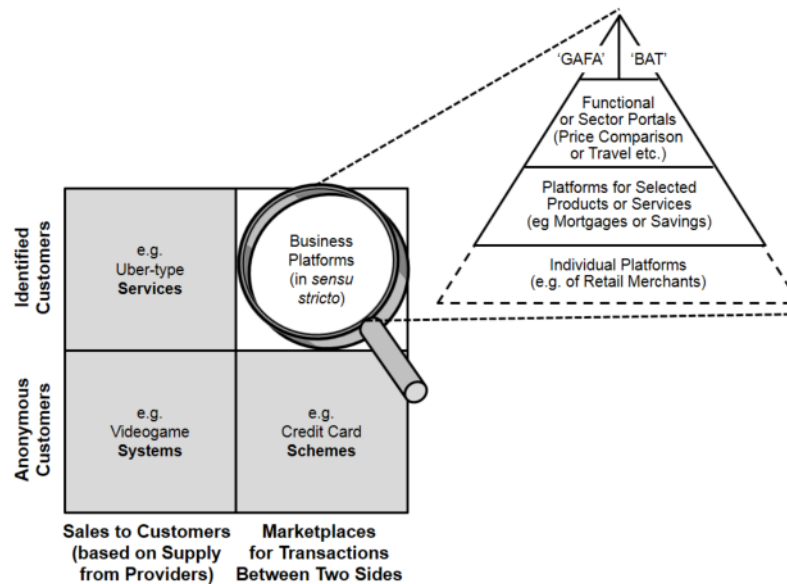


Figure 3: Classification of platforms (left) in two dimensions with (i) identifiability of the customers and (ii) model to link the two-sides of the market, and drill-down of business platforms (in sensu stricto, right) on three plus one levels: global, functional/sectoral, selected, and individual level (adopted from Milkau, 2018a, with extensions). The abbreviations 'GAFA' and 'BAT' stand for Google/Alphabet, Amazon, Facebook, Apple and Baidu, Alibaba, Tencent/WeChat as global players,

- Thomas J. DiLorenzo (DiLorenzo, 1996) already elaborated in 1996 that [quote, emphasise by the authors]:

'It is a myth that natural-monopoly theory was developed first by economists, and then used by legislators to "justify" franchise monopolies. [...] If competition is viewed as a dynamic, rivalrous process of entrepreneurship, then the fact that a single producer happens to have the lowest costs at any one point in time is of little or no consequence. The enduring forces of competition — including potential competition — will render free-market monopoly an impossibility.'

These two perspectives can be exaggerated in a simplistic manner as (a) 'call for planification of innovations' versus (b) 'creed of free-market development'. The problem comes from the challenge that the empirical and experimental results (as described above) do neither support such extreme opinions, nor provide a model, which could claim to describe future developments. Of course, there were examples that digital players broke the rules (incl. Microsoft and Google as listed before), but is individual misconduct a justified foundation for an overall regulation? Does the discussion about 'natural monopoly' provides real insight in times of non-equilibrium, non-linear, and path-dependent dynamical development?

The complication in the era of digitisation can be - on a very simplified level - summarized that any practical definition of 'a market' at an *ex-ante* (randomly) selected point of time is either difficult or not significant in the light of an ongoing innovations. Together with the development of 'services for free', traditional approaches to define and delineate markets are scrutinized by intertemporal market developments, horizontal integration, and vertical reach across traditional industrial sectors.

In an example of a future platform providing mobility services a self-driving car could 'knows' when your flight is delayed depending on your diary, pick you up at the airport based on your latest search and takes the best route home along a new pizzeria with a discount offer for your favourite pizza. Is there a realistic way to define a line between real value for the customer, some 'nudging' by a central provider with benefits for all stakeholders, and anti-competitive manipulation of consumers and discrimination of third-party providers? Especially such a combination of a vertical concentration plus global reach plus analysis of data (in the sense of data + context = graph of relationship) raises new question about being 'hooked' (Eyal, 2014). This has to be compared to the undisputable creation of value for all stakeholders (incl. taxi service, pizzeria and consumer, who gets a decent meal late at night) and require more unbiased research and fact-based evidences.

A pragmatic solution versus pretence of knowledge

To apply the aforementioned challenge to competition policy one has to align the empirical tendency of digitisation that 'the winner takes it all' for a point in time, the individual misbehaviour of digital firms (on different scales) and the lack of consistent model for dynamic market developments far from equilibrium. As Friedrich August von Hayek elaborated in his prize lecture to the memory of Alfred Nobel in Dec. 11, 1974, we should be aware of 'The Pretence of Knowledge' (von Hayek, 1974). Therefore, a pragmatic competition policy in the era of digitisation could start with general rules for the market economy without any fine-tuning to a specific technology or a firm-specific business model:

- clear ownership rights including ownership rights on data (see e.g. Van Asbroeck et al., 2017, Fezer, 2018, Milkau, 2018b) and digital intellectual property rights
- unimpeded freedom of contract including negative freedom not to contract a third party (and especially not to be obliged to contract without agreement about fees or a general scheme with a fee model)
- definition of a market power of intermediaries or business platforms especially due to intrinsic information advantages (see also: Van Reenen, 2018) as a basis for a defined responsibility of business platforms not to discriminate third parties (but not as an argument against organic growth)
- assessment of a market failure based on measured evidences and fact-based predictable impact for the future, but not based on opinions how consumers should decide (with a prescription of an abstract public benefit, which does not represent the individual 'voice of the customer')
- technology-agnostic regulation, legislation and taxation to avoid pointless discussion about distinction of digital and non-digital business (Are cars in the future to be defined as digital products or maybe digital mobility services?)

Especially, when digitisation means that 'data is the new oil' - a phrase coined probably by Clive Humby (Palmer, 2006) and later used by European Consumer Commissioner Meglena Kuneva (2009) and German Chancellor Angela Merkel (SZ, 2015) – data will be a new 'digital' production factor. Can rules applied, for example, to a vertically integrated oil company (from extrapolation to petrol stations with sale to consumers) be the same as for an integrated digital platform? Nobody requires an oil company to 'share' a production plant with third parties, or even to 'share' the oil itself. However, there are proposals for obligation to 'share data' (see e.g. Schweitzer et al., 2018), i.e. to 'share' the digital oil. The existing European Database Directive (EU, 1996), which protects the intellectual creation of an 'author' of a database and says in Article 3(1): *'databases which, by reason of the selection or arrangement of their contents, constitute the author's own intellectual creation shall be protected as such by copyright'*. This implicitly points out that the value of a dataset does not result from an (uncorrelated) sequence of single data entries. The 'arrangement of their contents', i.e. the context and correlations (or 'graphs' between the data elements) is the actual value – and the undisputable 'intellectual creation' of the firm, which provided (for free, maybe) services to the market and - in result - obtains deeper insight. It should be mentioned that also the General Data Protection Regulation's 'Portability of Data' obligation (GDPR; EU, 2016) excludes such internally derived and/or analysed results from the obligation to portability of personal data.

The summary from the examples shown in this paper supports an approach in a consumer driven market economy with general *ex-ante* rules, clear responsibilities (especially in case of development far from equilibrium) and proper *ex-post* monitoring or measures. In a constantly changing, globalized world with a dynamic economic development driven by 'the voice of the customer', any specific regulation of digitisation would be based on weak evidences, would run after the changes in the market and had to take into account possible collateral damages for European firms in the international 'digital' competition.

Potential Conflict of Interest

The views expressed in this paper are those of the authors and not necessarily those of the organisations mentioned.

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