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An Economic Analysis**

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A New (Intellectual) Property Right for Non-Personal Data? An Economic Analysis

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Abstract

The discussion about appropriate legal rules for the digital economy has raised the question of the ownership of non-personal data, e.g. in the context of value networks of firms, smart manufacturing and connected cars. The article analyzes from an economic perspective whether there is a need for a new exclusive IPR on data. It is shown that there are no convincing economic arguments for the introduction of such a new IPR, especially due to the lack of an incentive problem for the production and analysis of data. On the contrary, a new IPR on data might lead to considerable problems and dangers for competition and innovation, especially for the digital economy, which depends on the access to a broad variety of data. Therefore problems of access to data might be a much more important policy issue than exclusive property rights on data.

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I. Introduction

Big Data and digitisation have triggered a broad academic and political discussion about the question whether and how the legal and regulatory framework for markets should be adapted to the specific characteristics and problems of the digital economy. There is a broad consensus that the production and analysis of data comprise the key factor in the digital economy, and therefore data have become a critical and valuable resource for driving innovation. The policy discussion focusses, on one hand, on the manifold new problems in the digital economy (e.g., in regard to privacy, competition, consumer protection or intellectual property) and on the appropriate regulatory responses. On the other hand, however, it is equally important to ask what legal changes are necessary in order to enable the digital economy to realize the huge potential benefits of this technological, economic, and social revolution.¹ In its Digital Single Market Strategy for Europe the European Commission raises the questions of creating the right conditions for thriving digital networks and services, and the best possible use of the growth potential of the European digital economy.² In order to build a data economy, the Commission wants to address not only the problem of legal and technical barriers to the free flow of data (e.g. through interoperability and standardisation) but also the question about ownership of data in situations of business-to-business, business to consumers, machine-generated and machine-to-machine data.³

The question of who owns data has emerged in both legal and political discussions. One discussion concerns personal data which however are subject to data protection laws. It is also clear that part of the huge amount of data produced in the digital economy is protected by traditional IPRs especially copyright law. However most of the produced and collected data in the digital economy, which are so important for data analytics in Big Data application, are machine-generated data, e.g. sensor data. This applies especially for the data collected on the internet (either directly or through tracking etc.), produced within the new integrated networks of manufacturing firms ("industry 4.0", "smart manufacturing"), or that will be generated in the future as part of the development of the "internet of things". In the legal discussion there is a broad consensus that such data (also sometimes called "industrial data") are not protected by exclusive property rights. Firms de facto hold and use these data, and they

¹ See, e.g., *Peitz/Waldfoegel*, Oxford Handbook of the Digital Economy 2012, *European Data Protection Supervisor*, Privacy and competitiveness in the age of big data: The interplay between data protection, competition law and consumer protection in the Digital Economy, Preliminary Opinion 2014, *Monopolkommission*, Competition policy: The challenge of digital markets, Special Report No. 68, 2015, *OECD*, Data-Driven Innovation. Big Data for Growth and Well-Being 2015, *Bräutigam/Klindt*, Digitalisierte Wirtschaft / Industrie 4.0, 2015, *Kerber*, Digital Markets, Data, and Privacy: Competition Law, Consumer Law and Data Protection, GRURInt, 2016, 639.

² *European Commission*, A Digital Single Market Strategy for Europe, Communication, COM (2015) 192 final, 6 May 2015, *European Commission*, Staff Working Document: A Digital Single Market Strategy for Europe - Analysis and Evidence, SWD (2015) 100 final, 6 May 2015.

³ *European Commission* (supra note 2), 15.

also can sell them or allow others to use them. However, these de facto holders of data do not have a legal ownership in the sense of exclusive property, although the possession and use of "their" data might be protected, e.g., by tort and trade secret law against destruction and misappropriation.⁴ This lack of property rights on many kinds of data so valuable in the digital economy has triggered a controversial legal discussion whether a new property right on non-personal data should be introduced. Since data is a form of information and therefore an intangible good, the discussion focussed from the beginning on the necessity of a new IP-like property right. The main arguments in the legal discussion refer mostly to the protection of these valuable data, on facilitating the creation of markets for data, and the necessity of assigning the benefits of data (also due to problems of unfair remuneration of data). However, other participants in this discussion do not see evidence for the necessity of a new IPR on data and warn about the dangers for competition and innovation through limiting the public domain for information.⁵

In this paper I want to analyze from an economic perspective whether the introduction of a new IPR on (non-personal) data can be recommended. To this end basic insights from law and economics, innovation economics as well as the economics of the digital economy will be used. Since this is an entirely new discussion with so far only preliminary ideas about specific proposals, I will focus on the question of the necessity of such a new IPR for non-personal data and the potential dangers in regard to its impact on innovation, competition, and welfare. This paper will draw the conclusion that - on the basis of our current preliminary knowledge - a new IPR on data is not necessary (especially due to the lack of an incentive problem for producing and analyzing data). On the contrary, its introduction can be even dangerous for innovation and competition in the digital economy, because it might lead to considerable legal uncertainty, the monopolisation of information, and impediments for the free flow of data that is so crucial for the digital economy. This does not imply that the data of data holders should not be protected by various legal means (as, e.g., trade secret law), but protection by an exclusive IPR is not the appropriate solution from an economic perspective.

⁴ See *Dorner*, Big Data und "Dateneigentum". Grundfragen des modernen Daten- und Informationshandels, *Computer und Recht*, 2014, 617, *Zech*, Daten als Wirtschaftsgut - Überlegungen zu einem "Recht des Datenerzeugers", *Computer und Recht*, 2015, 137, *Zech*, A Legal Framework for a Data Economy in the European Digital Single Market: Rights to Use Data, *JIPLP*, 2016, 460, *Drexl*, Designing Competitive Markets for Industrial Data - Between Propertization and Access, Max Planck Institute for Innovation and Competition, Munich 2016, *Wiebe*, Protection of industrial data - a new property right for the digital economy? *GRURInt*, 2016, 877-884; more references in section II.

⁵ See for this discussion *Zech*, Information als Schutzgegenstand 2012, 421-440, *Dorner* (supra note 4), *Hornung/Goebble*, "Data Ownership" im vernetzten Automobil, *Computer und Recht*, 2015, 265, *Zech* 2015 (supra note 4), *Zdanowiecki*, Recht an den Daten, in: *Bräutigam/Klindt* (supra note 1) 19, *Sahl*, Daten als Basis der digitalen Wirtschaft und Gesellschaft, *RDV* 2015, 236, *Zech* 2016 (supra note 4), *Wiebe* (supra note 4), *Drexl* (supra note 4), *Max-Planck-Institut für Innovation und Wettbewerb (MPI)*, Positionspapier: Zur aktuellen Diskussion über Ausschließlichkeits- und Zugangsrechte an Daten auf europäischer Ebene (16.8.2016), 2016.

The paper is structured as follows. Section II will briefly summarize the current legal discussion on a new IPR on data. Section III introduces a theoretical framework for assessing a new IPR from an economic perspective. Sections IV to VI analyze the three main rationales that are relevant to the discussion of a new IPR on data. Whereas section IV focusses on the incentive problem (as the traditional main rationale for IPRs), section V discusses whether property rights on data can help to facilitate the use and trade of data. Section VI addresses the question whether an IPR on data might be helpful for solving problems within the new complex connected networks of firms, which are typical for new business models in the digital economy. In section VII the potential dangers and risks of such a new IPR for innovation, competition, and welfare, are analyzed, also regarding to the specific functional logic of Big Data and the digital economy. Section VIII presents the conclusions (1) that such an IPR on data cannot be recommended, and (2) that the problem of rights of access to data might be a much more important future research topic than the question of exclusive ownership.

II. A New Exclusive IPR on Data: The Legal Discussion

The amount of data being produced, collected, stored, and analyzed in the digital economy will also increase rapidly in future. The integration of manufacturing firms through automation and robots with real-time exchange of data ("smart manufacturing"), connected systems such as "connected cars", and the "internet of things" will contribute further to this development. Particularly important are machine-generated data and sensor data. Part of the data in the digital economy are protected through traditional IPRs, e.g. all copyrighted digital goods such as digital music files, e-books, and software. In regard to these data, the copyright owners have exclusive property rights. However, many data such as machine-generated data and sensor data do not fulfil the requirements for copyright protection.⁶ Another case are data that are subject to data protection law, which defines to what extent and under what conditions personal data can be collected, stored, and used, and what the rights of persons are in regard to "their" personal data. However, data protection law does not confer exclusive property rights on such data. There is also a discussion about propertization and ownership of personal data (with the possibility of selling or licensing them), but this is a separate issue dominated by privacy and consumer protection concerns.⁷

⁶ See *Zech* 2015 (supra note 4), 141, *Wiebe* (supra note 4), 879.

⁷ For the broad discussion about (property) rights on personal data see *Dorner* (supra note 4), *Kilian*, Property Rights und Datenschutz. Strukturwandel der Privatheit durch elektronische Märkte, in: *Kaal/Schwarzte/Schmidt*, Festschrift zu Ehren von Christian Kirchner, 2015, 901, *Schwartzmann/Hentsch*, Eigentum an Daten - Das Urheberrecht als Pate für ein Datenverwertungsrecht, RDV 2015, 221, *Zech* 2016 (supra note 4), 463-465; for the US discussion and a more economic perspective see *Laudon*, Markets and privacy. Communications of the ACM 1996, 92, *Samuelson*, Privacy as intellectual property. Stanford Law Review 2000, 1125, *Schwartz*, Property, Privacy, and Personal

The discussion of a new IPR on data focusses on the huge amount of (industrial) data, which are neither protected by traditional IP law nor by data protection law. One obvious candidate in order to protect such data is database protection, at least in the EU. However, the legal discussion agrees that for most of these data this is not a suitable solution, because EU database protection only protects the investment made into the collection of already existing data in a database but not the investment made into the production of data itself. Therefore it is the database which is protected by this exclusive right but not the data itself.⁸ The protection of data by trade secret law is considered to be much more important. There is a consensus that most of these data can be protected - similarly to knowhow - as trade secrets, but a number of conditions have to be met, e.g. the data holder has to make efforts to keep the data secret. But most important is that trade secret law does not confer exclusive property rights on trade secrets but protects data only against certain misappropriating behaviour. If therefore data were to be leaked, the data holder could not stop third parties from using that data by claiming exclusive property rights.⁹ It is, however, clear that the data of a data holder are protected through a number of other legal instruments (as, e.g., tort and criminal law) against destruction, certain impediments to access and use, as well as against compromising their integrity.¹⁰ As a result, de facto data holders are protected against behaviour that endangers the holding and use of their data or misappropriates them, but without obtaining exclusive property rights. Therefore the policy discussion focusses on the question whether these existing legal instruments for protecting data are sufficient or whether a new IPR on such data should be introduced as an additional legal instrument.

The discussion about the necessity of an exclusive property right on data started in the German legal literature and quickly shifted to the European level, especially in the context of the European initiatives for a Digital Single Market Strategy. What are the most important arguments why we should consider the introduction of such a new IPR? Zech has discussed four justifications for a new exclusive property right for machine-generated data.¹¹ First he rejects the argument that we need an IPR due to incentive problems for producing data. More relevant for him are the two justifications disclosure and the creation of data markets. A new IPR could help to disclose data that have been kept secret and

Data. *Harvard Law Review* 2004, 2056, *Acquisti/Wagman/Taylor*, *The Economics of Privacy*, *Journal of Economic Literature* 2016, 480, and briefly *Kerber* (supra note 1), 646.

⁸ See *Zech* 2016 (supra note 4), 466, *Dorner* (supra note 4), 621, *Drexl* (supra note 4), 17, *Zdanowiecki* (supra note 5), 21, *Wiebe* (supra note 4). In the legal discussion the sui generis data base protection established by the EU is discussed very controversially. It does not play an important role in the data economy. See for a critical view on database protection *Drexl* (supra note 4), 17-19.

⁹ See for the protection of data through trade secret law *Dorner* (supra note 4), 622, *Wiebe* (supra note 4), 879, *Drexl* (supra note 4), 19, *Zech* 2016, (supra note 4), 465.

¹⁰ See, e.g., *Zech* "Industrie 4.0" - Rechtsrahmen für eine Datenwirtschaft im digitalen Binnenmarkt, *GRUR*, 2015, 1151, 1158-1159, *Hoeren*, *Dateneigentum: Versuch einer Anwendung von § 303a StGB im Zivilrecht*, *MMR*, 2013, 486.

¹¹ See particularly *Zech* 2015 (supra note 4), 144, *Zech* 2016 (supra note 4), 470, and also *Zech* 2012 (supra note 5), 316-323.

help to create markets for trading data leading to an optimal allocation of data.¹² Another important reasoning starts with the problem who should get the economic value of the data, especially in the complex new value networks of firms. A new IPR on data could be used for clarifying data ownership. Part of this reasoning is also scepticism that existing contractual solutions about the de facto holding and rights to use data might not work well, also in regard to a fair distribution of the benefits.¹³ This reasoning can also relate to the argument that with an IPR on data, it might be easier to introduce order into the market.¹⁴ In the background of the discussion is also the notion that data should be protected as property, because they are valuable assets and firms make contracts about data as if there were property on data.

So far no detailed specific proposals for the design of such a new IPR on data exist. At least in the German and European discussion there is a consensus that it could only be introduced through new legislation (*de lege ferenda*),¹⁵ and that it should be designed as a new kind of IPR. It should have a limited (and rather brief) duration of protection, e.g., two or five years (perhaps with the possibility of extension), and should be fully tradable.¹⁶ It should protect only against commercial use of the data, and there should be limitations (e.g., for research). So far there also seems to be a consensus that the data should only be protected against copying but producing the same data anew should be allowed.¹⁷ Very important are also the questions what kinds of data should be protected, to whom such a new IPR should be assigned, and how the subject matter should be defined and specified. Zech has focussed on machine-generated raw data (such as sensor data). However, an IPR need not be limited to raw data but might also be granted for other non-personal data, especially also for processed data and the often very valuable data resulting from data analytics.¹⁸ Another unresolved question is whether each unit of data can be protected separately or only entire sets of data.¹⁹ An especially difficult problem seems to be the question to whom such an IPR should be granted: Should it be the data producer, who codifies the data ("scripture act"), or the firm which is economically responsible for the production of data, or the firm which can benefit most from the data? This is an unresolved question in the legal discussion, especially because even these criteria might not lead to clear answers, especially in the new digital world of connected networks of firms.²⁰

¹² Zech 2015 (supra note 4), 145, Zech 2016 (supra note 4), 470.

¹³ Zech 2015 (supra note 4), 145, Zech 2016 (supra note 4), 464, Zdanowiecki (supra note 5), 28.

¹⁴ Wiebe (supra note 4), 881.

¹⁵ Dorner (supra note 4), 625, Zech 2015 (supra note 4), 144.

¹⁶ See Zech 2015 (supra note 4), 146, Zech 2016 (supra note 4), 468-470, Wiebe (supra note 4), 882.

¹⁷ Zech 2015 (supra note 4), 142-144, Wiebe (supra note 4), 882.

¹⁸ Another discussion is whether only commercially produced data should be protected or also data of consumers (see, e.g., Zech 2015 (supra note 4), 469).

¹⁹ See Drexler (supra note 4), 34.

²⁰ See for this discussion Zech 2015 (supra note 4), 142-144, Zech 2016 (supra note 4), 469, Wiebe (supra note 4), 883, Zdanowiecki (supra note 5), 23-29.

The specification problem seems to be particularly difficult. Especially the relationship between data and information is seen as a critical issue. The analysis in the legal discussion uses basic categories from semiotics, especially the distinction between syntactic and semantic information.²¹ Since data is codified information, data is seen clearly at the syntactic level of information (i.e. the level of signs, such as, e.g., sequences of 0 and 1). The content or the meaning of information, however, is at the semantic level. A crucial principle of IP law so far is that there should be no exclusive rights on pure semantic information. Patent and copyright law do not protect information but, rather, innovation or a creative work. Therefore there are great concerns in the legal discussion that an IPR on data might also protect the content of information and therefore monopolize information. Hence the proposals that are being discussed insist that the protection of data should only be at the syntactic level, and the IPR should not protect information at the semantic level.²² However, it is unclear whether such a limitation on the syntactic level is possible or whether it also would lead to a monopolization of the content of information. Although the legal discussion is still at an early stage, many legal scholars have become sceptical about introducing such a new IPR, at least at the present time.²³ In the following section, a comprehensive analysis of the need for such an IPR will be presented from an economic perspective.

III. Law and Economics of Intellectual Property: A Theoretical Framework

The following theoretical framework that is mainly based upon law and economics of IPRs can be used for the analysis of the possible benefits and problems of a new exclusive IPR on data:²⁴

(1) *Incentive problem*: Both in patent law and copyright law the main argument for creating and granting an exclusive IPR is the risk that the innovator lacks sufficient incentives for the development of her innovation, because others might easily imitate or copy it (public good problem). The economic analy-

²¹ See for the following discussion *Zech* 2015 (supra note 4), *Zech* 2016 (supra note 4), 462-463, and *Wiebe* (supra note 4), 881-882. For a comprehensive and pioneering study of the manifold already existing legal rules for the protection of information at the syntactic, semantic, and structural level in legal systems, see *Zech* 2012 (supra note 5); for the use of semiotics see also *Zech*, *Information as Property*, *jipitec*, 2015, *Wiebe*, *Information als Schutzgegenstand im System des geistigen Eigentums*, in: *Fiedler/Ullrich*, *Information als Wirtschaftsguts. Management und Rechtsgestaltung*, 1997, 93; for the complex relationship between data, information, and knowledge see *Prombriant*, *Data, Information and Knowledge*, *CRi*, 2013, 97-102.

²² See *Zech* 2016 (supra note 4), 469.

²³ Very sceptical are particularly *Dorner* (supra note 4), *Drexl* (supra note 4), *MPI* (supra note 5), and *Wiebe* (supra note 4).

²⁴ See, e.g., *Lévêque/Ménière*, *The Economics of Patents and Copyright*, 2004, and *Burk*, *Law and Economics of Intellectual Property: In Search of First Principles*, *Annual Review of Law and Social Science*, 2012, 397; for an overview about justifications from a legal perspective *Zech* 2012 (supra note 5), 149-158.

sis of IPRs focusses on the question how such an exclusive right that allows for monopoly profits should be optimally designed (e.g., duration, breadth) in order to balance the benefits (innovation incentives) and the costs (efficiency losses due to monopoly prices, hampering future innovators) of these IPRs.²⁵

(2) *Facilitating trade and use of innovations*: One important transaction cost argument is that an IPR on innovations or creative works can facilitate their tradability and/ or their use by others (through licensing contracts).

(3) *Disclosure*: Since patents require the disclosure of innovations, this increase in transparency about existing technologies can help further innovation and save information and R&D costs.²⁶

(4) *Assigning the benefits of data*: It will be analysed whether this additional reasoning for an IPR on data can also be supported from an economic perspective.

(5) *Problems and regulatory failures of IPRs*: The current IP system suffers from numerous problems which reduce their effectiveness, lead to huge costs, and often also negative effects on innovation. Particularly well-analyzed are the problems through patent thickets, weak and over-lapping patents, patent hold-ups (e.g., in the context of complex products and technical standards), patent trolls, as well as anticompetitive IP strategies such as predatory and defensive patenting.²⁷ It is also necessary to analyse the possible negative effects of regulatory failure, i.e. the dangers and risks of a new IPR on data.

IV. IP Rationale I: Solving an Incentive Problem?

As regards traditional intellectual property rights such as patents and copyrights, the main argument for justifying the grant of temporary monopolistic positions is that innovations might suffer from a public good problem leading to insufficient incentives for investing in innovation or creative works. Do we have an incentive problem regarding the production and analysis of data? In the discussion about data property so far, nobody has claimed that we have a general incentive problem in the digital economy as regards the collection, production, and analysis of data. To the contrary, the empirical fact of the massive and often simple production of huge amounts of data and their analysis seems to

²⁵ Economic analysis has shown that the question of the optimal design of IPRs for solving the incentive problem can be very complex, especially if also alternative appropriation mechanisms and the often cumulative character of innovations is taken into account. See for an overview *Kerber, Zur Komplexität der Anwendung des ökonomischen Anreizparadigmas bei geistigen Eigentumsrechten: Ein wirtschaftspolitischer Analyserahmen*, *Zeitschrift für Geistiges Eigentum / Intellectual Property Journal* 2013, 245.

²⁶ The disclosure argument in regard to data will be addressed in section V.

²⁷ See, e.g., *Burk/Lemley, The Patent Crisis and How the Courts can solve it*, 2009, and *Boldrin/Levine, The Case against Patents*, *Journal of Economic Perspectives*, 2013, 3.

be one of the most important characteristics of Big Data and the digital economy. The amount of collected data is increasing exponentially, and it is widely expected that through the spreading of sensor technology and the "internet of things" this trend will continue for the foreseeable future.²⁸ However, these empirical facts do not imply that the level of the collection, production, and analysis of data is optimal from an economic perspective, and therefore a deeper analysis of the incentive problem is necessary. The analysis will consist of two steps: First, does a public good problem exist in regard to data? Secondly, are there other problems that might lead to wrong incentives for producing and analyzing data.

From an economic perspective data would be a public good, if there is no rivalry in the use of data and non-excludability.²⁹ It is clear that the use of data is non-rivalrous, i.e., the use of specific data through one person would not impede use of the same data by another person. Since therefore the marginal costs of using them by an additional user is zero, the welfare-optimal solution would be to grant general access to these data free of charge (price = marginal costs).³⁰ This non-rivalry in use is also the crucial argument why there can be no analogy to physical property.³¹ Since the use of physical objects nearly always impedes the use through others (also through wearing off), this rivalry in use is the main argument why property law grants an exclusive property right to decide on the use of physical objects to a single "owner". Therefore regarding rivalry we have a similar situation as with innovations and many creative works, which justifies discussing data property in analogy to intellectual property instead of physical property.

However, the decisive argument for exclusive IPRs is that often copying of creative works or imitation of technologies is easy, and that this characteristic of (technological) non-excludability would lead to the incentive problem. Do data have the same problem of copying and non-excludability? It is clear that if data are uploaded on the internet and made freely accessible to everybody, then there is non-excludability with the possibility of running into a public good problem and lack of private incentives. However, the criterion excludability means whether a data holder has possibilities to exclude, i.e. can keep his data secret, and therefore can maintain his incentives for producing and analyzing the data. Since technologically it is easily possible to protect data within firms against copying and leaking to the public (e.g. through encryption), most privately produced and held data can be (and are) kept

²⁸ See *OECD* (supra note 1), 133-143.

²⁹ For the definition of a public good, *Lévêque/Ménière* (supra note 24), 7.

³⁰ For the non-rivalry of data, see also *Zech* 2015 (supra note 4), 139, *OECD* (supra note 1), 179, and *Dewenter/Lüth*, *Big Data: Eine ökonomische Perspektive*, in: *Körber*, *Daten und Wettbewerb in der digitalen Ökonomie: Dateneigentum, Datenschutz, Datenmacht*, 2016 forthcoming. Please note that rivalry or non-rivalry in regard to the use of a good is defined in welfare economics at a purely technological level. It is clear that the market value of data differs whether only one firm has certain data or these data are freely accessible to all. But the criterion of "rivalry in use" is not about the market value, but about the social costs of the use of the good through an additional person.

³¹ See also *Zech* 2012 (supra note 5), 276-279.

secret by the data holders. Although there might be very different kinds of data and therefore also the costs and the difficulty of keeping them secret might vary, generally data holders are capable of excluding others from copying and using their data. Admittedly, "hacking" and therefore cybersecurity is an important topic, but so far the large data holders as Google, Facebook, and others do not seem to suffer from a vast copying and leaking of their huge amounts of collected data.³² However, it has to be considered that the extent of excludability is an empirical question and can change over time.

Since data are characterized by non-rivalry in use and excludability, there is no general problem of a lack of incentives for producing and analyzing data due to a public good market failure. Hence the main economic rationale for granting exclusive IPRs is not fulfilled in regard to data.³³ ³⁴ However, this result does not allow for the conclusion that there are optimal incentives for producing and analyzing data in the digital economy. Economically, it can be expected that data are produced and analyzed as far as the marginal benefits of the data producers and holders exceed their marginal costs. Theoretically, these costs might be high or low, depending on the kind of data produced and analyzed. However, so far the empirical facts show that in the digital economy much data can be produced or collected at very low costs, often only as a free by-product of other activities. Additionally, there also seem to be huge economies of scale and scope, also through far-reaching network externalities.³⁵ But this does not exclude the possibility that for certain kinds of data the costs for producing and/or analyzing them might be substantial. Furthermore, it is not clear to what extent there might be positive and negative externalities of data production, data analysis, and data use, leading to a gap between the private and social benefits and costs of data production and analysis. In such cases, the

³² However, the argument can be made that IPRs on data might reduce the socially wasteful costs of an "arms race" between cybersecurity measures for protecting data and hacking technologies. But is very doubtful whether such an argument would increase the benefits of IPRs on data significantly.

³³ With the combination of non-rivalry and excludability, data can be seen similar to knowhow, which is not protected by exclusive property rights but only through trade secret protection against misappropriating behaviour. It should also be noted that as far as (patentable) technological innovations can be kept secret and therefore other appropriation methods are possible, as, e.g., first-mover advantages or complementary capabilities, innovators might have sufficient innovation incentives also without using IP (see, e.g., *Cohen/Nelson/Walsh*, Protecting their intellectual assets: Appropriability conditions and why U.S. manufacturing firms patent (or not), Working Paper 7552, National Bureau of Economic Research, 2000. Economically, in regard to those innovations there is no market failure and therefore no justification for granting exclusive IPRs.

³⁴ Another relevant argument in regard to the incentive problem is that the competitive advantages of large tech companies might not only be based upon their large amount of data but also upon their superior skills and technologies for analyzing data. This would allow to protect their competitive advantages either directly through these complementary capabilities or through copyright protection of the software for data analytics. See for the latter argument *Drexel* (supra note 4), 24, and also *OECD* (supra note 1), 196.

³⁵ See *OECD* (supra note 1), 184.

private incentives might be either too small or too large.³⁶ These questions indicate the need for specific research into the economics of producing and analyzing data in order to identify other market failures, which however might also call for other policy solutions than exclusive property rights.

V. IP Rationale II: Facilitating Use and Trade of Data?

In the IP discussion an important additional rationale for the justification of exclusive IPRs is that these rights concerning technologies and creative works reduce transaction costs for trading technologies or commercialising them through licensing contracts.³⁷ In addition, the propertization of innovations and creative works can also facilitate their use as securities and therefore can help to fund innovative firms.³⁸ All of these arguments can also be applied to data. As innovative firms are not always the most suitable firms for developing and commercialising products leading them to sell or license their patents to others, also the firms that produce or analyze data might not be the most suitable firms for using such data in order to develop new products and services. Economists would therefore claim that well-functioning markets for trading privately held data or granting other firms access to such data (through licensing) might increase innovation, competition, and welfare, and help to exploit the immense opportunities of the digital economy. An (online-registered) IPR on data might also support these markets through the increased transparency about existing data (disclosure function).³⁹ The crucial question is whether the lack of exclusive property rights on data leads to a market failure in regard to the trade and use of data, and therefore to an inefficient allocation and an underutilization of data.⁴⁰

³⁶ For example, the *OECD* (supra note 1), 186, emphasized positive externalities of data, leading to a discussion about open data and the option of subsidizing data production or analysis (as a standard policy solution for dealing with positive externalities).

³⁷ See, e.g., *Lévêque/Ménière* (supra note 24), 11-13, *Burk* (supra note 24), 407, and especially *Spulber*, *How Patents Provide the Foundation of the Market for Inventions*, *Journal of Competition Law & Economics* 2015, 271, who claims a number of additional transaction costs efficiencies of markets for inventions that emerge through patents. He mentions particularly transferability, disclosure, certification, standardization, and divisibility, and sees advantages through easier financing of innovations.

³⁸ See, e.g., *Spulber* (supra note 37), 297-301. A related argument is that patents can have positive reputational effects.

³⁹ *Zech* 2015 (supra note 4), 145, is right to view disclosure in close connection with the advantages of creating markets for data. In patent law disclosure has also an important role for further innovation, which does not exist in the same way in the case of data.

⁴⁰ Obviously, this question is also related to the incentive problem (discussed in the last section), because if data holders cannot sufficiently sell or license their data due to market failures, then also the incentives for producing and analyzing them might be too low in comparison to the social optimum.

Since data is information, this question is theoretically directly linked to an earlier discussion in information economics about the problems of markets for information. These problems are well-known but so far have not led to a serious discussion about introducing exclusive property rights on information. What are the most important problems of information markets and what conclusions can be drawn for data? One problem is the information paradox of Arrow:⁴¹ Before knowing the information a potential buyer cannot assess what value this information has for her, but if the seller were to reveal the content of the information to the buyer before concluding the contract, the buyer would already know the information and no longer have to buy it. This information paradox can make trading of information difficult (high transaction costs), whereas an exclusive property right on this information would allow it to be revealed before conclusion of the contract - without allowing the potential buyer to use the information. Although such problems cannot be ruled out in regard to data, in most cases it can be assumed that the data can be defined and described sufficiently for a buyer to assess their value (without revealing them in detail). Therefore the information paradox is presumably not a huge problem for commercialising data. Much more critical is the second well-known problem that the first buyer of data can at once resell these data to other buyers with potentially very negative effects on the overall sales of the initial seller. Therefore the danger arises that trading or granting others access to data leads back to the non-excludability and the public good problem. Direct and indirect solutions to this problem are discussed below.

Direct solutions are contractual obligations and technical restrictions. The seller can stipulate in her sales contract that the buyer is not allowed to resell the data or provide other parties access to these data. In the case of a violation of the contract the buyer is liable and has to pay damages. Theoretically, it is no problem to use these kinds of such contractual solutions in order to impede the uncontrolled spreading and use of data. It is, however, an empirical question whether the enforcement of such contracts works adequately. The critical problem is that the initial data holder can only sue the contracting buyer but not other third parties, that have somehow gained access to these data. One important question is also to what extent other laws, e.g., the law on trade secrets, might help to support these contractual solutions. Theoretically, an exclusive IPR on data could reduce these problems and reduce transaction costs. However, in the digital economy there is also the possibility of technical restrictions, which only allow certain uses of data but make the reselling or unauthorized access to data technically impossible. The importance of technical restrictions, which can be flanked by laws that prohibit the circumvention of such restrictions, has already been proven in regard to the protection of copyrighted data such as music files, e-books, and games. Although technical restrictions as such might increase transaction costs, they can be an effective solution for making the uncontrolled

⁴¹ Arrow, Economic welfare and the allocation of resources for inventions. in: *Nelson*, The Rate and Direction of Inventive Activity: Economic and Social Factors, 1962, 609, see also *Anton/Yao*, Markets for partially contractible knowledge: Bootstrapping versus bundling. *Journal of the European Economic Association*, 2005, 745.

spreading of data impossible and therefore ensure the excludability of data in the case of trading or granting access to data.

Irrespective of these contractual and technical restrictions, produced and analyzed data can also be commercialised indirectly not by selling or granting access to the data but by selling services that are based upon these data (but do not require their disclosure). For a long time this has also been the standard solution for dealing with the market failure problems of markets for information. Instead of selling directly information, firms developed business models that sell services, e.g., consulting services, the quality of which arises from the superior information these firms have in comparison to their competitors. It is therefore not surprising that this is exactly the strategy chosen by many of the very successful tech firms in the digital economy. Both Google and Facebook, which have collected huge amounts of data about their users, do not sell these data or grant direct access to them for a fee. Instead they use these data for the service of targeted advertising, i.e. they offer - based upon the analysis of their data - a superior service for advertisers, one which cannot be provided by competitors without these data. The huge profitability of these firms (and many others in the digital economy) shows that such indirect usage of collected and analyzed data can lead to highly successful business models and therefore need not be seen as second-rate methods of using data.⁴²

Theoretically the reasoning that granting property rights for data might facilitate trade and licensing of data can be an important argument in favour of a new IPR on data from an economic perspective. The crucial question, however, is whether it is really necessary in order to ensure the sufficiently efficient use and allocation of data. Both through contractual and technical restrictions and through indirect use of data through services, the digital economy so far seems to have developed a wide range of effective market solutions for dealing with potential market failure problems of data markets. However, a comprehensive analysis of the functioning of data markets in the digital economy is still lacking. So far only few empirical studies exist that have analyzed how the markets for data work and to what extent they work well or suffer from market failures.⁴³ These markets are still in a developing stage. Both the suppliers of data as well as the organization of data markets can be very different (data brokers, data market places, data intermediaries). There is empirical evidence that a large number of firms are active in these markets and the revenues on data markets are increasing rapidly. However, "... despite the growth of data intermediaries, as yet there is no established data market

⁴² See for the manifold data-based business models in the digital economy *OECD* (supra note 1), 71-91.

⁴³ See, e.g., *Carnelley*, Europe's Data Market Places. Current Status and Future Perspectives (European Data Market SMART 2013/0063 D 3.9), IDC/Open Evidence, 2016, *Cattaneo* D8 Second Interim Report (European Data Market SMART 2013/0063), IDC/Open Evidence, 2016, *FTC*, Data Brokers. A Call for Transparency and Accountability, Washington, D.C., 2014, *Stahl et al*, A Classification Framework for Data Marketplaces, *Vietnam J Comput Sci*, DOI 10.1007/s40595-016-0064-2, 2015; see also *Acquisti/Wagman/Taylor* (supra note 7), 457 and 473.

place where organisations and individuals can sell or exchange data directly with each other."⁴⁴ First analyses about the problems of these markets do not indicate that legal questions about data ownership, copying, or considerable transaction costs are the main impediments to a faster development of data markets. Rather, the problems are seen to lie in an insufficient demand for data, because many, especially small- and medium-sized companies, seem not to be sufficiently aware of the benefits of using data for their business, the lack of interoperability, standardization, and open platforms for data-sharing as well as problems of pricing of data and the availability of skilled data workers.⁴⁵ Therefore the question of the functioning of data markets is one of the most important research questions that should be addressed in future research. Despite this caveat, there is so far no evidence supporting the claim that the trade and use of data generally suffers from a lack of exclusive property rights.⁴⁶

VI. Data in Value Networks: Assigning (the Benefits of) Data as a New Rationale for an IPR?

In the discussion about a new IPR for data, an additional new reasoning for the necessity of such exclusive rights emerged that does not exist in economics in regard to traditional IPRs. Its starting-point is the empirical observation that in the digital economy networks of firms are much more informationally integrated and connected than ever before. Especially in the context of new methods of manufacturing (industry 4.0, smart manufacturing) the production, exchange, and sharing of data, often in the form of real-time data, between the firms within those value networks play an increasingly crucial role. But also beyond manufacturing, new business models such as connected cars (and the future "internet of things") will lead to very complex connected systems with many parties, e.g., car manufacturers, car owners, multiple service providers (for collecting and analyzing sensor data, data analysts, navigation services, insurance companies), and public authorities (road maintenance, traffic regulation). Within these systems large volumes of different data will be collected and analyzed that are valuable for many of these firms and institutions. In the discussion about an IPR on data the important question has been raised who should obtain the (benefits of) these valuable data. Whereas some data might be personal data and subject to data protection laws, this is not the case for much of these data.

⁴⁴ *OECD* (supra note 1), 96; see similarly *Acquisti/Wagman/Taylor* (supra note 7), 473.

⁴⁵ See *Carnelley* (supra note 43), 26-27, *Cattaneo* (supra note 43), 52-58, and also *OECD* (supra note 1), 95-97.

⁴⁶ That exclusive property rights are not necessary for a well-functioning market shows the example of the marketing of broadcasting rights of sport events, for which in most countries no protection through IPRs exist. Here factual exclusivity through the control of the access to the sport event is sufficient. See *Drexel* (supra note 4), 26.

Therefore it has been discussed that in regard to non-personal data this problem might be solved by introducing and assigning exclusive property rights on data to certain parties.⁴⁷ One argument is that in these networks firms have different opinions about who should hold these data and the right to use them commercially, and that a clear assignment of property would resolve conflicts and thus contribute to the order of the market. Another line of reasoning emphasizes the need for also smaller firms or private persons to obtain fair remuneration for "their" data, especially due to the problem of imbalances of power between the firms.⁴⁸ As a consequence, what might be the best criterion for the assignment of IPRs on data to certain actors has been discussed in the legal literature. One possibility is that the data are assigned to the firm economically responsible for producing the data, but this need not be the same firm which de facto produces the data (e.g., through sensors). The latter would be the data producer (e.g., through the scripture act). Another criterion is who can use the data most efficiently. The problem with these and other criteria is that they do not necessarily lead to a clear answer within a network of firms, in which several connected firms often contribute technically and economically to the production and processing of data. The legal discussion so far has not led to clarification and consensus about a convincing solution.⁴⁹ However, it is argued below that from an economic perspective this problem of data in value networks of firms does not give rise to a new additional rationale for the introduction of a new IPR on data, because these problems can and also should be solved in a different way.

The following questions can be asked: Why can we not leave the problem of the governance of data to the contracting parties of these value networks? Why do we have to assign (the benefits of) data at all to a single firm (or person), and why do we need exclusive IPRs for this? There can be no doubt that within such a network of firms and other actors it is necessary to decide on the governance of all relevant data, i.e. who produces, processes, stores, and analyzes data, who has access to what kinds of data and can use them for what purposes, and who has the rights entitled to sell them or grant outside firms access to these data, and how the benefits (and revenues) from these data are distributed. However, the firms know their business model best, and therefore have the best knowledge how the optimal data governance within such a network should look like. Therefore all these specific questions can and should be decided in the contractual relationships between these firms as a result of the market process. This implies that the "rights" about the relevant data in the network are defined and assigned in the contractual arrangements between the firms of the network. External criteria for as-

⁴⁷ See *Zech* 2015, 2016 (supra note 4), *Zdanowiecki* (supra note 5), 19-25, *Wiebe* (supra note 4); see especially for the problem of data ownership in regard to connected cars *Hornung/Gooble* (supra note 5).

⁴⁸ See for the last point especially *Zech* 2015 (supra note 4) 145; this concern was also mentioned by officials of the Commission at the "GRUR meets Brussels" conference on June 16, 2016 in Brussels.

⁴⁹ See for the problems *Wiebe* (supra note 4), 883, and especially in regard to connected cars *Hornung/Gooble* (supra note 5), 270-272. See for an even broader overview about data stakeholders that might claim ownership *OECD* (supra note 1), 195-196.

signing these rights to specific firms are not only unnecessary but will often lead to the economically wrong allocation, because they do not fit the specific business model. In fact, so far all these questions are resolved through contractual arrangements between the firms.⁵⁰

However, the question can be raised whether this solution of leaving the governance of data within networks of firms to the market might suffer from market failure problems and what kind of policy instruments should be used for remedying them. In this paper, only a few hints can be given on how these questions can be approached. Information and rationality problems are one of the important market failures that also can be very relevant for contractual arrangements about the production and analysis of data. In the privacy discussion of the digital economy, it is one of the most controversially discussed problems whether consumers (e.g., as users of internet-based services) are capable of making rational and/or well-informed decisions about their data, and whether therefore the contractual arrangements (usually in standard form contracts) that are offered in the market (and usually allow for a far-reaching collection of personal data) are well-functioning or suffer from market failure problems due to information and behavioural problems of consumers. For example, it is heavily disputed whether "notice and consent" solutions work sufficiently to protect the privacy rights and preferences of internet users.⁵¹ It is clear that this problem will emerge in all value networks, in which also the data of consumers or other private persons will play an important role (e.g., in the case of connected cars). However, these market failure problems cannot be solved by introducing an IPR right on data but only through a proper regulation of these contracts. Hence it is primarily the task of consumer and data protection law to solve such market failures.

For small- and medium-sized firms it might be a much more important concern that large firms, e.g., Google or, in the case of connected cars, the large car manufacturers might be so powerful that they can "dictate" the terms of the governance of data to other less powerful firms in these networks. This could also result in unfair outcomes in regard to the question of who is the de facto holder of data and can decide on the access and commercial exploitation of these data.⁵² This is a very legitimate concern, because the tendency in the digital economy towards monopolistic platforms has raised serious competition concerns.⁵³ However, it remains entirely unclear how the introduction of exclusive IPRs

⁵⁰ So far there seems to be a broad consensus among representatives of companies and business associations that contractual solutions are working satisfactorily. This might also explain that the business community is very reluctant about the introduction of a new IPR on data (see *Drexl* (supra note 4), 4-5).

⁵¹ See for this discussion, which is also linked to the privacy paradox, *Kokolakis*, Privacy attitudes and privacy behavior: A review of current research on the privacy paradox phenomenon, *Computers & Security* 2015, *Borgesius*, Behavioural Sciences and the Regulation of Privacy in the Internet, in: *Al-Emanno/Sibony*, Nudge and the Law 2015, *Monopolkommission* (supra note 1), paras. 308-310, and also *Hornung/Goeble* (supra note 5), 270, in regard to the example of connected cars.

⁵² See *Zech* 2015 (supra note 4), 145, *Zdanowiecki* (supra note 5), 28.

⁵³ See *Monopolkommission* (supra note 1), 15-26.

on data would solve these problems. If these firms have such a strong position in the market, then it does not make a difference whether the smaller firms have property rights on certain data, because they will be contracted out by the powerful firm in the same way as a de facto-holding of data. Therefore the proper approach in order to address potential problems of an unfair distribution of benefits of data within a value network of firms through market power imbalances is the application of competition law. It may be asked whether a powerful firm that organizes an entire value network is dominant pursuant Art. 102 TFEU, and whether certain contracts about data and their governance might constitute exploitative or exclusionary abusive behaviour and therefore violate European competition law.⁵⁴ Since such contracts in a value network might also be seen as vertical restraints, which can be subject to Art. 101 TFEU, competition rules about vertical restraints might also be applicable in such cases.⁵⁵ Important is that problems of imbalances of power and unfair distributions of benefits of data within such networks cannot be solved by introducing exclusive IPRs on data but should be addressed by competition law.⁵⁶

There are certainly numerous problems to be resolved in regard to the governance of data in the many new and closely integrated networks of firms in the digital economy. However, an exclusive IPR on data would only be a solution, if the main market failure problem in these value networks were the leaking of data to outside firms or the public with an ensuing public good and incentive problem. But this does not seem to be one of the problems in these networks of firms. Even if there are practical legal questions about who de facto should hold data and what kind of rights other firms have regarding access to these data within such a network, these problems can also be solved, e.g., via contract law or - if necessary - direct regulation, without having to introduce an exclusive IPR on data. More fundamental is the question why assigning an IPR to one single owner should at all be an appropriate solution in such a deeply connected network of firms, in which many contribute to the production, processing, and analysis of data but also need access to these data. Therefore it is more necessary to develop sophisticated and complex institutional solutions for the data governance in those networks.⁵⁷ In our concluding section VIII we will therefore come back to the question of access to data.

VII. Problems and Dangers of Exclusive Property Rights on Data

⁵⁴ In Germany it can also be thought about applying § 20 of the German Act Against Restrictions of Competition (ARC), which can protect also bilaterally dependent firms (relative market power) against abusive behaviour.

⁵⁵ The advantage of Art. 101 TFEU solutions is that they require no market dominance.

⁵⁶ If there are concerns that competition law might not be sufficient for dealing with market power problems in the digital economy, then policy-makers should think about improving the applicability of competition law. However, policy-makers should be very cautious in trying to correct distributional results between the firms of a network.

⁵⁷ Therefore this question can also be seen as a part of the more general problem of the governance of networks of firms.

The current critical discussion about the problems of traditional IPRs renders it necessary to ask also about the potential problems and dangers of a new IPR on data. One of the important critical discussions about patents refer to the immense costs of the patent system for the firms and society due to low legal certainty (e.g., through weak or overlapping patents) and the substantial costs of patent litigation. It is this legal uncertainty that also allows for the application of many problematic patent strategies of firms, which impede competition and innovation. Regarding the introduction of a new IPR on data, it is therefore essential that it can be unequivocally defined and specified. However, the legal discussion has shown that the specification of the subject matter and the scope of protection seems to be extremely difficult in regard to data.⁵⁸ Since data is codified information, it will be very difficult to draw the line between protecting the data alone as codified information (syntactic level) and the content of information itself (semantic level). Since data is not a physical object but only another form of information, and all information can be easily transformed into data, there is a clear danger that protection cannot be limited to the pure syntactic level and might also entail the communication of the content of information. This problem will be aggravated by the still unsolved problem of how such an IPR on data can be enforced. The danger therefore arises that either such an IPR might be hardly enforceable, or, if more broadly defined, that it might lead de facto to exclusive rights on semantic information. This, however, would be a paradigmatic shift in the entire IP system.⁵⁹ Since the problem of how to determine to whom the IPR on data should be assigned is also very unclear, the introduction of such an IPR might lead to considerable legal uncertainty.

Also due to this legal uncertainty, many of the problems that emerged in traditional IPRs in regard to competition and innovation might also turn up again in the case of IPRs on data. For example, competition law had to develop sophisticated antitrust solutions for patent pools (and cross-licensing) in order to distinguish those patent pools that enhance efficiency from those that impede competition between patents (by allowing only necessary and complementary patents in a patent pool and eliminating all substitutive ones).⁶⁰ It can be expected that similar anticompetitive problems will emerge, if firms pool their data for the purpose of jointly selling or licensing them (data pools). The problem of patent hold-ups for complex products (that need the simultaneous consent of many patent holders) can also arise in regard to data, if the provider of a certain product or service needs access to complementary data. It might then be necessary to consider access solutions similar to standard-essential patents (with FRAND-conditions). Especially where the IPRs on data are not clearly defined, the well-known business model of patent trolls can also emerge in the data economy, threatening companies for having used data (information) for which they claim IPRs (data trolls). It has to be admitted that

⁵⁸ See *Wiebe* (supra note 4), 881-883, for a deeper analysis of the specification problem.

⁵⁹ See regarding such a paradigmatic shift *Wiebe* (supra note 4), 882.

⁶⁰ See *Shapiro*, Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard Setting, in: *Jaffe/Lerner/Stern*, Innovation Policy and the Economy, 2001, 1, who also clearly showed that patent thickets and therefore defects of the patent system were the reasons for many patent pools and cross-licensing agreements.

most of these potential problems might also emerge without exclusive IPRs on data, because the de facto holding of data can also lead to similar problems. However, granting the data holders additionally an absolute IPR on these data would strengthen their position (e.g., in data hold up-cases) and result in much more problems than without such IPRs. This can also be claimed for the already intensely debated problems of the emergence of market power of firms with large sets of data, especially through mergers, which might lead to "data monopolies" or at least dominant positions that are based or at least strengthened by controlling vast amounts of data. The danger is that granting IPRs on data would increase entry barriers and strengthen the market power of these firms. Additionally, the acknowledgement of a property character of data might also generally raise the legal barriers to resolving access problems to these privately held data, e.g. due to the special protection of property under constitutional law.

A different but even more important question is whether a new IPR on data would fit into the functional logic of Big Data and the digital economy. The basic idea of Big Data applications is to use data from many different sources, combine them, analyze them, derive new data, which again can be used for further analyses in combination with other data. One of the characteristics of the data economy is that data can often be used for analyses in many different contexts and for solving many different problems. It has therefore been claimed that in order to develop innovations in the digital economy it is essential to have easy access to many different kinds of data and that therefore all impediments to the "free flow of data" should be eliminated as far as possible. From this perspective new exclusive IPRs on data might lead to additional barriers to this "free flow of data" and hamper competition and innovation in the digital economy.⁶¹ It is therefore not surprising that in the literature on the digital economy very different alternative concepts have been developed. For example, the OECD, in its report about "Data-driven innovation" views data more as an "infrastructure" for innovations in the digital economy.⁶² As a consequence, not exclusive property rights on data but, rather, easy access to data and the already mentioned "free flow of data" are considered essential in order to enable and promote innovations based upon the myriads of data that are and will be produced in the digital economy. Therefore the OECD report recommends to develop data governance systems that overcome barriers to data access and data sharing. This means that supporting portability, interoperability and standardization in regard to data is seen as pivotal policy measures for improving the governance of data in the digital economy.⁶³

VIII. Conclusions for Data Governance: From Exclusive Property to the Access Problem

⁶¹ See *Dorner* (supra note 4), 625, *OECD* (supra note 1), 195-197, and *Drexl* (supra note 4), 27-29.

⁶² See *OECD* (supra note 1), 177-206, and also *Goodman*, *The Atomic Age of Data: Policies for the Internet of Things*, 2015.

⁶³ Data as an infrastructure also links this discussion directly to the issue of public sector information. See *OECD* (supra note 1), 403-446.

The results of the economic analyses in sections IV to VII lead to the clear conclusion that so far the introduction of an IPR on data cannot be recommended. Both from a theoretical and empirical perspective there is no evidence that there are generally too few incentives for producing and analyzing data in the digital economy. Due to the possibilities of keeping data secret there is no general problem of copying of data and therefore no public good problem. Without an incentive problem the main economic argument for establishing an exclusive property right vanishes, if the use of the good is simultaneously non-rivalrous (as in the case of data).⁶⁴ The results of our analysis of the second rationale for IPRs, namely facilitating the use and trade of data, lead to a similar conclusion. Although it cannot be ruled out that the market for trading and licensing data can suffer from market failure problems, and empirically data markets are still developing and need more scrutiny, it seems that so far data producers and holders have sufficient possibilities for commercialising their data. The potentially most important market failure problem that the first buyer might resell data seems to be solvable through either contractual and technical restrictions or through the strategy of selling services based upon these data.

It was also shown that the fiercely discussed problem of to whom the (benefits of) data should be assigned, e.g., in a value network, and potential problems of an unfair remuneration for data do not lead to an additional rationale for an exclusive IPR on data. Usually the problem who is the de facto holder of data and how data governance within a network of firms is organized should be left to the contractual arrangements of the market, because the firms know their business model best. Market failure problems in these networks should be resolved by proper regulations, e.g., competition law. Therefore no convincing arguments about any considerable benefits of introducing exclusive IPRs on data can be found. However, there are powerful arguments concerning the costs and dangers of introducing such a property right. Most important are the difficulties of defining and specifying the exact subject matter of such an IPR. This leads to the danger of high legal uncertainty with potentially many ensuing problems that we know from recent discussions of patent law. . Especially important is also the concern that the further development of the digital economy and Big Data itself might be hampered by such an IPR.

However, our conclusion that the introduction of a new exclusive IPR on data cannot be recommended comes with some caveats and needs qualifications. Most important is that the digital economy is still at its beginning and might be developing fast and in a manner difficult to predict. Hence the results of such an analysis can change over time, especially because excludability and transaction costs of trade depend critically on technological developments. Another caveat is that it cannot be ruled out that there might be serious incentive problems could arise in regard to the production and analysis of specific kinds of data (e.g., in specific sectors). The question might then arise as to wheth-

⁶⁴ The basic rationale for exclusive IPRs was always that we have to accept monopolies with all their ensuing inefficiencies and problems, because otherwise we cannot ensure the incentives for producing these innovations or creative works in the first place.

er an exclusive property right on a specific (much more narrowly defined) set of data can be a solution (or whether such a specific problem might be better solved through other policy instruments, e.g., subsidies). This, however, would require significantly more specific empirical research about the production and analysis of data in different industries and sectors. Also necessary is significantly more economic and legal research about markets for trading or licensing data, allowing a deeper analysis of potential market failure problems and their remedies.

Our negative result in regard to protecting data through an exclusive property right does not imply that the data of data holders should not be protected against a wide array of behaviour that endangers and impedes the holding, use, and trade of these data. On the contrary, the existing legal rules in regard to protecting the data of data holders against destruction, compromising their integrity, and misappropriation that are based on tort law, contract law, trade secret law, and even criminal law, could be essential for the proper governance of data in the digital economy. It is rather one of the crucial questions for future research how these rules for protecting de facto holders of data should be shaped and whether the current legal rules are sufficient or can be improved. Therefore, from an economic perspective, it can be said that data holders have a bundle of rights on the de facto held data, as, e.g., the right to store, use and sell them, as well as the right that they are not destroyed, misappropriated, or compromised by others. In that respect, we could also talk about "rights on data" and "ownership" of data, which however would not encompass an exclusive right on these data (as physical property or traditional IPRs). Therefore the possession and use of data can be protected without the necessity of introducing exclusive property.

One of the important benefits of the discussion about data ownership is that it has helped to draw attention to other important dimensions of data governance in the digital economy, especially the problem of access to privately held data. Since the majority of data in the digital economy will be held privately, the question of access to such data will increasingly emerge, and presumably in many different contexts. If access to certain kinds of data is necessary for market entry and these data are not reproducible, then the question can be raised, whether there should be solutions for granting access for new entrants. In competition law, the question of under what circumstances data can constitute essential facilities and whether the refusal to grant (non-discriminatory) access to privately held data might be an abusive behaviour according to Art. 102 TFEU, are already being debated.⁶⁵ Since there are, however, high hurdles for solving the problem of access to data through competition law alone, it is increasingly being discussed whether this problem has to be addressed also by other kinds of regu-

⁶⁵ Access to certain kinds of data might also be an object of regulation as part of the conditions for cartel exemptions according to Art. 101 (3) TFEU, e.g., in regard to vertical restraints in distribution systems or vertical value chains. For, e.g., the rights to access repair and maintenance information for independent repair services in the automobile sector see *European Commission*, Guidelines on vertical restraints in agreements for the sale and repair of motor vehicles and for the distribution of spare parts for motor vehicles, OJ, C/138/16 (28.5.2010), recitals 62-68.

lation, perhaps also in a sector-specific way.⁶⁶ Another important discussion is about data portability (e.g., via data protection law). If customers have the right to data portability, then competitors can obtain access to certain sets of data through their customers. The problem of access to privately held data, however, can also be linked to the more general discussion about data as an infrastructure in the digital economy: This might also imply obligations of data holders to make certain kinds of data accessible, either only to the state for certain public services or even to the general public (with or without remuneration). But it is also important that the problem of access (as well as trade of data) is deeply intertwined with the topics of interoperability and standardization. However, policy solutions in regard to access to privately held data, and particularly obligations to grant access, will need very careful consideration and justifications. The problem of access to data will be one of the pivotal future policy questions for the governance of the digital economy.

⁶⁶ See in more detail *MPI* (supra note 5), 11-13, and *Drexl* (supra note 4), pp.36-56.