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What role for EU Competition Law Enforcement and Regulatory Intervention?

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Data Access Problems in the Emerging Digital Agriculture Sector:

What role for EU Competition Law Enforcement and Regulatory Intervention?

Proefschrift ter verkrijging van de graad van doctor aan Tilburg University

op gezag van de rector magnificus, prof. dr. W.B.H.J. van de Donk, in het openbaar te verdedigen ten overstaan van een door het college voor promoties aangewezen commissie in de Aula van de Universiteit

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Summary

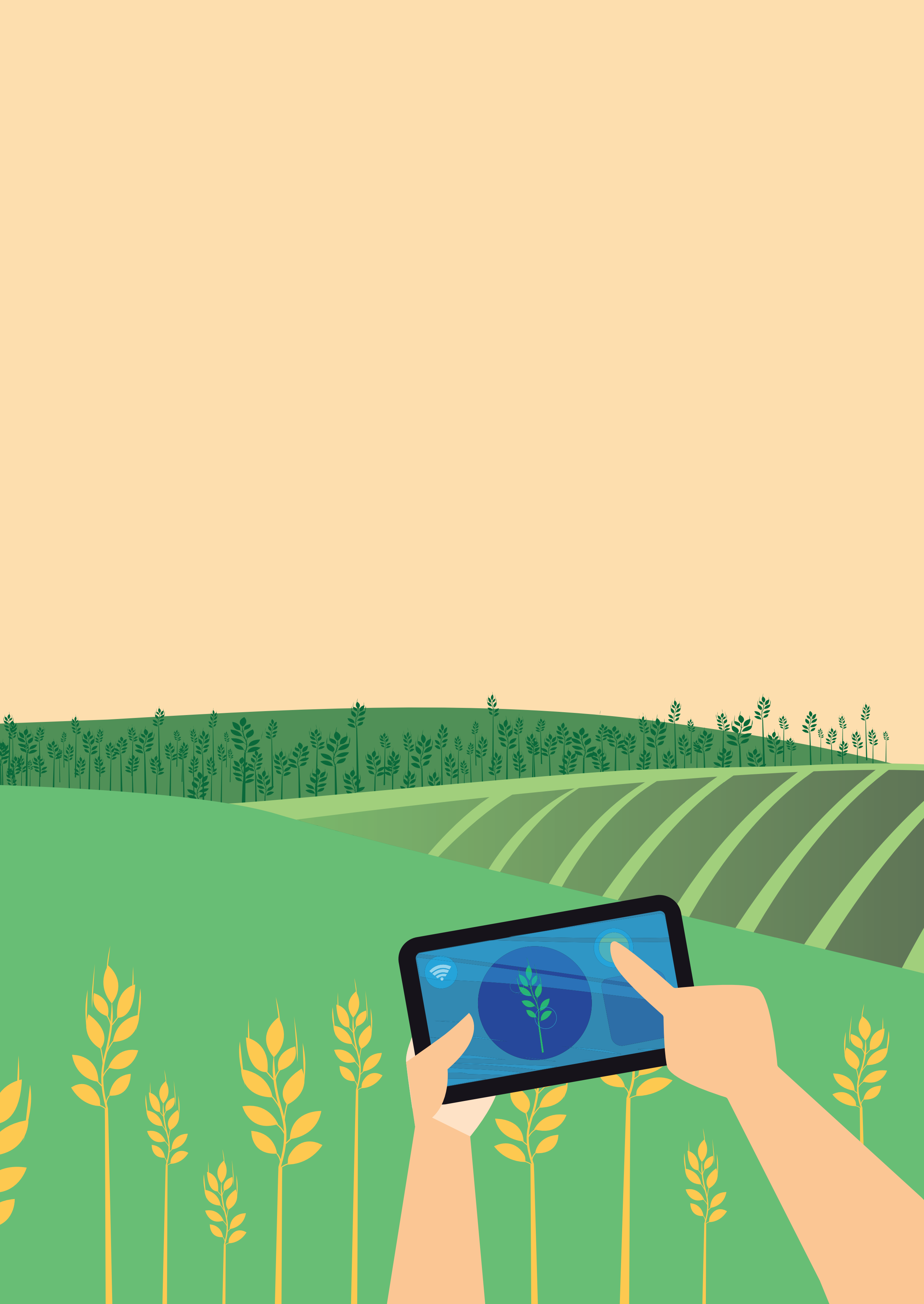
With the proliferation of IoT technologies in agriculture, ‘Smart Farming’ emerged as a new method referring to tailored data-driven solutions for agricultural practices. Data is collected from farms, and processed together with other relevant data sets by agricultural technology providers to generate different data-driven services for farmers to let them detect the problems earlier, track the developments, and take swift actions to specific agricultural operations. This offers enormous potential for more production with less agricultural input usage and limited environmental impact. Despite the significant potential, the Digital Agriculture sector is not free from problems. Multiple stakeholders in the farm-to-fork chain have interests to access different agricultural data sets. However, it is not clear who has what rights over which agricultural data sets among various stakeholders. In particular, there are interconnected data access-related issues: i) ag-data sets are fragmented in isolated data silos that are exclusively controlled by first-mover machine manufacturers or technology providers, ii) farmers are locked in the first-mover technology providers or machine manufacturers, iii) various access seekers are unanswered in the farm-to-fork chain, and iv) legal ambiguity creates trust-related problems that prevent farmers from adopting digital technologies and sharing data with third parties. These cumulatively create harmful effects on competition and innovation in the emerging Digital Agriculture sector. In this context, the overall research question of this dissertation is the following: *What are the prominent problems deriving from the ambiguities about ag-data access and control from the perspective of facilitating the development of a competitive Digital Agriculture sector,* and *to what extent are the EU regulatory initiatives and/or traditional EU competition law enforcement able to address these challenges?*

The European Union has been very active in regulating the digital economy over the last years with various horizontal policy initiatives and legislative proposals. In parallel, the sectoral stakeholders developed voluntary sectoral rules regarding agricultural data sharing in Europe. Also, European Commission investigated data-related issues in various cases including in a sectoral case of *Bayer/Monsanto*. However, despite the increasing attention, existing public or private initiatives are not sufficient to solve the complicated sectoral data access puzzle because the EU initiatives provide horizontal provisions that are not adequate to eradicate the sectoral issues, and the sectoral stakeholders’ attempt to provide voluntary

rules has significant limitations from the perspective of both design and enforcement mechanisms. This dissertation has identified the extent to which these developments are able to mitigate the agricultural data access-related ambiguities and what the remaining issues are to be solved by possible future sector-specific regulation(s). Thus, this study moves beyond providing suggestions for improvement of the existing frameworks, and it explores options for developing a future sectoral agricultural data governance model to fully answer the sectoral needs with a tailored design based on the generated understanding of the economic characteristics of ag-data control and underlying reasons for the data access problems.

The dissertation adopts different methodological approaches, including doctrinal legal research in the form of an in-depth analysis of existing legal frameworks, voluntary rule-making initiatives, and competition law enforcement practice in the EU as well as comparative and interdisciplinary (law and economics considerations) approaches. The thesis provides conceptual and regulatory suggestions for policymakers and legislators to address sector-specific concerns with tailored provisions to sectoral needs. It suggests a data access regime nuanced according to the peculiarities of the Digital Agriculture sector and investigates opportunities for synergies by using different tools together. The contributions of the dissertation fall under three main categories. The first contribution is to the competition law literature, where Chapters 2 and 6 provide a distinct sectoral evaluation of data-driven market power and the role of EU competition law enforcement to unlock ag-data sets. The second contribution is to the broader data governance literature, where Chapter 3 evaluates the potential and limitations of the voluntary rule-making initiatives in the US and the EU, and where Chapters 4 and 5 discuss existing and forthcoming regulatory initiatives in the EU from the Digital Agriculture sector perspective and identify their gaps, uncertainties, and limitations. The third contribution is a conceptual and regulatory suggestion for policymakers, legislators and enforcers, where Chapters 5 and 6 discuss the potential synergies of different tools to unlock ag-data in the DAS, such as ex-ante sectoral rules, technical infrastructures like the common European agricultural data space (CEADS), and traditional competition law enforcement. In particular, the thesis provides a detailed discussion regarding the possible consequences of an ag-data 'ownership' regime and recommends avoiding the 'ownership' concept. Instead, the entitlements of data access rights should be linked with the 'farm units' (not to farmers or their companies) to address farm data lock-in situations. In order to respond to broader data access needs in the farm-to-fork chain, designing sectoral authorities with the managerial powers to run CEADS and with the regulatory power to determine data re-use conditions according to certain principles may help to address prominent data access needs. For more dynamic challenges, traditional competition law enforcement may play a complementary role.

The findings of this dissertation have various impacts. The results can inform European Union policy-making and law-making processes from the sectoral perspective as well as guide supervisory authorities and sectoral stakeholders in their practices. The ultimate contribution is to provide deeper insights into sectoral issues to help the development of a more consistent and fit-for-purpose legal framework for holistic agricultural data governance in Europe.



CHAPTER 1

Introduction

1. Introduction

1.1 Research Background

The ‘datafication’ of the economy has significantly affected various industries and created echoes in different fields of law.[1] Especially, there has been an online platforms-centric debate about the possible anti-competitive consequences linked to the notion of ‘Big Data’.[2] This is not an unexpected focus when considering the growing importance of online platforms and their data-driven power, but the digital revolution also has rapidly growing effects on many other sectors that should not be overlooked.[3]

This dissertation investigates the data-driven transformation of the agriculture sector. The notion of ‘Smart Farming’ refers to data-driven targeted solutions, suggestions and prescriptions for farmers in order to render them into better decision-makers in their farming activities such as seeding depth, seed placement, cultivar, machinery diagnostics, time and motion, dates of tillage, planting, scouting, spraying, input applications, harvesting and even in the marketing stage.[4] Despite the huge potential of this digital transformation for the agriculture sector, there are significant agricultural data (‘ag-data’) access related problems in the emerging

1 such as privacy, consumer protection, taxation, and competition law. See OECD, *Data-Driven Innovation: Big Data for Growth and Well-Being*, (OECD Publishing, 2015), preface; Margrethe Vestager ‘Competition in a big data world’ (*European Commission*, 2016) <https://ec.europa.eu/commission/commissioners/2014-2019/vestager/announcements/competition-big-data-world_en> accessed 2 October 2022.

2 See, for instance, Autorité de la concurrence and Bundeskartellamt, *Competition Law and Data* (2016) <https://www.bundeskartellamt.de/SharedDocs/Publikation/DE/Berichte/Big%20Data%20Papier.pdf?___blob=publicationFile&v=2> accessed 24 September 2022 – Online platforms refer to search engines, e-commerce platforms and social networks in this report; Luigi Zingales and others, *Stigler Committee on Digital Platforms: Final Report* (Stigler Center, 2019) <https://www.chicagobooth.edu/-/media/research/stigler/pdfs/digital-platforms---committee-report---stigler-center.pdf> accessed 24 September 2022; Jacques Crémer, Yves-Alexandre de Montjoye and Heike Schweitzer, *Competition Policy for the digital era – Final Report* (Publications Office of the European Union, 2019), <https://ec.europa.eu/competition/publications/reports/kd0419345enn.pdf> accessed 24 September 2022.

3 such as health, energy, telecommunication, insurance, banking or transportation sectors are considered as some of them. See at OECD, n.1 above, pp. 331-378; See detailed information about data-driven paradigm shift in agriculture in Sjaak Wolfert and others, ‘Big Data in Smart Farming - A review’ (2017) 153 Agriculture Systems.

4 See for instance, Keith Coble and others, *Advancing U.S. Agricultural Competitiveness with Big Data and Agricultural Economic Market Information, Analysis, and Research*, (FARE report, 2016), p. 3 and Wolfert and others, n. 3, p. 74.

data-driven markets of the Digital Agriculture sector ('DAS') due to legal ambiguities, technical barriers and economic reasons. This thesis explores the role of EU competition law enforcement and regulatory intervention to address these prominent problems in the DAS.[5]

From the legal perspective, the main problem is strictly related to the lack of clarity regarding the applicable legal framework(s) to agricultural data, and thus, the ambiguities on who has which rights on what ag-data sets.[6] This causes data lock-ins in the hands of first-mover technology providers or machine manufacturers, data fragmentation in isolated data silos exclusively controlled by different parties, unanswered data access needs of various players in the farm-to-fork chain, and trust-related problems that prevent farmers from adopting the Internet of Things ('IoT' henceforth) technologies and sharing data with third parties.[7] In this regard, investigating possible ways to remove or mitigate these interconnected problems is critical to fully benefit from 'Smart Farming' by ensuring continuous innovation in the sector with free data flows.

This dissertation approaches the issue from two main perspectives. On the one hand, it explores the opportunities and limitations of EU competition law enforcement to unlock ag-data for various access seekers. On the other hand, it focuses on growing regulatory initiatives to design data rights and create data infrastructures in the European Union ('EU' henceforth) to identify to what extent they can remove the underlying reasons for the ag-data access-related concerns. In this regard, the thesis presents an overall analysis of the potential of competition law enforcement and regulatory initiatives in Europe, and it provides suggestions to improve the effectiveness of the

5 Under the EU competition law, the thesis investigates the underlying reasons for agricultural data-driven market power of digital service providers in the DAS (Chapter 2) and possible application of the refusal to deal case law to identified agricultural data access request scenarios (Chapter 6). Regulatory intervention as a notion is used here broadly. The thesis discusses the role of sectoral stakeholders' voluntary rule making for data access (Chapter 3), existing legislative frameworks in the EU regarding data access and control (Chapters 3, 4, and 5) and regulatory design opportunities for the future of agricultural data governance in Europe (Chapter 5).

6 See, for instance, the literature review regarding 'data ownership' discussions in the sector in Simone van der Burg, Marc-Jeroen Bogaardt and Sjaak Wolfert, 'Ethics of smart farming: Current questions and directions for responsible innovation towards the future' (2019) 90:91 NJAS - Wageningen Journal of Life Sciences, pp. 3–5.

7 See detailed discussions regarding the reasons for these problems and nuances in Chapters 2 and 3 below.

existing tools and to develop new ones in order to address the challenges in the DAS. In particular, the thesis highlights the potential to achieve stronger synergies between competition law enforcement and regulatory intervention towards functional ag-data governance in the EU.

1.1.1 Agriculture as a Special Sector in the Eyes of Policy Makers

While the growing population in the world demands a sustainable food supply, farmers have to deal with many challenges to meet this need. These include overcoming weather and climate conditions, meeting the time gap between consumer demand and supply, being cost-effective, sustainable and environmentally friendly or preserving soils and biodiversity – despite the fact that the income of an average farmer is around 40% lower compared to the average income of other businesses in Europe.[8]

In this environment, special treatment from policymakers is considered necessary. Indeed, the Common Agricultural Policy (the 'CAP' henceforth) of the European Union aims i) to support farmers and improve agricultural productivity in order to ensure a stable supply of affordable food, ii) to safeguard farmers' reasonable living, iii) to help them tackle climate change and the sustainable management of natural resources, iv) to maintain rural areas and landscapes across the EU and v) to keep the rural economy alive by promoting jobs in farming, agri-foods industries and associated sectors by providing income support, market measures and rural development measures.[9] The CAP framework was initiated in 1962 and has been gradually updated by the policymakers.[10] Thus, agriculture has always been a special sector in the eyes of the EU policymakers and has been treated within the scope of the CAP.[11]

Because of the described vulnerabilities, agriculture has also a specific position from the EU competition policy perspective. Since the early times of the CAP, common market organisations (CMOs) were generated to plan and coordinate the production and trade of agricultural products in the EU in order to ensure

8 "The Common Agricultural Policy at a Glance" (European Commission, 2019) <https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/cap-glance_en> accessed 5 November 2022.
9 Ibid.
10 Ibid.
11 See Francis Synder, *New Directions in European Community Law,* (1st edn, Weidenfeld and Nicolson 1990), pp. 101-145.

a sustainable food supply for society and a decent income for farmers.[12] The CMO regulation contains particular derogations and exemptions to the agriculture sector *"to provide a safety net to agricultural markets through the use of market-support tools, exceptional measures and aid schemes for certain sectors (in particular fruit and vegetables, and wine), to encourage producer cooperation through producer organisations and specific rules on competition and to lay down marketing standards for certain products"*.[13] In particular, in line with Article 42 of the Treaty on the Functioning of the European Union (TFEU),[14] agreements, decisions, and practices of farmers and cooperatives concerning the production or trade of agricultural products are treated leniently with regard to the application of the rules on competition (Article 101(1) and Article 102) in the TFEU.[15] In addition, Article 107 TFEU, which contains the state aid provisions, is applied exceptionally lightly to agriculture.[16] This specific application of the competition law rules for the 'agriculture sector' covers most of the markets for the production or trade of traditional agricultural products listed in Annex I of the CMO Regulation such as sweetcorn, wheat, rye, barley, oats, maize, potato, rice, sugar and many more.[17] More recently, the Regulation (EU) 2021/2117[18] amended inter alia the CMO Regulation and enlarged the scope of the mentioned derogations and exemptions by allowing increased cooperation amongst the relevant actors in agriculture.[19]

12 "Common Organisation of Agricultural Markets (CMO)" (*eur-lex.europa.eu*2013) <https://eur-lex.europa.eu/EN/legal-content/glossary/common-organisation-of-agricultural-markets-cmo.html> accessed 9 November 2022.

13 Regulation (EU) 1308/2013 of the European Parliament and of the Council of 17 December 2013 establishing a common organisation of the markets in agriculture, OJ L 347 of 20.12.2013.

14 Treaty on the Functioning of the European Union (TFEU) OJ C 326/47, 26 October 2012.

15 According to Articles 206 to 210 of the Regulation (EU) 1308/2013; See also a summary of this exceptional regime in 'The Common Organisation of Agricultural Markets in the EU' (*eur-lex.europa.eu*2013) <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3A0302_1> accessed 9 November 2022.

16 Ibid., Articles 211 to 218 of the Regulation.

17 See Ibid., Article 1 and Annex I of the Regulation.

18 Regulation (EU) 2021/2117 of the European Parliament and of the Council of 2 December 2021 amending Regulations (EU) No 1308/2013 establishing a common organisation of the markets in agricultural products, (EU) No 1151/2012 on quality schemes for agricultural products and foodstuffs, (EU) No 251/2014 on the definition, description, presentation, labelling and the protection of geographical indications of aromatised wine products and (EU) No 228/2013 laying down specific measures for agriculture in the outermost regions of the Union, OJ L 435, 6.

19 See Ibid, Recitals 56, 61 and 62 as well as Articles 102, 172b, 193a, 208, 210a. For instance, Recital 62 states that *"Certain vertical and horizontal initiatives concerning agricultural and food products, which aim to apply requirements that are more stringent*

Although these exceptions are only applicable to the practices of farmers or cooperatives related to the production or trade of agricultural products in the traditional markets of the broader agriculture sector, and, therefore, they are not directly relevant to the specific focus of this thesis (data-related practices of digital service providers and agricultural machinery manufacturers in the DAS), it is still important to note that one should be aware of the rationale behind the special position of the agriculture sector when considering the digital developments in the sector.

1.1.2 Digital Transformation and Data-Driven Innovation in Agriculture

Since the 1950s, agriculture has been considered an underdeveloped sector compared to other industries in Europe for certain reasons. In particular, the form of agricultural production was considered rudimentary compared to other industries because agriculture was related to the production of raw materials with traditional methods by predominantly small rural family farms whereas most of the other industries were characterised by the process and distribution of inputs by well-organised companies.[20] However, the sector has been modernised over time, and especially after the 1980s, the 'industrialisation' or 'modernisation' of agriculture theories started to be discussed in parallel to the transformation of the sector.[21] Synder argues that some EU regulations also followed this modernisation theory implicitly.[22]

than the mandatory requirements, can have positive effects on sustainability objectives. The conclusion of such agreements, decisions and concerted practices between producers and operators at different levels of the production, processing and trade could also strengthen the position of producers in the supply chain and increase their bargaining power. Therefore, under specific circumstances, such initiatives should not be subject to the application of Article 101(1) TFEU." or Recital 56 provides that *"The special commercial value of wines covered by a protected designation of origin (PDO) or protected geographical indication (PGI) derives from their belonging to a premium segment of the market thanks to their reputation for quality that derives from their product specifications. Such wines tend to fetch higher prices in the market as consumers value the characteristics to which the designation of origin and geographical indication attests. To prevent those quality credentials from being undercut by detrimental price action, interbranch organisations representing the operators benefiting from those quality credentials should be able to issue price guidance concerning the sales of the relevant grapes by way of derogation from Article 101(1) TFEU."*

20 See Synder, n. 11, pp. 109-119.

21 Ibid.

22 Ibid. p. 109.

Since the beginning of the 1990s, technology usage in agricultural production started to proliferate under the notion of 'precision agriculture' referring to the operation of farms by using closed data management and storage systems at this preliminary level.[23] Today, developments have shifted to another phase. Farming activities are being increasingly promoted by advanced Big Data processing and IoT technologies, and the new form of data-driven decision making in agriculture is called 'Smart Farming' or 'Digital Agriculture'.[24] There are significant successful Big Data implementations in the sector. For instance, farm data collection via various methods plays a key role to predict any disease or determining the ideal time for insemination of live stocks (as sensors are much more sensitive than human observation), and data is also collected to observe crop developments, to estimate harvesting times, or to determine plant diseases in very early stages.[25] These developments are regarded as just a first step of a big revolution in the agriculture sector because it is expected that Big Data will significantly change the operation, management, and structure of the farms as well as the agricultural supply chain as a whole.[26]

Connected to these developments, the Digital Agriculture sector has emerged as a new sector, in which Agricultural Technology Providers ('ATPs' henceforth) provide data-driven services (e.g. input usage prescriptions, farm operation solutions or suggestions for better practices) for farmers to let them switch from traditional decision-making to more efficient 'Smart Farming' by processing large agricultural data sets.[27] By recalling the increasing population of the world and ascending need for food in a sustainable way not only for people's nutrition, but also for the industry that is dependent on agricultural raw material, the benefits of Smart

23 Ibid.

24 Harald Sundmaeker and others, 'Internet of food and farm 2020' in Ovidiu Vermesan and Peter Friess (eds), Digitising the Industry – Internet of Things Connecting the Physical, Digital and Virtual Worlds (River Publishers 2016), p. 132-133; Wolfert and others, n. 3, pp. 69-75; Michael E. Sykuta, 'Big Data in Agriculture: Property Rights, Privacy and Competition in Ag Data Services' (2016) 19 International Food and Agribusiness Management Review 57, p. 60; see also Case No COMP/M.8084 – Bayer/Monsanto, European Commission Decision (29 May 2018), para. 2442.

25 Krijn J. Poppe and others, 'Information and Communication Technology as a Driver for Change in Agri-food Chains' (2013) 12 EuroChoices 60, p. 60-63; Krijn Poppe and others, 'A European perspective on the economics of Big Data' (2015) 12 Farm Policy Journal, pp. 11-12; See also Bayer/Monsanto, n. 24, para. 2442.

26 Poppe and others, n. 25, p. 12.

27 *Bayer/Monsanto*, n. 24, para 2442, and 2562-2565.

Farming with a more productive, less costly, and environmentally-conscious production style are crucial for the future.[28]

The digital revolution in the agriculture sector is, therefore, significantly promoted at the EU level. The Member States aim to increase the adoption rates of digital technologies amongst farmers across the EU.[29] The future CAP also promotes innovation and supports farmers to benefit from the digital transition in agriculture.[30] In line with the general CAP framework,[31] there are also important collaborations with relevant institutions. For instance, Digital Innovation Hubs run significant projects to support the farm advisory community in order to prepare farmers for the digital revolution in the agriculture sector,[32] and the European Innovation Partnership for Agriculture ('EIP-AGRI') intends "*to foster competitive and sustainable farming and forestry that 'achieves more and better from less'.*"[33] Alliance for IoT and Edge Computing Innovation (AIOTI) aims to promote easy-to-use IoT solutions in Smart Farming.[34] Academia has also been encouraged to contribute to fostering this transformation for a long time. For instance, SmartAgriFood is an early project that was designed to support SMEs to develop innovative applications and services for Smart Farming.[35] The Horizon 2020 programme has increased the support for projects to promote digital technologies in agriculture.[36] For instance, Smart Agricultural Knowledge and Innovation

28 See more at Sundmaeker and others, n. 24, p. 129-134.
29 See 'EU Member States Join Forces on Digitalisation for European Agriculture and Rural Areas' (*Shaping Europe's digital future*, 2019) <https://digital-strategy.ec.europa.eu/en/news/eu-member-states-join-forces-digitalisation-european-agriculture-and-rural-areas> accessed 4 August 2022.
30 See 'The New Common Agricultural Policy: 2023-27' (*agriculture.ec.europa.eu*, 2021) <https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/new-cap-2023-27_en#innovation> accessed 5 August 2022.
31 See footnote 8 above.
32 'Shaping the digital (r)evolution in agriculture' (*European Commission,* 2018), p. 7 <https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_brochure_digital_revolution_2018_en_web.pdf > accessed 12 September 2022.
33 'European Innovation Partnership "Agricultural Productivity and Sustainability" – EIP-AGRI' (*European Commission*, 2018) <https://ec.europa.eu/eip/agriculture/en/european-innovation-partnership-agricultural> accessed 12 September 2022.
34 "Agriculture" (*AIOTI,* 2019) <https://aioti.eu/about-us/our-groups/agriculture/> accessed 5 November 2022.
35 "Smart Food and Agribusiness" (*SmartAgriFood,* 2011), <http://smartagrifood.eu/node/96> accessed 5 November 2022.
36 'European Union Funds Digital Research and Innovation for Agriculture to Tackle Societal Challenges' (*European Commission*, 2017) <https://ec.europa.eu/info/news/european-union-funds-digital-research-and-innovation-agriculture-tackle-

Systems (Smart AKIS) project aims to make Smart Farming a mainstream practice among European farmers and to bring cutting-edge research and practice together.[37] The purpose of the Internet of Food & Farm (IoF2020) project is to increase the usage of IoT technologies in the agri-food value chain.[38] Similarly, SmartAgriHubs project is designed to release the full innovation potential of the digital transformation in the European agrifood sector.[39]

However, the Big Data transformation in the agriculture sector is not free from problems. As hinted above, the main legal issue is the lack of clarity regarding who has which rights over what ag-data sets.[40] Beyond that, the global concentration trend in the (upstream) agricultural input production sector exacerbates the concerns in the emerging DAS because a few vertically integrated agricultural conglomerates have various incentives and capabilities to dominate the downstream emerging markets in the DAS and to control wide agricultural data sets exclusively – as explained below.

1.1.3 Global Concentration Trend in the Agricultural Input Production Markets and Its Effects on the Emerging Digital Agriculture Sector

In the last decade, there has been a concentration trend in the upstream agricultural input sector, which also affected the dynamics of the emerging DAS. In 2013, the American agriculture conglomerate Monsanto acquired The Climate Corporation mainly because of its data sets by paying nearly 1 billion USD.[41] The Climate Corporation had an impressive database including topographical maps of 25 million American fields, combined with weather and climate data, weather simulation modelling, and soil fertility data. [42] This data

societal-challenges_en> accessed 12 September 2022.

37 ‘Why a Network on Smart Farming?’ (*Smart AKIS*, 2016) <https://www.smart-akis.com/index.php/network/smart-akis/> accessed November 5, 2022

38 See more at ‘Internet of Food & Farm’ (*IoF2020*, 2018) <https://www.iof2020.eu/> accessed 12 September 2022.

39 ‘About SmartAgriHubs’ (*SmartAgriHubs*, 2018) <https://www.smartagrihubs.eu/about> accessed 5 November 2022.

40 See footnotes 5, 6 and 7 above.

41 Tony Danova, ‘Big Data is Worth $1 Billion to Agricultural Giant Monsanto’ (*Business Insider*, 2013) <https://www.businessinsider.com/monsanto-buys-climate-corporation-for-1-billion-2013-10?international=true&r=US&IR=T> accessed 5 January 2021.

42 See at Monty Guild and Tony Danaher, ‘Big Data Comes to the Farm’ (*Financial Sense*, 2014) <https://www.financialsense.com/contributors/guild/big-data-farm> accessed 3 August 2022; *Data Revolution: Emerging New Data Driven Business*

complemented Monsanto's own data regarding corn and soybean varieties and their yield performance under various conditions.[43] Thus, this merger brought about significant consequences as Monsanto had a very advantageous position in terms of providing better digital agriculture services for farmers.[44]

After this specific data-driven takeover in the US, Monsanto, this time, attempted to acquire Syngenta (another huge agricultural input company) in July 2014, but this was not realized because of the target company's rejection.[45] However, it started a broader merger trend in the sector including mega-mergers between Dow and DuPont[46] (the merger was announced in December 2015), ChemChina and Syngenta[47] (the public tender offer was made in February 2016), and the trend has reached its peak with Bayer's acquisition of Monsanto (the takeover was announced in September 2016).[48] The *Bayer/Monsanto* merger is the cornerstone from the perspective of this thesis because this is the only case where the Commission investigated possible anticompetitive effects of the concentration for the 'Digital Agriculture sector' separately.[49] This is discussed in detail in this dissertation in Chapter 2 below.

This merger wave resulted in a further concentration in the already concentrated agricultural inputs sector. According to 2015 data, the total value of the farming inputs sector was about 85 billion Euro including 23.1€bn Bayer/Monsanto combination as the market leader (with around %27.18 market share), 14.8€bn for ChemChina/Syngenta, 14.6€bn for Dow/DuPont in addition to 5.8bn€ of

Models in the Agri-Food Sector (EIP-AGRI Report, 2016) <https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_seminar_data_revolution_final_report_2016_en.pdf> accessed 5 January 2021, p, 11.

43 Ibid.

44 Ibid.

45 Katharina Bart and Pamela Barbaglia, 'Syngenta Rejects $45 Billion Monsanto Takeover Offer' (*Reuters* 2015) <https://www.reuters.com/article/us-syngenta-m-a-monsanto-reject-idUSKBN0NT0JM20150508> accessed 26 December 2022; See more discussion in Ioannis Lianos and Dmitry Katalevsky, 'Merger Activity in the Factors of Production Segments of the Food Value Chain: - A Critical Assessment of the Bayer/Monsanto merger' (2017) CLES Policy Paper Series 2017/1 <https://www.ucl.ac.uk/cles/sites/cles/files/cles-policy-paper-1-2017.pdf> accessed 14 July 2022, p. 2.

46 Case No COMP/M.7932 – *Dow/DuPont*, European Commission Decision (27 March 2017).

47 Case No COMP/M.7962 – *ChemChina/Syngenta*, European Commission Decision (5 April 2017).

48 See *Bayer/Monsanto*, n. 24; See a detailed evaluation regarding this trend in Lianos and Katalevsky, n. 45, p. 2.

49 See *Bayer/Monsanto*, n. 24, paras. 2442 – 2872.

BASF's sole contribution.[50] This trend reduced the number of prominent market players, and thus, increased the collusion risk (as it is easier to be coordinated amongst limited players) in addition to a number of other competition risks such as parallel exclusion, cumulative foreclosure effect or strategically preventing the disruptive innovation in order to maintain the *status quo* in favour of vertically integrated powerful players in the sector.[51] Verdonk puts forward that as the conglomerate players in the agricultural inputs sector also have digital agriculture branches, the upstream concentration wave indirectly reduced competitive constraints of established rivals and increased entry barriers in the DAS – considering the merging giants' capabilities such as their combined customer advantage from the traditional businesses, their investment capital, product differentiation, data accumulation due to their first-mover advantage and also their significant know-how.[52] Lianos states a noteworthy concern for farmers: the possible combination of traditional (agricultural inputs) business with digital agriculture services may result in *tight value chains* via contractual relationships and bundling practices.[53] Lianos and Katalevsky argue that this concentration trend in the upstream input production sector may result in an increase in the defensive investments and may trigger a further acceleration of the takeover activity in order to swallow the potential threats before they are able to change the market equilibriums with their disruptive/innovative features.[54] Indeed, it is also stated by the competitors in the *Bayer/Monsanto* case that the power of the merged entity after the transaction might prevent the entry of start-ups, new investments and more innovation.[55] According to Kritikos, this concentration trend may also lead to food security concerns in the EU and increase dependencies on multinational agricultural giants, especially if they dominate the digital agriculture markets and create one-stop-shop platforms on a global scale. [56]

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50 Lianos and Katalevsky, n. 45, p. 3, footnote 7.
51 Ibid., pp. 8-9 and 21-22.
52 Tom Verdonk, 'Planting the Seeds of Market Power: Digital Agriculture, Farmers' Autonomy, and the Role of Competition Policy', in Leonie Reins (ed.), *Regulating New Technologies in Uncertain Times* (Springer, 2019), pp. 114-116.
53 See Ioannis Lianos, 'Chapter 21: The Interaction of Competition, Regulation and IP Rights in Agriculture: Towards a Dynamic Equilibrium?' in Gabriella Muscolo and Marina Anna Tavassi (eds), *The interplay between competition law and intellectual property: an international perspective*, International Competition Law Series, Volume 77 (Kluwer Law International 2019), pp. 348-349.
54 Lianos and Katalevsky, n. 45, p. 22.
55 *Bayer/Monsanto*, n. 24, para 2600.
56 Mihalis Kritikos, 'Precision agriculture in Europe – Legal, social and ethical considerations' (*EPRS | European Parliamentary Research Service,* 2017), p. 42.

Consequently, players in the already highly concentrated agricultural inputs markets might use their upstream market power as leverage in the downstream emerging markets in the DAS.[57] While the literature touches upon the possibly detrimental consequences of the concentration trend in the upstream agricultural input sector on the emerging DAS, this thesis aims to go further and dive into the reasons and consequences of agricultural data access problems within the DAS and seeks possible solutions to address them. Investigation of the adequacy of the recent regulatory initiatives in the EU to address the ag-data access related problems in the DAS is, therefore, a part of this research.

1.1.4 Initiatives in the European Union to Regulate 'Big Data'

Public debates about regulating data access and control issues may date back to much before, but the European Commission started to declare policy objectives about envisioning today's data economy in Europe, especially as of 2014.[58] The Commission signalled that the well-being of citizens and socio-economic progress in the digital age can only flourish in Europe with modern and innovative rules.[59] 'A Digital Single Market Strategy for Europe' came in 2015 with the objectives of the free movement of goods, persons, services and capital when exercising online activities by ensuring fair competition as well as consumer and personal data protection.[60]

When it comes to regulating data with binding rules and rights, the first cornerstone is the General Data Protection Regulation ('GDPR' henceforth).[61] Superseding the Directive 95/46/EC in 2016,[62] the GDPR brought about new horizontal rules, rights and obligations regarding personal data, which refers to any information relating to an identified or identifiable natural person

57 This will be discussed in detail from the perspective of data accumulation in Chapters 2 and 6 below.

58 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Towards a thriving data-driven economy – COM(2014) 0442 final.

59 Ibid., p. 12.

60 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A digital single market strategy for Europe – COM(2015) 192 final, p. 3.

61 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119, 1.

62 Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data, OJ L 281, 31.

(data subject).[63] Particularly, the right to data portability (Article 20) is highly relevant for data lock-in situations from the competition policy perspective despite its main role of privacy protection. In particular, by enabling the transfer of personal data, the right to data portability has made it easier for individuals to switch digital service providers with their personal data.[64]

After the GDPR, the Commission announced successive communications and legislative proposals in order to release the full potential of the data economy by addressing problems of wider availability of data. In 2017, 'Building A European Data Economy' communication was released with the purpose of exploring issues related to "*free flow of data, access and transfer in relation to machine-generated data, liability and safety in the context of emerging technologies, and portability of non-personal data, interoperability and standards.*"[65] The year 2018 was very dynamic in this regard as the Commission released important documents including a communication namely 'Towards a common European data space'[66] and Staff Working Document on "Guidance on sharing private sector data in the European data economy".[67] Also, a regulation on a framework for the free flow of non-personal data in the European Union was adopted to promote free data flow with voluntary codes of conduct by mainly focussing on cloud service providers.[68] In line with these developments, sectoral stakeholders

63 See Articles 2 and 4 of the GDPR.

64 Therefore, this dissertation discussed the applicability of *inter alia* the GDPR regime to ag-data access issues in the DAS. See Chapters 2, 3 and 5 for the details.

65 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – building a European Data Economy – COM(2017) 9 final, pp. 4-5. This document also mentioned the increasing use of sensors in modern farms and importance of farm data collection to optimise farming operations. See p. 8.

66 which provided an example of smart farming practices. See Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Towards a common European data space – COM(2018) 232 final.

67 Commission Staff Working Document on Guidance on sharing private sector data in the European data economy accompanying the document communication "Towards a common European data space" – SWD(2018) 125 final.

68 Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union, OJ L 303, 59–68; See also 'Free Flow of Non-Personal Data' (*Shaping Europe's digital future*) <https://digital-strategy.ec.europa.eu/en/policies/non-personal-data> accessed 21 December 2022; It is important to note that this regulation also considered farm data sets as an example of 'non-personal data'. See Recital 9 of the Regulation (EU) 2018/1807.

in Europe developed voluntary rules regarding agricultural data sharing under the name of the 'EU Code of Conduct on agricultural data sharing by contractual agreement'.[69] This initiative was the first step towards an ag-data governance regime in Europe even though it was based on only a set of non-binding principles developed by the stakeholders.[70]

In 2020, "A European Strategy for Data" declared detailed objectives and planned initiatives towards a European single market for data to ensure free data flow within and across sectors in line with European rules and values by clearly referring to legal frameworks of personal data protection, consumer protection and competition law.[71] This document also states that the Commission is planning to create 'common European data spaces' for nine strategic sectors including a 'common European agricultural data space'.[72] In the same year, the Data Governance Act proposal was released to regulate providers of bilateral or multilateral data exchange services, personal data sharing services and data cooperatives. [73] The proposal of the Digital Markets Act (DMA) was also released.[74] It defines mandatory business-to-business data sharing obligations for (non-personal) commercial data – only applicable to very large "gatekeeper platforms" that provide "core platform services".[75]

69 'EU Code of Conduct on agricultural data sharing by contractual agreement' (*Copa and Cogeca at all*, 2018) <https://www.cema-agri.org/publication/brochures/37-eu-code-of-conduct-on-agricultural-data-sharing> accessed 4 December 2022.

70 Therefore, this dissertation discussed *inter alia* the impact of this voluntary initiative from the sectoral perspective. See Chapter 3 below.

71 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A European Strategy for Data – COM(2020) 66 final.

72 beyond others such as energy, mobility, manufacturing, health, financial services, and public administration. See Ibid., pp. 26-34. See a detailed discussion on the sectoral data space in agriculture in Chapter 5 below.

73 Proposal for a Regulation of the European Parliament and of the Council on European data governance (Data Governance Act), COM(2020) 767 final, 25.11.2020. As of the date of submission of this thesis, the DGA has already been adopted. See Regulation (EU) 2022/868 of the European Parliament and of the Council of 30 May 2022 on European data governance and amending Regulation (EU) 2018/1724 (Data Governance Act), OJ L 152.

74 Proposal for a Regulation of the European Parliament and of the Council on contestable and fair markets in the digital sector (Digital Markets Act), COM(2020) 842 final, 15.12.2020. As of the date of submission of this thesis, the DMA has already been adopted. See Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act), OJ L 265.

75 See Ibid. It has to be noted that the The Digital Services Act (DSA) proposal was

Eventually, in early 2022, a proposal for a Regulation on harmonized rules on fair access to and use of data, namely, 'Data Act' was released by the Commission.[76] This is also a horizontal regulation with binding rules and data rights like the GDPR, but the scope of the regulatory proposal is broader in terms of covering both personal and non-personal data sets,[77] and Data Act has regulatory objectives based on economic arguments[78] unlike the GDPR, which has its grounds from the protection of the fundamental right to data protection.[79] The Data Act proposal provides a data access regime that includes i) obligations for manufacturers of 'products' to make data generated by the use of products or related services accessible,[80] ii) users' rights to access and use data generated by the use of 'products' or 'related services',[81] iii) users' right to share data with third parties,[82] and iv) obligations for third parties receiving data at the request of the user.[83] In addition, the Data Act proposal provides other relevant provisions concerning obligations for data holders to make data available,[84] unfair terms related to data access and use between enterprises,[85] obligations to make data available to public sector bodies based on exceptional need,[86] or interoperability obligations for the operators of data spaces.[87]

also released in the same year, but it has less relevance from the perspective of this thesis because it is about content moderation rather than data governance. Still, see Proposal for a Regulation of the European Parliament and of the Council on contestable on a Single Market For Digital Services (Digital Services Act) and amending Directive 2000/31/EC, COM(2020) 825 final, 15.12.2020. As of the date of submission of this thesis, the DSA has already been adopted. See Regulation (EU) 2022/2065 of the European Parliament and of the Council of 19 October 2022 on a Single Market For Digital Services and amending Directive 2000/31/EC (Digital Services Act), OJ L 277.

76 Proposal for a Regulation of the European Parliament and of the Council on harmonised rules on fair access to and use of data (Data Act), COM(2022) 68 final, 23.02 2022.

77 See Ibid., Article 2.

78 See Explanatory Memorandum and Recitals of the Data Act proposal.

79 See Recitals of the GDPR.

80 The Data Act proposal, n. 76, Article 3.

81 Ibid., Article 4.

82 Ibid., Article 5.

83 Ibid., Article 6. User-centric data rights are listed in Chapter II of the proposal.

84 See provisions in Ibid., Chapter III.

85 See provisions in Ibid., Chapter IV.

86 See provisions in Ibid., Chapter V.

87 See provisions in Ibid., Chapter VIII.

The thesis touches upon all these initiatives by discussing their impact on addressing the above-mentioned problems relating to access to agricultural data. Especially, as the recent Data Act proposal is a horizontal regulatory framework that particularly covers IoT-generated non-personal data-driven sectors, it is highly relevant to investigate the possible implications of this intervention for the emerging DAS.

1.1.5 Gap in the Literature

In light of all the background information above, the gap in the literature can be evaluated in two main axes: i) the gap in the legal literature and ii) the gap in the sectoral (digital agriculture) literature. The legal literature refers here to the discussions focusing on EU competition law enforcement and regulatory intervention in the digital age. The sectoral literature refers to publications that touch upon agricultural data control issues without legal expertise or without a particular legal focus.

From the EU competition law enforcement perspective, 'Big Data' centric discussions in the literature predominantly focused on online platforms. About the possible application of the EU competition law enforcement to the challenges in the data economy, there are many reports[88] and countless articles[89] and books.[90] Although this focus is natural when considering that

88 See, for instance, Autorité de la concurrence and Bundeskartellamt, n. 2; Crémer, de Montjoye and Schweitzer, n. 2; See also a comprehensive review of policy reports on the matter in Filippo Lancieri and Patricia Morita Sakowski, 'Competition in Digital Markets: A Review of Expert Reports' (2021) 26(1) Stanford Journal of Law, Business & Finance 65-170.

89 See, for instance, Lapo Filistrucchi, Damien Geradin, Eric van Damme, and Pauline Affeldt, 'Market Definition in Two-Sided Markets: Theory and Practice' (2014) 10(2) Journal of Competition Law & Economics; Inge Graef, 'Market Definition and Market Power in Data: The Case of Online Platforms' (2015) 38 World Competition: Law and Economics Review 473; Ariel Ezrachi, 'EU Competition Law Goals and the Digital Economy' (2018) Oxford Legal Studies Research Paper No. 17/2018; Inge Graef, 'Rethinking the Essential Facilities Doctrine for the EU Digital Economy' (2019) 53 RJTUM 33; Nicolas Petit and David J Teece, 'Innovating Big Tech firms and competition policy: favoring dynamic over static competition' (2021) 30(5) Industrial and Corporate Change.

90 See, for instance, Inge Graef, *EU competition law, data protection and online platforms: data as essential facility* (Kluwer Law International, 2016); Maurice Stucke and Allen Grunes, *Big Data and Competition Policy* (Oxford University Press, 2016); Ariel Ezrachi and Maurice E. Stucke, *Virtual Competition: The Promise and Perils of the Algorithm-Driven Economy* (Harvard University Press, 2016); Rupprecht Podszun and Stephan Kreifels, 'Data and Competition Law', in Vanessa Mak, Eric Tjong Tjin Tai, and Anna Berlee (eds), *Research Handbook in Data Science and Law* (Edward

online platforms have surrounded our lives in an unprecedented way in recent years, 'Big Data' revolution also affected other sectors even the most traditional ones including agriculture. Considering the critical potential of Smart Farming for the future, which needs having sustainable food and agricultural raw material supply while reducing environmental impact, understanding the competition problems in the emerging DAS, and taking policy measures against prominent anticompetitive conduct and other practices that harm innovation is as important as the problems in online platforms. However, the existing publications on the sectoral issues are very limited, and they mostly approached the matter as secondary effects of the concentration trend in the upstream agricultural input production sector.[91] In this regard, investigating the role of agricultural data in the emerging DAS, identifying the most prominent market failures and discussing possible applications of the competition law to address them would be valuable from academic and practical points of view.

From the perspective of regulatory solutions and conceptual design suggestions to address the data access issues in the digital age, the same can be stated for the broader literature. There is a significant number of reports,[92] articles[93] and books[94] that investigate the IoT revolution from a

Elgar Publishing, 2018).

91 As explained in section 1.1.3 above.

92 See, for instance, Joseph Drexl, *Data access and control in the era of connected devices* (BEUC Report, 2018) <https://www.beuc.eu/sites/default/files/publications/beuc-x-2018-121_data_access_and_control_in_the_area_of_connected_devices.pdf> accessed 12 November 2021.

93 See, for instance, Joseph Drexl, 'Designing competitive markets for industrial data – between propertisation and access' (2017) 8 JIPITEC 257-292.

94 See, for instance, Joseph Drexl, 'The Future EU legal framework for the digital economy: a competition-based response to the 'ownership and access' debate' in Sebastian Lohsse, Reiner Schulze and Dirk Staudenmayer (eds) *Trading data in the digital economy: legal concepts and tools* (Nomos, 2017) 221–244; Wolfgang Kerber 'Rights on data: the EU communication 'Building a European Data Economy' from an economic perspective' in Sebastian Lohsse, Reiner Schulze and Dirk Staudenmayer (eds) *Trading data in the digital economy: legal concepts and tools* (Nomos, 2017) 109–134; Christine Godt, ''Data property' – entitlements between 'ownership, factual control and access to commons', in Bram Akkermans and Anna Berlee (eds) *Sjef-Sache: essays in honour of Prof. mr. dr. J.H.M. (Sjef) van Erp on the occasion of his retirement*. (Eleven Int.'l Publ., 2021), 449–483; Joseph Drexl, 'Connected devices – an unfair competition law approach to data access rights of users', in German Federal Ministry of Justice and Consumer Protection and Max Planck Institute for Innovation and Competition (eds), *Data access, consumer interests and public welfare* (Nomos, 2021) 477–528.

regulatory perspective,[95] but they do not focus on the problems of Smart Farming and ag-data access-related issues particularly.[96] Therefore, exploring existing and possible future regulatory frameworks to identify to what extent they are able to eradicate or ease the prominent concerns in the DAS and discussing possible ways to improve their effectiveness in the sector would be necessary to fill the gap in the literature.

The sectoral literature is rich in explaining the reasons for the technical developments in the sector, exploring possible business models, and also identifying problems in Smart Farming.[97] There are also plenty of reports[98] and articles[99] that demonstrate the data access-related problems, and they prominently state the ambiguity of 'data ownership' over the agricultural data sets. However, these publications lack a particular legal focus to provide the necessary insights on the legal status of ag-data sets, the possible application of existing and forthcoming sectoral regulations in the EU or the potential effects of different legal concepts when regulating future ag-data access rights. In this regard, approaching the 'data ownership'

95 as this is much more relevant from the Digital Agriculture sector's perspective.

96 even though some publications provide certain examples from different sectors in which IoT devices are becoming widely used. See, for instance, Drexl, n. 92 and Drexl, n. 93 above.

97 See, for instance, Sjaak Wolfert and others, 'Big Data in Smart Farming – A Review' (2017) 153 Agriculture Systems; Emma Jakku and others, '"If they don't tell us what they do with it, why would we trust them?" Trust, transparency and benefit-sharing in Smart Farming' (2019) 90–91 (1) NJAS.

98 See, for instance, Lesser A, *Analyst Report: Big Data and Big Agriculture* (GIGAOM Report, 2014); Jop Esmeijer and others, *Data-driven Innovation in Agriculture: Case Study for the OECD KBC2-Programme* (TNO Report, 2015) R10154; Coble K H and others, *Advancing US agricultural competitiveness with big data and agricultural economic market information, analysis, and research* (FARE Report, 2016); *Data Revolution: Emerging New Data Driven Business Models in the Agri-Food Sector* (EIP-AGRI Report, 2016); *EIP-AGRI WORKSHOP Data sharing: ensuring fair sharing of digitisation benefits in agriculture – Final Report* (EIP-AGRI Report, 2017); Simone van der Burg and others, *D7.4 Analysis Report of the Interactive Sessions Futures of Farm Data Sharing Practices Perspectives of European Farmers, Researchers and Agri-Tech Businesses* (IoF2020 Report, 2020).

99 Jeremy de Beer, 'Ownership of Open Data: Governance Options for Agriculture and Nutrition' (2016) Global Open Data – GODAN Papers; Ashley Ellixson and Terry Griffin, 'Farm Data: Ownership and Protections' (2017) AREC Fact Sheet | FS-1055; Coble K H and others, 'Big Data in Agriculture: A Challenge for the Future' (2018) 40 Applied Economic Perspectives and Policy; van der Burg, Bogaardt and Wolfert, n. 6 above; Simone van der Burg, Leanne Wiseman and Jovana Krkeljas 'Trust in farm data sharing: reflections on the EU code of conduct for agricultural data sharing' (2020) 23 Ethics and Information Technology 185-198.

discussion with a legal focus would be valuable from the perspective of the sectoral literature.

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A few studies produced by different researchers such as Sykuta,[100] Kritikos,[101] Verdonk,[102] Wiseman and others,[103] Jouanjean and others,[104] or Spolidoro[105]

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100 Sykuta investigated the data-related concerns among both farmers and ag-data service providers about the privacy, ownership and use of farm data in the United States. He provided preliminary discussions regarding the ag-data control and its potential effects on entry barriers in digital services markets. See Sykuta, n. 24.

101 Kritikos provided a comprehensive report for the European Parliament and it examines the legal, social and ethical considerations surrounding precision agriculture. He particularly provided the ambiguities on the ag-data ownership and discussed some examples. Also, he provided some preliminary discussions on which data collected through farming activities can be considered as personal among other issues. See Kritikos, n. 56.

102 Verdonk investigated the data-driven market power of those who have vertically integrated position in agricultural inputs and Digital Agriculture sectors, but he focused more on unfair trading practices by saying that competition law enforcement is an *ex-post* instrument with limited scope (taking into account dominance prerequisite) and stating that it might not be adequate alone to address data-related concerns. See Verdonk, n. 52 above.

103 The underlying reasons for the farmers' hesitations to adopt digital technologies and their reasons were discussed. One of the reasons is lack of legal clarity over ag-data control. See Leanne Wiseman and others, "Farmers and their data: An examination of farmers' reluctance to share their data through the lens of the laws impacting smart farming" (2019) 90–91(1) NJAS Wageningen Journal of Life Sciences 1–10. https://doi.org/10.1016/j.njas.2019.04.007; Wiseman also has a distinct approach regarding ag-data ownership discussions in the literature. See Wiseman, Jay Sanderson, and Lachlan Robb, 'Rethinking Ag Data Ownership' (2018) 15(1) Farm Policy Journal 71–77.

104 The OECD paper demonstrated that fragmented and unclear data governance arrangements may weaken farmers' willingness to adopt digital solutions by focusing on farmers' concerns around access, sharing and use of agricultural data and explored the role of existing policy frameworks and other sectoral initiatives to mitigate these concerns. Marie-Agnes Jouanjean and others, 'Issues Around Data Governance in the Digital Transformation of Agriculture: The Farmers' Perspective' (2020) OECD Food, Agriculture and Fisheries Papers No. 146.

105 In her Master's thesis, Spolidoro examined the extent to which the current European legal framework supports the objectives of the EU Code of Conduct on ag-data sharing by particularly discussing i) the Directive (EU) 2016/943 of the European Parliament and of the Council of 8 June 2016 on the protection of undisclosed know-how and business information (trade secrets) against their unlawful acquisition, use and disclosure OJ L 157, ii) the Database Directive (Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases, OJ L 77, and iii) the CMO regulation. See Elena T. M. Spolidoro, 'He Who Seeds Technology Shall Harvest Data?: Farm Data under the Shelter of European Law' (Tilburg University 2021). What is missing in this research, however, is an examination of how to open up data access to a wider range of access seekers in and out of the farm-to-fork chain from the perspective

aimed to identify the legal issues connected to the (reasons for the) ag-data access problems and to provide some suggestions. However, either their focuses are not particularly targeting the emerging DAS from the perspective of EU competition law and policy[106] or they do not dive into the role of EU competition law enforcement or regulatory solutions to address the sectoral data access issues in detail.[107]

In this regard, this dissertation aims to fill these gaps with a comprehensive research to identify the underlying reasons for the prominent data access problems in the emerging Digital Agriculture sector and to inquire about solutions from the perspective of the EU competition law enforcement and regulatory intervention opportunities. In particular, the novelty of this thesis lies in connecting the different strands of the mentioned literature. While there are relevant discussions in each field, they still mainly develop in isolation from each other. Bringing the various insights together to provide a more comprehensive analysis and a more complete picture of the prospects and challenges of access to data in the DAS would be the main contribution of this thesis in this regard.

1.2 Research Questions and Research Scope

It is critical to investigate the peculiarities of the DAS by exploring the prominent data access and control related problems in the sector, discussing the applicability of the EU competition law and other relevant legal frameworks in the EU to ag-data access issues, identifying opportunities, ambiguities or limitations and their causes in this regard as well as seeking solutions to eradicate or, at least, mitigate the sectoral concerns.

In this context, the overall research question of this dissertation is the following:

> *What are the prominent problems deriving from the ambiguities about ag-data access and control from the perspective of facilitating the development of a competitive Digital Agriculture sector, and to what extent are the EU regulatory initiatives and/or traditional EU competition law enforcement able to address these challenges?*

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of competition law and policy and with the tools of competition law enforcement and regulatory intervention.

106 such as Kritikos, Hartel, Wiseman, Spolidoro, and Jounjean and others cited in the above footnotes.

107 such as Syukuta and Verdonk as explained above footnotes.

In order to answer the research question, the dissertation has two major lines of inquiry. On the one hand, it explores how competition law concepts and analysis can be useful to address the challenges in the DAS. On the other hand, it analyses the role of regulation containing ag-data access rights and rules beyond competition enforcement. These two perspectives are used to generate an interrelated understanding regarding the legal and economic characteristics of ag-data control, reasons for the data access problems and possible ways to address them.

This dissertation concentrates on the datafication of agricultural decision-making and connected problems from the legal perspective. The aimed contribution to the literature with this research is twofold: (1) for the broader legal literature, it contributes to the general data governance debate and the role of competition law in the digital age debate with a sectoral paradigm by providing a detailed sector-specific analysis on ag-data access and control issues, and (2) for the digital agriculture literature, the dissertation contributes to the "ag-data ownership" debate with a very neglected legal focus by providing a deeper discussion of the potential effects of different legal concepts and regulatory design options on the novel dynamics of the emerging DAS.

The dissertation brings the tools of the competition law enforcement and regulatory intervention together to simultaneously and synergistically apply to the data access problems in a sectoral context. By doing this, the research also demonstrates how they can complement each other to be able to address the ag-data access issues more effectively.

1.3 Methodology

The overall methodological approach adopted in this dissertation is 'doctrinal legal research' ('DLR' henceforth), which refers to *"research that aims to give a systematic exposition of the principles, rules and concepts governing a particular legal field or institution and analyses the relationship between these principles, rules and concepts with a view to solving unclarities and gaps in the existing law"*[108] or involving the "*rigorous analysis and creative synthesis*" of legal documents, connecting "*seemingly disparate doctrinal strands*", and generating principles "*from an inchoate mass of primary materials*".[109]

108 Jan M Smits, 'What Is Legal Doctrine?: On The Aims and Methods of Legal-Dogmatic Research' in Edward L Rubin, Hans-W Micklitz and Rob van Gestel (eds), *Rethinking Legal Scholarship: A Transatlantic Dialogue* (Cambridge University Press, 2017), p. 210.

109 See various other definitions including the one used here provided by 'The Council of

Beyond the main DLR framing, each chapter written under the scope of this dissertation has different peculiarities. Chapter 2 contains some considerations beyond a purely legal analysis, especially when identifying the economic characteristics of ag-data and explaining the reasons for data-driven market power in the DAS. Chapter 3 conducts comparative legal research with a focus on the parallel developments of voluntary rulemaking in the US and EU. It also has an interdisciplinary approach by combining law and economics considerations when further exploring the economic characteristics of ag-data and identifying data-driven business models in the DAS.[110] The remaining chapters of the thesis are mostly based on pure DLR. Chapter 4 is an analysis of a regulatory proposal, namely the Data Act, from the sectoral perspective. Chapter 5 contains broader policy-oriented and theoretical discussions towards a holistic ag-data governance regime in the EU. Chapter 6 investigates the possible application of EU competition law enforcement to ag-data access problems by also providing suggestions to improve the existing refusal to deal test in the digital age beyond broader policy suggestions for enforcing competition law and sectoral regulation synergistically.

The analysis in the dissertation depends on different layers of sources. In order to generate an adequate understanding regarding the technical developments and economic dynamics of the so-called 'Smart Farming', the research encountered several documents including academic papers, books, policy documents, reports, technical field material, and general sources of media news and interviews with stakeholders. Based on the insights generated through the investigation of the relevant sources, the legal part of the research determines the prominent legal problems and seeks solutions for these problems in the sector by investigating, discussing, and interpreting applicable legal sources including laws, regulations, case law, and policy documents as well as the linked academic legal literature.

In this regard, the thesis mainly adopts the inductive method by i) conducting sectoral and technical investigations; ii) determining patterns and identifying the sector's prominent legal challenges from the perspective of competition law and policy; iii) forming the research questions; iv) conducting research to find answers to the research questions and applying

Australian Law Deans' in P. Ishwara Bhat, 'Doctrinal Legal Research as a Means of Synthesizing Facts, Thoughts, and Legal Principles' *Idea and Methods of Legal Research* (Oxford University Press, 2020), pp. 143-168.

110 Chapter 3 was a product of a collaborative work with economist Dr. Bertin Martens upon a research visit to European Commission's Joint Research Centre.

the derived knowledge as a result of this PhD research on the sectoral challenges to identify opportunities, limitations and possible paths for the required improvements, and v) discussing findings. The legislative and policy framework mainly focussed on EU law.

1.4 Academic, Practical and Societal Relevance

Although a single dissertation cannot provide all the answers to all the existing problems inherently, this research seeks to provide a distinct academic contribution to the ag-data access debate by approaching the issues with a specific legal perspective by also being aware of the economic, societal, and technological impacts of the policy preferences and legal design choices.

The primary contribution for academia is broadening the Big Data-related scholarly discussions (which have predominantly focused on online platforms) towards the emerging DAS, which is one of the neglected data-driven sectors. In this regard, this research may serve to stimulate legal scholars to focus on the ag-data access and control related issues in the DAS. This dissertation also analyses the applicability of existing and possible future legal frameworks to the ag-data access issues, identifies challenges in terms of legal gaps, ambiguities, and limitations, and provides suggestions to help policymakers and legislators when designing functional and fit-for-purpose ag-data governance in the EU. In this regard, it has implications not only for academic literature but also for high-level policymaking and law-making even beyond the EU by considering the fact that various jurisdictions in the world can also benefit from these findings and suggestions. Also, in an environment where the stakeholders are highly confused about who has which rights on which part of the broader term of agricultural data, the practical relevance of this study for stakeholders (especially, farmers, cooperatives, digital service providers and other ag-data access seekers) cannot be ignored.

1.5 Outline of the Dissertation

This thesis is based on a compilation of five separate but interrelated academic studies including one book chapter and four research articles that were produced during the PhD trajectory from 2017 to early 2023. Each of these academic outputs of the PhD research corresponds to one substantial chapter of this thesis. The book chapter and three of the research articles are single-authored and one of the research articles is co-authored, where the writer of this dissertation is the principal author.[111] The published book chapter is placed as Chapter 2[112] and published academic articles are placed as Chapters 3[113] and 5[114] while Chapters 4 and 6 correspond to completed manuscripts that have been submitted to two academic journals for publication and are under peer review. Except for minor editing, the text of the book chapter and articles remain unchanged. The citation style of the original published version in Chapter 5 has been changed so as to ensure a single citation style (i.e., OSCOLA) in this dissertation.

The main body of the thesis is structured as follows. Chapters 2 and 3 investigate the underlying reasons and possible consequences of data access-related concerns in the sector by using different analytical frameworks. In particular, Chapter 2 investigates the dynamics of agricultural data-driven dominance and inquiries about the right elements to take into account when assessing the data-driven market power of agricultural technology providers as a part of the traditional competition law assessment by using the *Bayer/ Monsanto* merger decision of the Commission[115] as a benchmark of the discussion. Chapter 3 further analyses the economic characteristics of ag-data and prominent business models in the sector from legal and economic perspectives, and building on this, it discusses to what extent the voluntary rules created by stakeholders in the US and EU can address the ag-data access problems in the DAS. Chapters 4 and 5 focus on binding regulatory intervention option as a potential solution. These pieces examine the policy and legislative initiatives in the EU and their potential application to the ag-data access issues by also inquiring about possibilities to improve their sectoral impact. Chapter 4 is a comprehensive analysis of the recent Data Act proposal from the sectoral perspective to identify the possible legal impact

111 This is placed in this dissertation as Chapter 3 while it was originally published as Can Atik and Bertin Martens, 'Competition Problems and Governance of Non-personal Agricultural Machine Data: Comparing Voluntary Initiatives in the US and EU' (2021) 12(3) Journal of Intellectual Property, Information Technology and E-Commerce Law (JIPITEC) 370.

112 This was subject to double blind peer review in ASCOLA 2020 conference and was originally published as Can Atik, 'Understanding the Role of Agricultural Data on Market Power in the Emerging Digital Agriculture Sector: A Critical Analysis of the Bayer/Monsanto Decision' in Michal Gal and David Bosco (eds), *Challenges to Assumptions in Competition Law* (Edward Elgar 2021).

113 See footnote 111 above.

114 originally published as Can Atik, 'Towards a Comprehensive European Agricultural Data Governance: Moving Beyond the 'Data Ownership' Debate' (2022) 53(5) IIC – International Review of Intellectual Property and Competition Law 701.

115 See *Bayer/Monsanto*, n. 24.

of this horizontal intervention on the sectoral problems and remaining issues. Chapter 5 contains an overall evaluation of existing and possible regulatory initiatives in the EU. It also seeks an appropriate legal concept when designing possible future sectoral regulation to more effectively address sectoral issues. It proposes detailed suggestions for policymakers in designing ag-data access rights and combining the regulatory design with the technical data access infrastructures to ensure a comprehensive European agricultural data governance in the EU. Chapter 6 investigates the potential of the refusal to deal case law in the EU to address the ag-data access problems and discusses how the existing legal test can be improved by adapting it to the digital age, in general, and to the needs of the emerging DAS, in particular. The chapter also highlights the potential for synergies by enforcing competition law together with well-designed sectoral regulation. Chapter 7 provides overall conclusions, possible implications of this research and topics for further research.

CHAPTER 2

Understanding the Role of Agricultural data on Market Power in the Emerging Digital Agriculture sector: A Critical Analysis of the *Bayer/Monsanto* Decision

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https://doi.org/10.4337/9781839109072.00009[1]

1 This chapter has been presented at the 14th ASCOLA Conference on 27–29 June 2019 in Aix-en-Provence, France and subjected to double-blind peer review before its publication as a chapter in an edited book.

2.1 Introduction

Although there might be a perception that agriculture is a rural activity that is far from technology,[2] modern agricultural production has become densely data-driven with advanced Big Data implementations[3] thanks to the proliferation of the Internet of Things (IoT) and cloud computing technologies.[4] Agricultural data (ag-data) is collected via various methods and used in agricultural decision-making processes such as implementing sensors in fields to track and prevent crop diseases, using drones and satellite images to observe crop developments, or using IoT infrastructure in glasshouses to enhance coherence in management of the production.[5] It is expected that Big Data will positively affect productivity, sustainability, food safety, efficiency of resources and waste management.[6] Moreover, current developments are regarded as just the first step of a big revolution in the operation, management, and structure of the entire agricultural value chain.[7]

In line with these developments, the Digital Agriculture sector (the DAS) has emerged based on 'the collection of data and information about farms with the aim of providing tailored advice or aggregated data to farmers'.[8]

2 See the ever-present perception that agriculture is even behind the industry, 'industrialization' or 'modernization' of agriculture theories after the 1980s, and the EU regulations' implicit adoption of these developments at Francis Synder, *New Directions in European Community Law* (1st edn., Weidenfeld and Nicolson, 1990), pp. 109–119.

3 Michael E. Sykuta, 'Big Data in Agriculture: Property Rights, Privacy and Competition in Ag Data Services' (2016) 19 International Food and Agribusiness Management Review 57, p. 58.

4 Harald Sundmaeker et al., 'Internet of Food and Farm 2020', in Ovidiu Vermesan and Peter Friess (eds), *Digitising the Industry – Internet of Things Connecting the Physical, Digital and Virtual Worlds* (River Publishers, 2016), pp. 132–133; Sjaak Wolfert et al., 'Big Data in Smart Farming – A Review' (2017) 153 Agriculture Systems, pp. 69–75.

5 Adam Lesser, *Analyst Report: Big Data and Big Agriculture* (GIGAOM Report, 2014) <https://gigaom.com/report/big-data-and-big-agriculture/> accessed 5 January 2021; Wolfert et al. (2017), n. 4, p. 73; Krijn J. Poppe et al., 'Information and Communication Technology as a Driver for Change in Agri-food Chains' (2013) 12 EuroChoices 60, pp. 60–63; Krijn J. Poppe et al., 'A European Perspective on the Economics of Big Data' (2015) 12 Farm Policy Journal 11, pp. 11–12.

6 Poppe et al. (2015), n. 5, p. 18.

7 Ibid., p. 12. Additionally, this development is not limited to food production, i.e. this may also have significant effects on various industries that are dependent on the agricultural raw material.

8 See the definition at Case No COMP/M.8084 – *Bayer/Monsanto*, European Commission Decision (29 May 2018), para 2442.

Within this particular sector, Agricultural Technology Providers (ATPs)[9] offer various data-driven agronomic services for farmers to help them become better decision-makers from the production to marketing stages of their profession.[10] While Digital Agriculture practices create significant benefits,[11] this data-driven transformation has brought about some competition law concerns. For instance, the European Commission (the Commission) reacted to the *Bayer/Monsanto* merger[12] and implemented remedies[13] due to *inter alia* the Digital Agriculture aspects of the concentration.[14]

Although there have been some attempts to discuss the case from a vertical integration perspective by evaluating relationship between Digital Agriculture and the agricultural inputs sector,[15] the role of ag-data in providing services and on the market power of ATPs in the emerging DAS with a horizontal competition perspective has not been discussed enough so far. Therefore, this study aims to fill this gap in the literature by exploring data-driven market power in the DAS and also critically analysing the *Bayer/Monsanto* decision in this regard. In particular, it will be argued that the Commission's considerations regarding the role of ag-data on market power might not be considered comprehensive enough[16] since it did not provide an extensive analysis about distinguishing reasons for the emergence of data-

9 See Sykuta (2016), n. 3, p. 58, footnote 1.

10 Wolfert et al. (2017), n. 4, p. 74.

11 Poppe et al. (2015), n. 5, p. 11.

12 Which is the first investigation on the emerging Digital Agriculture sector so far. See at *Bayer/Monsanto*, n. 8, para 2555.

13 Ibid., para 3030 and the subsequent paras.

14 Ibid., para 2555.

15 Which predominantly focus on seeds/pesticides markets and reinforcement of concentration risks with Digital Agriculture implementations. See, for instance, Ioannis Lianos and Dmitry Katalevsky, 'Merger Activity in the Factors of Production Segments of the Food Value Chain – A Critical Assessment of the Bayer/Monsanto Merger' (2017) UCL-CLES Policy Paper Series: 2017/1; Maurice E. Stucke and Allen P. Grunes, 'An Updated Antitrust Review of the Bayer-Monsanto Merger' (2018) The Konkurrenz Group White Paper; Tom Verdonk, 'Planting the Seeds of Market Power: Digital Agriculture, Farmers' Autonomy, and the Role of Competition Policy', in Leonie Reins (ed.), *Regulating New Technologies in Uncertain Times* (Springer, 2019), pp. 112–115.

16 Maybe because it was the first case that separately evaluated the emerging DAS so far. See at *Bayer/Monsanto*, n. 8, para 2555. Although the Commission touched upon precision farming in the *Dow/DuPont* decision [See at Case No. COMP/M.7932 – *Dow/DuPont*, European Commission Decision (27 March 2017), para 246], the Digital Agriculture operations of the merging parties were not under the investigation in this case.

driven market power in this new sector from the perspective of the economic characteristics of ag-data even though it touched upon various potential elements in the text such as network effects and first-mover advantage.[17]

As having a well-rounded understanding of data-driven dominance is of prime importance for possible future DAS cases, this chapter aims to identify (1) the sectoral dynamics and the ag-data's distinctive role on market power in the DAS, (2) the indispensable elements of an optimal market power assessment based on economic characteristics of ag-data in the sector, and (3) to what extent the Commission's considerations in the *Bayer/Monsanto* decision is compatible with them. In particular, this study puts forward that the most prominent reason for data-driven entry barriers in the sector is switching costs stemming from legal and technical obstacles that prevent the free-flow of data in the DAS. This is exacerbated by lack of data substitutability due to the cross-dependency of farmers and ATPs in the data collection and storage processes. Even though these issues were mostly neglected in the decision, they should be taken into account during market power assessments in possible future DAS cases.

The remainder of the chapter is organized as follows. Section 2.2 will convey the essential information regarding the *Bayer/Monsanto* decision to provide a baseline for the rest of the analysis. Section 2.3 will attempt to explore the economic characteristics of ag-data in order to generate an in-depth insight regarding the reasons for the emergence of data-driven market power in the DAS by also discussing the Commission's considerations in the *Bayer/Monsanto* decision. Section 2.4 will provide an overall evaluation regarding the Commission's data-driven market power assessment in the *Bayer/Monsanto* decision, and it will put forward some suggestions for future cases. In light of this, Section 2.5 will conclude by formulating an optimal market power test for the DAS.

2.2 Bayer/Monsanto Merger Case

There has been a merger wave amongst the agricultural giants within the last decade. In 2013, Monsanto acquired The Climate Corporation mainly because of its data sets paying nearly USD 1 billion.[18] After this data-driven

17 *Bayer/Monsanto*, n. 8, paras 2830–2846.
18 Tony Danova, 'Big Data is Worth $1 Billion to Agricultural Giant Monsanto' (*Business Insider*, 2013) <https://www.businessinsider.com/monsanto-buys-climate-corporation-for-1-billion-2013-10?international=true&r=US&IR=T> accessed 5 January 2021.

takeover in the US, Monsanto attempted to acquire Syngenta in July 2014, but this attempt was not successful due to the rejection from the target company.[19] However, these activities started a broader merger trend, including mega-mergers such as *ChemChina/Syngenta*,[20] *Dow/DuPont*,[21] and finally *Bayer/Monsanto*.[22] This merger wave mainly decreased the number of market players in the agricultural inputs sector, but the DAS was also affected because nearly all the merging conglomerates had Digital Agriculture operations as well.[23] However, the Commission provided a standalone investigation about Digital Agriculture related concerns only in the last one, the *Bayer/Monsanto* merger.[24]

2

2.2.1 Bayer/Monsanto Case at a Glance

According to the Commission, the merger would create the largest globally integrated seed and pesticide player, and this would have significant impacts on price and innovation in several traditional markets, including seeds and pesticides, as well as in emerging Digital Agriculture markets.[25] In particular, the concern was that this merger 'would have strengthened Monsanto's dominant position on certain markets, where Bayer is an important challenger of Monsanto'.[26]

The Commission's investigation identified particular competition concerns about Digital Agriculture.[27] It focused on the loss of potential competition in Europe between Bayer's recently launched Xarvio and Monsanto's FieldView platform – the leading platform worldwide, which was about to be launched in Europe.28 As a response to this, Bayer offered a set of commitments29

19 Lianos and Katalevsky (2017), n. 15, p. 2.
20 Case No. COMP/M.7962 – *ChemChina/Syngenta*, European Commission Decision (5 April 2017).
21 See *Dow/DuPont*, n. 16 above.
22 See *Bayer/Monsanto*, n. 8 above.
23 Lianos and Katalevsky (2017), n. 15, p. 3, footnote 7.
24 See at *Bayer/Monsanto*, n. 8, para 2555.
25 'Mergers: Commission clears Bayer's acquisition of Monsanto, subject to conditions' (2018) <https://ec.europa.eu/commission/presscorner/detail/en/IP_18_2282> accessed 5 January 2021 ['Press release' henceforth].
26 Ibid.
27 *Inter alia* the Commission's particular concerns in (a) seeds and traits, (b) pesticides, and (c) other initial concerns that were not confirmed during the investigation such as innovation in biological pesticides and bee health. See more at ibid.
28 Ibid.
29 Other commitments were about (a) vegetable seeds, (b) broadacre seeds and traits, and (c) pesticides. See more at ibid.

to license a copy of its worldwide current offering and pipeline on Digital Agriculture to BASF (The BASF Divestment Package)[30] in order to maintain competition by allowing BASF to replicate Bayer's position in the European Economic Area (EEA).[31] However, after this initial commitment, Bayer requested to replace its original commitment with complete divestment of its Digital Agriculture assets and products to BASF with a condition of a temporary license back to these assets and products on 11 April 2018, and the Commission approved this by considering it was sufficient to maintain the race to become a leading supplier in Europe in this emerging field.[32]

2.2.2 The Commission's Relevant Market Definition and the Broader Digital Agriculture Sector

Services that ATPs provide for farmers are divergent, and there are various markets in the DAS. Some companies offer services in pest and disease modelling, some focus on satellite data, others have weed monitoring services with cameras, or there are crop modelling and nitrogen optimization services, and some ATPs have image recognition services for disease identification.[33] Markets may also vary according to input types such as herbicides, insecticides, fungicides, fertilizers, plant growth regulators or seeds.[34] Additionally, markets may be further distinguished according to crop groupings such as broadacre crops, e.g. corn, wheat, or barley.[35] While being aware of this market variety, the Commission's concerns focused on 'the market for the provision of digitally-enabled prescriptions of fungicides for broad acre crops in the EEA' in the *Bayer/Monsanto* merger.[36]

The crucial point of discussion in the market definition part is related to whether the provision of digitally-enabled prescriptions can be considered under the same market for traditional agronomic advisory services, as the Notifying Party (Bayer) argues that they are in the same broader market.[37] However, the Commission rejected this argument by considering the demand and supply sides of the related services that differentiate these two markets significantly because the demand for digitally-enabled prescriptions

30 See more detail at *Bayer/Monsanto*, n. 8, para 3046 and subsequent paras.
31 Press release, n. 25 above.
32 Ibid.
33 See more at *Bayer/Monsanto*, n. 8, Annex – 3, p. 44.
34 Ibid., para 2576.
35 Ibid., paras 2577–2578.
36 Ibid., para 2612.
37 Ibid., paras 2557–2561.

requires much more detailed and customised services, and therefore, supply is much more complicated, requiring significantly different capabilities such as access to huge data sets and advanced algorithms, compared to traditional agronomic advisory services.[38]

Regarding the relevant geographic market, the Commission stated that it was determined as 'national'[39] by considering several elements such as language differences, different farming practices, government regulations, types of crops, local crop diseases and farmers' ATP preferences that have regional focuses.[40]

As this study mainly focuses on market power, there will not be a substantial discussion about market definition, but it is necessary to state that the approach of the Commission on market definition appears reasonable.[41] The Commission is aware of the divergent services for farmers in the DAS. It identified the sector in general as well as the particular relevant and geographic markets in detail. However, it is difficult to argue that the data-driven market power assessment in the *Bayer/Monsanto* decision is as comprehensive as the relevant market considerations to identify the most delicate parts of the matter.

2.2.3 Competitive Assessment: Digital Agriculture Aspects of the Concentration

Within the competitive assessment part, the Commission starts with the concerns raised during the market investigation. According to the questionnaires conducted by the Commission with stakeholders, it was highlighted that the merger would result in higher prices, narrower choices and less innovation in the DAS.[42] In particular, competitors were worried about the acceleration of network effects and possible predatory pricing

38 Ibid., paras 2562–2578.
39 Ibid., paras 2583 and 2593.
40 Ibid., paras 2583–2592.
41 Indeed, there is a trend that attaches less importance to market definition, and more significance to theories of harm and identification of anticompetitive strategies in data-driven markets investigations. See Jacques Crémer, Yves-Alexandre de Montjoye and Heike Schweitzer, *Competition Policy for the digital era – Final Report* (Publications Office of the European Union, 2019), pp. 3–4 ['EU Report', henceforth]. On the other hand, it is important to note that some competitors had concerns regarding other Digital Agriculture markets as well. See at *Bayer/Monsanto*, n. 8, para 2598.
42 *Bayer/Monsanto*, n. 8, para 2594.

strategies in the post-merger period by bundling agricultural inputs and Digital Agriculture services.[43] The risk of increased entry barriers for small-scale start-ups was also underlined by arguing that the new (merged) company would control too many IP rights and data.[44] These risks drove competitors to a general concern about the dominance of the merged entity in Europe that would influence all the rival services.[45]

The Notifying Party argued that the merging parties were not leaders in the sector and their existing Digital Agriculture activities were related to different stages of the agricultural process, and thus, they did not overlap each other as Monsanto did not provide services in the EEA, and no evidence showed it would enter in a timely manner.[46] Additionally, the Notifying Party asserted that merging parties' access to data was not unique and the combination of data sets via the merger would not give them a competitive advantage,[47] and there was no basis for first-mover advantage or network effects concerns.[48] Also, it put forward that there were enough competitive constraints by rivals in the sector, there was no plan to cease innovation activities in the post-merger period, the market investigation of the Commission was misleading, and the market was not defined based on widely accepted market studies.[49]

However, the Commission rejected these arguments by listing and comparing the existing and upcoming products of the merging entities, and discussing Monsanto's capabilities, strategic position, plans and possible entry to the EEA.[50] Based on this comparison, it concentrated on the elimination of potential competition[51] by considering that the merging parties had significant strengths and capabilities that constituted critical competitive constraints to each other.[52] Eventually, the Commission concluded that the transaction was likely to lead to a significant impediment to effective competition due to the elimination of an important competitive constraint

43 Ibid., para 2599.
44 Ibid., para 2600.
45 Ibid., para 2601.
46 Ibid., paras 2602–2606.
47 Ibid., para 2603. This study strongly opposes this allegation as the substitutability of ag-data can be very limited or not possible at all in some situations. See more discussion in Section 2.3.2.6.
48 *Bayer/Monsanto*, n. 8, para 2609.
49 Ibid., paras 2607–2611.
50 Ibid., paras 2614–2699.
51 Ibid., para 2612, and subsequent paras. In particular, para 2631.
52 Ibid., para 2700.

in the post-transaction period.[53] The Commission could not obtain reliable data about the market shares of the merged entities as the sector is new and still emerging.[54] Therefore, the competitive assessment was conducted based on the following main layers of substantial analysis.

In the first layer, in addition to the comparison of existing and upcoming products as the indication of potential competition,[55] the Commission considered the rivals' internal reports, their views, and the internal documents of merging parties to demonstrate that the merging parties might have imposed important competitive constraints to each other in the absence of the transaction.[56] For instance, the view of BASF was stressed in the decision in a way that Monsanto was the leading player in Digital Agriculture globally, and Bayer was the leading player in the EEA.[57] Eventually, the Commission also concluded that Monsanto was the global leader in the sector and likely to become the leader in the EEA, and Bayer was 'ahead of the other competitors with regard to digitally-enabled prescriptions of crop protection products in the EEA'.[58]

In order to support the conclusion declared in the first layer, the Commission provided additional reasons. The first reason was that the merging parties' superior knowledge about their conventional seeds and pesticides businesses could generate a competitive advantage in the post-merger period.[59] Second, as access to raw data is one of the fundamental pillars in digitally-enabled prescription services, merging parties' data collection networks would help them to generate better prescriptions thanks to their superior access to the public, third-party, customer and proprietary data sets.[60] The text highlighted the merging parties' data access capabilities such as their data collection partnerships with third parties including John Deere, AGCO and others in addition to their farm data sets[61] collected from

53 Ibid., para 2872. As will be discussed below, although there are accurate considerations in this analysis, there are also significant missing points or potentially misleading evaluations for future DAS cases, if not this one. See more discussion in Section 2.3.2.
54 *Bayer/Monsanto*, n. 8, para 2613.
55 Ibid., paras 2614–2699.
56 Ibid., paras 2700–2708.
57 Ibid., paras 2705–2706.
58 Ibid., para 2710; see also para 2735.
59 Ibid., paras 2712–2714.
60 Ibid., para 2715.
61 However, the text did not discuss details, importance or the distinctive role of

their customers, as well as their proprietary data sets generated through in-house research on their products (seeds, pesticides, fertilisers etc.).[62] After listing the related capabilities, the Commission again referred to rivals' opinions regarding the importance of combination of these data sets. For instance, it was indicated that data aggregation in the hands of the merged entity might generate clear advantages compared to rivals[63] because better algorithms can be trained through these superior data sets or a wide variety of data could enable *Bayer/Monsanto* to expand their services to other crop types and services.[64] This was summarised as the ability to offer services and improve them, and develop new services compared to rivals.[65] The third factor was the merging players' powerful agronomic engines and data processing capacities.[66] Therefore, the Commission considered that the creation of prescriptions by combined capabilities and data sets of the merging giants would be superior compared to products of those who have relatively limited access to these required data layers.[67] Thus, the decision refused the Notifying Party's arguments about not having unique access to proprietary (exclusive information about seeds and pesticides) data and third-party data sets, and the absence of any competitive superiority over rivals.[68] It concluded that the distinctive capabilities of the merging companies generate a competitive advantage, and the merger would eliminate close potential competition as well as significant competitive constraints in the market.[69]

This study agrees with the related considerations to a large extent. However, the Commission did not provide a standalone analysis regarding the replicability or substitutability of the different components of the broader term of ag-data[70] even though this is one of the most important parameters when assessing how concerning a data combination could be from the

farm data in the sector.

62 See *Bayer/Monsanto*, n. 8, paras 2720–2723.

63 However, there is not any discussion about how serious this concentration would be, what the separate roles of these data sets on market power are, whether they are replicable or not.

64 *Bayer/Monsanto*, n. 8, para 2726.

65 Ibid., para 2727. See detailed discussion in Section 3.3.2 below.

66 See *Bayer/Monsanto*, n. 8, paras 2729–2734. Data's importance on providing prescription services was also stressed as the decisive factor. See para 2733.

67 Ibid., para 2734.

68 Ibid., para 2728.

69 Ibid., paras 2734 and 2738.

70 Especially, it underestimated the farm data component throughout the analysis.

competition point of view.[71] Additionally, the conclusions were mostly supported by rivals' opinions, but depending too much on competitors' concerns might not be considered the optimal analytical criteria to understand and evaluate the role of ag-data on market power in the DAS. Instead, the Commission could have provided a more detailed economic characteristics analysis based on the sector realities and the facts of the particular case.[72]

2

The third assessment layer in the decision focused on the existing competitors of the merging parties. The Commission concluded that very few players (such as Dow/DuPont, ChemChina/Syngenta or BASF)[73] might have comparable capabilities, but even they could not exercise a sufficient degree of competitive pressure on the merged entity in the post-merger period based on its investigation conducted with questionnaires, conference calls and also direct interactions in a trade fair.[74] The reason behind this conclusion is strictly related to data-driven prescription services' dependency on a wide variety of data.[75] In particular, the Commission underlined the importance of proprietary data[76] on agricultural inputs and the capacity of data processing tools,[77] and emphasized the difficulty to reach an equal capability with the merging entity for rivals[78] by also considering that the

71 See the importance of determining replicability/substitutability of data when assessing data-driven market power at EU Report, n. 41, pp. 49 and 101–105; see also Autorité de la concurrence and Bundeskartellamt, *Competition Law and Data* (2016), pp. 44–47 ['Franko-German Report' henceforth].

72 The fourth assessment layer touched upon some of them, but the critical ones were neglected. See Section 2.3.2 for a more detailed discussion in this regard.

73 *Bayer/Monsanto*, n. 8, para 2758. However, it concluded that they were unlikely to exercise competitive pressure in the post-merger period effectively. When evaluating the other integrated giants' possible competitive constraints such as DowDupont, ChemChina-Syngenta or BASF, the Commission concluded that they were either not active in the EEA or did not have the comparable capabilities for the particular market under investigation. See more at paras 2787–2829. Moreover, even though they had enjoyed the equal capabilities to compete, they would have faced the first-mover advantage of the merging entity and eventual network effects. See paras 2817 and 2826.

74 Ibid., paras 2739–2744; see also paras 2827–2829.

75 Ibid., para 2746.

76 The decision focused too much on proprietary data sets (data about seed or pesticide performance). See at ibid., paras 2470 and 2745–2829. The Commission's assessment is correct but does not represent the whole picture in the sector as data-driven market power is not limited to proprietary data sets. See more discussion in Section 2.3.2 below.

77 *Bayer/Monsanto*, n. 8, para 2747.

78 Ibid., para 2748.

non-integrated companies such as small start-ups or software developers did not have the required genetic and performance insight about inputs in terms of scale and/or scope to provide digitally enabled prescriptions equal with integrated giants.[79] The Commission also checked the large distributors and agricultural equipment companies, but concluded that the former ones had the same limitations as the small start-ups in terms of the required capabilities.[80] Even though the latter ones have some services in the broader DAS, machine producers are mainly collaborators rather than competitors in the data-driven prescription services.[81] Exclusive access to proprietary data sets, for sure, is a highly relevant parameter to assess the effect of data accumulation on the market power of merging parties, especially in the inputs (seed and pesticide) prescription markets as in the case of the merger. However, it can be argued that the Commission overfocused on the proprietary data advantage and neglected the role of farmers' data and the distinctive nature of the users (farmers) and ATPs' relationships on market power.[82]

In the fourth layer of the assessment, the Commission mentioned the first-mover advantage and network effects as the main characteristics of the DAS (including the specific market under investigation) and argued that these were likely to decrease potential post-merger competitive constraints further.[83] The Commission reached this conclusion by investigating merging parties' internal documents,[84] but did not provide a detailed explanation about the reasons for this conclusion. It particularly referred to an internal document containing Bayer's positive feedback loop expectations, i.e. more subscribers (farmers) in the Digital Agriculture services means more authentic products, which in turn attracts more farmers as additional users of the services.[85] The Commission connected positive feedback loops with

79 Ibid., para 2750 – see also para 2760; for software companies, there is an additional limitation regarding farmers' data as they are further away from farmers compared to integrated inputs giants such as merging parties. See paras 2782–2786.
80 Ibid., paras 2763–2768.
81 Ibid., paras 2769–2779.
82 The Commission mentioned the importance of accessing farmers' data to compete in the market in general. Ibid., paras 2783 and 2786. However, it did not discuss farm data's relevance to market power assessments in the sector in detail. See extensive discussion on the matter in Section 2.3.2.
83 *Bayer/Monsanto*, n. 8, para 2830.
84 Ibid., para 2831.
85 Ibid., para 2836.

the first-mover advantage by stating that first-comers could create a quality advantage compared to late-comers, and this might constitute entry barriers as the users would not have any incentive to switch new services[86] by again referring to internal documents of Bayer and Monsanto about the importance of quantity and quality of farmers' data to develop better services.[87]

Understanding the economic characteristics of ag-data is the most delicate part of the market power assessment, but the Commission frequently used internal documents or rivals' opinions in its discussion instead of providing an in-depth analysis of the sectoral conditions from the perspective of the economic characteristics. Additionally, the Commission's very brief assessment in this layer reflects only a part of the story.[88] Section 2.3 below will provide a comprehensive analysis regarding the role of ag-data on market power in the DAS. In particular, it will demonstrate that even though the first-mover advantage is the most prominent characteristic of the DAS, the reason behind this advantage is more related to switching costs, which mainly derive from farmers' data related lock-in situations due to legal and technical barriers that prevent free data flow in the sector. This already high switching cost is exacerbated by the lack of substitutability of farm data because of the distinctive cross-dependency of farmers and ATPs in the costly data collection processes.

The last layer of the substantive assessment in the decision is about whether Bayer will continue the same innovation efforts in Digital Agriculture in

86 Ibid., para 2837.

87 Ibid., paras 2838–2840. However, these natural user preferences might not be the correct base of the theory of harm for the decision. This paper argues that focusing on data related lock-ins might have been a more solid approach when considering the sector's conditions. See below Section 2.3.2 in general, and especially Section 2.3.2.9.

88 For instance, the Commission used quotes from individual calls with KWS and DowDupont about switching costs and network effects in order to complement its main position on the importance of the first-mover advantage and network effects, but the Commission did not provide a separate switching costs analysis. However, especially KWS's statements on switching costs contain very crucial hints about the most delicate parts of the data-driven entry barriers in the DAS that were not covered deservedly by the *Bayer/Monsanto* decision: "*It is difficult to switch from one platform to another, since the industry is not able to agree on one common data protocol (joint data format), therefore there is high incentive for the farmer to decide on only one platform. Even though farmers keep the ownership of provided data and they can contractually request that their data are returned to them, from the technical point of view, such data are not compatible with another platform and can therefore not be easily transferred to another platform from a practical point of view.*" See at ibid., paras 2742–2843.

the post-merger period. Based on the market investigation and the internal documents of the merging parties, the Commission concluded that the pre-merger innovation efforts conducted separately were unlikely to be continued as they would be merged in the post-merger period.[89]

As a general consideration, even though the concerns and large parts of the reached conclusions are not far from the sector realities, it can be argued that especially data-driven market power considerations could have been much more analytical by generating insights from a comprehensive discussion based on economic characteristics of ag-data instead of overreliance on stakeholders' ideas as discussed in detail below.

2.3 Exploring Data-Driven Market Power in the Digital Agriculture Sector

2.3.1 The Concept of Market Power

The market power[90] of a company is a highly significant parameter of competition law analysis for all kinds of cases because dominance may lead to detrimental consequences that contradict the main aim of the EU competition law, i.e. consumer welfare.[91] Accordingly, the Commission's guidelines on the assessment of horizontal mergers[92] consider the creation or strengthening of a dominant position via mergers as a primary form of such competitive harm.[93]

89 Ibid., paras 2847–2862.

90 The level of market power that leads to dominance is described in the *United Brands v Commission* case as 'a position of economic strength enjoyed by an undertaking, which enables it to prevent effective competition being maintained on a relevant market, by affording it the power to behave to an appreciable extent independently of its competitors, its customers and ultimately of consumers'. Case T-27/76 *United Brands Company and United Brands Continental v Commission* ECLI:EU:C:1978:22, para 65.

91 Richard Whish and David Bailey, *Competition Law* (Oxford University Press, 2018), p. 25; see other risks related to data-driven dominance at Wolf Sauter, 'A Duty of Care to Prevent Online Exploitation of Consumers? Digital Dominance and Special Responsibility in EU Competition Law' (2019) Journal of Antitrust Enforcement 8(2), pp. 416–418.

92 Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings, OJ C 31, 5.2.2004 ['Horizontal Merger Guidelines', henceforth].

93 Ibid., para 2. Dominance 'provides an important indication as to the standard of competitive harm that is applicable when determining whether a concentration is likely to impede effective competition to a significant degree'. See para 4.

In the conventional market power assessment, the first determinant is the market shares of the merging undertakings.[94] It is considered that very large market shares – 50 per cent or more[95] – might be a significant indicator of dominance although there might be exceptional circumstances and the importance of the market shares might vary from market to market.[96] However, with the datafication of the economy, conventional assessment tools may struggle to perform their function accurately.[97] Especially in dynamic and fast-growing markets with short innovation cycles, market shares might not represent the market power correctly.[98] In such cases, entry barriers in the relevant markets are stated as helpful to assess the market power more properly.[99]

Although one may consider that services are not provided free of charge in the DAS[100] and, thus, the market shares might represent the market power to

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94 Market shares provide a useful first indication for the Commission regarding the market structure and the relative importance of the various undertakings active on the relevant market. See at Case 85/76 *Hoffmann-La Roche & Co. v Commission* [1979] ECLI:EU:C:1979:36, paras 39–41; Case C-62/86 *AKZO v Commission* ECLI:EU:C:1991:286, para 60; Case T-30/89 *Hilti v Commission* ECLI:EU:T:1991:70, paras 90, 91 and 92; Case T-340/03 *France Télécom v Commission* ECLI:EU:T:2007:22, para 100. Basically, it is calculated based on the ratio of sales of a company compared to the total sales in the market. See more at the EU Report, n. 41, p. 48.

95 Horizontal Merger Guidelines, n. 92, para 17; *AKZO v Commission*, n. 94, para 60; Case T-221/95, *Endemol v Commission*, ECLI:EU:T:1999:85, para 134, and Case T-102/96, *Gencor v Commission*, ECLI:EU:T:1999:65, para 205.

96 See *Hoffman-La Roche*, n. 94, para 41.

97 Especially in data-driven online markets. See Rupprecht Podszun and Stephan Kreifels, 'Data and Competition Law', in Vanessa Mak, Eric Tjong Tjin Tai, and Anna Berlee (eds), *Research Handbook in Data Science and Law* (Edward Elgar Publishing, 2018), pp. 190-204.

98 Case T-79/12 *Cisco Systems Inc. and Messagenet SpA v Commission*, [2013] ECLI:EU:T:2013:635, para 69. Digital platforms are considered as one of the prominent examples of this, i.e. lack of market shares' effectiveness in market power assessment. See EU Report, n. 41, pp. 48–50; See, for instance, the Commission's consideration at Case No. COMP/M.7217 – *Facebook/WhatsApp*, European Commission Decision (3 October 2014), para 99. See more at Inge Graef, 'Market Definition and Market Power in Data: The Case of Online Platforms' (2015) 38 World Competition: Law and Economics Review 473, p. 503.

99 Especially, in the substantial assessment of data-driven mergers. See EU Report, n. 41, p. 116.

100 See generally at Sundmaeker et al. (2016), n. 4; See Bayer's business model, for instance, at *Bayer/Monsanto*, n. 8, para 2547; See also the FieldView as an example at 'Pricing' (*FieldView*, 2018) https://climate.com/pricing accessed 10 February 2020. See more information about the business model of the sector in

a certain extent,[101] focusing solely on market shares might still be deceptive in such a highly dynamic and still emerging data-driven sector. Also, this dynamism might not be limited to the infancy period of the sector as there is no constant stability regarding the roles and powers of players due to the everlasting innovative developments, i.e. market players' positions are changing in line with IoT and Big Data advancements.[102] Ongoing adoption of Smart Farming practices by farmers might also influence this instability. Indeed, estimations for the EEA-wide revenues were not stable at the time of the transaction in the *Bayer/Monsanto* decision.[103] Accordingly and accurately, the Commission did not focus on market shares in *Bayer/Monsanto* by saying that there was no reliable data about market shares.[104] Moreover, it can be argued that even though there had been reliable data about market shares, this might still have been misleading to solely depend on as they may represent only a part of the broader picture because of the determinative role of data on the market power of ATPs beyond the ratio of sales of a company compared to the total sales in a market as explained in detail below.

Market shares can still be useful when calculated with an innovative approach. For instance, the German competition authority, Bundeskartellamt, assessed the market shares based on the number of users in the platform compared to the total users in the relevant market in its Facebook decision.[105] However, this method might not fit in well with the market shares assessment in the DAS because the number of users might not directly represent the data advantage or market shares of ATPs as one ATP might have more data-driven advantage/income with fewer users compared to their rivals if the subscriber farms conduct large-scale activities, and thus, upload more data and pay more subscription fees. Therefore, focusing on the number

Section 2.3.2.5 below.

101 If the market shares can be calculated properly.

102 Wolfert et al. (2017), n. 4, p. 75; Sundmaeker et al. (2016), n. 4, p. 147.

103 *Bayer/Monsanto*, n. 8, para 2448; Even though the Commission did not investigate Digital Agriculture in the *Dow/DuPont* decision, it touched upon the issue when explaining industry trends and new technology developments by stating that 'it is still unclear which player will emerge as a leader in this area'. See at *Dow/DuPont*, n. 16, para 246.

104 *Bayer/Monsanto*, n. 8, para 2613.

105 See Case Summary of Facebook decision, B6-22/16, p. 6 https://www.bundeskartellamt.de/SharedDocs/Entscheidung/EN/Fallberichte/Missbrauchsaufsicht/ 2019/B6-22-16.pdf?_blob=publicationFile&v=4 accessed 5 January 2021.

of acres for which an ATP is providing services compared to the total acres that receive digital services in the relevant market might be a more useful criterion to identify.[106]

On the other hand, as farmers have a profoundly weak position vis-à-vis ATPs,[107] which have standard 'take it or leave it' terms and conditions that are closed to negotiations,[108] farmers have very limited control over already collected data sets, and they are highly dependent on ATPs and machine producers.[109] Therefore, countervailing buyer power might have much less meaning when investigating the market power of a company in the DAS compared to market shares. For this reason, the main focus should be on entry barriers when exploring data-driven market power.

2.3.2 Assessing Data-driven Entry Barriers in the Digital Agriculture Sector

2.3.2.1 Switching costs

There are significant reasons that make switching from one ATP to another highly difficult or costly for farmers. The question of 'can farmers take the historical data with them if they move to another supplier?'[110] is critical in this regard. As KWS (one of the stakeholders that the Commission had individual calls with) hinted,[111] there are two main reasons for data-driven lock-in concerns in the DAS, i.e. legal ambiguity in data rights and technical barriers to transfer data. To understand the reasons for this, it is vital to know first, what the ag-data covers, and what the legal status of its main proportion is.

106 Of course, this has to be complemented with a broader data-driven market power assessment by focusing on entry barriers due to explained dynamism in the sector.

107 Sundmaeker et al. (2016), n. 4, p. 144; Verdonk (2019), n. 15, pp. 118–119; Mihalis Kritikos, *Precision Agriculture in Europe – Legal, Social and Ethical Considerations* (EPRS | European Parliamentary Research Service, 2017), p. 39.

108 See more in Section 2.3.2.1.

109 See more in Sections 2.3.2.1 to 2.3.2.6.

110 See *Data Revolution: Emerging New Data Driven Business Models in the Agri-Food Sector* (EIP-AGRI Report, 2016), p. 12 <https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_seminar_data_revolution_final_report_2016_en.pdf> accessed 5 January 2021 ['EIP-AGRI report', henceforth].

111 *Bayer/Monsanto*, n. 8, para 2842, table 170. However, the Commission did not discuss this issue apart from citing the view of KWS.

Agricultural data

The notion of agricultural data or agronomic data covers different types of data sets that are relevant to Digital Agriculture services. It can be analysed from two different perspectives: (1) its collection sources and function, as well as (2) its legal status.[112]

- *Types of ag-data according to collection sources* – There are three main data types in the DAS according to their sources and function:[113] (1) farm data (collected from farms via sensors, machines or directly by farmers for tailor-made agronomic prescriptions); (2) complementary data (such as weather, satellite and other environmental data, including precipitation events, evapotranspiration, and heat unit accumulation);[114] and (3) proprietary data (such as data of an agricultural inputs company about its agronomic products, the results of the field tests and other exclusive information).[115] In order to provide Digital Agriculture services to farmers, different combinations of these data sets might be needed according to the type of services.[116]

- *Applicable legal regime to ag-data* – In its decision, the Commission did not discuss the legal status of ag-data or any possible legal regime applicable to it even though this may substantially affect the competitive assessment.[117] In particular, it is critical to know whether the collected ag-data sets can be considered personal or non-personal. This categorization is essential to determine data control and portability (or existence of any) regime in the DAS.

112 Although the decision explored the importance of agricultural data sets, it neglected their legal status.

113 *Bayer/Monsanto*, n. 8, para 2453.

114 Keith Coble and others, *Advancing US agricultural competitiveness with big data and agricultural economic market information, analysis, and research* (FARE, 2016), p. 3. See also another type of categorization at the same source.

115 See *Bayer/Monsanto*, n. 8, para 2453.

116 Ibid., paras 2453 and 2724.

117 Regardless of its reason, i.e. whether it was a conscious choice or negligence, it has to be noted that this is a problematic silence because, for instance, determining whether there is an explicit right to data portability for the related data sets might affect the data substitutability assessment, which is also absent in the Commission's analysis to a large extent, as discussed in detail at below Section 2.3.2.6.

As ‘farm data’ is more related to the mentioned lock-in problem of farmers compared to the other two components of the broader notion of ag-data, it deserves particular attention. The so-called ‘farm data’ is further categorized in the literature, namely, (a) process-mediated data;[118] (b) machine-generated data;[119] as well as (c) human-sourced data,[120] and the main proportion of farm data in the sector is considered machine-generated non-personal data.[121] Additionally, the complementary data and proprietary data might not represent personal characteristics as they are related to the environment and performance of agricultural inputs which might not easily be associated with a natural person. Indeed, paragraph 9 of the Regulation on a framework for the free-flow of non-personal data in the European Union gives ag-data as an example of non-personal data.[122]

On the one hand, even if these data sets are considered personal, the applicability of the General Data Protection Regulation (GDPR)[123] framework might not be effective enough in the sector. It must be recalled that the only beneficiaries of data protection rules under the GDPR are natural persons.[124] Therefore, farms, which are run by legal persons (both small and medium-sized enterprises (SMEs) and bigger corporations), cannot institutionally benefit from the GDPR framework. Here, one may think that workers of these farms might enforce their rights as natural persons, but this can be highly burdensome and confusing as workers are not a part of the contractual relationship with ATPs, and it might be highly complicated

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118 Which covers *purchasing inputs, feeding, seeding, applying fertilizer, taking an order, etc.* See at Wolfert et al. (2017), n. 4, p.74.

119 Which is generated by IoT systems such as sensors and smart machines. See ibid.

120 It is based on human experiences, which have been recorded in *books and works of art, and later in photographs, audio and video.* This data is generally not well structured and stored. Therefore, in Big Data related discussions, human-sourced data is rarely mentioned except marketing part of the agricultural value chain. See at ibid.

121 Ibid. See the given examples in Kritikos (2017), n. 107, pp. 14-15; See EU Report, n. 41 above, p. 87. This gives soil data as an example of ‘strictly non-personal’ data.

122 ‘…Specific examples of non-personal data include … data on precision farming that can help to monitor and optimise the use of pesticides and water.’ See Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union, OJ L 303, pp. 59–68 [‘Free flow of non-personal data regulation’, henceforth].

123 Regulation (EU) No. 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (‘GDPR’) OJ L 119/1.

124 See Article 1 of the GDPR.

to determine which worker collected which data. Also, enforcement would fail if the related workers leave the job.

On the other hand, the free-flow of non-personal data regulation does not provide any binding data portability right[125] for non-personal data sets. It only suggests the creation of sector-specific voluntary codes of conduct.[126] Accordingly, the joint EU Code of Conduct on agricultural data sharing was released by a coalition of the EU agri-food associations on 23 April 2018 in Brussels.[127] However, although this is a noteworthy endeavour to mitigate legal ambiguities in the sector, it is not a binding regulation.[128] It is rather a guideline, which might be voluntarily followed by the stakeholders in the sector. Additionally, the superiority of contractual freedom prevails despite the proposed rules: 'unless otherwise agreed in the contract, the data originator (farmer) has the right to transmit this data to another data user'.[129] The same emphasis of 'unless stated in the contract' is repeated when discussing the portability of data.[130] Considering farmers' weaker position vis-à-vis ATPs when they are entering into agreements,[131] it can be argued that the EU Code of Conduct does not present a helpful approach for the data lock-in problem, especially from the enforcement and functionality perspective.[132]

Data-driven lock-ins in the Digital Agriculture sector due to legal ambiguity

Connected to the explained legal ambiguity, one of the most prominent discussions in the literature is whether data belongs to farmers, data collectors (if not farmers), ATPs, landowners or even financial lenders.[133]

125 Which lets the right holders transfer their data sets from one company to another.
126 Free flow of non-personal data regulation, n. 122, Article 6.
127 See more at 'EU Code of conduct on agricultural data sharing by contractual agreement' (*Copa and Cogeca at all*, 2018) <https://www.cema-agri.org/publication/brochures/37-eu-code-of-conduct-on-agricultural-data-sharing> accessed 4 March 2021 ['EU Code of Conduct', henceforth].
128 Ibid., p. 4.
129 Ibid., p. 9.
130 Ibid., pp. 9–10.
131 Sundmaeker et al. (2016), n. 4, p. 144; Verdonk (2019), n. 15, pp. 118–119; Kritikos (2017), n. 107, p. 39.
132 See more detailed discussion at Can Atik and Bertin Martens, 'Competition Problems and Governance of Non-personal Agricultural Machine Data: Comparing Voluntary Initiatives in the US and EU' (Joint Research Centre of the European Commission | Digital Economy Working Paper 2020-07-JRC121337, Seville 2020) <https://ec.europa.eu/jrc/sites/jrcsh/files/jrc121337.pdf> accessed 5 January 2021.
133 Coble et al. (2016), n. 114, p. 6; See also Joan K. Archer and Cordero A. Delgadillo,

This uncertainty makes farmers concerned as they might not have discretion about the farm data sets, which are collected from their farms.[134] This concern was also mentioned in the EIP-AGRI workshop in 2016 that ambiguity of data ownership and lock-in situations might detrimentally affect the development of the sector.[135]

Even though some ATPs try to relieve farmers' concerns by stating 'yes, you own the data' in their discourse, their terms and conditions generally contain ultimate rights in favour of ATPs.[136] For instance, some ATPs restrict the usage of the collected 'farm data' in another field of the same farmer if there is no contractual relationship for the second field.[137] Similarly, usage of farm data (collected by, for instance, ATP 1) by another service provider (for instance, ATP 2) is sometimes prohibited by the terms and conditions even after the contractual relationship ends with ATP 1.[138] As a more robust and relevant example for this study, Monsanto's FieldView platform[139] makes a clear distinction between personal and non-personal data in its terms and conditions.[140] For personal data, it provides a separate set of terms and conditions that contains a list of what is considered as personal data.[141] Related provisions on non-personal farm data start by saying that farmers and farms own the data, but the rest of the text shows that the data can only be shared with other FieldView users or platform partners of FieldView,

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'Key Data Ownership, Privacy and Protection Issues and Strategies for the International Precision Agriculture Industry' (2016) Proceedings of the 13th International Conference on Precision Agriculture, p. 3.

134 Sundmaeker et al. (2016), n. 4, p. 144; Leanne Wiseman, Jay Sanderson and Lachlan Robb, 'Rethinking Ag Data Ownership' (2018) 15 Farm Policy Journal 71, pp. 71–72.

135 See EIP-AGRI report, n. 110, p. 14.

136 Kritikos (2017), n. 107, p. 17; See also Monty Guild and Tony Danaher, 'Big Data Comes to the Farm' (*Financial Sense*, 2014) https://www.financialsense.com/ contributors/guild/big-data-farm accessed 5 January 2021; Matt McIntosh, 'Data Ownership Questions – and Why They're Important' (*Future Farming*, 2018) https://www.futurefarming.com/Tools-data/Articles/2018/10/Data-ownership-questions--and-why-theyre-important-340743E/ accessed 5 January 2021; Jop Esmeijer and others, *Data-driven Innovation in Agriculture: Case Study for the OECD KBC2-Programme* (TNO Report, 2015) R10154, p. 27.

137 Sykuta (2016), n. 3, pp. 68–69.

138 Ibid.

139 The core concern in the *Bayer/Monsanto* merger was the concentration of this platform's capabilities with Bayer's Xarvio. See Section 2.2.1 above.

140 'Climate Fieldview™ Terms of Service' (*Climate.com*, 2020) https://climate.com/fieldview-terms-of-service accessed 5 January 2021.

141 Ibid., para 1.2 – Personal Data.

not with rivals.[142] There is no portability provision outside of the platform. Moreover, the terms and conditions state that both hardware and software are licensed, not sold.[143] The hardware includes the FieldView Drive, the hard disk that collects and stores all data.[144] Since there is no undisputed and explicit data portability right for farmers, it is difficult to see how farmers could transfer their data to another platform when they desire to do so.

Apart from ATPs' ultimate power on the collected data, there are similar concerns on the agricultural machinery side because agricultural machinery and vehicles also have data collection tools.[145] It is stated that multinational machinery giants apply end-user license agreements (EULA) regarding the usage of machinery and data collection procedure (in which farmers have minimal access after collection), and in these agreements, there are particular provisions to let machine producers block the machines if farmers do not abide by the data collection guidelines in the scope of EULA.[146] For instance, John Deere goes beyond and claims that they do not sell tractors. Instead, it claims that farmers only get 'an implied license for the life of the vehicle to operate the vehicle' when they pay for the tractor.[147] By saying that, Deere can also claim that the data (generated by the tractor) is also owned by Deere based on the law of property principles.[148] Additionally, agricultural vehicles are highly expensive, and inherently constitute very high fixed costs for farmers. This alone has the potential to lock farmers in the existing machine providers during the time for paying debts of the agricultural machinery[149] and even maybe after that stage - considering the additional financial burden due to the need for technological support and maintenance. If the data dependency is added on top of that, it is highly difficult to speak about farmers' freedom of choice. This might

142 Ibid., para 4, in particular, para 4.3 – Sharing Data with other Climate FieldView Users and Platform Partners.
143 Ibid., para 1.5 – Limited License.
144 Ibid., para 3.1 – Lease of Equipment.
145 EIP-AGRI report, n. 110, p. 10.
146 See, for instance, John Deere's practices at 'Vendor lock-in, DRM, and crappy EULAs are turning America's independent farmers into tenant farmers' (*boingboing.net*, 2018) <https://boingboing.net/2018/03/08/you-are-the-product-5.html> accessed 5 January 2021.
147 Kyle Wiens, 'We Can't Let John Deere Destroy the Very Idea of Ownership' (*Wired.com*, 2015) https://www.wired.com/2015/04/dmca-ownership-john-deere/ accessed 5 January 2021.
148 In the scope of the right to the fruits (*fructus*) element of ownership right.
149 Kritikos (2017), n. 107, p. 7.

speculatively mean that farmers might become only tractor drivers for agricultural machinery producers to collect ag-data in the scope of the 'Smart Farming' practices.

Technical challenges in interoperability and standardization

In addition to the legal uncertainty, there are also technical barriers regarding the adaptability of one infrastructure to another system requirement.[150] It is argued that hardware/software systems are sometimes intentionally designed to block moving data to rival systems in order to nudge farmers to buy the whole system from the same company.[151] There are very limited data standards as a result of this so-called 'brand protection' strategy, and therefore, technical interoperability barriers prevent further innovation and technological advancement due to lack of interconnection of farming equipment and tools.[152] Sundmaeker and others assert that this *proprietary architecture* in technical compatibility of systems and lack of data standards are the core reasons for the absence of widespread interoperability.[153] Accordingly, Lianos and Katalevsky argue that the lack of interoperability might bring about farming solution clusters where services cannot be changed with other companies' services, and this can be detrimental to existing and potential competition as well as innovation in the sector.[154] To put it another way, interoperability and standards are critical for farmers to ensure their autonomy to choose the best services from the wide range of alternatives for each particular need in the farm instead of depending on one integrated bundle of services from a single company.[155]

150 Sundmaeker et al. (2016), n. 4, pp. 142–143; See also at Esmeijer et al. (2015), n. 136, pp. 24–25; 'Main Principles Underpinning the Collection, Use and Exchange of Agricultural Data' (*Copa-Cogeca*, 2016) <https://ec.europa.eu/futurium/en/system/files/ged/main_principles_underpinning_the_collection_use_and_exchange_of_agricultural_data_.pdf > accessed 15 January 2021, p. 3 ['Copa-Cogeca', henceforth].

151 Guild and Danaher (2014), n. 136; Kritikos (2017), n. 107, p. 19.

152 Kritikos (2017), n. 107, p. 19. See also at EIP-AGRI report, n. 110, p. 14.

153 Sundmaeker et al. (2016), n. 4, p. 143.

154 Lianos and Katalevsky (2017), n. 15, p. 1.

155 To give an example, farmers should be legally and technically able to use their soil data collected through a soil analysis company in order to get seeding prescription services from another company that also needs soil data sets to provide services. This would also mitigate farmers' switching costs beyond interoperability of various services. If there are data standards and interoperable infrastructures, then farmers can also change their seeding prescription services company or soil analysis company later on by keeping their previous data sets usable.

As a general consideration, switching costs in the sector have a distinctive and strong role in creating entry barriers when considering legal and technical reasons together. Furthermore, by taking into account farmers' weaker position vis-à-vis ATPs in behaving autonomously (they cannot negotiate on or change standard terms and conditions,[156] to be more precise) and highly imbalanced contractual provisions regarding the control of collected data sets,[157] already explained high switching costs render the first-mover ATPs ultimate decision-makers regarding third parties' access to data regardless of the wills of farmers. This, in turn, could make them the gatekeepers of the DAS owing to locked-in data sets' significant competitive advantage for the first-movers over their existing rivals and new entrants, who suffer from data shortages to compete with the established ATPs.

Even though the Commission cited a stakeholder's view that touches upon the interoperability challenge in the sector,[158] it did not mention the legal ambiguity in applicable rules to non-personal ag-data. More importantly, it did not provide a standalone analysis regarding the switching costs in the *Bayer/Monsanto* decision. Instead, the Commission primarily focused on network effects and considered the first-mover advantage in the sector as a result of these effects.[159] However, switching costs[160] are the core reason for the first-mover advantage in the DAS compared to the relatively limited role of network effects[161] that need to be considered together when assessing data-driven market power in the DAS.

Beyond the explained legal and technical barriers that prevent free data flow, there are additional factors that potentially exacerbate the impacts of data-driven switching costs in the sector. The following sections will provide an in-depth discussion about them.

2.3.2.2 *Importance of historical farm data*

Historical farm data is essential for ATPs not only to develop their algorithms/

156 Kritikos (2017), n. 107, pp. 1 and 39; See also, Ashley Ellixson and Terry Griffin, 'Farm Data: Ownership and Protections' (2017) AREC Fact Sheet | FS-1055, p. 7; See at Jeremy de Beer, 'Ownership of Open Data: Governance Options for Agriculture and Nutrition' (2016) Global Open Data – GODAN Papers, p. 14.

157 Sykuta (2016), n. 3, pp. 68–69.

158 See *Bayer/Monsanto*, n. 8, para 2842, table 170.

159 See ibid., paras 2843–2844.

160 Deriving from legal and technical barriers that result in the data-driven lock-in problem in the sector, as discussed above.

161 That will be discussed in detail in Section 2.3.2.9.

tools but also to provide tailor-made competitive services for the targeted farms.[162] The Commission mentioned this briefly, but concentrated on the first aspect.[163] Historical data sets are important to training algorithms, but they are also needed to generate effective agronomic predictions based on retroactive patterns.[164] Therefore, even the rivals, which have already advanced data processing tools or wide proprietary/ complementary data sets, might not be able to compete with first-mover ATPs, which exclusively control historical farm data, once farmers are locked-in due to these data sets. For this reason, accessing historical data may be crucial for new entrants and existing market players, and this particularity of the sector should be taken into account specifically as a factor that further deteriorates the explained data-related lock-in concerns in the DAS.

In some cases, the so-called velocity of data might also be the critical element when analysing data's role in market power whereas in other instances, having historical data sets might be the core asset to give rise to market power. Sometimes both of them may have equal importance. It should be noted that the importance of historical data is valid predominantly for 'farm data' and possibly 'proprietary data' sets of ATPs while real-time access to accurate complementary data, such as weather data or satellite data, might be more relevant as this component of ag-data inherently requires velocity.

In this regard, the data-driven market power analysis should be conducted by separating different data types required for the particular Digital Agriculture service and also identifying the importance of each, especially by taking into account the relevance of the real-time data or historical data access to generate the competitive services in the relevant market. In the case of the *Bayer/Monsanto* decision, the Commission successfully categorised ag-data sets in the descriptive section,[165] but did not provide the suggested standalone discussion, especially regarding the importance of historical farm data sets.

162 See at Sykuta (2016), n. 3, p. 69; See also Sundmaeker et al. (2016), n. 4, p. 143.
163 See *Bayer/Monsanto*, n. 8, para 2570. See also general statements regarding data accumulation and its importance for improving the tools, i.e. positive feedback loops at paras 2830–2846.
164 Keith H. Coble and others., 'Big Data in Agriculture: A Challenge for the Future' (2018) 40 Applied Economic Perspectives and Policy, pp. 87 and 91.
165 See *Bayer/Monsanto*, n. 8, para 2453.

2.3.2.3 Importance of data combination

Interrelated to the statements above, the combination of different types of data can be precious for providing accurate Digital Agriculture services,[166] and the Commission successfully explored this sector characteristic and the special need for data combination in data-driven prescription services.[167] Particularly, it linked the possibility of creating a competitive advantage with unique access to proprietary and third-party data sets[168] and considered the importance of field testing and proprietary data sets as the necessary element to provide services in the markets for agronomic prescription services.[169] Also, locked-in farm data sets of the existing customers have an influential role in entry barriers in the sector, as explained above. It might even be argued that the farm data sets are the most critical part of the agricultural prescriptions because they make the services tailor-made, which is the most distinctive characteristic of the DAS. Therefore, the importance of each data component (especially, the role of farm data in the required combination) should be determined and assessed in detail in an optimal market power test in the DAS.

2.3.2.4 Costs of 'Smart Farming' and scarcity of alternative data collection sources

Adoption of the so-called 'Smart Farming' is strictly related to costly equipment and machinery investments in addition to the role of subsidies and tax benefits as financial incentives.[170] For this reason, relatively developed farms might be more expected to switch to data-driven farming from traditional farming. For even these farms, there are still doubts about whether these benefits can quickly compensate for the required investments[171] despite the promises of Digital Agriculture.[172] Additionally, when farmers

166 Sundmaeker et al. (2016), n. 4, pp. 143–144; Copa-Cogeca, n. 150, pp. 2 and 5.

167 *Bayer/Monsanto*, n. 8, para 2733.

168 Ibid., para 2728.

169 Ibid., para 2805.

170 Esmeijer et al. (2015), n. 136, p. 13; see also ibid., para 2838 for the importance of the high adoption rate in the sector.

171 See for example at Iria Soto and others, *The Contribution of Precision Agriculture Technologies to Farm Productivity and the Mitigation of Greenhouse Gas Emissions in the EU* (JRC Report, 2019) JRC112505, pp. 21–22.

172 See the remarkable differences between conventional production and data-driven production in field trials, for instance, in terms of crop yield, soil fertility loss, quality of crops, input consumption percentages at 'Internet of Food and Farm 2020' (*iof2020eu*, 2020) https://www.iof2020.eu/communication-materials/iof2020-booklet -2019-highres.pdf accessed 5 January 2021.

need to expand ‘Smart Farming’ practices towards their second and/or third lands or barns, they have to invest nearly the same amount for embedded sensors once again when setting the data collection infrastructure as well as service fees of ATPs as much as the first investment. Therefore, it can be argued that ATPs’ data collection capacity is naturally interconnected with farmers’ intentions to switch to ‘Smart Farming’, which is strictly related to the mentioned fixed and marginal investment costs. In this environment, farmers are at the centre of the data collection stage in the fields,[173] and data access possibilities for Digital Agriculture services are up to “*farmers’ ability to automatically upload their field data”*.[174] This distance from fields decreases ATPs’ control in the data collection stage. There is also a physical distance between ATPs and data collection in the fields. It may be eliminated to a large extent by IoT devices, which collect data and automatically send it to databases of ATPs, but the help of IoT facilities to eliminate the physical distance sometimes has limitations due to some farms’ distance to required infrastructure. For instance, due to internet connection problems, data transfer from the field to ATPs might be interrupted.[175] This can be extended to electricity, defects in the sensors, and other essential infrastructural and technical problems. All these challenges have to be overcome by farmers. In this regard, it can be put forward that ATPs’ distance to the data collection stage is also related to: (1) farms’ distance to essential infrastructures, and connected to this; (2) their heavy responsibility regarding (a) setting the IoT infrastructure in farms, (b) keeping the data collection tools in working condition, and (c) solving problems regarding the infrastructure. All these costs significantly influence data collection alternatives, and in turn, the value of data accumulation (especially, locked-in farm data sets) in the hands of first-movers in the sector. Therefore, understanding the value of already collected (locked-in) farm data is important for data-driven market power assessments in the DAS.

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173 EU Code of Conduct, n. 127; as well as responsible for the quality and credibility of data. See at Copa-Cogeca, n. 150, p. 2.

174 *Bayer/Monsanto*, n. 8, para 2688. However, the Commission did not focus on this that much in the following evaluations.

175 See more at Brian E. Whitacre, Tyler B. Mark, and Terry W. Griffin, ‘How Connected Are Our Farms?’ (2014) 29 (3) The Magazine of Food, Farm, and Resource Issues 1; and Zerina Kapetanovic, ‘Farmbeats: Empowering Farmers with Low-Cost Digital Agriculture Solutions’ <https://www.microsoft.com/en-us/research/video/farmbeats-empowering-farmers-with-low-cost-digital-agriculture-solutions/?OCID=msr_video_farmbeats_facsum_tw#!related_info> accessed 5 January 2021.

2.3.2.5 Business model and distance to data effect

The reason for farmers' data collection costs is also related to the generally applied business model in the DAS. Although the Commission stated in the *Bayer/Monsanto* decision that 'business models in digital agriculture are not stable',[176] the critical information to identify the main business model of the DAS might be that Digital Agriculture services (including agronomic prescription services) are not free of charge,[177] and the service fees consist of the primary business income of ATPs.[178]

Additionally, it can be observed that data is not an externality of service usage. Instead, farm data is at the centre of the agronomic prescription services as an irreplaceable input in such a way that farmers intentionally set the data collection infrastructures to extract and send data to ATPs in order to get tailor-made data-driven solutions from ATPs by paying subscription fees.[179]

Table 3.1 Business model of the Digital Agriculture sector

Services for Users or Customers	Data Collection Awareness and Role of Data in Services	Main Income of the Businesses	Primary Purpose of Data Collection	Secondary Purpose of Data Collection
-Data-driven digitally enabled agronomic / solutions / prescriptions / observation / services	-Data collectionis up to farmers' explicit intention, investment and practice -Data is the core input for services	-Via subscription fees for data-driven agronomic services. -Business income mainly depends on the size of acres and number of customers[a]	-To provide tailor-made agronomic services for Customers (farmers)	-To train algorithms, fix errors, enhance services -Network effects enabled by the scale and scope of data[b]

Notes: [a] See Section 3.3.2.8; [b] See Section 3.3.2.9.

This chapter argues that there is a novel relationship between farmers and ATPs due to the special value of farm data. On the one hand, there is a

176 *Bayer/Monsanto*, n. 8, para 2991.

177 Joddy L. Ferris, 'Data Privacy and Protection in the Agriculture Industry: Is Federal Regulation Necessary?' (2017) 18 Minnesota Journal of Law, Science & Technology 1, p. 314.

178 See generally at Sundmaeker et al. (2016), n. 4; See Bayer's business model at *Bayer/ Monsanto*, n. 8, para 2490 and 2547; See also the FieldView as an example at 'Pricing' (*FieldView*) https://climate.com/pricing accessed 5 January 2021.

179 Notifying Party also stated the ATPs' dependency on the farm data collection process operated by farmers. See at *Bayer/Monsanto*, n. 8, para 2688.

distance between farmers and already collected farm data sets due to legal and technical barriers, as discussed above. Farmers do not have any explicit legal or practical position to control data after the data collection stage (farmers' *distance to data*). On the other hand, ATPs have limited discretion on farmers' costly data collection investments, and thus, ATPs' data capacity is interrelated with farmers' technological transformation. This cross-dependency cannot be easily overcome by ATPs alone. Thus, their distance from the data collection stage (ATPs' *distance to data*) increases the value of farm data sets for ATPs, which in turn, exacerbates the effects of the data-related lock-in problem from the perspective of entry barriers for new entrants and expansion barriers for existing rivals as a result of the problem of switching costs for farmers.

ATPs' *distance to data* due to farmers' centrality in data collection and its costs for farmers might bring about the question of whether this can constitute a significant countervailing bargaining power for farmers. However, this chapter is cautious about this possibility because farmers have equal or even (arguably) more incentive to collect data and receive Digital Agriculture services to reach more efficient and productive farming solutions. In this regard, farmers might not effectively use the data collection argument to bargain with ATPs because farmers demand technology services from ATPs by knowing that they will invest in data collection infrastructure and pay for Digital Agriculture services unless they have large operations with considerable data potential that can particularly draw ATPs' attention to consider exceptional pre-contractual bargaining processes.[180] Moreover, large operations of farmers might not directly affect ATPs' claim on collected data sets since companies have other options to bargain with farmers such as offering discounts for the given services. Therefore, it can be stated that ATPs' *distance to data* does not necessarily increase (especially relatively small) farmers' bargaining power as they do not have any level playing field to change standard terms and conditions of the Digital Agriculture services. Instead, this makes farm data highly valuable for ATPs and increases the anticompetitive potential of already aggregated data sets in the hands of a few ATPs. Moreover, ATPs' *distance to data* does not mean that farmers have control over already collected data sets as already explained above in the scope of farmers' lack of control after the data collection stage, i.e. farmers' *distance to data*.

180 However, in the scope of this research, no such situation has been encountered in the literature or sector investigation.

To mitigate farmers' *distance to data* problems, cooperatives can come to mind as an effective mechanism that may increase farmers' bargaining power. As already discussed in the case law,[181] farmers' cooperatives can purchase agricultural inputs wholesale in order to benefit from discounts, and they can impose restrictive rules on their members *"to forbid them to participate in other forms of organized cooperation which are in direct competition with it"*.[182] Therefore, one can consider whether a similar form of organization could be a solution to ease farmers' *distance to data* (lack of control after the data collection stage) by entering into agreements with ATPs as a powerful entity (cooperative). This could be a promising attempt to increase countervailing buyer power of farmers vis-à-vis ATPs,[183] but this chapter is also sceptical about the possible success of such an endeavour. As the nature of the DAS is based on tailor-made solutions/suggestions/services to individual farms, it might be challenging to organize a collective agreement. Additionally, as explained in the above paragraph, ATPs might offer other alternatives such as reduced prices instead of renouncing their exclusive *de facto* control on collected data sets. More importantly, this type of collective agreements might constitute another set of switching costs for individual farmers when they desire to change the service providers during the process owing to potentially restrictive rules of these cooperatives to keep their members in the collective agreement.

Still, there are initiatives to create intermediary data pooling cooperatives to store collected farm data and open-up these data sets to ATPs according to farmers' requests later on.[184] These initiatives might be useful to mitigate concerns on switching costs for new 'digital farmers', but established first-movers do not have any explicit incentive to let already locked-in farmers switch to alternative services. This makes the *distance to data effect* (especially from the farmers' side) more concerning as the market forces might not be able to correct the failure easily without external intervention. Nonetheless, the potential of the explained pooling intermediary initiatives might still be valid for new 'digital farmers', as they can choose ATPs accordingly.

181 See, for instance, Case C-250/92 *Gøttrup-Klim e.a. Grovvareforeninger v Dansk Landbrugs Grovvareselskab AmbA,* ECLI:EU:C:1994:413.
182 Ibid., para 45.
183 even though such an initiative has not been encountered in the scope of this research.
184 See, for instance, 'JoinData – The Future of Smart Farming' (*Join-data.nl*, 2019) < https://www.join-data.nl/en> accessed 5 January 2021; see more about its operation model at 'Data Sharing in the Agricultural Sector | Support Centre for Data Sharing' (*Eudatasharing.eu*, 2019) <https://eudatasharing.eu/examples/data-sharing-agricultural-sector> accessed 5 January 2021.

2.3.2.6 Lack of data substitutability

The level of data substitutability has been emphasized by various reports in the broader literature as an indicator of data-driven market power, i.e. if competitors cannot easily access the same required data, then the substitutability level is low, and there is a higher level of concern and vice versa.[185] Therefore, it is stated that data sets of the undertaking(s) under investigation and available substitutable data for their rivals should be taken into account when assessing market power.[186]

This issue has long been discussed by the Commission in online platforms cases, but with a different perspective, as a relieving factor for data combinations via mergers such as in *Google/DoubleClick*,[187] *Telefónica UK/Vodafone UK/Everything Everywhere/JV*,[188] *Facebook/WhatsApp*[189] because of the availability of substitutable data for competitors. For instance, it is stated in the *Facebook/WhatsApp* case that *"there will continue to be a large amount of Internet user data that are valuable for advertising purposes and that are not within Facebook's exclusive control"*.[190] The 'exclusive control' emphasis was also placed in the *Microsoft/LinkedIn* merger.[191] It can be observed that the Commission is lenient about the data concentrations unless they are exclusively controlled by the merging entities.

Due to the sector-specific conditions in the DAS, the substitutability of data argument, which is repeated in online platforms cases, should be reconsidered cautiously in possible DAS cases. It can be put forward that the substitutability level of farm data sets (for training algorithms) can be very low in the DAS due to *inter alia* the data-driven lock-ins, high data collection costs and scarcity of data collection alternatives which are encapsulated by the notion of *distance to data* effect (from both ATPs' and farmers' sides) in this chapter as explained above. For the purposes of providing tailored Digital Agriculture services to farms, there is no substitutability for farm-specific data at all because the main feature of Digital Agriculture

185 EU Report, n. 41, p. 49; Franko-German Report, n. 71, pp. 44–47.

186 Ibid.

187 Case No. COMP/M.4731 – *Google/ DoubleClick*, European Commission Decision (11 March 2008), paras 269–272 and 365–366.

188 Case No. COMP/M.6314 – *Telefónica UK/Vodafone UK/Everything Everywhere/ JV*, European Commission Decision (4 September 2012), para 543.

189 *Facebook/WhatsApp*, n. 98, paras 188–189.

190 Ibid., para 189.

191 Case No. COMP/M.8124– *Microsoft/LinkedIn*, European Commission Decision (6 December 2016), para 180.

is providing tailored unique solutions to the customer farms and accessing farm-specific data from the customer is indispensable to provide the services. Apart from farm data, a substitutability assessment might also be meaningful for proprietary data sets (data about the performance of agricultural inputs) as they are exclusively generated and controlled by input producers. Again, the purpose of access may need to be determined to see whether substitutability can be mentioned for proprietary data sets. Therefore, there could be a test to assess the substitutability level of each data set under investigation.[192]

A substitutability assessment is not only related to the same data sets, but also relevant to economies of scope enabled by data. The combination of different data sets (including farm data, proprietary data and complementary data) is one of the prominent characteristics of the DAS.[193] In this regard, it can be argued that substitutability of required data variety, i.e. whether providing a competitive service with slightly different combinations might also be possible or not, should also be one of the elements in the data-driven market power test in the DAS.

In the *Bayer/Monsanto* decision, the Notifying Party claimed that there was no unique access for proprietary or third-party data, but the Commission did not directly respond to this and provided a general statement that merging parties have special capabilities that put them in an advantageous position compared to rivals.[194] Although the Commission mentioned the importance of access to ag-data for entering into a market in the DAS[195] or discussed the advantage to offer, improve or develop new services with superior access to proprietary and complementary data sets,[196] the substitutability levels of related data sets were not discussed at all in the decision. More importantly, the role of farm data on market power was underestimated to

192 Beyond the market power assessment, the Commission could consider imposing data portability remedy for locked-in farm data sets in order to mitigate concerns regarding high entry barriers or data access obligations for proprietary data sets in favour of new entrants or existing rivals, especially when such data is the pre-requisite for doing business in certain markets. See more in Chapter 6 of this thesis.

193 *Bayer/Monsanto*, n. 8, para 2733. As this was determined by the Commission, it can be acknowledged that the Commission considered the issue (importance of data combination) in the decision properly even though it over-focused on proprietary data advantage of integrated giants.

194 Ibid., para 2728.

195 By referring Monsanto's considerations on the matter. See at ibid., para 2452.

196 Ibid., paras 2715–2728.

a large extent. In this respect, this silence in the *Bayer/Monsanto* decision regarding the substitutability of data sets is worth further investigation to identify whether it means a diversion from the older precedents based on online platforms cases by realising the sector conditions, or whether it was entirely ignored in the case by considering the remedy, The BASF Divestment Package[197] that would keep Digital Agriculture operations of the merging parties separate anyway. Regardless of the reason for this silence, it should be noted that market power assessments in the sector should not neglect the substitutability levels of related data sets (especially the farm data component) in light of the particular markets' conditions.

2.3.2.7 Practical rivalrousness of farm data

Just like other data types, farm data is non-rivalrous from a technical perspective because multiple players can use identical farm data at the same time. However, it can be argued that the profitability of data collected from farms might be rivalrous in practice due to the novel business model of the DAS. Farm data cannot be used profitably by more than one company at the same time in the same market for agronomic prescription services because income comes from farmers' subscription fees for the tailor-made agronomic services,[198] not data-driven targeted advertisement, for instance. Therefore, replicated data would not be directly profitable for any other company unless the farmer replaces the existing service provider, and starts paying the fees. The only benefit to accessing farm data from non-contractual farms might be training the algorithms or providing shadow services to compete with existing ATPs by convincing farmers with more accurate and better services than the existing provider. In this regard, due to the practical rivalrousness, farm data might only be indirectly profitable for rivals in the same market, but technically non-rivalrous data can still be valuable to use in connected markets that require the same farm data (for instance, soil data) processing to provide other services.

There might be an exception here for the non-rival use of 'farm data' by rivals at the same time. For instance, there are field information services like AcreValue that process various data including soil type and crop yields, and other relevant historical data to help farmers choose the correct field to buy or rent.[199] In this market, farm data can be used by all the rival

197 Ibid., para 3046 and subsequent paras.
198 See Section 3.3.2.5 above.
199 'Acrevalue – Granular' (*Granular*, 2020) <https://granular.ag/acrevalue/>

companies at the same time to provide the best service to customers because of the peculiarity of this particular service. Similarly, replicability and non-rivalrousness discussion might be more meaningful for complementary or proprietary data sets because more than one company can use them to make a profit at the same time in the same market as all the ATPs need to complement these data sets with the farm-specific data of their customers.

In this regard, it is important to note that the replicability or non-rivalrousness of data should be discussed carefully in the market power analysis of the DAS cases. The Commission should take into account the type of aggregated data and the particular business model of the relevant market in the broader DAS and should be highly cautious when implementing its precedents from online platforms cases based on the argument of abundance, replicability or non-rivalrousness of data, especially when it comes to farm data.

2.3.2.8 Economies of scale in providing agronomic prescription services

The Commission stated in the *Bayer/Monsanto* decision that economies of scale are a key element to ensure competitiveness and viability. Therefore, the development of services for broad acre crops is more attractive compared to prescriptions for smaller-scale farming such as fruits and vegetables.[200] In this regard, it can be inferred that the data-related competitive advantages of ATPs might be different in different prescription markets for different crop groupings according to the scale of the farming activities. In the crop groups that are grown in smaller-scale fields, a data unit might be more important (especially for training algorithms) because of the limited total acres as the potential data collection sources due to the nature of the particular agricultural production. If the related market is dominated by few players, this might result in higher entry barriers for the new entrants who suffer from data shortage to train algorithms compared to markets that provide Digital Agriculture services for large-scale production that naturally result in more total data to feed data processing tools of market players. Furthermore, this may make comparisons of data aggregation levels between different DAS markets difficult. For instance, it may be misleading to take data aggregation levels in a large-scale agricultural production market as a benchmark for a small-scale market when evaluating how concerning a data concentration is.

accessed 5 January 2021; Similar data is also used for scouting services. See *Bayer/Monsanto*, n. 8, para 2489 (3), and 2505.

200 Ibid., para 2577.

In this regard, the scale of the farming activities, its reflection on the data collection scale for agronomic prescription services, and the structure of the particular market under investigation should be explored in detail when assessing the role of data on market power in the DAS cases. For instance, data aggregation in the hands of limited players might be more concerning in the markets which provide services for small-scale agricultural production compared to markets that have more data potential due to large-scale agricultural production.

2.3.2.9 Positive feedback loops instead of direct network effects

As discussed in detail above when explaining the business model and distance to data effect, farmers' primary objective to implement data collection infrastructure and to take paid tailor-made suggestions/prescriptions from ATPs is more related to making better farming decisions and increasing their productivity rather than reaching other farmers or their data directly. Therefore, an ATP having a vast network of farmers does not necessarily attract other farmers directly. In this sense, it is very difficult to argue that direct network effects are one of the main economic characteristics of the DAS. Consequently, focusing on direct network effects might be misleading in market power assessments in the DAS.

In the Bayer/Monsanto merger decision, the Commission focused on data-driven positive feedback loops even though it used 'network effects' as a broader notion that typically covers both direct and indirect network effects. The Commission considered that first-movers might have a quality advantage compared to late-comers, and thus, the users would not have enough incentive to switch to new services.[201] It is reasonable to argue that having a large number of farmers (as customers) means having a wide variety of farm data,[202] which can be used to develop algorithms and services, and thus, to attract new farmers with high-quality services. In this regard, indirect network effects deriving from the scale and scope of data advantage are one of the non-negligible factors when assessing entry barriers in the DAS, and the Commission did it in its decision properly.

201 Ibid., para 2837.

202 However, it is important to note that this kind of generalization might not always be valid because sometimes limited customer farms may mean more data and subscription income for ATPs if they conduct large scale farming activities. See the suggestion for an innovative market share calculation for the DAS cases in Section 2.3.1 above.

However, the Commission considered network effects as the main reason for the first-mover advantage and entry barriers.[203] This chapter opposes this consideration by virtue of two main reasons, especially from the perspective of the broader DAS. First, there is a robust first-mover advantage in the sector, but the core reason for this is more related to switching costs, as explained above. Second, presenting consumer accumulation deriving from better services as a competition problem seems a bit awkward because it is a natural consequence rather than explicit and direct harm for consumers even though this may affect the entry barriers after all. Therefore, it can be argued that constructing the theory of harm based on switching costs might be a more sound base in the DAS cases as there is a definite problem if the users are locked in low-quality services compared to innovative and better alternatives in the market.

2.4 Considerations of the Bayer/Monsanto Decision and Suggestions for Future Cases

Building on the in-depth discussion above, the following issues can be stated as prominent regarding the Commission's data-driven market power assessment in the *Bayer/Monsanto* decision and should be particularly taken into account in future market power inquiries in the sector.

First of all, the Commission did not consider market shares in its assessment as it could not reach reliable data.[204] Indeed, focusing solely on market shares might be misleading to estimate the market power in the dynamic and still emerging DAS. Additionally, when considering farmers' weaker position vis-à-vis ATPs and 'take it or leave it' type of terms and conditions, countervailing buyer power might not be a meaningful competitive constraint as well.[205] Therefore, the core element to investigate market power in the DAS should be based on entry barriers. However, still, innovative methods to estimate market shares might be helpful to complement entry barriers analysis, such as focusing on the number of acres for which an ATP provides services compared to the total available acres in the market.[206]

203 See *Bayer/Monsanto*, n. 8, para 2837.
204 Ibid., para 2613.
205 See Sections 2.3.1 and 2.3.2.1.
206 See more in Sections 2.3.1 and 2.3.2.8. This can be adapted according to the conditions of the market under investigation. For instance, the Commission can check the number of cows for which an ATP provides data-driven animal health solutions compared to the total cows being traced and served in the same market.

Regarding the assessment of the economic characteristics of ag-data, the Commission overrelied on stakeholders' ideas via questionnaires and internal documents throughout the text instead of providing in-depth analytical discussions to justify its position. Apart from the method, the Commission indicated network effects as the main reason for the first-mover advantage in the sector.[207] However, the core reason for the first-mover advantage mainly derives from the switching costs compared to the relatively limited role of indirect network effects stemming from positive feedback loops.[208] Therefore, the Commission's overemphasis on network effects[209] by neglecting to discuss switching costs[210] might be problematic, and it should be revised in future investigations.[211]

As a more general consideration, instead of arbitrarily mentioning various economic characteristics in the analysis, a checklist, which covers all the potential characteristics, can be created to provide an overview to see which factors exist and which are absent, which reasons intensify existing factors, and to explain why the particular characteristics are chosen for market power analysis as the reasoning of the decision.

There are definite factors that should be kept in mind as they have the potential to exacerbate the role of switching costs in the sector;

- The concentration of farm data can be highly problematic due to the explained switching costs in the DAS, but the Commission underestimated this and focused on proprietary data sets in the *Bayer/Monsanto* decision.[212] It also did not mention the cruciality of historical farm data sets for farmers

207 See *Bayer/Monsanto*, n. 8, para 2837.
208 See the overall discussion in Section 2.3.2.
209 See *Bayer/Monsanto*, n. 8, paras 2843–2844.
210 It did not provide a standalone discussion on the lock-in problem in the sector.
211 Especially, it may affect the remedies and their effectiveness regarding addressing competitive concerns. For instance, if it had identified the switching costs in detail, the Commission could have considered data access or data portability obligations in favour of rivals and farmers, respectively, in addition to the divestment package.
212 See *Bayer/Monsanto*, n. 8, paras 2715–2728. Maybe the reason for this is related to the fact that Monsanto had not yet started its operations in the EEA, and thus, did not have large farm data sets in Europe at the time of the merger. However, as the main focus of the Commission was on elimination of potential competition, Monsanto's potential farm data coverage after initiating the EEA operations in full capacity might have been discussed.

when changing service providers.[213] It can be argued as a general point that the importance of data combination and historical farm data sets in the context of switching services should be paid attention to when assessing entry barriers in the DAS while not neglecting the role of real-time access to complementary data sets (about weather or satellite images). Additionally, market power assessments in the DAS should first categorize the relevant data sets under investigation and determine their potential importance for given services. The Commission separated different data types,[214] and mainly explained the importance of proprietary data sets,[215] but failed to provide a detailed discussion about the distinctive competitive effects of each data set and especially, neglected the farm data analysis in the relevant market.

- Adopting Smart Farming is a costly transformation for farmers due to high fixed and incremental costs in addition to farmers' maintenance responsibilities and subscription fees of digital services.[216] Thus, farmers become at the centre of the data collection stage. They need tailor-made prescriptions/ suggestions/solutions, and ATPs need farm data not only to provide tailored Digital Agriculture services to customers (farms) but also to develop their algorithms and services. This cross-dependence requires a novel way of thinking when considering market power in the DAS cases, which was absent in the *Bayer/Monsanto* decision. As this is another factor that can affect switching costs assessments in the DAS, entry barriers investigations should take into account the explained *distance to data* effect, i.e., whether the level of ATPs' control on data collection stages is high or low, and to what extent farmers control the already collected data sets (the intensity of data-driven lock-in situations).

- Data-driven lock-ins due to legal and technical problems, data collection costs and scarcity of data collection sources influence the substitutability of data in the sector. However, the Commission kept silent on the substitutability of data, unlike its previous decisions in online platforms cases.[217] This could mean a diversion from the older precedents by

213 It only mentioned historic data sets when explaining that data aggregation is key for training/improving tools. Ibid., para 2570. Again, switching costs discussion could have been made by considering the post-operational period of Monsanto in the EEA.
214 Ibid., para 2453.
215 Ibid., para 2733; and somehow complementary data sets. See at para 2728.
216 See Sections 3.3.2.4 and 3.3.2.5.
217 The Commission has been lenient about data concentrations in online platforms

considering the distinctive conditions in the sector, or the Commission might have just neglected this discussion in this case. Regardless of the reason for this silence, it should be noted that the substitutability levels of related ag-data sets under investigation should be one of the essential elements of the market power assessments in the sector.

- Connected to the substitutability discussion, it is also essential to understand the practical rivalrousness of farm data from the perspective of directly making a profit out of it. Farm data from non-contractual farms might not be used to generate direct profit by ATPs unless they convince the farmers to switch their existing service providers, excluding some exceptional situations in the DAS.[218] In this regard, farm data can be practically rivalrous, unlike proprietary and complementary data sets that can be used by various ATPs in the same market in a directly profitable manner. As the Commission did not put emphasis on the business model of the sector and the role of farm data on market power in the *Bayer/Monsanto* decision, it did not identify this issue as well. However, it can be argued that the suggested substitutability of data analysis should also cover the potential practical rivalrousness of farm data sets in each case in accordance with the particular business model and other features of the relevant market under investigation.

- The *economies of scale in providing agronomic prescription services* are rightfully determined and considered in the *Bayer/Monsanto* decision, but the relationship between the importance of a data unit and the risks of dominance in different DAS markets that provide services to different scales of agricultural production is absent in the Commission's analysis. In this regard, data aggregation might be more concerning in Digital Agriculture markets for small-scale agricultural production where the total scale of data would also be limited, compared to the markets that provide services for large-scale agricultural production where the total data would naturally be more. Therefore, the scale of farming activities, which are served under a particular DAS market, should also be determined during the substitutability/replicability of data assessment as this may be relevant for the market power of ATPs under investigation, especially from the perspective of training the algorithms.

cases by considering the abundance of available/substitutable data for rivals. See Section 2.3.2.6.

218 See more in Section 2.3.2.7.

2.5 Conclusion

This study aimed to investigate the role of agricultural data on market power in the DAS, and, in particular, to critically analyse the *Bayer/Monsanto* decision in light of the distinctive features of the sector in order to identify indispensable elements of an optimal market power test for the DAS.

In the scope of this investigation, it can be concluded that the core focus when assessing market power in the sector should be on entry barriers in light of an in-depth economic characteristics analysis.[219] The main novelties in this regard derive from very high legal and technical barriers preventing free data flow, the vitality of data combination, the special importance of historical farm data sets, significant data collection costs for farmers, the cruciality of data collection for ATPs, and the lack of data substitutability - especially for farm data sets.[220] These characteristics have a collective potential to significantly give rise to the market power of those who hold data exclusively. Interrelated to this, there is a sector-specific cross-dependency between farmers and ATPs that has been explained as the *distance to data effect* both from ATPs' and farmers' sides.[221] ATPs have limited control over data collection stages, which makes farm data highly valuable for them. At the same time, farmers lack control after the collection stage due to legal ambiguity about the applicable (or existence of any) legal framework on data rights and interoperability problems as technical barriers to transferring data when farmers decide to change existing service providers. In such an environment, switching from one ATP to another is very costly and sometimes nearly impossible for farmers due to very harsh lock-in situations, and, thus, there is a solid first-mover advantage for ATPs who have already reached a certain number of users. Although switching costs are the main reason for entry barriers and there are no direct network effects in the sector,[222] positive feedback loops as indirect network effects also contribute to these already high entry barriers in the emerging DAS.

As the DAS covers a wide variety of data-driven services, there are different markets in the sector. Therefore, the roles of farm data, proprietary data, and

219 In addition to the helpful potential of the innovative methods such as focusing on the ratio of acres that an ATP provides services for compared to the total acres in a market. See Section 2.3.1.

220 They are mostly neglected in the *Bayer/Monsanto* decision except for the vitality of data combination. See more in Section 2.3.2 in general and Section 2.4 above.

221 See Section 2.3.2.5.

222 Because the main aim of farmers is receiving tailor-made agronomic services, not reaching other farmers or their data directly. See Sections 2.3.2.5 and 2.3.2.9.

complementary data on the market power of service providers might vary according to the specific conditions of each particular market. For instance, field biomass measurement services might be predominantly dependent on satellite data[223] while irrigation products or spraying prescription services might primarily need climate data and farm data beyond satellite data[224] or some services such as farm management services might solely use data produced in the target farms.[225] In this regard, understanding the particular role of each data set in the related market under investigation is of crucial importance. Therefore, each case should be investigated specifically according to its facts, conditions, and particular business model of each market in addition to the sector-wide relevant factors discussed above when assessing market power in the DAS cases.

Building on the substantial discussion above, it can be put forward that the optimal market power test should include the following steps: (1) determination of required data types for the given service in the market under investigation, and their legal status; (2) assessment of each data set's distinctive importance for generating the related agronomic service/solution; (3) analysis of the substitutability levels of each data set by considering the applicable (or existence of any) legal regime as well as the *distance to data effect* (from both farmers' and ATPs' sides),[226] especially for farm data component;[227] and (4) a comprehensive discussion about how concerning the data concentration as a result of the merger would be and the reasons for the related concerns in light of in-depth economic characteristics and business model analysis.[228] Thus, the formulation of remedies would become more effective and targeted to the specific reasons for the related concerns in the relevant market.

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223 See, for instance, Monsanto's Field Health Imagery product at *Bayer/Monsanto*, n. 8, para 2505.

224 See, for example, AquaTEK at ibid., para 2508; and Field Manager at ibid., para 2538.

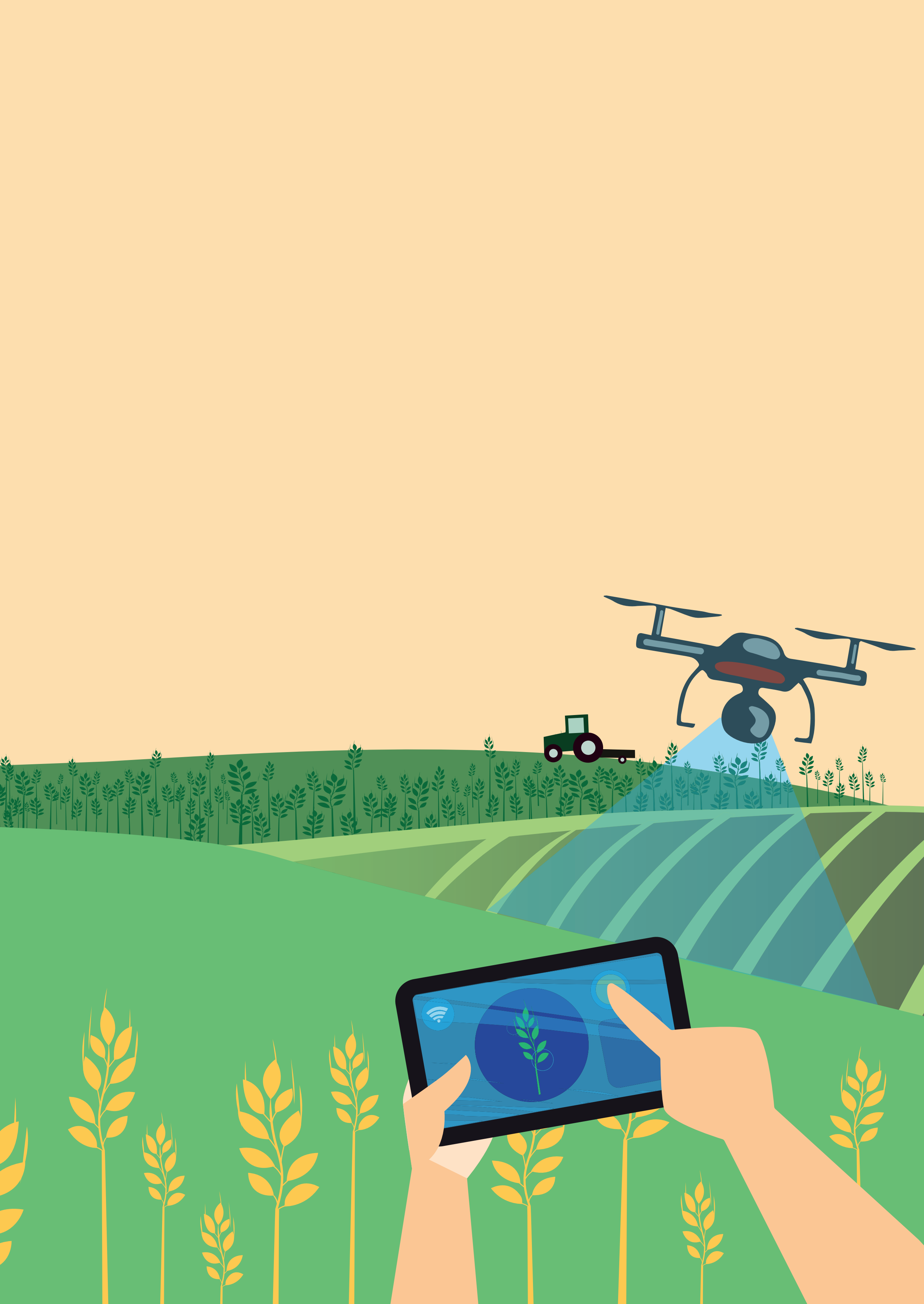
225 For instance, VitalFields provides record-keeping services to its customer farms. See at ibid., para 2509.

226 i.e., assessing the intensity of data-driven lock-in situations and the level of ATPs' control on data-collection stages, and thus, value of farm data accumulation for ATPs. See Sections 2.3.2.5 and 2.3.2.6.

227 The Commission determined the data types, but neglected the legal status and substitutability levels of related data sets in its analysis. It identified the proprietary data sets' importance in detail when providing services, but underestimated the distinctive role of the farm data component in the *Bayer/Monsanto* decision. See the details of these and other criticisms in Section 2.4 above.

228 A checklist can be created for a more systematic analysis.

With regard to the suggestions for future research, there is a need for particular attention to switching costs deriving from data lock-ins that create very high entry barriers in the sector. Therefore, future research can analyse the adequacy of existing legal frameworks to address the lock-in problem in the DAS. In such harsh sector conditions, it might even be discussed whether regulatory intervention is necessary beyond the competition law enforcement in order to eradicate, at least, the legal barriers (preferably mitigate technical barriers as well) to facilitate free data flow with a cost-efficient and fair framework without hindering data-driven innovation in the sector.



CHAPTER 3

Competition Problems and Governance of Non-personal Agricultural Data: Comparing Voluntary Initiatives in the US and EU

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3.1 Introduction

In conventional agriculture, decisions on farm inputs and processes are taken by farmers, based on their personal know-how. Today, the introduction of sensor-based digital data, Internet-of-Things (IoT) technologies and big data analytics in Smart Farming or Digital Agriculture[1] result in machine-based applications and data-driven solutions that are more precise than human observations.[2] Large amounts of sensor data are used for benchmarking and predictive modelling[3] to improve and refine decision-making about planting, seeding depth, seed placement, plant disease and machinery diagnostics, tillage, scouting, spraying,[4] harvesting and even marketing.[5] Although there are still doubts about the potential benefits compared to the costs,[6] it is often argued that data-driven services can improve farm productivity[7] and induce significant changes in the operation, management, and structure of farms and their role in the agricultural supply chain.[8] Farmers' role as independent decision-makers in the agricultural production process may come under pressure as other parties start contributing to critical decisions and claim a share in the

1 Xuan Pham and Martin Stack, 'How data analytics is transforming agriculture' (2018) 61 Business Horizons, p. 127; Harald Sundmaeker and others, 'Internet of food and farm 2020' in Ovidiu Vermesan and Peter Friess (eds), *Digitising the Industry - Internet of Things Connecting the Physical, Digital and Virtual Worlds* (River Publishers 2016), pp. 132-133; Sjaak Wolfert and others, 'Big Data in Smart Farming - A review' (2017) 153 Agriculture Systems, pp. 69-75; Michael E. Sykuta, 'Big Data in Agriculture: Property Rights, Privacy and Competition in Ag Data Services' (2016) 19 International Food and Agribusiness Management Review, p. 60; See also Case No COMP/M.8084 – *Bayer/Monsanto*, European Commission Decision (29 May 2018), para. 2442.

2 Krijn J. Poppe and others, 'Information and Communication Technology as a Driver for Change in Agri-food Chains' (2013) 12 EuroChoices, pp. 60-63; Krijn Poppe and others, 'A European perspective on the economics of Big Data' (2015) 12 Farm Policy Journal, pp. 11-12.

3 Adam Lesser, *Analyst Report: Big Data and Big Agriculture* (GIGAOM Report, 2014) <https://gigaom.com/report/big-data-and-big-agriculture/> accessed 4 March 2021; Wolfert and others, n. 1, p. 73.

4 Keith Coble and others, *Advancing US agricultural competitiveness with big data and agricultural economic market information, analysis, and research* (FARE Report, 2016), p. 3.

5 Wolfert and others, n. 1, p. 74.

6 See, for example, Iria Soto and others, *The Contribution of Precision Agriculture Technologies to Farm Productivity and the Mitigation of Greenhouse Gas Emissions in the EU* (JRC Report, 2019) JRC112505.

7 See 'Internet of Food & Farm' (*IoF2020*, 2018) <https://www.iof2020.eu/communication-materials/iof2020-booklet-2019-highres.pdf> accessed 4 March 2021; See also Poppe and others, n. 2, p. 18.

8 Poppe and others, n. 2, p. 12

benefits of farm operations. In this context, data access and re-use rights will affect competition and may redistribute welfare between farmers and service providers.[9]

The EU is a more active jurisdiction in regulating data issues compared to the US. The primary horizontal legislative instrument in the EU is the General Data Protection Regulation (GDPR).[10] It assigns exclusive rights over access and use of personal data to natural persons as data subjects and restricts the re-use and re-purposing of these data. We argue in this paper that most agricultural data are non-personal machine/sensor-generated data that do not fall under the purview of the GDPR.[11] While the data subject is the logical anchor point for inalienable personal data rights, there is no obvious anchor point for rights to non-personal data. Any party that intervenes in the agricultural production process might claim access and use rights over data collected on farms. This unregulated agricultural data market comes close to a free business-to-business (B2B) data market, governed only by bilateral contracts between the parties involved. However, competition in that free market is distorted in several ways. Agricultural machines and devices that collect data and implement data-driven services can be designed to give the manufacturer exclusive access to the data. Farmers, who buy these devices in a competitive primary market, are locked into data-driven service providers in aftermarkets. That weakens their bargaining position in aftermarket services. Data lock-in situations also occur when there is no possibility to switch digital services together with historical data sets.[12] We describe several agricultural business models that build on these data lock-in situations.

9 Data-driven service providers are commonly referred, especially in the US, as Agricultural Technology Providers (ATPs): *"The term "agricultural technology provider" or ATP generally refers to a company that aggregates farmer's data, combines it with other relevant data sets, and applies algorithms to analyze the data."* See Sykuta, n. 1, p. 58, footnote 1.

10 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119/1.

11 Some scholars argue that all data can be linked to a natural person. See, for instance, Nadezhda Purtova, 'The law of everything. Broad concept of personal data and future of EU data protection law' (2018) 10 Law, Innovation and Technology.

12 See Marie-Agnes Jouanjean and others, 'Issues Around Data Governance in the Digital Transformation of Agriculture: The Farmers' Perspective' (2020) OECD Food, Agriculture and Fisheries Papers No. 146, p. 18.

Aftermarket lock-in is a well-known classic problem in competition law and economics.[13] However, data economics adds additional complications that may further weaken farmers' bargaining position in aftermarkets. Many data applications depend on economies of scale and scope in data aggregation to achieve efficiency gains. This requires a third-party intermediary to collect, aggregate and analyse the data of many farms. Individual farmers cannot realise the collective or social value of data. The relatively low market value of raw farm data compared to processed data weakens the bargaining position of farmers in data-driven agricultural services. It explains why farmers pay fees for agronomic services but do not receive payment for their data contributions. The question is whether giving farmers specific non-personal data rights could change that situation.

Machine manufacturers and agronomic service providers with exclusive access to data are well-placed to occupy that intermediary position. Vertical integration with downstream data-driven services reinforces their position. Mergers can create larger data pools and data-driven agricultural conglomerates.[14] There is a role for competition policy to ensure an appropriate balance between potential efficiency gains from data aggregation and efficiency losses from reduced competition.

The lack of clear rules regarding control and access to agricultural data does not seem to satisfy agricultural industry stakeholders. In the EU[15] and the US,[16] they have independently created two data charters to fill the perceived

13 See, for example, Richard A. Posner, 'The Chicago School of Antitrust Analysis' (1979) 127 University of Pennsylvania Law Review.

14 There has already been a merger trend in the agricultural inputs sector that has also affected the emerging Digital Agriculture sector (DAS). See Case No COMP/M.7962 – *ChemChina/Syngenta*, European Commission Decision (5 April 2017); Case No COMP/M.7932 – *Dow/DuPont*, European Commission Decision (27 March 2017); *Bayer/Monsanto*, n. 1 above. See discussions in the literature regarding this trend's effects on the DAS in Ioannis Lianos and Dmitry Katalevsky, 'Merger Activity in the Factors of Production Segments of the Food Value Chain: – A Critical Assessment of the Bayer/Monsanto merger' (2017) UCL-CLES Policy Paper Series: 2017/1; Maurice E. Stucke and Allen P. Grunes, 'An Updated Antitrust Review of the Bayer/Monsanto Merger' (2018) The Konkurrenz Group White Paper; Tom Verdonk, 'Planting the Seeds of Market Power: Digital Agriculture, Farmers' Autonomy, and the Role of Competition Policy' in Leonie Reins (ed), *Regulating New Technologies in Uncertain Times* (Springer 2019), pp. 112-115.

15 'EU Code of conduct on agricultural data sharing by contractual agreement' (*Copa and Cogeca at all*, 2018) <https://www.cema-agri.org/publication/brochures/37-eu-code-of-conduct-on-agricultural-data-sharing> accessed 4 March 2021.

16 'Privacy and Security Principles for Farm Data' (*Fb.org*, 2016) <https://www.

regulatory gaps with voluntary rules and principles.[17] The charters seek to emulate the EU GDPR by assigning primary data (ownership) rights to farmers. We analyse the impact of these charters on farmers' ability to overcome monopolistic data and aftermarket lock-in problems. We find that, while the EU and US charters differ on a number of points, their legal design limits the potential of the proposed rules and principles. They generally accept the primacy of bilateral free-market contracts over proposed rights for farmers. Aftermarket lock-in, combined with economies of scale and scope in data aggregation, explains why free-market bargaining overrules the data ownership principles in the charters.

We then look at two alternative responses to overcome the lock-in problem and facilitate switching between alternative aftermarket service providers: a) the ability of neutral third-party data intermediaries to unlock farmers and b) regulatory intervention with mandatory data portability right and interoperability obligations. We show how neutral data intermediaries that are not vertically integrated with machine or input sales, face problems in collecting sufficient data to realise the value-added from economies of scale and scope in data aggregation and how this weakens the financial sustainability of their business models. We argue that attributing data rights in the absence of an obvious "anchor" party opens the door to many parties involved in farming claiming access rights, not only farmers. It is unclear who should get access to which data and under which conditions.

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fb.org/issues/innovation/data-privacy/privacy-and-security-principles-for-farm-data> accessed 4 March 2021.

17 Apart from the US and EU, there are also initiatives in New Zealand and Australia, see respectively 'Farm Data Code of Practice' (*Advisory Group*, 2016) <https://www.farmdatacode.org.nz/wp-content/uploads/2016/03/Farm-Data-Code-of-Practice-Version-1.1_lowres_singles.pdf> accessed 4 March 2021 and 'Farm Data Code' (*NFF*, 2020)<https://nff.org.au/wp-content/uploads/2020/02/Farm_Data_Code_Edition_1_WEB_FINAL.pdf> accessed 4 March 2021. Also, there is a clear interest in generating data governance rules for the sector. See, for instance, an online tool to let stakeholders generate their own data governance rules 'The Codes of Conduct' (*GODAN*, 2020) <https://www.godan.info/codes/list> accessed 4 March 2021; See the literature review on existing codes of conduct and calls for agricultural data regulation from the perspectives of various fields from ethics to engineering in Simone van der Burg, Marc-Jeroen Bogaardt and Sjaak Wolfert, 'Ethics of smart farming: Current questions and directions for responsible innovation towards the future' (2019) 90-91 NJAS - Wageningen Journal of Life Sciences, p. 9.

The remainder of this paper is structured as follows. In section 3.2, we start with a description of the economic efficiency gains from agricultural data and how these are realised in several types of data-driven agricultural business models by also identifying prominent competition concerns including data lock-ins. Section 3.3 discusses the legal status of agricultural data as non-personal machine and sensor-generated data. Section 3.4 explores to what extent the EU and the US voluntary codes of conduct offer an effective solution to these aftermarket competition concerns. We focus on i) the attribution of original data rights, ii) the re-use of data and iii) data portability. We conclude that the codes do not really change market outcomes and market failures. Section 3.5 first discusses the role of third-party intermediary platforms as alternative market-based arrangements to circumvent monopolistic data lock-ins. We show that they depend on data portability and face problems finding a sustainable business model. Second, we explore the possibility of regulatory intervention to facilitate portability and mandatory access to agricultural data, and discuss the complexity of the attribution of data access rights. Section 3.6 concludes.

3.2 The Economics of Agricultural Data

In the first part of this paper, we take a closer look at the market-driven use of agricultural data to understand the competition concerns that need to be addressed before diving into comparing the voluntary data charters developed in the US and EU. We start from different types of agricultural business models that have emerged in digital agriculture. While some platforms have emerged as independent digital service providers without any links to existing agricultural firms, some major data platforms have developed out of existing agricultural firms, including machine manufacturers and agricultural inputs producers.[18] We compare the business models of these different types of firms, how they monetise and ensure exclusive control over the data that they collect and how they affect the welfare of farmers. We argue that the business models are confronted with a choice between cooperation and competition among complementary service providers. We then turn to some economic characteristics of data and discuss how they can contribute to economic efficiency gains in agricultural production. We highlight the aftermarket services lock-in and competition problems that occur in this data-driven setting.

18 See, for example, Kenney Martin, Serhan Hiam and Trystram Gilles, ‘Digitalization and Platforms in Agriculture: Organizations, Power Asymmetry, and Collective Action Solutions’ (2020) ETLA Working Papers 78.

3.2.1 Data-driven Business Models in Digital Agriculture

Data is an input in the production of goods and/or services. They have no value on their own. They become valuable only when they can be used to generate revenue in product and services markets. Since data are non-rival, private monetisation of data requires some degree of excludability in their use. If not, they dissipate into the public domain and lose their private market value – but not necessarily their social value.

We identify two main business models to generate private market value through excludability. The first one builds on exclusive access to data in agricultural machines, both for upstream data collection through sensors and downstream product and services implementation through actuators. The second uses proprietary knowledge about the optimal use of inputs to maximise production efficiency: seeds, fertilisers, and chemicals in crop production as well as feedstock and animal health products in livestock management. These services are provided through an excludable channel, for instance, through devices. The two models may overlap to some extent and require some degree of collaboration. We can also identify a third category of business models that revolves around smaller firms that are either specialised in data collection and analytics, or in product sales but without integrating the upstream and downstream part in a single business model. This includes, for example, data-driven start-ups that apply artificial intelligence and machine learning to generate better agronomic services.[19] These pure data analytics firms are not vertically integrated. We come back to this intermediate category when the occasion arises throughout the text.

3.2.1.1 Agricultural machine producers

Agricultural machines are equipped with digital data sensors and actuators. Sensors collect data on the mechanical movements and navigation position of the machine. Actuators use data inputs to activate mechanical movements and steer the machine. For example, a GPS signal sensor captures the precise location of a machine; actuators steer the machine on the basis of instructions received from a computer programme. This combination enables the collection of field-level data and implementation of agronomic advisory services, for example, for automated seeding, fertilising, and chemicals inputs.[20]

19 A similar classification of data-driven agricultural firms is proposed previously. The authors distinguish five types of intermediary platforms. See Ibid

20 Athanasios Balafoutis and others, 'Precision Agriculture Technologies Positively

While the market for agricultural machine sales is highly competitive, the market for data that drive aftermarket services is less so. Agricultural machinery manufacturers can design the machine in such a way that they have exclusive access to sensor data and actuators inputs. Once a farmer buys a particular machine, he is locked into the data channels controlled by the machine manufacturer. The manufacturer may use this monopolistic position in upstream data collection, or in access to the downstream implementation of data-driven agronomic services, to leverage his position in downstream services markets.[21] The lack of interoperability between data formats and devices from different manufacturers reinforces this monopolistic market structure. Agricultural machine producers and service providers deliberately segment the data standards in order to increase switching costs for farmers, reduce competition in aftermarkets and apply monopolistic pricing in aftermarket services.[22] This was emphasised by KWS (an agricultural company) in the market investigation of the Bayer/ Monsanto case:

> *"It is difficult to switch from one platform to another, since the industry is not able to agree on one common data protocol (joint data format), therefore there is high incentive for the farmer to decide on only one platform. Even though farmers keep the ownership of provided data and they can contractually request that their data are returned to them, from the technical point of view, such data are not compatible with another platform and can therefore not be easily transferred to another platform from a practical point of view."*[23]

According to the "Chicago Critique",[24] there is no need to intervene in aftermarket when farmers are rational. They will consider the combined costs and benefits in the primary and aftermarket before deciding on the

Contributing to GHG Emissions Mitigation, Farm Productivity and Economics' (2017) 9 Sustainability; See also a preliminary study in this regard Daan Goense, 'The Accuracy of Farm Machinery for Precision Agriculture: A Case for Fertilizer Application' (1997) 45 Netherlands Journal of Agricultural Science.

21 Mihalis Kritikos, *Precision Agriculture in Europe – Legal, Social and Ethical Considerations* (EPRS | European Parliamentary Research Service, 2017). See also *Data Revolution: Emerging New Data Driven Business Models in the Agri-Food Sector* (EIP-AGRI Report, 2016) <https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_seminar_data_revolution_final_report_2016_en.pdf> accessed 5 January 2021.

22 Ibid.

23 *Bayer/Monsanto*, n. 1, para 2842.

24 See Posner, n.13 above.

purchase of a device. If farmers are myopic, however, they may struggle to combine costs and benefits in both markets. Lack of transparency at the time of purchase may be an obstacle to rational decision-making. For instance, with long machine lifetimes and a fast-evolving technology environment, mismatches may occur during the lifetime of the machine, and they may not be predictable at the time of purchase.

This monopolistic lock-in position is not absolute. Data plug-ins and add-ons can circumvent the manufacturer's monopoly on mechanical access. For example, Bosch has developed, in collaboration with some partners including Bayer's Xarvio, Syngenta and AGCO, the Nevonex interface that seeks to overcome incompatibility problems between agricultural machines.[25] It consists of an interface that can take data input from various machines, brands and data formats, and send steering signals to a variety of machines, including retro-fitted mechanical devices on existing machines.[26] In agricultural machinery, there is the Isobus ISO technical standard initiative.[27] For example, Xarvio designed a data-driven sprayer that can be mounted on existing mechanical sprayers to give them data steering for precision spraying purposes.[28] These add-ons with open technical standards may help to overcome interoperability barriers between machines and data-driven agronomic advisory services. However, there are several limitations to these interoperability solutions. First, the Isobus standard suffers from "forking" into several proprietary versions that are not necessarily fully compatible. Second, interoperability does not ensure the transfer of historical farm data between machines and applications.[29] Third, it remains

25 See 'Discover What NEVONEX is All About' (*NEVONEX powered by Bosch*, 2021) <https://www.nevonex.com/how-it-works/> accessed 4 March 2021.

26 Ibid.

27 The worldwide ISO 11783 (ISOBUS) standard defines the communication between agricultural machinery, tractors and implements, and data transfer between these machines and farm software applications. However, it suffers from "forking" problems that are typical for open standards. This has led to a great number of innovative but proprietary ISOBUS solutions that are not necessarily fully interoperable. See 'ISOBUS - AEF Online' (*Aef-online.org*, 2020) <https://www.aef-online.org/the-aef/isobus.html#/About> accessed 4 March 2021.

28 See 'NEVONEX' (Xarvio.com, 2020) <https://www.xarvio.com/nl/nl.html> accessed 4 March 2021.

29 On the various possibilities regarding farm data lock-ins and the importance of historical data sets, see Can Atik, 'Understanding the Role of Agricultural Data on Market Power in the Emerging Digital Agriculture Sector: A Critical Analysis of the *Bayer/Monsanto* Decision' in Michal Gal and David Bosco (eds), *Challenges to Assumptions in Competition Law* (Edward Elgar 2021), pp. 56-63.

to be seen how successful interoperable data formats, such as the Isobus standard, will become in the market. Several economic models explain the ambiguity in incentives for firms to open up access to their exclusive data.

Incentives may vary according to firms' market shares. Big manufacturers that benefit from a strong market position may be reluctant to give up their advantages.[30] Smaller manufacturers or companies that have no entrenched position in the agricultural machine market may prefer an open data standard. Smaller firms stand to gain more from interoperability than large firms with strong market positions.[31]

Another economic model that explains the ambiguity of incentives is the "co-opetition" (cooperation-competition) model.[32] Machine manufacturers can choose to open access to their machine data and make data formats compatible with common standards. This makes it easier for farmers to switch between agronomic service providers in the aftermarket. It increases competition between aftermarket service providers and decreases prices. That will make the machines more attractive to farmers and increase the market share of manufacturers who sell interoperable machines in the primary machine market. On the other hand, it may decrease aftersales revenue for manufacturers who are vertically integrated into aftermarket services. The net effect of all these factors is a complex empirical question that is hard to predict.

3.2.1.2 Agricultural input producers

Large input producers have accumulated considerable knowledge in the use of inputs such as seeds, fertilisers, pesticides, and other chemicals. Working closely with agricultural extension services, agronomic laboratories, and big historical datasets, they have proprietary knowledge about the precise genetic composition and characteristics of seeds, and the biochemical interaction

30 Machine producers may prefer to ensure their exclusive control of machine-generated data. For instance, John Deere, a major player in the agricultural machines market, applies end-user license agreements (EULA) that let it block a tractor if the data collection procedure is violated. See 'Vendor lock-in, DRM, and crappy EULAs are turning America's independent farmers into tenant farmers' (*boingboing.net*, 2018) <https://boingboing.net/2018/03/08/you-are-the-product-5.html> accessed 4 March 2021.

31 Jacques Crémer, Patrick Rey and Jean Tirole, 'Connectivity in the Commercial Internet' (2003) 48 The Journal of Industrial Economics.

32 See Adam M. Brandenburger and Barry J. Nalebuff, *Co-Opetition* (Doubleday 1998) as the standard work on this subject.

with chemical inputs, soil quality and weather factors.[33] Besides these large vertically integrated input providers, there are also smaller start-ups that are specialised in data-driven agricultural services only. They both require complementary data to generate tailor-made agronomic solutions. An individual farmer's experience and data cannot match the insights obtained from large data pools and economies of scale and scope in the analysis of these fine-grained farm-specific data about actual input use and crop yields. Some data can be obtained from the market, and some need specific contractual relationships. For instance, coarse-grained land maps can be obtained from free satellite services (scale 10x10 meters) while more fine-grained mapping (up to 30x30 cm) is available for a price.[34] Farm-specific data, such as detailed irrigation and soil data, need to be collected from the target farm. Combined with detailed weather forecasts, they enable the production of very granulated agronomic advisory services tailored to the needs of individual farmers and fields.[35] Service providers store historical data collected from farms. They have exclusive *de facto* control over these farm-specific data sets.[36] New market entrants will need to access these historical data to generate accurate prescriptions[37] when farmers desire to change service providers. This creates a data lock-in situation for farmers, which can jeopardise competition in the emerging markets of data-driven agronomic services.[38] Vertically integrated agronomic advisory services can be combined with agricultural input sales. This entails the risk of self-preferencing: the service provider can recommend its own upstream products even though they are not objectively the best or cheapest products to suggest. Self-preferencing may reduce competition in upstream inputs markets.

Integrated input producers can monetise their information advantage in the form of agronomic services. They can simply send the advice to the farmers and enable them to implement it manually on these fields. For instance,

33 See *Bayer/Monsanto*, n. 1, paras 2453-2455 and 2715-2724.
34 Many firms are producing and selling land images based on satellite and drone pictures. For an overview of pricing according to scale, see for example, 'Buy Satellite and Drone Imagery | Our Imagery Pricing Plans' (*Geocento.com*, 2020) <https://geocento.com/imagery-pricing-plans/> accessed 4 March 2021.
35 See more about generating data-driven agronomic services/ prescriptions/ solutions for farmers in Wolfert and others, n. 1 above.
36 See this cross dependency of farmers and ATPs in Atik, n. 29, pp. 64-68.
37 Based on retroactive patterns. See Keith H. Coble and others, 'Big Data in Agriculture: A Challenge for the Future' (2018) 40 Applied Economic Perspectives and Policy, pp. 87 and 91.
38 See Atik, n. 29, pp. 56-73.

advice can be dispensed through apps on mobile devices. Combined with field navigation maps, the farmer can steer his machines as required. Alternatively, advisory services can be dispensed automatically by proprietary data interface devices that directly steer machines. Many companies have developed such interfaces. Monsanto's subsidiary, the Climate Corporation, has introduced FieldView, a service that makes agronomic advice available to farmers and interacts with agricultural machines.[39] Bayer generated a similar service called FieldManager.[40] BASF uses the Maglis interface[41] and DowDuPont has various digital products that are sold in the US through its subsidiaries Pioneer[42] and Corteva Agriscience.[43] These companies can negotiate agreements with machine manufacturers to create a direct data access gate. For example, in the US, agricultural machine manufacturer John Deere came to an agreement with the Climate Company to let machines from the former interact with advisory services from the latter.[44]

Proprietary devices that dispense agronomic services can be used to leverage these integrated giants' positions in the markets for data-driven agronomic services or inputs sales. Once farmers buy into a device that has special arrangements with a particular agronomic service provider, they are locked

39 See 'Digital Farming Decisions and Insights to Maximize Every Acre' (*Climate.com*, 2020) <https://climate.com/> accessed 4 March 2021.

40 It is now controlled by BASF in the scope of the remedy package of the *Bayer/Monsanto* decision. See "The BASF Divestment Package" in *Bayer/Monsanto*, n. 1, para 3069 and subsequent paras. See the current services of FieldManager at 'FIELD MANAGER' (*Xarvio.com*) <https://www.xarvio.com/nl/nl/FIELD-MANAGER.html> accessed 4 March 2021.

41 'BASF Launches Maglis, a New Online Platform to Help Farmers Improve Crop Management' (*BASF*) <https://www.basf.com/en/company/news-and-media/news-releases/2016/03/p-16-140.html> accessed 4 March 2021.

42 'Farm Management Software' (*Pioneer.com*, 2021) <https://www.pioneer.com/us/tools-services/granular.html> accessed 4 March 2021.

43 'Software and Digital Services' (*Corteva.us,* 2021) <https://www.corteva.us/products-and-solutions/software-and-digital-solutions.html> accessed 4 March 2021.

44 'John Deere and the Climate Corporation Expand Precision and Digital Agriculture Options for Farmers' (*Climate.com*, 2015) <https://climate.com/newsroom/john-deere-climate-corp-expand-precision-digital-ag-options/15> accessed 4 March 2021. However, this agreement was investigated by the US District Court of Illinois from the perspective of antitrust concerns. See US District Court of Illinois, case 1:16-cv-08515, the US Justice Department as plaintiff against Deer & Company and Precision Planting as defendants. Eventually, the parties cancelled this agreement. See 'Monsanto Terminates Agreement for Sale of Precision Planting Equipment Business' (*Climate.com*, 2017) <https://climate.com/newsroom/monsanto-terminates-agreement-for-sale-of-precision-planting-equipment-business/25> accessed 4 March 2021.

into the device and the agronomic aftermarket service, especially when it uses non-compatible and non-interoperable data formats and software design. This aftermarket lock-in enables firms to charge a monopolistic price for their advisory services and inputs sales. Firms can either choose a lock-in strategy to avoid farmers' switching between data platforms or choose an open system strategy to attract more farmers. Another strategy to circumvent exclusive cooperation between machine manufacturers and service providers is the use of machine add-ons that by-pass the manufacturers' exclusive data channels. The above example from Nevonex illustrates the latter case.

Agronomic service providers face the same trade-off between competition and cooperation as machine manufacturers. They can perceive machines as complementary products because their customers may value agronomic services more when combined with the manufacturer's machine compared to having the service alone. They may also perceive them as competitors if customers will pay less for the agronomic services when combined with the machine than when they buy the services separately. This is again a hard empirical question.

3.2.1.3 Complementary nature of business models

The machine-centred and the agronomic services-centred data-driven business models are complements, and there is some degree of convergence between the two. Machine manufacturers can either produce their own complementary agronomic advisory services or, alternatively, negotiate an agreement with other agronomic service providers to share these data channels for the purpose of dispensing agronomic services. The tension between competition and cooperation is always present. In line with the co-opetition model,[45] machine manufacturers seek collaboration agreements with inputs and advisory service providers, and vice versa. For example, John Deere, an agricultural machinery manufacturer, focuses on machine-based data collection while Bayer and Monsanto, agricultural input providers, focus on data-driven agronomic services in input markets.[46] There are many collaboration agreements between these companies. Monsanto (or Bayer, now), for example, has agreements with machine manufacturers John Deere, Agco and CNHI, through its subsidiary, the Climate Corporation,

45 Brandenburger and Nalebuff, n. 32 above.
46 *Bayer/Monsanto*, n. 1, paras. 2774-2775.

which specialises in data-driven agronomic services.[47] These collaboration agreements fall short of mergers, but they nevertheless involve coordination.

3.2.2 Economies of Scale and Scope in Data Aggregation and Re-use

In the previous section, we examined two private business models that seek to monetise the value of agricultural data through data lock-in, either by linking primary machine markets with aftermarket services or by linking data-driven agronomic services with inputs markets. These lock-in situations are well-known in classic competition policy. In this section, we focus on the underlying sources of agricultural efficiency or productivity gains from digital data. This creates new competition problems in data markets, with spill-over effects to machine and agronomic services markets.

3.2.2.1 Economies of scale in data aggregation

Statistical analysis requires large samples of data in order to extract insights. Economies of scale occur when adding more observations on the same variables in a sample increases the accuracy of the statistical predictions. For example, more observations on the response of crop yield to different types of fertiliser improve the prediction accuracy for fertiliser. More fine-grained soil maps allow for more precise application of fertiliser and chemicals in fields.[48] These improvements will, at some point, become subject to diminishing returns to scale or the number of observations.

Economies of scale constitute an argument in favour of data concentration in large databases, allowing firms to accumulate and combine data from many sources.

3.2.2.2 Economies of scope in the re-use of data

Contrary to ordinary goods that are rival and can only be used for one purpose at the time, data are non-rival. Many parties can use the same dataset at the same time for a variety of purposes. Economic efficiency gains occur when

47 Ibid., para. 2815. Indeed, the European Commission identified in the *Bayer/ Monsanto* merger case that machine manufacturers are not direct competitors of digital service providers in agriculture. They are mostly collaborators of them. See Ibid., paras. 2769-2775.

48 Another example is the prevention of the spread of plant diseases. The aggregation of fragmented data sets from different farms can help to prevent that spreading and reduce costs for the economy. See Martin Parr, 'Who Owns Open Agricultural Data? - The Plantwise Blog' (*The Plantwise Blog*, 2015) <https://blog.plantwise.org/2015/12/04/who-owns-open-agricultural-data/> accessed 4 March 2021.

data collected by a firm can be re-used for other purposes. Economies of scope in re-use[49] can be realised either by the firm that collected the data and re-uses it in-house for other purposes or by sharing/selling the data to another firm that uses it for another purpose. For example, a tractor is a rival physical good and can only be used by one farmer at the time. If a tractor would be non-rival, all farmers could use the same tractor at the same time to work in different fields. The welfare gains would be enormous: it would suffice to invest in the production of a single tractor to cater to the needs of all farmers. This prospect can theoretically be achieved with data. For example, detailed farmland and soil survey maps can be used for precision farming applications for all types of inputs and services on that farm. Collecting the data comes at a fixed cost. Re-use of the same non-rival data for another purpose entails quasi-zero marginal reproduction costs of an electronic data file. Economies of scope in re-use constitute an argument in favour of wider access to data. Many applications of data in farming are re-use applications. Farmers share land and soil map data with agronomic services, or livestock health and production data with service providers.

Contrary to economies of scale, economies of scope in the re-use of data constitute an argument in favour of de-concentration of data, facilitating the distribution of data over many applications and allowing access by many firms for competing applications.

Data access may also come at a cost. Privacy and commercial confidentiality are important for the autonomy of private decision-making by firms and individuals and for extracting private value from these decisions.[50] When data are used by a competing firm to produce a substitute good or service, it may harm the interests of the original data collector. When data become widely available, it erodes the market value of the data for the original collector and may become a disincentive for continued investments for data collection.

49 For a more detailed explanation of economies of scope in re-use of products in general, see John C. Panzar and Robert D. Willig, 'Economies of Scope' (1981) 71(2) The American Economic Review; David J. Teece, 'Economies of scope and the scope of the enterprise' (1980) 1(3) Journal of Economic Behaviour & Organisation; David J. Teece, 'Towards an economic theory of the multi-product firm' (1982) 3(1) Journal of Economic Behaviour and Organisation.

50 See John G. Palfrey and Urs Gasser, *Interop: The Promise and Perils of Highly Interconnected Systems* (Basic Books 2012).

An ideal data governance regime would thus seek an optimal combination of wider access and exclusive control, a balance between anti-competitive concentration and competitive decentralisation.[51] Data are not excludable by nature. They require technical and/or legal protection to ensure exclusive access for one party. That is what machine manufacturers and agronomic advisory services aim to achieve by channelling data-driven services through exclusively controlled devices and technologies.

3.2.2.3 Economies of scope in data aggregation

When two datasets are complementary, more insights and economic value can be extracted from the analysis of the merged dataset, compared to applying data analysis to each of the separate data sets.[52] Economies of scope in data aggregation constitute another argument in favour of large data pools and concentration of data. They are a critical factor in the success of digital farming.

At the same time, they trigger concerns from competition authorities, as shown by the market investigation of the European Commission's *Bayer/ Monsanto* merger decision:

> *"The more data (and the more specific data) you have, the more robust your algorithms will be and the more proven results you will have as references to your potential customers. (..) Covering more crop varieties, more climate areas, more soil types, etc allows you to expand your offering to other areas and cultures and because it is a complex system that constantly evolves, it is important to have different independent and broadly representative sources of information to build the necessary expertise."*[53]

51 This balance between competitive and anti-competitive forces has become a major issue in recent policy debates on anti-competitive behaviour by all kinds of digital data platforms. See for example Luis Cabral and others, *The EU Digital Markets Act – A Report from a Panel of Economic Experts* (JRC Report, 2021) <https://doi.org/10.2760/139337> accessed 15 November 2021.

52 Economies of scope in aggregation goes back to insights from the economics of learning. See Sherwin Rosen, 'Specialization and Human Capital' (1983) 1(1) Journal of Labor Economics. Rosen observed that when a person has a choice between learning two skills, specialisation in one skill is always beneficial when the costs of learning both skills are entirely separable. However, when learning costs are not separable and learning one skill decreases the cost of learning another, then there are economies of scope in learning both skills, provided that the benefits from interaction exceed the additional learning costs.

53 *Bayer/Monsanto*, n. 1, para. 2726.

The merger between Bayer, a chemicals producer, and Monsanto, mostly known for genetically modified seeds, was designed to generate more benefits from their combined agronomic research, including in the digital era where big data collection and the use of algorithms to comb through these datasets would have become primary tools to advance research. The merger decision package sought to reduce economies of scale and scope in data aggregation in order to maintain competition.[54]

Economies of scale and scope are two distinct measures. In our fertiliser example, economies of scale are related to the number of observations on a particular fertiliser. Economies of scope occur when more variables are added to estimate the impact of fertilisers on yields, such as soil and weather conditions and the use of different chemicals.

Realising economies of scale and scope in data aggregation requires "big" datasets, usually across many farms, inputs, outputs, and production conditions. Individual farmers cannot realise these benefits. It requires a third-party intermediary who collects and aggregates data from many sources in order to extract more insights from the pooled data compared to the insights that farmers could extract from their own datasets.[55]

Intermediaries are not necessarily large firms. Small start-up firms may be able to collect a sufficiently large data sample and reach a high level of economies of scale and scope in selected data domains. However, specialisation in one specific area is not sufficient to be competitive in a wide range of agronomic services markets that span many complementary and substitute products and crops.[56]

An important consequence of economies of scale and scope in aggregation is that the collective or social value of farm data is usually higher than the private value of data for individual farmers.[57]

54 The BASF divestment package, as the main remedial condition of the decision, aimed to keep the merging parties' Digital Agriculture operations and data sets separate. See more details in Ibid., para. 3046 and subsequent paras.

55 For more details on the role that data platforms play in realising the social value of data, see Bertin Martens, 'Data Access, Consumer Interests and Social Welfare: An Economic Perspective' (2020) <https://ssrn.com/abstract=3605383> accessed 4 March 2021.

56 *Bayer/Monsanto*, n. 1, paras. 2758-2762.

57 Dirk Bergemann, Alessandro Bonatti and Tan Gan, 'The Economics of Social Data' (2020) Cowles Foundation Discussion Paper – N. 2203R.

The existence of a gap between private and social value implies an inherent market failure. Purely private data ownership rights may therefore not be an optimal allocation mechanism. Neither is purely public and common access to data because that would eliminate any market value for data. All benefits would be dissipated as user surplus and would disincentivise investment in data collection. This constitutes an argument in favour of regulatory intervention to overcome data market failures and put in place alternative data access regimes that seek to realize the social value of data while preserving competition in data-driven services markets.

Another source of market failure occurs when data aggregation generates negative externalities for farmers. Economies of scale and scope in data aggregation are subject to diminishing returns.[58] Once an agricultural service provider has collected a dataset that is sufficiently large to produce algorithms with a high level of prediction accuracy, the marginal value of collecting additional data from farms is low or zero. This depresses the market value of individual farm data[59] and puts farmers in a weak bargaining position with regard to their data. Even if they did not face data portability or interoperability obstacles, they would not be in a position to monetise the value of their data. Conversely, it explains to a certain extent why intermediary platforms cannot give farmers a meaningful remuneration for their data. They can only ensure their financial sustainability by charging for the data-driven services that they offer.[60]

Several digital economy studies[61] already highlighted how the data-driven platform economy is torn between efficiency and welfare gains from data

58 Economies of scale and scope in data aggregation are easily confused with network effects. We do not think this terminology is appropriate in the case of agricultural data. Social media users, for example, are attracted by network effects because they want to be able to contact many other users. By contrast, farmers are not necessarily interested in contacting each other. They are interested in getting more efficient services. See similar considerations in Atik, n. 29, pp. 72-73. That requires data aggregation across many farms, products and circumstances, up to the point where diminishing returns to scale and scope in data aggregation set in.

59 For an application to personal data, see Daron Acemoglu and others, 'Too Much Data: Prices and Inefficiencies in Data Markets' (2019) NBER Working Paper – N. 26296.

60 See the discussion on the prominent business model in the emerging Digital Agriculture sector and cross dependency of farmers and service providers in Atik, n. 29, pp. 65-68.

61 See Cabral and others, n. 51. More explanations are provided in Bertin Martens, 'An economic perspective on data and platform market power' (JRC, 2021) – JRC122896.

aggregation in intermediary platforms and anti-competitive behaviour by these monopolistic data giants.

3.3 The Legal Status of Agricultural Data

In the *Bayer/Monsanto* decision, the Commission classifies agricultural data into three types: (i) farm data collected from fields or barns via sensors in machines or provided by farmers, (ii) complementary data from specialised providers outside the farm (such as weather, satellite and other environmental data), and (iii) proprietary data from agricultural inputs producers and data analytics service providers.[62] All three categories are mostly machine-generated, either as raw data or as the outcome of data processing.

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To identify their legal status, the first question is whether they can be considered as personal data within the scope of the GDPR. Article 4 of the GDPR defines personal data as *"any information relating to an identified or identifiable natural person ('data subject')…".* The GDPR gives the data subject a number of rights to the data collected by a service provider or hardware manufacturer, including the right to consent for collecting the data or re-using them for other purposes; the right to access and delete personal data; and to retrieve or transfer (portability) data.[63] As such, the GDPR automatically links personal data collected by a device to the data subject, irrespective of device ownership. Device owners, renters and operators, or service performers using the device as an intermediary, always require the consent of the data subject before they can collect personal data. The data subject retains inalienable non-tradable rights to the collected personal data. He/she can share data with other parties, but fundamental rights to the data will always remain attributed to the data subject, unless the data are anonymised in such a way that the link between the data and the data subject is irreversibly broken.

There are several legal reasons to consider agricultural machine-generated data outside the scope of the EU GDPR. Kritikos is very prudent in this regard

62 See *Bayer/Monsanto*, n. 1, para 2453 and subsequent paras.

63 For a discussion on the limitations of the data portability right under the GDPR from the competition perspective, see Inge Graef, Martin Husovec and Nadezhda Purtova, 'Data Portability and Data Control: Lessons for an Emerging Concept in EU Law' (2018) 19(6) German Law Journal. See also Jan Krämer, Pierre Senellart and Alexandre de Streel, *Making Data Portability More Effective for The Digital Economy: Economic Implications and Regulatory Challenges* (Centre on Regulation in Europe 2020).

as he states that *"not all categories of data involved in precision agriculture such as agronomic data, compliance data and meteorological data, actually qualify as personal data…"* apart from explicitly identified[64] or easily identifiable[65] data that are already under the protection of GDPR framework.[66] We argue that it is usually not possible to link machine/sensor-generated farm data with an *identified or identifiable natural person* as most data are directly collected from fields, greenhouses or barns via IoT technology. They provide information about, for instance, machines, soil, plants, products, and animals - not about the state or the behaviour of natural persons. Similarly, other components of agricultural data, i.e. complementary data and proprietary data sets, are not related to an identified or identifiable natural person. They are about environmental conditions or performances of agricultural inputs such as seeds or pesticides. Any human identification data that might be collected besides machine data has no relevance for the purpose of farm decision-making. The identity of the human farm worker, even if known, is usually not relevant for digital agriculture services. Human intervention in data collection does not necessarily change the legal status of farm data. Also, even if any data is assumed personal in the ag-data setting, the applicability of the GDPR on farms is limited because only natural persons can be beneficiaries of the GDPR.[67] So, farms as legal entities cannot institutionally benefit from the GDPR regime.[68]

A number of EU documents confirm the classification of precision farming data as non-personal data. The Commission defines machine-generated data as *"created without the direct intervention of a human … by sensors processing information received from equipment, software or machinery, whether virtual or real"*,[69] and cites agricultural data as an example.[70] Recital 9 of

64 such as *"financial/economic data and staff data or other data derived from people's behaviour"* see Kritikos, n. 21 above, p. 14-15.
65 such as drone images which cover humans. Ibid.
66 OECD working paper also considered agricultural data sets are mostly outside the scope of the GDPR framework. See Jouanjean and others, n. 12 above, pp. 10-11.
67 See Article 1 of the GDPR, n. 10 above.
68 See more in Atik, n. 29, pp. 57-58.
69 See the Communication from the Commission 'Building a European Data Economy' COM(2017) 9 final, p. 9.
70 *"In general, data can be personal or non-personal. For example, data generated by home temperature sensors may be personal in nature if it can be related to a living person,* ***while data on soil humidity is not personal****. … Where data qualifies as personal data, the data protection framework, in particular the GDPR, will apply."* Emphasis added. Ibid. The Commission has a similar understanding for IoT data. See, for instance, "***non-personal*** *data generated by Internet of Things objects in an automated manner."*

the Regulation on the Free Flow of Non-Personal Data confirms that it applies to agriculture: *"… Specific examples of non-personal data include … data on precision farming that can help to monitor and optimise the use of pesticides and water."*[71] Unlike the GDPR, this regulation does not define rights for non-personal data.[72] It is only a general framework for sectoral codes of conduct and possible future regulatory interventions.[73] There is no binding data portability provision for non-personal data sets (as of July 2021).

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Therefore, portability is only possible when standard terms and conditions let farmers do so. However, practice is not in favour of farmers.[74] For example, the FieldView farmer interface, produced by the Climate Corporation, restricts the definition of personal data to name, address, and other personal details of the farmer.[75] Although the farmer is confirmed as the owner of all non-personal data, portability is limited to other FieldView users or platform partners only. This is further restricted because hardware and software that store the data are licensed, not sold. That includes the FieldView Drive, the hard disk that collects and stores all data. Data are accessible anytime, but the hardware should be returned at the end of the contract.[76] In this environment, there is no way for farmers to transfer their (historical) data to another platform. It locks them in at the existing service provider or machine producer.

Emphasis added. See Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Towards a common European data space – COM(2018) 232 final.

71 See Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union, OJ L 303.

72 Article 1 of the Regulation (EU) 2018/1807 *"aims to ensure the free flow of data other than personal data within the Union by laying down rules relating to data localisation requirements, the availability of data to competent authorities and the porting of data for professional users."*

73 See Ibid., Article 6. However, as we discuss in detail at section 3.4 below, existing voluntary codes have significant limitations in their design to achieve the policy goal of enhancing free flow of non-personal data not only in the EU, both also in other jurisdictions such as the US, New Zealand and Australia.

74 Kritikos, n. 21, p. 17; Jop Esmeijer and others, *Data-driven Innovation in Agriculture: Case Study for the OECD KBC2-Programme* (TNO Report, 2015) R10154, p. 27; See also Matt McIntosh, 'Data Ownership Questions – and Why They're Important' (*Future Farming*, 2018) <https://www.futurefarming.com/Tools-data/Articles/2018/10/Data-ownership-questions--and-why-theyre-important-340743E/> accessed 4 March 2021.

75 'Climate Fieldview™ Terms of Service' (*Climate.com*, 2020) <https://climate.com/fieldview-terms-of-service> accessed 4 March 2021.

76 Ibid.

We conclude that most agricultural data are non-personal and fall outside the scope of the EU GDPR and its right to data portability. For non-personal data, there is no *de jure* allocation of legal rights, neither in the EU nor in the US. Also, there is no undisputed *ex-ante* legal framework that can unchain farmers from the data lock-ins.[77]

In this almost regulation-free data environment,[78] stakeholders can negotiate claims for data in bilateral contracts to determine access and use rights to the data. Market forces and bargaining power will determine the outcome. Technology may also play a role because device manufacturers and agricultural technology providers can design the data collection and storage processes in such a way to ensure their *de facto* exclusive access to the data.

3.4 The US and EU Agricultural Data Charters

The absence of a clear legal framework for non-personal agricultural data has been perceived as a shortcoming and motivated agricultural stakeholders in the US and EU to draft voluntary data rules.[79] They are not legally enforceable but are meant to be guiding principles in data transactions. The US Privacy and Security Principles for Farm Data (the US Principles, henceforth) were signed by a number of companies and organisations on April 1, 2016.[80] It covers ownership, transparency, portability, collection, access and control issues. The signatories formed the Ag Data Transparency Evaluator Inc., which audits companies' ag-data contracts and issues the Ag Data Transparency Seal - a certificate of conformity with the principles for data-collecting agri-tech companies.[81] Two years later, the EU Code of

77 The Directorate General for Communications Networks, Content and Technology of the European Commission released a report that investigates the EU acquis that is potentially applicable to sharing of non-personal data. See *B2 – Analytical report on EU law applicable to sharing of non-personal data Support Centre for data sharing* (DG CONNECT Report, 2020) SMART 2018/1009 <https://eudatasharing.eu/legal-aspects/report-eu-law-applicable-sharing-non-personal-data> accessed 24 January 2021. However, there is no mechanism equivalent to a portability right for non-personal data as of July 2021.

78 See a detailed discussion of recent EU proposals to regulate data and digital markets in Section 3.5 below.

79 in addition to other voluntary attempts in other jurisdictions such as in Australia and New Zealand.

80 See n. 16 above.

81 'What does it mean to be AG DATA TRANSPARENT' (*agdatatransparent.com*, 2014) <https://www.agdatatransparent.com/about> accessed 4 March 2021. This might be a factor that compensates the voluntary nature of the rules to a certain extent because, at least, this might be a mechanism to track whether companies abide

Conduct on agricultural data sharing (the EU Code, henceforth) was released by a coalition of EU agri-food associations on 23 April 2018 in Brussels.[82] The EU Code is a more comprehensive report with not only definitions of rules but also case examples.

Both the EU and US data charters take inspiration from the EU GDPR and seek to introduce GDPR-like data rights for farmers such as consent, access, portability, purpose, and re-sale limitations. They are farmer-centric in the sense that they try to establish a direct link between data rights and the operator of the farm – although the EU Code is a bit ambiguous in this aspect. They aim to portray the farmer as the equivalent of the "natural person" in the GDPR. Unlike the GDPR, which assigns certain inalienable rights to natural persons, both data charters introduce tradable data ownership and alienable data rights. We compare both data charters in this section. In particular, we inquire to what extent they are able to overcome the lock-in and foreclosure data market failures identified above.

3.4.1 Attribution of Original Data Rights – Ownership Rights

The US document distinguishes farmers and service providers (called Agriculture Technology Providers or ATPs), and attributes original rights (ownership of data) to farmers:

> *"Farmers own information generated on their farming operations. However, it is the responsibility of the farmer to agree upon data use and sharing with the other stakeholders with an economic interest, such as the tenant, landowner, cooperative, owner of the precision agriculture system hardware, and/or ATP etc. The farmer contracting with the ATP is responsible for ensuring that only the data they own or have permission to use is included in the account with the ATP."*

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by the proposed principles or not. The limitation of this seal is also related to the contractual superiority design in the US principles. As the US rules keep a significant leeway to deviate from the principles with contractual agreements, preventing portability by a company might not be incompliant with the principles per se, and thus, seal requirements. In sum, the general limitation of the contractual superiority approach in the Principles also blocks the potential of this verification of compliance design to a large extent.

82 See n. 15 above.

The US text unambiguously attributes the 'ownership of data' to farmers[83] who generate data on their farming operations. Data ownership[84] is divorced from machine, device or land ownership, including from external parties that perform services on the farm. Ownership is attributed to the party that decides and manages the farming operations. The data are not considered as the product of device ownership, but rather of the farming operation: farmers' efforts and practices. The text makes farmers responsible for any data sharing with other stakeholders with an economic interest by means of contracts, but this responsibility is ambiguous. There is no clarification in the text that implies rights for stakeholders or any mechanism to be used by them to access the data. This looks more like an advisory statement for farmers. The text uses ownership as the central legal concept when designing data rights. However, ownership rights are tradable/alienable. Although some parts of the text seem to provide inalienable consent rights to data re-use (see section 3.4.2. below), the data ownership design behind the US Principles limits the potential of the proposed rights with their alienable/transferable nature.

The EU Code has a more ambiguous wording. It distinguishes between data originators, providers and users.[85] It attributes data ownership rights for data generated through farming operations to data originators, i.e. the right to benefit from and/or be compensated for the use of data created as part of their activity. However, when data are produced by a service provider or external operator on the farm in the course of their activity, the operator might be considered as the data originator, not the farmer:

> *"The originator (owner) - "the person or entity that can claim the exclusive right to licence access to the data and control its downstream use or re-use"*[86]

> *"The data originator of all the data generated during the operation is the one who has created/collected this data either by technical means*

83 Note the ambiguity of the use of the word "farmer". It may refer to the farm as a legal entity but also to a natural person who is in charge of the farming operations. The latter interpretation might have been intended here in order to reinforce the similarity with personal data rights.
84 There is some research on data ownership in agricultural data. See the literature review by van der Burg, Bogaardt and Wolfert, n. 17, pp. 3-5.
85 See the EU Code, n. 15, pp. 5-9.
86 Ibid., p. 6.

> *(e.g. agricultural machinery, electronic data processing programs), by themselves or who has commissioned data providers for this purpose."*[87]

> *"This Code recognises the data originator's right, whether they are a farmer or another party..."*[88]

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Clearly, the data originator may be different from the farmer, especially in automated data collection. It is not clear whether the operator would be the owner of the device, the device controller, or possibly the farmer who may have rented a device. Data collection may also be conducted by a third party, commissioned by the farmer and with the aim to facilitate farmers' decision-making. If data-collecting sensors in machines are not owned by farmers, the sensor/machine owners are the data providers, not the data originators:

> *"It can be assumed that the data originators are the farmers, also from data of sensors that are owned by the farmer. If sensors are not owned by the farmers, the sensor owners are seen as data providers."*[89]

The notion of data provider refers to a natural or legal person who, under an agreement, delivers data to the data user and/or data originator.[90] Although these extra definitions (data user and data provider) create confusion regarding the attribution of original rights, the owner is the data originator.

An additional provision in the EU Code adds to the confusion because it seemingly reverses the provision that data rights can be owned by other parties than the farmer:

> *"Rights regarding data produced on the farm or during farming operations are owned by the farmer and may be used extensively by them."*[91]

The attribution of original rights emphasises data on *"the farm or during farming operations"*. This may be interpreted as indicating raw farm data

87 Ibid.
88 Ibid., p. 8.
89 Ibid., p. 15.
90 Ibid., p. 7.
91 Ibid., p. 8.

only, not processed data. The text may be intentionally silent on processed data, leaving it out of the data charter and subject to the free market.

Both data charters have repetitive statements that indicate that related rights can be alienable and transferable, i.e. they can be traded through bilateral contracts. This is compatible with the concept of ownership. Bilateral negotiations imply that bargaining power will play an important role in deciding who ends up with the effective ownership right of the data. For example, powerful data aggregators, who can extract more value from large data pools, could end up acquiring the data. This may be beneficial for farmers if it allows them to obtain the highest value for their data. It may also be detrimental when farmers are locked-in machine data and data-driven services markets are foreclosed. For example, machine manufacturers or service providers may have exclusive control over access to the data that enables them to foreclose the market for downstream use of the data for the purpose of digital agricultural services. That leaves no other option to the farmer than to accept the proposed terms and conditions that may contain provisions to transfer ownership rights from farmers to machine producers or technology providers. Portability rights would open the door to circumvent lock-in situations, but it is unlikely to be enforced together with the alienable and exclusive data ownership understanding.

Despite the fact that the EU and US agricultural data charters were inspired by the GDPR,[92] the introduction of tradable data ownership rights shows how the charters represent a clear departure from the underlying principles of the GDPR, where rights to personal data are considered fundamental and inalienable human rights.[93] Even if the data rights are allocated initially to the farmers, bargaining power determines which party eventually ends up with the right to use the data. Consequently, data ownership as conceived in both the EU and US charters is not able to address lock-in concerns and broader data access problems in the sector. Inalienability might protect farmers from powerful service providers or machine producers in terms of

92 As it can be seen from the following part of this section, they both used GDPR concepts, but sometimes this transplantation approach does not match the non-personal agricultural data.

93 With regards to the Australian and New Zealand ag-data codes, it has to be noted that they do not mention ownership of farm data as they solely revolve around particular principles such as data security, data access and retention. In this regard, it has to be stated that they adopt a less problematic approach when designing their texts.

controlling collected raw farm data in a sustainable way.[94] Also, inalienable data rights do not necessarily exclude other stakeholders from using the data. For instance, while farmers can have rights to data portability when changing services, the same data can also be used for training algorithms by the previous technology provider, or the new tenant of a rented farm field might benefit from the historical data sets.

However, since farms are tradable assets, all the rights that they acquire should be by definition tradable as well. So, inalienable rights should stay with the farm, not with the farmer as an individual. Otherwise, it may create problems when farms are sold while rights remain with the farmer. Inalienable rights for farms not only protect the farmer while he owns the farm, but also allow him to sell the rights together with the farm. Alienable rights imply that the rights to data can be sold separately from rights to the legal entity of the farm. Big data firms might hoover up farm data rights without owning farms. That would handicap future owners of farms and diminish the value of farms.

3.4.2 Data re-use, Access, and Consent Rights

Under the title of 'Collection, Access and Control', the US Principles state that;

> *"An ATP's collection, access and use of farm data should be granted only with the affirmative and explicit consent of the farmer. This will be by contract agreements, whether signed or digital."*

This gives farmers an exclusive decision right over data access and re-use by third parties, as an attribute of their data ownership right. This clause aims to restrict onward data sharing by ATPs. At first sight, it gives farmers inalienable control rights vis à vis third parties. However, farmers can give their consent in the agreement to leave it up to the ATP to decide on sharing data with third parties. Unlike in the GDPR, there are no details regarding the modalities of the consent. Is a general consent statement valid, and is there a right to withdraw consent? This might result in ambiguities with regard to the alienability of the right to consent. The primacy of contracts implies that withdrawal and data retention rights can also be restricted by

94 See the previous arguments in this regard at Can Atik, 'Data Ownership and Data Portability in the Digital Agriculture Sector: A Proposal to Address Novel Challenges' (*fsr.eui.eu*, 2019) <https://fsr.eui.eu/atik-c-how-big-data-affects-competition-law-analysis-in-online-platforms-and-agriculture-does-one-size-fit-all/> accessed 4 March 2021.

agreements, i.e. they are alienable. Repetitive statements throughout the text in favour of contractual superiority may be an indicator of the ATPs' influence in designing the charter.[95]

The EU Code is again more ambiguous. Consent for data access and re-use may be given by the data originator or the operator. This boils down to the farmer's consent only if the farmer and originator coincide. Contract dominates, however, which implies that consent and re-use rights are alienable, as in the US charter.

> *"The collection, access, storage and usage of the collected agricultural data can only occur once the data originator has granted their explicit, express and informed permission via a contractual arrangement."*[96]
>
> *"The data originator must give permission for their data to be used and shared with third parties, including circumstances in which decisions are made based on data."*[97]
>
> *"Right to determine who can access and use the data is attributed to this operator."*[98]
>
> *"Parties ... should establish a contract clearly setting the data collection and data sharing conditions..."*[99]
>
> *"Parties may not use, process or share data without the consent of the data originator."*[100]

Like in the US Principles, details of the consent conditions are not mentioned, apart from a reference to GDPR-based principles such as being explicit, express and informed. Therefore, it is unclear if a general consent statement in the contract is valid or whether there is a right to withdraw consent.

95 One may expect that industry stakeholders favour the *status quo*. They benefit from the existing non-regulatory environment with their *de facto* data control. The design of the EU and US charters that prioritise contractual freedom over the principles of the charters ensures this *status quo*.
96 The EU Code, n. 15, p. 9.
97 Ibid.
98 Ibid., p. 8.
99 Ibid.
100 Ibid.

This example demonstrates the limitations of the contract-based design in the charters. The validity of contractual relationships can be challenged by using the explicit, express and informed permission argument as most of the service providers' terms and conditions are standard texts. So, the existing design is open to a number of problems in practice.

> *"Data originators must be given the possibility to opt-out of the contract and terminate or suspend the collection and usage of their data, provided that the contractual obligations have been met. This must be clearly stated in the contract..."*[101]

This statement signals that the consent rights could be inalienable and can be cancelled at any time by the data originator. Not surprisingly, this general statement is again subject to contractual provisions. Unless stated in the contract, there is no right to opt-out or terminate.[102] This problematic design is repeated all over the EU Code. It is difficult to see how these data principles could change anything if they would become law, compared to free and unregulated data markets, since contracts and market forces prevail over the principles.

Another rule mentions pseudonymisation or anonymisation of agricultural data in the EU Code;

> *"Data originator must give permission for their data to be used and shared with third parties... Information should only be given to third parties as aggregated, pseudonymized or anonymised data unless it is required to deliver the requested service and/or the conditions specified in the contract. Unless specified in the contract, the data user must take all precautions to avoid re-identification."*[103]

The concepts of pseudonymisation and anonymisation are related to the privacy and identifiability of natural persons. They do not have any meaning for non-personal agricultural data in this regard. Data could be anonymised with respect to the identification of the farm. Farmers might not be happy about other parties' access to data regarding their farming practices because it may affect the asset value of their farm, their credit score, etc. This may

101 Ibid., p. 10.
102 Ibid.
103 Ibid., p. 9.

imply that farm identification and physical location coordinates should be eliminated from the data. It could have been more appropriate to link the clear aims and the re-use consent requirements such as to protect farms' trade secrets, instead of using privacy law concepts.

Other principles in the US charter might also play a role in consent for access and re-use. For example, under "Transparency and consistency", it states that;

> *"ATPs shall notify farmers about the purposes for which they collect and use farm data, third parties to which they disclose the data and the choices the ATP offers for limiting its use and disclosure."*

This formulation is not clear about the consequences of notification. Does the farmer have a right to object? The text is silent about this. The notification principle can become functional only if it is related to an inalienable consent right. Inalienability, in nature, is strictly related to binding legal rules that have clear enforcement mechanisms.

Under 'Disclosure, Use and Sale Limitation', the US charter states that;

> *"An ATP will not sell and/or disclose non-aggregated farm data to a third party without first securing a legally binding commitment to be bound by the same terms and conditions as the ATP has with the farmer. Farmers must be notified if such a sale is going to take place and have the option to opt out or have their data removed prior to that sale. An ATP will not share or disclose original farm data with a third party in any manner that is inconsistent with the contract with the farmer. If the agreement with the third party is not the same as the agreement with the ATP, farmers must be presented with the third party's terms for agreement or rejection."*

This statement implies an extension of contractual terms to third parties. Since there is no *in rem* legal framework for data that is enforceable towards third parties, the US charter attempts to use contracts as an enforcement tool for these principles.

Both charters also have rules that prevent unilateral contractual changes without the consent of farmers.

The US Principles include the following statements:

> *"An ATP's principles, policies and practices should be transparent and fully consistent with the terms and conditions in their legal contracts. An ATP will not change the customer's contract without his or her agreement."*

The EU Code has the following consent rule:

> *"Contracts must not be amended without prior consent of the data originator. If data is to be sold or shared with a third party that is not initially mentioned in the contract, the data originator must be able to agree or refuse this, without financial or other repercussions."*[104]

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This protects farmers from unilateral actions. Service providers are obliged to maintain services under older terms and conditions (T&C). Provisions that forbid unilateral changes are indeed stating the obvious because both of the charters are designed to be enforced via contracts, and unilateral changes are not compatible with the mutual assent principle in contractual relations in any case.

Apart from this general statement in the texts, the EU Code provides a specific obligation to take consent for new data-sharing situations that are not specified in the contract beforehand. The originator can refuse new sharing. The obligation for service providers is not to impose any response to this refusal that would result in negative consequences for farmers. Although it is not clear what the scope of this obligation or the meaning of the negative repercussions exactly is, it is a positive intention to protect the weaker party in case of a refusal decision for third-party access. The prohibition of financial or other repercussions plays an important role to compel service providers or machine producers not to limit machine functionality, for instance, if new T&Cs are rejected. The US text has no statement regarding the consequences of such an action.

The EU Code brings an interesting obligation for third parties' access to data;

> *"The data user can only sell or disclose data to a third party if she/he has secured the same terms and conditions as specified in the contract between user and originator."*[105]

104 Ibid., p. 10.
105 Ibid.

However, it is unclear whether this is an additional obligation above the ones discussed before or an alternative one to share data, or whether the farmer and third party enter into a direct contractual relationship or this is only between companies, i.e. data user and third party. In the case of the latter situation, it is difficult to see how a farmer can enforce the rights against the third party as the farmer would not be a part of the contract between companies. The idea seems to protect farmers with the same contractual conditions, but the existing form of the text is ambiguous.

In general, there are various consent rules to collect, access or re-use of data, especially in the EU code. However, neither their scope and enforcement mechanisms nor their effects on the competitive dynamics in the sector are undisputedly clear. Also, the contractual superiority emphasis throughout the text further limits the potential of the proposed rules and rights, if any. Apart from the discussed ambiguities and limitations of the texts, the core question, indeed, might be whether we really need consent-based rules and rights in the non-personal agricultural data setting from the competition policy perspective. On the one hand, consent rights for collection, access and re-use of data might increase farmers' bargaining position if they are inalienable and binding. On the other hand, this may create another set of barriers against the free flow of data in the sector. This balance should be carefully considered when designing the sectoral consent rules. Instead of transplanting personal data concepts from the GDPR, rights need to be designed in accordance with sectoral conditions. Data protection law serves a more human rights-oriented policy preference that might not always be compatible with the needs of the sector, which is predominantly based on non-personal agricultural data.

3.4.3 Data Portability Designs and Lock-in Situations

In the US Principles, data portability is considered a privacy-related issue, not a competition issue because there is no portability right for anonymous or unidentifiable data sets. Also, only primary data can be ported, not 'aggregated' data;

> *"Within the context of the agreement and retention policy, farmers should be able to retrieve their data for storage or use in other systems, with the exception of the data that has been made anonymous or aggregated and is no longer specifically identifiable. Non-anonymized or non-aggregated data should be easy for farmers to receive their data back at their discretion."*

As discussed above, anonymisation or identifiability are incompatible when discussing non-personal farm data as they are privacy law concepts. Protecting commercial confidentiality might have a certain rationale, but it is not related to the portability provision. When it comes to portability right, these nuances do not make sense. This indicates that the US Principles did not have a clear framework of market failures to address them with their rules. It seems more like privacy-centric legal transplantation to an incompatible context, i.e. non-personal farm data.

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The reference to *"within the context of the agreement and retention policy"* indicates that this is not an inalienable right. Farms can trade this right away in a contract, and market power will determine the eventual outcome of the negotiations. The US Principles actually do not change the *status quo* of the free B2B data market setting apart from its advisory statements in favour of contractual portability clauses.

In the EU Code, the rule regarding portability is as follows:

> *"Unless otherwise agreed in the contract, the data originator has the right to transmit this data to another data user. If agreed between the parties, the data originator shall have the right to have the data transmitted directly from one data user to another, where technically feasible."*[106]

This demonstrates again that the EU Code respects the primacy of contracts over proposed principles. However, this clause has a different design compared to other rules in the text. In situations where contracts remain silent on portability, the Code could be invoked to assume portability by default. This makes the scope of portability right somewhat broader in the EU Code compared to the US Principles. This is still an alienable design as this right can be removed by contractual clauses. However, the following sentence repeats the same right by saying that *if agreed between the parties*. This makes the approach of the text confusing because this jeopardises the possible legal interpretation of default portability right in the case of contractual silence. The text could have been clearer in this regard.

Portability is only possible in the EU Code *"where technically feasible"* – again an explicit transposition from Article 20 (2) GDPR. Technical feasibility might be problematic, especially when different and incompatible

106 Ibid., p. 9.

standards create an obstacle to the transfer.[107] Differentiation in standards is sometimes an intentional business strategy to prevent the portability of data to competitors.[108] This may prevent farmers from enforcing their rights even if the portability clause is not waived in the contract.

Indeed, the EU Code is aware of technical barriers to data portability and asks for transparency in this respect in the contract:

> *"The means through which they may migrate data pertaining to their farming operations to other service and the electronic data interchange standards and formats which are supported shall also be made clear."*[109]

Even though there is an obligation on service providers to be clear about standards and interoperability, this falls short of a sector-wide standard and interoperability obligation. This rule is more about a transparency obligation for service providers. Therefore, even though the proposed rule in the EU Code becomes binding, this will not be effective in removing potential technical barriers to the free flow of data and will not ensure interoperability in the sector.

The portability rule is complemented by the following paragraph;

> *"This should be done without compromising restricted access to machine data or sensitive data (only relevant to the correct functioning of the machinery). This should be clearly specified in the contracts between farmers/contractors and device manufacturers."*[110]

This statement caters to the wishes of machine manufacturers to protect their proprietary, sensitive and confidential data collected, stored and processed in machines, including data regarding the operations of the

107 The technical feasibility of ag-data transfer/combination is discussed by computer scientists at Wageningen University. See 'DATA FAIR' (*WUR*, 2020) <https://www.wur.nl/en/article/DATA-FAIR-EN.htm> accessed 4 March 2021. The authors state that portability is possible and meaningful if the data is findable, accessible, interoperable, and reusable.

108 This is one of the problems in the sector: *"Every provider is building his own little kingdom."* See Esmeijer and others, n. 74, p. 34; See also at Kritikos, n. 21, p. 10.

109 The EU Code, n. 15, p. 10.

110 Ibid.

machine itself. Service providers' or machine producers' 'proprietary data' fall outside the data originators' rights to portability.

The EU Code also mentions the data formats when receiving data from service providers;

> *"The data originator shall have the right to receive the data concerning their operation as specified in the contract, in a structured, frequently used and machine-readable format."*[111]

3

The reference to *"the right to receive the data concerning their operation"* associates data rights with farming operations, not with the machine or device ownership. As noted before, this is important in a sector where renting machines and outsourcing of services is a common practice. It somewhat reduces the ambiguity in the attribution of original rights to data originators. It is obvious that stakeholders in the EU are aware of technical challenges to transferring data due to fragmentation in data formats and lack of standards, and this general principle could have been helpful to mitigate this problem to a certain extent, if it had been binding.

As a general consideration, although existing forms of portability related provisions in both the EU and US charters are not adequate to mitigate sectoral concerns deriving from farmers' lock-in situations, one can expect that these voluntary portability rules might become a sector trend to implement more lenient data policies by service providers in terms of enabling the transfer of data to rivals when farmers desire to do so, especially for the EU Code as the US Principles are more focused on transplanting privacy principles rather than having an objective to promote competition in the market. However, it might not be realistic to expect that service providers will voluntarily renounce their exclusive control over the collected data. They have no incentive to weaken the advantages deriving from their exclusive data access. Still, the design of the EU Code with a default portability right for farmers[112] unless repealed by contract could be an important step towards inalienable and binding rights for farmers, compared to the US Principles in which contractual clauses are always considered superior to the proposed rules and principles.

111 Ibid., p. 9.

112 despite the ambiguity in the following sentence of *"If agreed between the parties"*. Ibid.

3.4.4 Other Rights and Rules on Data

Our main focus in this section is to compare the attribution of original rights, data re-use/access rights and portability rights in these voluntary initiatives from a competition policy perspective. These rights could have major implications for data access related problems in the sector. However, it is also interesting to briefly evaluate other provisions in the charters, such as data retention/retrieval rights, purpose/storage limitation rules or prohibition of speculation and price discrimination. These may also affect the data access puzzle in this emerging sector. This sub-section discusses whether they are suitable for the non-personal ag-data setting and address the identified concerns.

3.4.4.1 Data Retention/Retrieval Rights

In the US text, the following principle is proposed:

> *"Each ATP should provide for the removal, secure destruction and return of original farm data from the farmer's account upon the request of the farmer or after a pre-agreed period of time."*

This statement seems inspired by the "right to be forgotten" in the EU GDPR. Farmers may want to exercise this right, for example, when they change service providers along with their portability right which is separately mentioned in the text.

In the EU Code, there is a general statement about access and retrieval rights:

> *"Data originators should be granted appropriate and easy access and be able to retrieve their attributed ("own") data further down the line, unless the aggregated data is not linked to the attribution as it is not only based on the data of the data originator. It is essential to make the data provider ("collector") responsible for making the data easily available to the data originator in a format that they will find accessible and readable, where technically feasible. If not technically feasible, the data provider should provide justification."*[113]

Data retrieval is applicable only to the original "attributed" farm data, not to the processed data sets that have been enrichened by other data sources. The rule is limited by technical feasibility constraints.

113 Ibid., p. 9.

The EU Code also has a specific rule on 'right to be forgotten' beyond the general statement of retrieval rights;

> *"There must be the option to remove, destroy (e.g. right to be forgotten) or return all original data (e.g. farm data) upon the data originator's request."*[114]

The "right to be forgotten" exists in the GDPR for personal data, including farmers' personal data. That right may be meaningful for non-personal business data to preserve commercial secrecy and prevent third-party access that could be harmful to the commercial interests of the farm. Indeed, the EU Code states that:

> *"Protecting trade secrets, intellectual property rights, and protecting against tampering are the main reasons as to why information is not shared and why even business partners in joint projects are not permitted to receive data."*[115]

However, the intention to address commercial concerns could have been stated more directly in both texts without using GDPR terminology.

3.4.4.2 Purpose and Storage Limitations

In the US Principles:

> *"An ATP will not share or disclose original farm data with a third party in any manner that is inconsistent with the contract with the farmer."*

In the EU Code:

> *"Data must be collected and used for the specific purpose agreed in the contract. The datasets should only be kept for as long as is strictly necessary for the relevant analyses to be carried out. In addition, data should only be accessed by those with the required authorisation."*[116]

114 Ibid., p. 11.
115 Ibid., p. 12.
116 Ibid., p. 9.

Purpose and storage limitations are again legal transplants from the GDPR. The EU Code links it with an implicit obligation for service providers to destroy the data after use. This may create complications when farmers store their historical data sets only in databases of service providers. Contracts will normally define retention periods. There is no explicit duty to inform farmers when data are about to be destroyed. This might be problematic. Purpose limitation rules may strengthen farmers' positions vis-a-vis service providers or machine producers, but this may also limit the potential societal welfare effect deriving from full data exploitation. Personal data related principles borrowed from GDPR should be carefully reconsidered in the non-personal farm data setting when designing the related rules.

3.4.4.3 Prohibition of Speculation and Price Discrimination

Both the US Principles and EU Code contain prohibitions to use the data for unlawful and anti-competitive activities. They also go further and contain somewhat moralizing statements.

In the US Principles:

> *"ATPs should not use the data for unlawful or anti-competitive activities, such as a prohibition on the use of farm data by the ATP to speculate in commodity markets."*

In the EU Code:

> *"Collectors and users of farm data must therefore not use this data for unlawful purposes or take advantage of it to speculate or for other such purposes."*[117]

The inclusion of speculation "or other such purposes" is strange. Speculation is not a *per se* unlawful activity. It may actually induce transparency and efficiency gains. Futures markets in agricultural commodities are an essential part of agricultural markets. We can infer that the statement in the EU Code intends to cover unfair behaviours such as the use of data for price discrimination purposes.[118] It, indeed, contains a clear prohibition in this regard;

117 Ibid., p. 9.
118 Here, exploitative abuse can come to mind as the fear seems to be related to charging higher prices for agricultural commodities according to the farmers'

"The data must not be used to assess the originators' ability to pay for a service."[119]

Farm data may be used to assess farmers' willingness to pay for goods and services. This, in turn, can lead to price discrimination. Price discrimination is not a *per se* an infringement of competition law.[120] Moreover, it can, under certain conditions, be welfare-enhancing[121] for farmers and service providers. Obviously, farmers fear that powerful data companies could use the data against their interests, to manipulate or exploit them in inputs and outputs markets. Price discrimination is a strategy that allows sellers to extract more profits from buyers. It may reduce buyers' welfare but may also enable new buyers to come into the market when they receive more attractive price offers. As such, price discrimination induces equity concerns because of changes in welfare distribution. It may also generate additional welfare for society as a whole. The net balance between these two effects is an empirical question.

3.4.5 General Considerations

Although there are some positive considerations,[122] attempts by the US and EU agricultural data charters to transpose some basic GDPR principles of personal data protection to non-personal machine-generated data run into several problems. For instance, notions of pseudonymization and anonymization or the right to be forgotten are related to the privacy of natural persons. They are not relevant for non-personal agricultural data. If the aim was to protect commercially sensitive data, it could have been stated more clearly without transplanting the GDPR concepts. In general, the absence of an obvious anchor for these rights creates ambiguity with regard to the rights-holder: is it the farm or the farmer, or other parties?

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dependency on those particular products or inputs with the help of insights generated through aggregated farm data sets.

119 The EU Code, n. 15, p. 11.

120 Case C-209/10 *Post Denmark I* ECLI:EU:C:2012:172, para 30. See the situations where price discrimination can be exploitative of customers in Richard Whish and David Bailey, Competition Law (9th edn, Oxford University Press 2018), pp. 779-782. For an empirical study about price discrimination by powerful intermediaries, see, for example, Lauren Falcao Bergquist and Michael Dinerstein, 'Competition and Entry in Agricultural Markets: Experimental Evidence from Kenya' (2020) 110 American Economic Review.

121 Whish and Bailey, n. 120, pp. 777-778.

122 See, for instance, Jouanjean and others, n. 12 above, pp. 10 and 14-15.

These voluntary charters are naturally limited in terms of sector-wide validity and enforcement, except for the external auditing system in the US Principles.[123] An additional limitation in both data charters is the primacy of contracts over principles. Rights can be limited and alienated from farmers by contracts even though a company declares its participation in the charters. Markets and bargaining power in contractual negotiations will determine the outcome despite the proposed rules/principles. Even if the EU and US regulators would turn the voluntary principles proposed in the data charters into legally binding text, it is hard to see how they could correct B2B agricultural data market failures.[124]

These initiatives were not designed with a list of market failures and aftermarket competition concerns in mind. Instead, they transplanted rules designed to protect the privacy of individuals. One can, therefore, not expect these voluntary data governance initiatives in the US and EU to effectively address competition-related problems in this emerging sector.

3.5 Alternative Ways Forward

So far, we focused on situations where ag-tech machines are equipped with proprietary interfaces that collect data on devices and servers exclusively controlled by machine manufacturers or agronomic service providers. In the absence of data portability, farmers are locked into aftermarket services. They lose control over current and historical farm data. This monopolistic relationship distorts the market for data and related services.

123 There is a criticism about the ongoing practices of the Ag Data Transparent. See Mark R. Patterson, 'Ag Data Transparent, or Not' (*antitrust.online,* 2020) accessed 4 March 2021.

124 It is important to note that the Australian Farm Data Code does not allow contractual freedom to overrule the principles of the Code. Participating companies have to follow the declared rules. However, it has its own limitations deriving from legal design and preferred wording. For instance, in the Australian Code's 'Portability of farm data', there is no obligation for service providers to directly transfer data to rivals. Another principle of the Code obliges providers to preserve farmers' ability to determine who can access and use data. It is not clear if this is a one-shot access to historical data or it also covers access to real-time data flows. See Australian Code, n. 17, pp. 3-4. The New Zealand initiative is more related to transparency than a list of principles or data rights. There is an obligation for participating companies to disclose their practice regarding matters such as data security, rights to data and access rights. It does not intervene in contractual relations between companies and farmers. See New Zealand Farm Data Code of Practice, n. 17. In this regard, it falls behind the other initiatives.

In the previous section, we explored to what extent voluntary data governance initiatives based on agreements between farmers and agro-industry stakeholders could give farmers more choices. Our analysis demonstrated that contractual negotiations prevail in these agreements and leave farmers dependent on the goodwill of the providers of the services and devices that collect their data.

In this section, we first explore a market-based option: storing farm data with neutral third-party intermediary platforms[125] or data cooperatives[126] that are not vertically integrated with machine or input producers. We then discuss the possibilities for regulatory intervention in agricultural data markets by assigning mandatory data rights, including data portability right for farms.

3

3.5.1 Neutral Third-party Data Intermediaries

There is a wide variety of third-party intermediaries that operate in the agricultural data market. Some of them behave in a "neutral" way: they are not vertically integrated with machine producers, inputs suppliers or agronomic services providers. As such, they have no stake in the sales of these products and no incentive to use the data to promote these sales. Of course, there are various shades of neutrality: some are more neutral than others. They range from not-for-profit to purely commercial data intermediaries. Their common characteristic is that they offer farmers some degree of control over the management of their data, sometimes combined with the promise that they can monetise farm data or appropriate a larger share of the benefits that data can generate. These intermediaries have been referred to as 'Agri-Business Collaboration and Data Exchange Facility' (ABCDEF),[127] i.e. "neutral" B2B data platforms where farmers and agri-businesses can collaborate and exchange data in standardized formats. This could purportedly strengthen the position of farmers in the data market. The European Commission announced its support for the creation of "*a common European agricultural data space to enhance the performance and competitiveness of the agricultural sector through the processing and analysis of production and other data, allowing for precise and*

125 See Eric A. Posner and E. Glen Weyl, *Radical Markets: Uprooting Capitalism And Democracy For A Just Society* (Princeton University Press 2018). The authors argue that data providers should create data unions, similar to labour unions, in order to extract a large value for their data contributions.

126 Apart from their potential to address competition concerns identified in this paper, there might also be other potential benefits as well as drawbacks of data cooperatives in agriculture. See Jouanjean and others, n. 12, p. 16.

127 See more in Poppe and others (2015), n. 2 above.

tailored application of production approaches at farm level".[128] This agricultural data space might also fall in the category of neutral intermediaries. However, no further details are known yet on this project.

The intermediary would act as a Farm Information Management System (FIMS),[129] comparable to Personal Information Management Systems (PIMS)[130] that have been suggested for personal data. They may fulfil several roles: data storage, identity and permissions management, service and monetization management, standardized and secure data transfers through APIs, compliance management and accountability.

Large agri-business firms with vertically integrated data services are a step ahead of FIMS because they already have a large user base that they can leverage to generate network effects in data collection and better service production. It is not easy for FIMSs to overcome this disadvantage unless they have a large and vertically integrated market side too. Some agricultural cooperatives may be relevant in that situation as they sell agricultural inputs and rent machines. However, that makes them commercial stakeholders in, at least, one market and undermines their neutral third-party status. In France, for example, the InVivo agricultural group has started from its strong market position in agricultural products to add a data management and analytical dimension to its business.[131] There are many other examples of such intermediaries.[132] Some of these intermediaries have vertically

128 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A European Strategy for Data – COM(2020) 66 final.

129 This notion has been discussed in literature with a technical focus since 2012. See Alexandros Kaloxylos and others, 'Farm Management Systems and the Future Internet Era' (2012) 89 Computers and Electronics in Agriculture; Alexandros Kaloxylos and others, 'A Cloud-Based Farm Management System: Architecture and Implementation' (2014) 100 Computers and Electronics in Agriculture cited in Jan W. Kruize and others, 'A Reference Architecture for Farm Software Ecosystems' (2016) 125 Computers and Electronics in Agriculture, p. 14.

130 See 'Personal Information Management System' (*edps.europa*, 2020) <https://edps.europa.eu/data-protection/our-work/subjects/personal-information-management-system_en> accessed 4 March 2021.

131 'Big Data and Agriculture | Invivo' (*Invivo-group.com*, 2020) <https://www.invivo-group.com/en/big-data-and-agriculture/> accessed 4 March 2021.

132 Just to list a few: API-AGRO (https://api-agro.eu/en/) in France, DjustConnect (https://djustconnect.be/en/) in Belgium, DKE agrirouter (https://my-agrirouter.com/en/) in Germany, Agrimetrics (https://agrimetrics.co.uk/) in the UK, Farmobile (https://www.farmobile.com/) and Farm Business Network (https://www.fbn.com/analytics/data-storage-integration) in the US accessed 4 March 2021.

integrated with data analytics firms. In the US, for example, GISC (Growers Information Services Cooperative) is an agricultural data cooperative that teamed up with IBM for data storage in the cloud to produce data analytics services that generate value-added on top of handling raw data.[133] Farmers pay for these services. This cooperative data business model retains some degree of neutrality with respect to products and services markets; it avoids self-preferencing in these markets. IBM has no stake in selling agricultural machinery or inputs, and it is neutral in this regard. As such, it may allocate a larger share of data-driven value-added to farmers. However, we do not have any information on the possibility for farmers to switch their data to other service providers than IBM.[134]

Other intermediaries have opted to stay neutral with regard to data analytics and use. They facilitate access and exchange of data but do not store or extract value from the data. For example, in the Netherlands, Join-Data is a not-for-profit agricultural data platform where farmers share their data with various agro-industry partners and companies that want to access data.[135] JoinData is set up by some large Dutch dairy and meat cooperatives involved in processing and distribution of agricultural inputs and livestock products. Some commercial firms are also members, including a bank and an IT services company that created the technical platform.[136] The platform manages data access authorisations for farms, but it does not store or analyse farm data. That is left to application providers. It is a mere passive and neutral data access & distribution platform, not an active data-driven agronomic services provider. It facilitates the transmission of data between farm machines and data users, including distributors of inputs and outputs, downstream industries, data-based agricultural service providers, with the authorisation of the farmer. JoinData membership terms & conditions do not say anything about ownership or access to data because it takes no responsibility for the handling of data.

133 See 'Grower's Information Services Coop' (*Grower's Information Services Coop*, 2020) <https://www.gisc.coop/> accessed 4 March 2021.
134 See also potential limitations of farmers' data cooperatives from the perspective of the data lock-in problem. Atik, n. 29, pp. 67-68.
135 See, for instance, Join-Data at 'Data Sharing in the Agricultural Sector | Support Centre For Data Sharing' (*Eudatasharing.eu*, 2020) <https://eudatasharing.eu/examples/data-sharingagricultural-sector> accessed 4 March 2021.
136 It has several members including Friesland Campina (dairy) and Royal Agrifirm (a large cooperative provider of agricultural inputs), CRV, LTO, Royal Cosun, Avebe, Rabo Frontier Ventures, EDI-Circle (an IT firm in data management). See 'About Joindata – Joindata' (*Join-data.nl*, 2021) <https://join-data.nl/en/about-joindata/> accessed 4 March 2021.

JoinData seeks to improve farmers' trust by giving them more control over the use of their data at any time, by means of authorisations. Farmers do not pay for the service. Data users pay a fee for data communication, not for the data itself. It does not build data interfaces to facilitate data portability. Application providers have to build their own interfaces. It uses the AgroConnect data standard for data transmission and for its APIs.[137] Most members of AgroConnect are active in downstream data-driven services; some are manufacturers of machines and sensor devices.[138]

This model comes closest to a neutral third-party data intermediary. It gives farmers more control over who can access and use their data, reduces switching costs and avoids data lock-in for farmers. Farmers gain more subjective control over their data. That does not necessarily translate into capturing more value-added from agronomic services. That still depends on the farmer's bargaining power with agro-service providers. It does not overcome the restrictions imposed by contracts between farmers and machine producers that may prevent them from accessing or porting their data or that may lock them into incompatible data formats. JoinData can only work when the original agreement with the data source (machine producer) allows it.

3.5.2 Neutral Third-party Data Intermediaries' Two Major Hurdles

First, they require access to data sources. For example, the JoinData model works to the extent that data sources (machine producers) allow JoinData to manage the portability of their machine data. What would be their incentive to give away their exclusive access and allow other service providers to use their data? We can find some tentative answers to that question when looking at the membership list of JoinData's data interoperability standard, AgroConnect. Members are mostly downstream agricultural services providers,[139] not upstream producers of data collection machines. The few exceptions are small machine and sensor producers that have very little to gain from maintaining data exclusivity. Their business model consists of selling machines and sensors, not selling data-driven analytics. We find the same pattern in membership of the more widely used Isobus interoperability standard for agricultural machines: only smaller machine manufacturers adhere to it while none of

137 See 'Member List' (*Agroconnect.nl*, 2020) <https://www.agroconnect.nl/overagroconnect/ledenlijst.aspx> accessed 4 March 2021.
138 See Ibid.
139 Ibid.

the larger ones do, except for a few of their machines in markets where they are not leaders.[140] This is in line with the predictions from economic theory.[141] When a platform is small, it can only gain from interoperability. Conversely, if the platform is large, the gain from interoperability will be limited while its competitor will gain more. Consequently, dominant platforms' incentives to accept interoperability will be low.

Second, they need to overcome several economic hurdles, similar to PIMS.[142] The parties (farmers, companies and platform operators) must find a sustainable data business model. That may be problematic. Farmers may not be willing to pay for storing and managing their raw data through FIMS unless they receive well-defined monetary benefits in return. Some farmers may be motivated by the subjective feeling of more control over their data, independently of any monetary gains. Farmers may expect payment for the use of their raw data by agro-industry firms. This is unlikely to happen because the marginal value of individual farm data may be close to zero for a service provider as soon as it has reached a sufficiently large data pool where the marginal return to economies of scale and scope in aggregation comes close to zero. That is why farmers usually have to pay a price for access to data-driven services, even if they deliver their own data to that service provider. New entrants in the data-driven services markets may subsidise data control services for farmers in order to attract more clients. This may be the case for JoinData. Eventually, however, full costs will have to be reflected on one or the other side of the market.

For data cooperatives, the only viable business model seems to require the production of data-based value-added services on top of the raw data delivered by farmers. This requires investment in data analytics. For example, the GISC in the US collaborates with IBM to produce data-driven insights. Only large cooperatives with a sufficient volume of data collection can achieve the necessary economies of scale and scope in data aggregation to produce efficient data-driven services.

These economic considerations lead us to the conclusion that neutral third-party intermediaries are likely to remain outside the mainstream

140 See 'Members' (*CC-ISOBUS*, 2020) <https://www.cc-isobus.com/en/das-cci/> accessed 4 March 2021.

141 Crémer, Rey and Tirole, n. 31 above.

142 See more about PIMS, for example, in Krämer, Senellart and de Streel, n. 63, pp. 66-75.

agricultural data market. It also raises questions about the potential benefits and limitations of voluntary interoperability and whether mandatory standards are necessary to overcome data-related competition bottlenecks in agricultural markets. We address this question in the next section.

3.5.3 Regulatory Intervention with Mandatory Rules

In this section, we explore regulatory intervention as an alternative to overcome exclusive data access by device manufacturers and agronomic service providers. Data portability and/or interoperability is a necessary technical condition to unlock farm data.[143] However, it does not answer the question of who can use the portability or access rights and under which conditions. That is an important question because it affects the welfare of stakeholders in the agricultural production process. Policymakers can introduce mandatory portability to increase the joint welfare of farmers, the agricultural industry and service providers, and consumers. The impact on these groups may not be evenly distributed, however, and can create equity and fairness concerns.

For personal data, the data subject as a natural person and originator of the data is the obvious rights holder and the basis for data protection rights in the GDPR. As we argued above, there is no equivalent for non-personal farm data, unless there is only one single data originator. When several parties contribute to an agricultural production process, they may all claim access rights to at least part of the data. Landowners may claim access to land use data from tenant farmers. Machine rental companies may compile usage data. Machine producers may collect data from all their machines. Agronomic service providers may collect data from all their client farms. Data analytics and other external service providers may claim use rights on the data that they process.

Some authors have suggested distinguishing between volunteered, observed and inferred data as a way to allocate data access rights.[144] Volunteered data have been willingly contributed by a user to service providers. For example, farms share their land and soil maps with rented seeding, fertilizer and harvest machines. Observed data are the result of interactions between users and the service provider. For example, combine harvesters collect data on the quantity of crops harvested. Fertilizer machines observe the type and

143 See, for instance, Jouanjean and others , n. 12, p. 18.

144 Jacques Crémer, Yves-Alexandre de Montjoye and Heike Schweitzer, *Competition Policy for the digital era – Final Report* (Publications Office of the European Union, 2019), <https://ec.europa.eu/competition/publications/reports/kd0419345enn.pdf> accessed 24 September 2022, pp. 24-29.

quantity of chemicals used. Volunteered and observed are raw primary data. Inferred data are derived from raw data and produced by a data service provider by means of algorithms or other calculations and transformations. For example, raw land & soil maps and cropping pattern data are inputs for algorithms that recommend chemicals for crop protection. Combined with harvesting data, they can evaluate the productivity of a farm. Apart from the fact that the distinction between these three categories is not always clear, this categorisation does not resolve the question of who should get access to which type of data and under what conditions.

Currently, in the EU, portability right exists only for personal data in the GDPR. Even this right has significant limitations.[145] A very limited legal notion of portability right for non-personal data is mentioned in the Free Flow of Data Regulation,[146] only for cloud-based data services and on a voluntary basis through sectoral codes of conduct to be negotiated between industry stakeholders. In other words: it merely endorses the existing EU agricultural data charter. Other sectoral precedents for portable machine data exist, for example, in automotive,[147] energy[148] and payments services.[149]

The proposed Data Governance Act[150] includes regulation of data sharing services. Article 9 restricts the application of the regulation to three categories of data intermediaries: providers of bilateral or multilateral data exchange services, personal data sharing services and data cooperatives. Recital 22 explains that providers of data sharing services are specialised intermediaries

145 See, n. 63 above.

146 Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union, OJ L 303, Article 6.

147 Regulation 2018/858 of the European Parliament and of the Council of 30 May 2018 on the approval and market surveillance of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles, amending Regulations (EC) No 715/2007 and (EC) No 595/2009 and repealing Directive 2007/46/EC, OJ L 151/1, Articles 61-66.

148 Directive 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast), OJ L 158/125, Article 23.

149 Directive 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/ EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC, OJ L 337/35, Articles 66-67.

150 Proposal for a Regulation of the European Parliament and of the Council on European data governance (Data Governance Act), COM(2020) 767 final, 25.11.2020.

that are independent of both data holders and data users. They assist both parties in their transactions of data assets. It covers services that intermediate between an indefinite number of data holders and users, not closed groups or an exchange platform that is exclusively linked to services provided by one data holder. It also excludes IoT data platforms that connect machines and devices, and services that generate value-added from the transformation and analysis of data without a direct relationship between data holders and users. We could not find any type of agricultural data service provider that would still fall within this very narrow definition of data sharing services. This leaves the category of data cooperatives as an alternative option. However, this category is not defined in the regulation. Even if there would be any agricultural data platforms that could be considered as data intermediary services under Article 9, the conditions that apply to these platforms under Article 11 are very general and do not go beyond what is already foreseen in the EU code of conduct that is investigated in detail in the section above.

The Digital Markets Act (DMA)[151] defines mandatory B2B data sharing obligations for (non-personal) commercial data. This applies only to very large "gatekeeper platforms" that provide "core platform services". Agricultural data services are not covered by these DMA definitions. However, it is worth noting that DMA Article 6(h) introduces a real-time data portability right for business users on gatekeeper platforms. Article 6(i) mandates free access for business users to non-personal commercial data provided and generated by their activities on the platform. These articles introduce data access and portability rights for legal entities (i.e. businesses). Moreover, they go beyond the GDPR by abolishing any delays and mandating real-time access.

These clauses constitute a first step towards portability rights for non-personal commercial business data in the EU. While the DMA does not apply to agricultural data platforms, the European Commission announced its intention to prepare proposals for a Data Act in 2021. It would include general regulatory provisions for B2B sharing of non-personal and machine-generated data.[152] The details of this proposal are not known yet.

151 Proposal for a Regulation of the European Parliament and of the Council on contestable and fair markets in the digital sector (Digital Markets Act), COM(2020) 842 final, 15.12.2020.

152 See 'Legislative Train Schedule | A Europe Fit For The Digital Age' (*European Parliament*, 2021) accessed 4 March 2021.

We can explore the conditions under which non-personal data portability rights could work for farms as business entities[153] and how this could increase competition in aftermarket services. In a simple one-to-one relationship between a farm and a machine or device producer, real-time portability and interoperability of machine data would separate primary machine markets from aftermarket services. It would enable farmers to select any aftermarket service provider of their choice. This would increase competition in aftermarkets. For example, a tractor or seeding machine could be steered by data-driven services from any provider. However, it would not prevent service providers from re-using the data for other purposes or sharing them with other businesses, unless re-use would be subject to consent from the farm to which the data pertain. One could think of a farm-centric portability and re-use right, limited to farms only and excluding other parties.

Exclusive rights for farms become complicated when more parties are involved in the agricultural production process. The farm's central role in data collection may be eroded by competing data access claims from other parties. For example, machines can be owned by leasing firms, farmland can be owned by another party, farm data analytics and agronomic advisory services can be performed by a third party, etc. Leasing firms can claim access to machine data to monitor the use and performance of their machines; land owners may claim access to data on agricultural activities to monitor the quality of their land; and agronomic advisory services firms may claim rights over the service data that they produce. This leads to a debate on who gets access to which data under which conditions. Leasing firms may be granted access to mechanical machine data only, not to the quantity and quality of agricultural inputs and outputs. Landowners may, however, want to access data on the quantity and quality of inputs and outputs because that affects the quality and value of their land. Once these parties obtain a right to access these data, they may also claim the right to re-use the data without the consent of the farm.

Data access and re-use by other parties are valuable from a social welfare perspective. It enables these parties to improve the efficiency and economic value of their activities. At the same time, re-use may also impact the farm.

153 Focusing on farms as legal persons instead of farmers as natural persons is important for the effectiveness of the portability design in the sector. See section 3.4.1 above.

Detailed land use data can affect the value of farmland and the creditworthiness of the farm. More reliable valuations are beneficial for society but not necessarily for the farm as a private undertaking. They may be used for price discrimination and speculation that are explicitly rejected in the EU code of conduct.

Like intellectual property rights, data need to have some degree of excludability in order to retain their market value. Making them widely available reduces their value to near-zero.[154] However, it may increase competition in downstream services markets, reduce prices and increase service quality. That may have positive welfare effects on farms via the services price channel. More competition in data-driven aftermarket services would help farmers to appropriate a larger share of data-driven productivity gains through lower prices and better service quality.[155]

The design of data access regimes is squeezed between two extremes. On the one hand, granting exclusive rights to farms when many parties contribute to the agricultural production process is not an optimal solution. On the other hand, generalised data portability and re-use for all is not ideal when negative externalities occur between parties. An intermediate solution that keeps some restrictions may be required to preserve the rights and welfare of some parties. All this indicates that a data access regime should be tailored to specific situations.

Smith warns us that the cost of intermediate data governance or data pooling regimes can be very high compared to the much lower costs of private ownership rights or fully open public domain regimes.[156] However, each of these cheaper regimes has its own costs. Public domain or full data sharing regimes may lead to underinvestment for lack of private incentives while exclusive private ownership data regimes lead to underutilisation of resources. Expensive data governance regimes should only be implemented if the benefits to society exceed the cost of governance.

154 Dirk Bergemann and Alessandro Bonatti, ‘Markets for Information: An Introduction’ (2018) CERP Discussion Paper – N. DP13148; Bergemann, Bonatti and Gan, n. 57 above.

155 or a theoretical economic model that arrives at this conclusion, see, for example, Paul Belleflamme and Martin Peitz, ‘Platforms and Network Effects’ in Luis C. Corchón and Marco A. Marini (eds), *Handbook of Game Theory and Industrial Organization*, Volume II (Edward Elgar 2018).

156 Henry Smith, ‘Toward an Economic Theory of Property in Information’ in Kenneth Ayotte and Henry E. Smith (eds), *The Research Handbook on the Economics of Property Law* (Edward Elgar 2011).

3.6 Summary and Conclusions

The arrival of digital data in agriculture opens the possibility to realize productivity gains through precision farming. It also raises questions about the distribution of these gains between farmers and agricultural service providers. It is tempting to believe that farmers can appropriate a large share of these gains when they remain in control of farm data. The reality of data-driven agricultural business models is that manufacturers of agricultural machines and devices design the data architecture in such a way as to retain exclusive control over access to the data. That enables them to foreclose downstream agricultural services markets that depend on these data. Also, agricultural technology providers' *de facto* control on the historical farm data sets locks their customer farmers in their systems due to the lack of a clear mechanism to force these companies to transfer the related data when farmers desire to switch service providers. This reduces competition in these markets and may increase prices which eventually reduces farmers' welfare.

Personal data protection regulation with its right to data portability is not applicable to non-personal agricultural machine data. Other existing regulations do not have any undisputedly equivalent mechanism to unchain farmers. Attempts to introduce voluntary data charters in the EU and US that emulate GDPR-like principles and purport to give farmers more control over their data have not been successful so far. Market-based outcomes still take precedence over farmers' rights enshrined in the contracts. Farmers' bargaining power is reduced because third-party data platforms are a necessary intermediary to realize economies of scale and scope from data aggregation in addition to the fact that farmers need tailored data-driven prescriptions/solutions generated through these intermediaries' advanced algorithms. Farmers cannot achieve these benefits on their own. The low marginal value of individual farm data and farmers' need for tailored data-driven services put farmers in a weak bargaining position. For-profit and non-profit intermediaries that are not vertically integrated into agricultural machines, inputs or services, or pure data cooperatives, have tried to offer better deals to farmers. However, they can only circumvent monopolistic data lock-ins when they can access the data sets. That depends on the goodwill of the machine manufacturers or agronomic service providers. Moreover, they may have a hard time achieving economies of scale and scope in data analytics and generating additional data-driven value-added. Without that, their business model may not be sustainable.

This leaves regulatory intervention as a last resort with mandatory data portability and interoperability to overcome data lock-in and monopolistic market failures. That inherently raises the question of the allocation of access rights: who should get access rights to which data and under which conditions? This is complicated when many parties contribute data to the production process and may claim access rights. Minor changes in who gets access to which data under which conditions may have significant effects on stakeholders. There is no clear answer yet to these questions. We conclude that digital agriculture still has some way to go to reach equitable and efficient solutions for detailed data access rights.

The European Commission's forthcoming proposals for a Data Act will have to address these issues in order to set the conditions for access to and sharing of non-personal machine data in a wide range of industries where hardware devices are used in Internet-of-Things settings. Regulators should design regimes with a view to maximising social welfare for society as a whole, not the private welfare of individual stakeholder groups

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CHAPTER 4

Data Act: Legal Implications for the Digital Agriculture Sector*

*Original manuscript authored by Can Atik. Completed in June 2022, available as a discussion paper: Can Atik, ‘Data Act: Legal Implications for the Digital Agriculture Sector’ (2022) TILEC Discussion Paper No. DP2022-013 https://dx.doi.org/10.2139/ssrn.4172957 - This is a slightly revised version, which was submitted to a journal in January 2023, and awaiting peer review.

4.1 Introduction

The proposal for a Regulation on harmonised rules on fair access to and use of data ('Data Act') has been released on 23 February 2022 to create a *"cross-sectoral governance framework for data access and use by legislating on matters that affect relations between data economy actors, in order to provide incentives for horizontal data sharing across sectors."*[1] It aims to address negotiation power imbalances between contractual parties and market imbalances deriving from data concentration that restricts competition, increases entry barriers and prevents data access and use by more players.[2]

The Regulation brings "*basic rules for all sectors*" as a horizontal framework, but it also mentions possible future follow-up *"vertical legislation to set more detailed rules for the achievement of sector-specific regulatory objectives."*[3] Thus, *"[t]he initiative leaves a significant amount of flexibility for application at sector-specific level."*[4] There is also a particular signal for a follow-up agricultural data regulation as Recital 25 clearly states that *"[t]his Regulation should therefore build on recent developments in specific sectors, such as the Code of Conduct on agricultural data sharing by contractual agreement. Sectoral legislation may be brought forward to address sector-specific needs and objectives."* However, until a sector-specific intervention arrives, the Data Act will be the main horizontal regulatory framework in the EU, and it is critical to identify the potential impacts of this horizontal regulation on the Digital Agriculture sector ('DAS')[5] that has emerged based on IoT implementations

1 Proposal for a Regulation of the European Parliament and of the Council on harmonised rules on fair access to and use of data (Data Act), COM(2022) 68 final, 23.02 2022.

2 Ibid., p. 2.

3 Ibid., p. 5.

4 Ibid., p. 8.

5 This notion is used by the European Commission when defining the new sector for data-driven agronomic solutions. See Case No COMP/M.8084 – *Bayer/Monsanto*, European Commission Decision (29 May 2018), para 2442 *et seq*.; There are also papers, which evaluate the Regulation without any sectoral focus. See, for instance, Inge Graef and Martin Husovec, 'Seven Things to Improve in the Data Act' (2022) SSRN <https://dx.doi.org/10.2139/ssrn.4051793> accessed 14 July 2022; Wolfgang Kerber, 'Governance of IoT Data: Why the EU Data Act will not fulfill its objectives' (2022) SSRN <https://dx.doi.org/10.2139/ssrn.4080436> accessed 14 July 2022; Moritz Hennemann and Gregor Lienemann 'The Data Act – Article-by-Article Synopsis of the Commission Proposal' (2022) SSRN <https://dx.doi.org/10.2139/ssrn.4079615> accessed 14 July 2022; Joseph Drexl and others 'Position Statement of the Max Planck Institute for Innovation and Competition of 25 May 2022 on the Commission's Proposal of 23 February 2022 for a Regulation on harmonised rules on fair access to and use of data (Data Act)' (2022) SSRN <https://dx.doi.

and tailored data processing services offered by Agricultural Technology Providers ('ATPs')[6] to make farmers better decision-makers regarding their agricultural operations.[7]

To evaluate the possible impacts, this paper will use the data-related problems in this promising sector as benchmark criteria to identify to what extent the horizontal provisions of the Data Act can be helpful to overcome the existing and possible future problems in the emerging DAS, and how the provisions of the Data Act can be fine-tuned to increase its effectiveness in this regard. Thus, the study will also aim to identify the remaining issues that may need to be addressed by a follow-up sectoral regulation.

To that end, Section 2 provides an outline of the main actors and the prominent problems in the DAS as a basis for the following evaluations, Section 3 scrutinises the provisions of the Data Act in order to respond to the questions posed above, and Section 4 concludes with the overall findings and suggestions.[8]

The most prominent finding of this research is that the provisions of the Data Act are quite limited from the perspective of the DAS - as the scope of the (data) rights/rules and the definitions of the core notions have been drawn too narrowly. Also, obligations regarding data access and re-use conditions are designed more comprehensively for the relationship between data holders and third parties while the initial relationship between users (farmers) and data holders requires equal or even stricter rules in the first place. However, only a part of these gaps can be closed by fine-tuning this horizontal intervention. Therefore, instead of expecting a comprehensive amendment before this horizontal initiative enters into force, it is critical to draw the legislator's attention to the remaining issues that can be regulated by follow-up sectoral intervention more effectively with targeted provisions for distinctive sectoral conditions.[9]

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org/10.2139/ssrn.4136484> accessed 14 July 2022.

6 ATP refers *"a company that aggregates farmer's data, combines it with other relevant data sets, and applies algorithms to analyze the data."* See Michael E. Sykuta, 'Big Data in Agriculture: Property Rights, Privacy and Competition in Ag Data Services' (2016) 19 International Food and Agribusiness Management Review 57, p. 58, footnote 1.

7 These services open up a new form of cost-efficient agricultural production. See *Bayer/Monsanto*, n. 5, paras 2442 and 2562-2565.

8 Chapters V, VI, VII and X of the Data Act are left out from the complete overview below as the provisions there have little impact on the DAS or no relevance at all.

9 It is not clear the reason behind this preference, but as there are repetitive signals

4.2 Understanding the Dynamics of the Emerging Digital Agriculture Sector (DAS)

In order to better understand the following evaluations regarding the possible effects of the Data Act on the DAS, it is critical to convey the necessary basics regarding the dynamics of the sector.

4.2.1 Prominent Actors in the Sector

The first investigation of the European Commission ('Commission') regarding the DAS was conducted in the *Bayer/Monsanto* merger decision,[10] which provides a wide discussion regarding the major players in the sector and their positions.

It is stated that the traditional input (seeds, pesticides, insecticides, fertilisers etc.) production conglomerates have more incentives to initiate downstream digital agriculture operations ('ATPs') because 'Smart Farming' threatens their traditional business considering that targeted data-driven solutions are promising to significantly reduce unnecessary input usage in farming operations.[11] Agricultural input giants have plans to compensate for their potential losses in traditional input markets with the income from their downstream digital agriculture services (ATPs).[12] They indeed have the necessary capabilities to dominate the DAS. Vertically integrated input giants exclusively control proprietary input performance data sets,[13] and have wide financial and operational advantages connected to their traditional business networks.[14] They also benefit from a first-mover advantage "*derived from*

for follow-up sectoral regulations within the Data Act proposal, legislator may have thought that the initial relationship between users and IoT manufacturers may show different characteristics from sector to sector and follow-up sectoral interventions can more effectively address the remaining issues with targeted specific provisions.

10 See *Bayer/Monsanto,* n. 5, para. 2555. Although the Commission previously touched upon precision farming in the *Dow/DuPont* decision, the merging parties' digital agriculture operations were not under investigation in that case. See Case No. COMP/M.7932 – *Dow/DuPont*, European Commission Decision (27 March 2017), para 246.

11 beyond the need for accessing farm data sets and complementary climate data. See *Bayer/Monsanto,* n. 5, paras 2712-2714.

12 Ibid. There is an inherent conflict of interests here. On the one hand, upstream conglomerates derive their main income from the sale of inputs. On the other hand, their downstream Smart Farming services claim to provide cost-efficient data-driven solutions to reduce unnecessary input usage.

13 Ibid., paras. 2562-2578, 2715-2738, and 2830-2846.

14 See even earlier evaluations before the *Bayer/Monsanto* decision in Ioannis Lianos and Dmitry Katalevsky, 'Merger Activity in the Factors of Production Segments of the Food Value Chain: – A Critical Assessment of the Bayer/Monsanto merger' (2017) CLES Policy Paper Series 2017/1.

eventual network effects which would raise further the barriers to entry."[15]

Agricultural machinery ('ag-machine') producers are other traditional players in agriculture, and they have potentially strong capabilities to expand into the downstream markets in the DAS.[16] This entails that they can be the main challengers of the vertically integrated input producers in the downstream DAS markets, but the analysis of the Commission demonstrates that they prefer to be collaborators/partners of the digital agriculture operations of the input producers as long as input producers do not enter the machinery market.[17]

Other players' weakness is mentioned in the decision as follows:

> *"The market investigation showed that smaller non-integrated companies such as agricultural input distributors, software companies, agricultural equipment companies or start-ups, lack the required broad capabilities such as the underlying input knowledge (e.g. crop protection products), scale and/or scope, to provide digitally-enabled prescriptions preventing them from exercising an effective competitive pressure..."*[18]

This demonstrates that the downstream operations of the agricultural input producers are the main players in the sector, and other players either prefer not to compete for now or have disadvantageous positions.

The analysis in the *Bayer/Monsanto* case is done for the particular market for the provision of digitally-enabled prescriptions of fungicides for broad acre crops in the EEA,[19] but similar dynamics can be stated as valid for the broader sector, especially when it comes to other input prescriptions markets and beyond.[20] Although it should not be excluded that there might

15 First-movers benefit from positive feedback loops, i.e. more data means better services to attract more users, who provide additional data sets in turn. See *Bayer/Monsanto,* n. 5, paras. 2830-2836.
16 See Can Atik and Bertin Martens, 'Competition Problems and Governance of Non-personal Agricultural Machine Data: Comparing Voluntary Initiatives in the US and EU' (2021) 12(3) Journal of Intellectual Property, Information Technology and E-Commerce Law (JIPITEC) 370, pp. 373-379 for a detailed discussion on the position of machine producers in the DAS.
17 *Bayer/Monsanto,* n. 5, paras. 2769-2775.
18 bid., para. 2750.
19 Ibid., para. 2612.
20 See more detailed analysis in Atik and Martens, n. 16 above.

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be other dynamics in different digital agriculture markets that may bring other players forefront,[21] this general outline regarding the prominent players is provided to better understand the sectoral problems that are explained below.

4.2.2 Main Data-related Concerns in the Sector

The first prominent problem in the sector is the farm data lock-in situations.[22] The first-mover ATPs and/or agricultural machine producers have significant competitive advantages owing to exclusive control over the locked-in farm data sets.[23] There are three underlying reasons behind the lock-ins. The first one is strictly related to the lack of clear enforceable rights over farm data sets.[24] In particular, the absence of undisputed data portability right for non-personal farm data and bargaining power imbalances between farmers and agri-business giants play the main role here.[25] The second one is the lack of interoperability and data standards,

21 For instance, when the provided services require a tech-intensive background, general tech giants may consider initiating digital agriculture operations. See, for instance, the cooperation between Growers Information Services Cooperative and IBM in the US in 'IBM Dashboard - Grower's Information Services Coop' (*Grower's Information Services Coop*, 2022) <https://www.gisc.coop/tools/ibm-dashboard/> accessed 14 July 2022; See also the discussions on the potential of alternative players in the sector in Atik and Martens, n. 16, pp. 391-392.

22 Commission Staff Working Document on the free flow of data and emerging issues of the European data economy accompanying the document communication "Building a European data economy" – SWD(2017) 2 final, p. 28; Harald Sundmaeker and others, 'Internet of food and farm 2020' in Ovidiu Vermesan and Peter Friess (eds), *Digitising the Industry - Internet of Things Connecting the Physical, Digital and Virtual Worlds* (River Publishers 2016), p. 144; Leanne Wiseman, Jan Sanderson, and Lachlan Robb, 'Rethinking Ag Data Ownership. Farm Policy Journal' (2018) 15(1) Farm Policy Journal 71, pp. 71–72; Marie-Agnes Jouanjean and others, 'Issues Around Data Governance in the Digital Transformation of Agriculture: The Farmers' Perspective' (2020) OECD Food, Agriculture and Fisheries Papers No. 146, pp. 17-25.

23 See detailed discussion in Atik and Martens, n. 16, pp. 373-379.

24 Jouanjean and others, n. 22, p. 9; Ines Härtel, *Report on the topic of "European Guidance and Rules for Agricultural Data* (*European Agricultural Data Governance)* (2020), pp. 7-9.

25 See Sundmaeker and others, n. 22, p. 144; Tom Verdonk, 'Planting the Seeds of Market Power: Digital Agriculture, Farmers' Autonomy, and the Role of Competition Policy' in Leonie Reins (ed), *Regulating New Technologies in Uncertain Times* (Springer 2019), pp. 118–119; Can Atik, 'Understanding the Role of Agricultural Data on Market Power in the Emerging Digital Agriculture Sector: A Critical Analysis of the *Bayer/Monsanto* Decision' in Michal Gal and David Bosco (eds), *Challenges to Assumptions in Competition Law* (Edward Elgar 2021), pp. 55 and 67-68; Atik and Martens, n. 16, p. 379.

which entails that even if farmers transfer their data sets, data sets may not be usable in the new service or machine due to technical incompatibility.[26] The third one is related to indirect network effects deriving from positive feedback loops (more users generate an ag-data advantage that can be used to develop better services that attract more users in turn).[27] Even if farmers can legally transfer their data sets and technically use them in the new service or machine, the first-mover advantage deriving from large ag-data (both farm and proprietary data)[28] control constitutes an economic/rational barrier to switch for farmers.[29]

The second connected problem is the fragmentation of ag-data sets[30] and exclusive data exchange agreements amongst already powerful vertically integrated agricultural input producers and machine producers.[31] Fragmentation of data limits the potential of data-driven innovation in the existing markets and even prevents the emergence of new markets based on disruptive innovation.[32] Exclusive data exchange practices of the vertically integrated giants generate insurmountable advantages for their downstream operations, but exclude the small rivals that have limited access to required

26 Jop Esmeijer and others, '*Data-driven Innovation in Agriculture: Case Study for the OECD KBC2-Programme* (TNO Report, 2015) R10154, pp. 24-25; Sundmaeker and others (2016), n. 22, pp. 142-143; Copa-Cogeca, 'Main Principles Underpinning the Collection, Use and Exchange of Agricultural Data' (2016) <https://ec.europa.eu/futurium/en/system/files/ged/main__principles__underpinning__the__collection__use__and__exchange__of__agricultural__data__.pdf >, p. 3; Martina Barbero and others, *Study on emerging issues of data ownership, interoperability, (re-) usability and access to data, and liability* (Deloitte Report, 2016), pp. 229-233; Jouanjean and others, n. 22.

27 See *Bayer/Monsanto,* n. 5, para 2837.

28 There are three important components in the broader concept of agricultural data that is necessary to generate competitive services in the sector: (1) farm data (collected from farms via sensors, machines or directly by farmers for tailor-made agronomic prescriptions); (2) complementary data (such as weather, satellite and other environmental data, including precipitation events, evapotranspiration, and heat unit accumulation); and (3) proprietary data (such as data of an agricultural inputs company about its agronomic products, the results of the field tests and other exclusive information). See *Bayer/Monsanto,* n. 5, para 2453.

29 See more in Atik, n. 25, pp.72-73.

30 Copa-Cogeca, n. 26, p. 3.

31 See detailed examples of exclusive data exchange practices in Can Atik, 'Towards a Comprehensive European Agricultural Data Governance: Moving Beyond the 'Data Ownership' Debate' (2022) 53(5) IIC - International Review of Intellectual Property and Competition Law 701, pp. 706-707. This article is placed as Chapter 5 of this thesis.

32 Ibid.

data sets, and it brings about a risk of the domination of the downstream digital agriculture markets by upstream oligopolistic players.[33]

The third connected problem in the sector is the unanswered ag-data access needs of various other players such as small ATPs and machine producers, data collectors (if not farmers), landowners, agricultural land speculators, banks, insurance companies, data dealers, market operators of agricultural products, or agricultural investors.[34] There are different components of the ag-data[35] that are needed to provide various digital agriculture services and create new ones.[36] Data can also be necessary for any other purpose according to the needs of different access seekers. There might be numerous innovative data usage potentials throughout the farm-to-fork chain and even beyond. This requires good ag-data governance with effective design and allocation of data access rights for third parties according to specific needs.[37]

The fourth problem is farmers' lack of trust in digital technologies due to ambiguities in the possible consequences of sharing data. Farmers mainly fear losing control after sharing data and facing, for instance, targeted exploitative commodity prices that are charged based on data-driven observation of their dependencies.[38] As the EU policy aims to foster the adoption rate of digital agriculture technologies amongst farmers,[39] trust-related problems are waiting to be solved.[40]

33 Ibid; Lianos and Katalevsky, n. 14.
34 Keith Coble and others, *Advancing US agricultural competitiveness with big data and agricultural economic market information, analysis, and research* (FARE Report, 2016), p. 6; See more in Härtel, n. 24, pp. 9-10.
35 See footnote 28 above.
36 See *Bayer/Monsanto,* n. 5, para 2453.
37 See a detailed consideration of the 'ag-data access puzzle' in Atik, n. 31; See also Atik and Martens, n. 16 above.
38 Various sources report farmers' trust-related concerns in this regard. See, for instance, 'Digital disruption on the farm' (*The Economist*, 2014) <https://www.economist.com/business/2014/05/24/digital-disruption-on-the-farm> accessed 14 July 2022; Esmeijer and others, n. 26, pp. 26-27; Jouanjean and others, n. 22; Simone van der Burg, Leanne Wiseman and Jovana Krkeljas, 'Trust in farm data sharing: reflections on the EU code of conduct for agricultural data sharing' (2021) 23 Ethics and Information Technology 185.
39 'EU Member States Join Forces On Digitalisation For European Agriculture And Rural Areas' (*Shaping Europe's digital future*, 2019) <https://digital-strategy.ec.europa.eu/en/news/eu-member-states-join-forces-digitalisation-european-agriculture-and-rural-areas> accessed 14 July 2022.
40 See, in particular, the importance of building trust in ag-data setting in

The following section will provide a comprehensive analysis of the Data Act proposal from the perspective of the DAS by particularly focussing on these prominent concerns in the sector beyond general evaluations regarding the design of the provisions of this recent horizontal regulatory initiative.

4.3 Provisions of the Data Act Proposal and Their Potential Impact on the Emerging Digital Agriculture Sector

4.3.1 Addressing the Farm Data Lock-in Problem

4.3.1.1 Whether Data Act brings clear enforceable rights applicable over ag-data sets

The Data Act provides rights to data access and data sharing with third parties in Chapter II. Although this is an important development, these provisions have some limitations from the sectoral perspective.

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Article 4 has the title of *“[t]he right of users to access and use data generated by the use of products or related services”* and states that;

> *“Where data cannot be directly accessed by the user from the product, the data holder shall make available to the user the data generated by its use of a product or related service without undue delay, free of charge and, where applicable, continuously and in real-time. This shall be done on the basis of a simple request through electronic means where technically feasible.”*

It is valuable to have an explicit data access right, which has functional elements. For instance, the emphasis on “*continuously and in real-time*” is critical for the interoperability of different farm machinery and digital services where applicable as the real-time flow of farm data (for instance, soil data) can be indispensable for multiple services such as irrigation suggestions, fertiliser applications or seeding prescriptions.[41]

Article 5 provides the “[r]ight to share data with third parties”;

‘Stakeholders Dialogue On Common European Data Spaces’ (*Shaping Europe’s digital future*, 2019) <https://digital-strategy.ec.europa.eu/en/library/stakeholders-dialogue-common-european-data-spaces> accessed 14 July 2022, pp. 5-8; See some suggestions to address this in Atik, n. 31.

41 See Atik (2021), n. 25, pp. 61-62 and footnote 155; See some evaluations on the technical part of the issue (interoperability) in Chapter VIII below, and a more detailed proposal for the sector in Atik, n. 31.

> *"Upon request by a user, or by a party acting on behalf of a user, the data holder shall make available the data generated by the use of a product or related service to a third party, without undue delay, free of charge to the user, of the same quality as is available to the data holder and, where applicable, continuously and in real-time."*[42]

This is a natural extension of the right to access under Article 4. The same design is valid here as well. The difference here is the right to direct transfer data to a third party. This is also a critical necessity for functional switching in any data-driven industry, and thus, it is definitely promising for the DAS.

However, there are significant limitations from the DAS perspective mainly owing to the definitions of the core concepts and the formulation of these provisions. Although the notion of 'data'[43] covers both personal and non-personal data sets,[44] the definitions of 'product', 'related service' and 'user' significantly limit the scope of these provisions by considering the fact that users can only enforce the rights over "*data generated by the use of products or related services*", not all data. Related provisions can, therefore, barely unlock farmers from a part of farm machinery data lock-ins.[45]

The notion of 'product'[46] refers to the movable tangible items that generate data concerning their use or environment. This entails that farm machinery may fall under this,[47] but this definition is unlikely to cover any other way of data collection such as embedded sensors in the soil or animals. Also, camera recordings on crop developments or animal behaviours/health

42 Article 5(1); Recital 31 also provides detailed statements on the matter.

43 defined as *"any digital representation of acts, facts or information and any compilation of such acts, facts or information, including in the form of sound, visual or audio-visual recording"* See Article 2(1).

44 This is definitely promising for the DAS as a great majority of ag-data sets as considered non-personal. See section 2 above.

45 However, machine lock-ins are not limited to data lock-ins. High investment in expensive machinery limits the farmers' switch to a better one for years, and data lock-ins can exacerbate this. See Atik and Martens, n. 16, p. 374.

46 defined as *"tangible, movable item, including where incorporated in an immovable item, that obtains, generates or collects, data concerning its use or environment, and that is able to communicate data via a publicly available electronic communications service and whose primary function is not the storing and processing of data"* See Article 2(2).

47 Indeed, Recital 14 clearly declares this by counting agricultural machinery amongst the possible 'products'. Beyond accessing machine-generated data, this can also be useful for aftermarket machine repair services. See Explanatory Memorandum of Data Act, p. 6.

seem outside the scope of the Regulation, especially when considering the statements in Recital 15.[48] Farmers' manual observations that are digitalised later on would not fall within the scope of these data rights, as well. In this regard, the 'product' definition does not undisputedly cover all farm data collection methods in the digital agriculture setting. It is clear that there is, at least, a difference between 'product' generated data and other non-personal data that are outside the scope of the Regulation.

The definition of 'related service'[49] is equally problematic from the perspective of the DAS. It refers to an incorporated or inter-connected service within a product that can only function with this service[50] while digital services provided by ATPs are predominantly unrelated to the function of the farm machines or any other tools that collect data. They (ATPs) process farm data sets collected through any device, sensor, camera or even manually by farmers to provide tailored data-driven solutions, suggestions or prescriptions to farmers.[51] For this reason, with this definition, most of the data stored in first-mover ATPs' databases would be out of the scope of these data access (Art. 4) and data sharing (Art. 5) rights. Recalling that the main actors of the sector are digital agriculture operations (ATPs) of the upstream agricultural input conglomerates,[52] this is a significant limitation from the perspective of farm data lock-ins.

Here, the definition of 'user' is also critical to be mentioned: *"a natural or legal person that owns, rents or leases a product or receives a services."*[53] It is

48 *"In contrast, certain products that are primarily designed to display or play content, or to record and transmit content, amongst others for the use by an online service should not be covered by this Regulation. Such products include, for example, personal computers, servers, tablets and smart phones, cameras, webcams, sound recording systems and text scanners. They require human input to produce various forms of content, such as text documents, sound files, video files, games, digital maps."*

49 defined as "*digital service, including software, which is incorporated in or inter-connected with a product in such a way that its absence would prevent the product from performing one of its functions"* See Article 2(3).

50 Recital 16 have some further clarification in the same direction of this interpretation: *"It is necessary to lay down rules applying to connected products that incorporate or are interconnected with a service in such a way that the absence of the service would prevent the product from performing its functions…"*

51 Sjaak Wolfert and others, 'Big Data in Smart Farming – A review' (2017) 153 Agricultural Systems 69, p. 72.

52 which are alleged to leverage their power to dominate downstream markets and benefit from the first-mover advantage. See section 4.2 above.

53 Article 2(5).

functional to cover both legal and natural persons as entitlement holders as farms may be run by individuals, SMEs or big companies. However, *"that owns, rents or leases a product"*[54] emphasis may further exclude some situations in the sectoral practice. Sometimes, farm machinery is not rented or leased itself, but a service can be taken from the company that owns farm machinery. For instance, a farmer can enter into an agreement with a company, which has a harvesting machine to conduct the harvesting operation, i.e. farmers do not have any direct control over the machine in terms of rent or lease. In such a situation, the machine owner company can access the related data sets from the manufacturer of the devices by using the data rights in Chapter II of the Data Act proposal, but farmers would not have any right to force the machine producer to directly access the related data sets. The given service cannot be considered as a 'related service' as well because this is irrelevant to the function of a 'product' that has been rented, leased or owned by the farmer – it is a sole harvesting operation. Farmers need to ensure to include a clause to indirectly access particular data when entering into a contract with a company that owns the machine and conducts harvesting operations based on free-market conditions. This is already the case before the Data Act intervention for farmer and machine producer relations.[55] When considering the weaker positions of farmers, this may not be possible all the time.

It has to be noted that the 'user' definition may also bring about confidentiality and trust problems. Recital 20 states that in case of an IoT device is owned, rented or leased by multiple parties, they will have equal rights over the collected data. When agricultural machinery is owned by multiple farmers, each owner can access all the data collected from others' fields or barns. Also, when the machine is owned by a cooperative and used by multiple farmers, the cooperative managers can access and share all data sets collected through members' fields or barns.

Beyond the limitations deriving from the definitions, the scope of Chapter II is also clearly restricted by the legislator. Article 7(1) states that the obligations of Chapter II shall not apply to SMEs. This entails that the obligation to make data available to users or third parties upon users' request will not be valid for SMEs. The goal seems to avoid overburdening

54 See the same emphasis in Recital 18.

55 In here same situation is valid for farmer/company (that own/rent/lease the machines) relations.

SMEs with this legislation, so they can grow and compete with bigger actors. However, there is no understandable rationale from the users' perspective to let SMEs lock them in. If a small start-up provides innovative services or products, the users would not leave. Otherwise, users need to flee with their data sets. This is what is expected when there is competition on merit. Protection of inefficient undertakings just because of their size at the expense of consumer welfare[56] is not an option for EU competition policy.[57]

Moreover, it is not clear that the data rights under Chapter II are inalienable. There is no definite statement that prevents users from alienating or waiving the data rights provided by Data Act via contracts. Therefore, one can argue that data rights and/or data control can be contracted out from the users (farmers).[58] By stating *"a party acting on behalf of a user"*, Article 5 generates an additional ambiguity on whether users can assign their rights to other players with contracts (permanently). This may result in a *de facto* loss of control for users (farmers) if companies (ATPs) have contractual clauses to collect these assignments to control

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56 In the context of this analysis, welfare of farmers (as users of Digital Agriculture services and IoT machines) would also affect the final consumers of the agricultural products.

57 See, inter alia, Case C-280/08 P *Deutsche Telekom AG v European Commission*, ECLI:EU:C:2010:603, para 177 and Case C-209/10 *Post Denmark I* ECLI:EU:C:2012:172, paragraph 22 and the case-law cited. Instead, the aim is to protect the 'competitive process' itself to ensure 'consumer welfare'. See Case C-501/06 P *GlaxoSmithKline Services Unlimited v Commission* ECLI:EU:C:2009:610, para 63; Case T-340/03 *France Télécom v Commission* ECLI:EU:T:2007:22, para 266; and Case T-321/05 *AstraZeneca AB v Commission* ECLI:EU:T:2010:266, para 353.

58 One may assume that data rights under Chapter II should be understood as inalienable by arguing that any other reading would make the provisions meaningless. However, in legal interpretation, one cannot add any meaning that does not exist in the text at all. More importantly, other chapters have clear statements to forbid changing the obligations via contracts. See Articles 8(2) and 12(2) in Chapter III as well as 13(8) in Chapter IV. This may even entail that the legislators intentionally kept silent in Chapter II in this regard. In particular, Art. 8(2) may appear to cover the protection of original allocation in Chapter II, however, it is a provision under Chapter III and it only restricts contractual provisions for making the data available between data holders and data recipients, which may result in the exclusion of the user's rights under Chapter II. In other words, it is not for contractual relations between users and data holders or an overarching statement to protect the original allocation of data rights in the Regulation. If the statements (similar to the ones after the first sentence of Art. 8(2)) had been placed at the end of Chapter II clearly, this ambiguity regarding waivability of rights would have not existed. So, at best, it is not crystal clear whether data rights under Chapter II are inalienable (waivable via contracts) or not.

data flows, and this may result in the failure of the regulatory objectives.[59] It is preferable to eliminate the risk by inserting clearer sentences before the Data Act proposal enters into force. If not, sectoral intervention should protect the original allocation of ag-data rights with a better design.[60]

This overall framing is not comprehensive and functional enough from the perspective of the emerging DAS. This means only a part of locked-in farm data[61] in the hands of machine producers will be accessible to farmers if they own, rent or lease the ag-machine. When looking at Recital 14,[62] it is clear that only raw farm data sets can fall under the rights provided by Articles 4 and 5. This means other information derived from raw farm data (such as data-driven suggestions, prescriptions or solutions) are outside the scope of the Regulation.

Taken together, unless the definitions are revised before the Regulation enters into force, a significant amount of farm data sets and connected solutions would not be affected by this Regulation. However, one should not expect a big change in this regard as the Regulation does not target addressing the DAS problems if it needs to be realistic. It is only a horizontal intervention for all sectors. A follow-up sector-specific regulation can be better suited to address all the remaining issues in the DAS.

4.3.1.2 Whether there are provisions to remove technical reasons for the lock-in problem in the DAS

Chapter VIII of the Data Act provides interoperability requirements for operators of common European data spaces (Article 28), data processing services (Article 29), and smart contracts for data sharing (Article 30). As ‘data processing services’ refer to cloud market players and usage of smart contracts[63] is not common practice in the Digital Agriculture sector,[64] only Article 28 will be

59 A similar discussion is provided regarding the detrimental consequences of a data ownership design for farmers’ autonomy in Atik (2022), n. 31.

60 See earlier suggestions for inalienability and un-waivability for ag-data rights in Atik and Martens, n. 16, pp. 383-384 and Atik, n. 31, pp. 718-727.

61 collected through farm machines and their connected services such as applications to track or control the automated farm machinery including milking robots’ control apps or harvesting monitoring apps.

62 “*The data represent the digitalisation of user actions and events and should accordingly be accessible to the user, while information derived or inferred from this data, where lawfully held, should not be considered within scope of this Regulation.*”

63 “*means a computer program stored in an electronic ledger system wherein the outcome of the execution of the program is recorded on the electronic ledger*” See Article 2(16).

64 This research did not encounter any smart contract-related issue between farmers

discussed here because the creation of a common European agricultural data space (CEADS) will be a critical part of the ag-data governance in the EU.[65]

Article 28 regulates the "*[e]ssential requirements regarding interoperability*" to facilitate interoperability of data, data sharing mechanisms and services. It obliges the operators of data spaces to describe "*the dataset content, use restrictions, licences, data collection methodology, data quality and uncertainty",*[66] "*the data structures, data formats, vocabularies, classification schemes, taxonomies and code lists"*[67] or *"application programming interfaces, and their terms of use and quality of service"*[68] These are the minimum requirements for the operators of data spaces, which entails that the details are left to separate interventions for (sectoral) data spaces.[69] Indeed, Article 28 empowers the Commission to adopt delegated acts for further specifying these essential requirements and harmonised standards. The Commission may also provide guidelines for the functioning of common European data spaces.[70] These are all useful provisions to ensure the smooth operation of CEADS.

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However, this Chapter does not apply directly to the *de facto* data holders in the digital agriculture sector (i.e., ATPs or ag-machine manufacturers) as the obligations are imposed on operators of data spaces, not data holder

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and ATP or machine producers with regards to data collection, access or sharing. Blockchain technology and smart contracts are more related to the technology usage in aftermarkets such as digital marketplaces to support the trading of agricultural goods. See, for instance, Guilain Leduc, Sylvain Kubler and Jean-Philippe Georges, 'Innovative blockchain-based farming marketplace and smart contract performance evaluation' (2021) 306 Journal of Cleaner Production.

65 CEADS refers to the Commission's plan to create a sectoral data access hub by combining the existing data pooling initiatives. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A European Strategy for Data – COM(2020) 66 final, pp. 12–13 and 21–23 in general and 31–32 in particular; see also earlier documents Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Towards a common European data space – COM(2018) 232 final and Commission Staff Working Document on Guidance on sharing private sector data in the European data economy accompanying the document communication "Towards a common European data space" – SWD(2018) 125 final. See a detailed discussion on the potential of CEADS to address the sectoral concerns in Atik, n. 31.

66 Article 28(1)(a).

67 Article 28(1)(b).

68 Article 28(1)(c).

69 See the last sentence of Article 28(1) and Recital 79. Article 28(6).

70 Article 28(6).

companies. This does not ensure an industry-wide standard and, therefore, it cannot address the need for farmers to use multiple brands of machines and different services within a single farm operation without facing interoperability barriers. If the Regulation passes as is, the technical side of the farm data lock-in problem is likely to remain largely unresolved. Although interoperability measures applicable to CEADS may indirectly affect the players in the sector as well, a sectoral regulatory intervention has to provide a set of detailed interoperability solutions to ensure farms can use different brands of machines and services at the same time smoothly interoperable to each other, instead of being nudged to buy the entire operation from the same brand/group.[71]

4.3.1.3 Whether other provisions may affect the lock-in problem in the DAS

In Chapter II, Article 6(2)(f) prevents third parties from restricting users to transfer data to another party via contractual commitments. The typical third party in the DAS setting could be ATPs or machine providers, which farmers would like to switch to. In that sense, Article 6(2)(f) may appear to be a useful provision to protect farmers when they want to switch again, especially considering their rights can be contracted out due to the standard terms and conditions of the ATPs or ag-machine manufacturers.[72] However, there is no similar provision to prevent data holders (first-mover ATPs or machine producers) from restricting data transfer in the first instance.[73] Therefore, this is not functional alone to overcome the farm data lock-ins in the hands of the first-mover. Preventing third parties might even be meaningless to a large extent as long as the original data holder can exclusively control the data in the first place. Similar statements can be inserted as obligations for data holders before the Regulation enters into force. As a more functional alternative, the rights under Articles 4 and 5 could have been designed explicitly as inalienable and un-waivable.[74]

In Chapter III, Article 9 regulates *"[c]ompensation for making data available"* for data holders to be paid by data recipients. It is stated that

71 This can only be done effectively if the ag-data rights intervention is designed together with the creation of CEADS. See more detailed discussion on the matter in Atik, n. 31.

72 See trust-related discussions in this regard in section 4.3.3 below.

73 One may argue that Article 5 (right to share data with third parties) itself addresses this possibility. However, there is no open declaration that data rights in the Regulation cannot be contracted out. In other words, it is unclear what happens when users waive or transfer their data rights via contracts.

74 See footnote 60 above.

any compensation shall be ‘reasonable’,[75] it shall not *“exceed the costs directly related to making the data available”* if the recipient is an SME, and the compensation shall not be discriminatory in accordance with Article 8(3).[76] Players, which are bigger than SMEs, have to understand what ‘reasonable’ is based on free contractual relationships. Also, regardless of the compensation amount, it has to be kept in mind that data recipients can pay first, but the access costs might be transferred to users in the end with higher prices depending on how competitive the market is. As one of the concerns is the oligopolistic domination of the emerging markets in the DAS by the upstream input production giants’ downstream digital agriculture operations, compensation costs could have been designed as low as possible in the Data Act if consumer welfare is centralised as a regulatory objective.[77] Having a uniform calculation model, at least, might increase clarity. If the Regulation passes as is, the Commission should provide some guidelines[78] such as the maximum amount to be charged and its calculation methods. Otherwise answering the question of ‘what is reasonable?’ will be one of the open discussions in the post-regulation period.

Article 10 regulates the dispute settlement mechanism regarding “*the determination of fair, reasonable and non-discriminatory terms for … making data available in accordance with Articles 8 and 9.”*[79] The Member States shall certify dispute settlement bodies by ensuring they are impartial and independent, have the necessary expertise in determining FRAND terms, use electronic communication to be easily accessible, and are capable of making swift, efficient and cost-efficient decisions.[80] These bodies shall let conflicting parties express their arguments,[81] and decide within 90 days.[82] These decisions shall only be binding if this is agreed on by the parties before the dispute settlement,[83] and therefore this provision does not preclude parties to apply to courts or

75 Article 9(1).
76 Article 9(2).
77 This is required to prevent higher Digital Agriculture services prices for farmers and to ensure fair prices for final consumers of the agricultural products. However, interests of the data holders are also an important element to take into account here when designing the rules.
78 See similar considerations in Graef and Husovec, n. 5.
79 Article 10(1).
80 See Article 10(2).
81 Article 10(6).
82 Article 10(7).
83 Article 10(8).

tribunals of a Member State.[84] As the dispute settlement process can only be initiated with both of the parties' applications, the first-movers can prefer long judicial processes as a method to deter users. Especially, this can happen whenever switching with related data sets might not be possible till the end of these processes. To exclude the abuse of long litigation processes, the dispute settlement mechanism could have been designed as mandatory. Also, although 90 days dispute settlement process may appear acceptable in general, this time may still constitute an obstacle for some of the users to switch. Without accessing relevant data in the meantime, it may not be possible to receive new (digital agriculture) services as efficiently as before, and this may significantly harm the ongoing (farming) operations. This can particularly happen when the provided data-driven agronomic solutions are highly dependent on accessing and processing historical sets and insights.[85] If the new provider has to wait for the dispute settlement process to access the relevant data sets (e.g., soil data or crop data), the given service (for instance, fertilising solutions) cannot be as precise as it should be. Similar problems can happen for the services (for instance, irrigation prescriptions) that are dependent on real-time data flows from the first-mover data holders (for instance, soil humidity data collected by the soil analysis services) to provide connected services as real-time data access is sometimes critical to ensure smooth operation of different agricultural processes. For this reason, a 90-day waiting time for data access may cause a considerable switching cost for farmers in these kinds of situations. Therefore, there can be a complementary provision to ensure that data access shall always be granted immediately upon users' request to prevent delays and any connected harms to users, and related details such as the amount to be paid can be arranged retrospectively after dispute settlement processes end. This may remove the mentioned risks to the benefit of users.

Another important provision from the farm data lock-in perspective is provided in Chapter IV. Article 13(1) states that;

> *"A contractual term, concerning the access to and use of data or the liability and remedies for the breach or the termination of data related obligations which has been unilaterally imposed by an enterprise*[86] *on*

84 Article 10(9).

85 See the importance of reaching retroactive patterns in Coble and others, n. 34, pp. 87 and 91.

86 defined as *"a natural or legal person which in relation to contracts and practices covered by this Regulation is acting for purposes which are related to that person's trade, business, craft or profession"* See Article 2(8).

a micro, small or medium-sized enterprise[87] *... shall not be binding on the latter enterprise if it is unfair."*

An important issue regarding this article is that the formulation does not contain the restrictive notion of "*data generated by the use of a product or related service"* unlike the provisions in the previous chapters. It is not clear whether this section's scope is broader or if this is just an omission issue. If the text of Article 13 is considered independent of the previous chapters, one can argue that the provisions on unfair terms can be applied to any data-related terms that are imposed on SMEs by a contractual party. This theoretically covers the relationship between ATPs and farmers (as long as they are SMEs). By recalling the limited applicability of the data rights in Chapter II from the DAS perspective, this can be a positive interpretation for the sector because the scope of the unfair terms, at least, would be broader for possible applications in the sector.[88] However, when considering the openly declared scope of the Regulation since the beginning of Chapter I, one can also understand that the word 'data' in Article 13 refers "*data generated by the use of a product or related service".* In this regard, the Regulation should clarify this ambiguity before entering into force – preferably by clearly declaring that the scope of Chapter IV is broader.

Article 13(2) states that *"[a] contractual term is unfair if it is of such a nature that its use grossly deviates from good commercial practice in data access and use, contrary to good faith and fair dealing."* Article 13(3) and Article 13(4) try to be more precise about what is unfair. The former lists three *per se* unfair situations while five presumably unfair contractual terms are listed in the latter. Unilaterally imposed terms[89] by object or effect are *per se* unfair if they (a) exclude or limit the intentional acts or gross negligence liability against SMEs, (b) exclude remedies available for SMEs in case of non-performance

87 as defined in Article 2 of the Annex to Recommendation 2003/361/EC: *"... (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million."* In the context of the agriculture sector, these actors could appear in the form of family farms.

88 Also, these provisions may be helpful to protect users (farmers) from the unfair effects of the 'take-it or leave-it' terms and conditions when recalling the fact that the data rights in Chapter II are not declared as inalienable and un-waivable clearly.

89 *"A contractual term shall be considered to be unilaterally imposed within the meaning of this Article if it has been supplied by one contracting party and the other contracting party has not been able to influence its content despite an attempt to negotiate it. The contracting party that supplied a contractual term bears the burden of proving that that term has not been unilaterally imposed."* Article 13(5).

of contractual obligations or the liability of imposing party for breach of those obligations, and (c) provide the imposing party with an exclusive right to decide whether data supply is compatible with the contract or to interpret any term of the contract in that way. Substantially, these are all valuable for the contractual problems in the DAS, especially when considering that the standard 'take-it or leave-it' terms and conditions are common.

With regards to the presumably unfair terms, Article 13(4)(b)[90] can help to ease farmers' concerns regarding the unintended use of farm data by the companies such as charging higher prices for commodities based on farmers' observable dependencies or undermining their commercial position in any other way.[91] Article 13(4)(c)[92] and (d)[93] can be useful to address the possible contractual terms that limit farmers on the already collected farm data sets. For instance, if a machine producer unilaterally imposes certain clauses to prevent SME farms from using the data generated through their contractual term, these clauses are presumed unfair. In this regard, the provisions in this Chapter are complementary.

However, there are also significant limitations in this protection design from the sectoral perspective;

First, the rules only apply if they are 'unilaterally imposed'[94] on SMEs.

90 *"A contractual term is presumed unfair for the purposes of this Article if its object or effect is to … allow the party that unilaterally imposed the term to access and use data of the other contracting party in a manner that is significantly detrimental to the legitimate interests of the other contracting party."*

91 See the considerations in Chapter II above as well. Recital 25 and Article 4(6) also respond to farmers' concerns in this regard.

92 preventing SMEs (with a unilaterally imposed term) from using the data, which are generated or contributed by the SMEs during the contractual period or limit "*use, capture, access or control such data or exploit the value of such data in a proportionate manner*",

93 preventing SMEs (with a unilaterally imposed term) *"from obtaining a copy of the data contributed or generated by that party during the period of the contract or within a reasonable period after the termination thereof"*

94 Definition of 'unilateral imposition' is provided in Article 13(5). However, recital 52 states that: *"… not all contractual terms should be subject to an unfairness test, but only to those terms that are unilaterally imposed on micro, small and medium-sized enterprises. This concerns 'take-it-or-leave-it' situations where one party supplies a certain contractual term and the micro, small or medium-sized enterprise cannot influence the content of that term despite an attempt to negotiate it. A contractual term that is simply provided by one party and accepted by the micro, small or medium-sized enterprise or a term that is negotiated and subsequently agreed in an amended way*

There can be ways to eliminate unilateral imposition allegations such as adding a claptrap negotiation stage to the contracts. As long as the users (farmers) have limited awareness of the consequences of the contractual clauses, the negotiation procedure might not change the outcome.[95]

Second, the scope is limited with the SMEs and excludes bigger farms that are still exposed to unfair contractual terms with possibly higher detrimental impacts as explained above. Bigger farms' presence as a user of digital technologies is much more than their general representation in the traditional agriculture sector.[96] Therefore, the unfair contractual terms framework in the Data Act would not be applicable to a non-negligible amount of large farms, especially considering the fact that when the farming operations become bigger, they face more switching costs, and this results in harsher data lock-ins for them. Also, having more turnover than SME definition as a farm business does not necessarily create bargaining power vis-à-vis vertically integrated agricultural giants and their standard terms and conditions.

Third, the article can be applied only when the allegedly unfair term is "*concerning the access to and use of data or the liability and remedies for the breach or the termination of data related obligations.*"[97] Article 13(7) states that *"[t] his Article does not apply to contractual terms defining the main subject matter of the contract or to contractual terms determining the price to be paid."* This brings another layer of ambiguity about which clauses are the main subject matter and are out of the scope of these provisions. This can be used as a

between contracting parties should not be considered as unilaterally imposed."

95 See some considerations on farmers' attitude in this regard in Jouanjean and others, n. 22, p. 9 and Härtel (2020), n. 24, pp. 7-9; A research shows that 74% of Australian farmers were not aware of the terms and conditions of their digital service providers. See Leanne Wiseman and others, 'Farmers and their data: An examination of farmers' reluctance to share their data through the lens of the laws impacting smart farming' (2019) 90-91(1) NJAS: Wageningen Journal of Life Sciences, p. 3.

96 The findings demonstrate that "*farm size has the largest average importance, followed by education…*" when it comes to the question of who adopts digital technologies most in the agriculture sector. See in Linmei Shang and others, 'Adoption and diffusion of digital farming technologies - integrating farm-level evidence and system interaction' (2021) 190 Agricultural Systems, p. 12.

97 Article 13(1). See also Recital 53: *"Furthermore, the rules on unfair contractual terms should only apply to those elements of a contract that are related to making data available, that is contractual terms concerning the access to and use of data as well as liability or remedies for breach and termination of data related obligations. Other parts of the same contract, unrelated to making data available, should not be subject to the unfairness test laid down in this Regulation."*

gap to keep users (farmers) locked in. Without imposing restrictions on data transfer, the companies (data holders) can put penalty clauses for the termination of contracts, and farmers can technically transfer data, but the lock-in situations may continue in practice.[98]

Taken together, the Data Act proposal brings valuable provisions as a starting point at the horizontal level, but they might not be adequate to eradicate all the lock-in situations in the DAS (and possibly other sectors as well).

4.3.2 Addressing Data Fragmentation and Broader Data Access Puzzle in the DAS

The Data Act proposal has provisions regarding data access (Art. 4) and share data with third parties (Art. 5) upon users' individual requests for specific data sets. However, it does not provide any mandatory way for direct access seekers to let them reach wide data sets without users' specific requests. This is particularly important from the broader data access puzzle perspective. Data access needs are not limited to the switching purposes of farmers in the DAS. Various third parties may also request access to big ag-data sets for different purposes. Although providing rights to share data with third parties upon users' requests may help to ease the data fragmentation in the sector to a certain extent, it is difficult to state that the broader data access puzzle in the DAS is fully addressed by this intervention.

Even for voluntary data sharing between companies, there are contradicting statements in the Recitals. For instance, Recital 31 states that "*[d]ata generated by the use of a product or related service should only be made available to a third party at the request of the user.*"[99] A contrary statement denies this in Recital 38 with the following clear sentence though: "*[v]oluntary data sharing remains unaffected by these rules.*" To evaluate altogether, the actual framing in the Data Act seems that mandatory third-party data access can only be realised upon users' request, but this does not necessarily mean voluntary non-personal data exchange is forbidden. At the same time, the first sentence of Article 4(6) states that "*The data holder shall only use any non-personal data generated by the use of a product or related service on the basis of a contractual agreement with the user.*" This may be interpreted to cover

98 Of course, imposing such unilateral clauses are subject to provisions of the general contract law or other relevant rules, and they may not be valid.

99 This is in line with the restrictive first sentence of Article 4(6). See a detailed discussion regarding this provision in section 4.3.3 below in the context of farmers' trust.

the voluntary sharing of the data with third parties. In this regard, it can be stated that voluntary sharing of data from data holders to other players (without users' individual requests) can be possible if this is stated in their contracts with users. It is not clear though whether particular data re-use conditions should be specified in detail, whether a general clause about letting data holders share data with third parties will be valid or whether users can withdraw their "consent" unilaterally, later on, like in the GDPR regime. One can only interpret the second sentence of Article 4(6) in a way that the data holder should ensure that the data re-use shall not harm the commercial position of users in any case.[100] Still, this is a confusing design and highly restrictive in terms of third-party access possibilities. As hinted above, this might not be compatible with the broader data access needs in the sector and also the free flow of data policy aim in the EU. As long as the re-use does not harm the user, data could have been more easily used for any other purposes because broader data access is likely to affect the data economy positively via data-driven innovation.

Another limitation regarding data sharing under Chapter II of the Data Act derives from Article 5(2) that excludes 'gatekeepers' defined in the Digital Markets Act[101] (DMA) from eligible third parties, who can access data under the right to share the data with third parties. It also prohibits gatekeepers from incentivising users in order to accumulate data. Obviously, the concern here is the risk that powerful players would hoover up all the data by using various methods that would be contrary to the aim of this Regulation. The same concern is valid for the DAS as bigger companies have more incentives and abilities to accumulate ag-data.[102] Therefore, it is critical to identify whether vertically integrated agricultural giants can be considered 'gatekeepers'. The notion of 'gatekeepers' refers to core platform services listed in Article 2.2 of the DMA, and traditional input giants, ATPs or ag-machine manufacturers seem not to fall under any of these definitions.[103]

100 *"…The data holder shall not use such data generated by the use of the product or related service to derive insights about the economic situation, assets and production methods of or the use by the user that could undermine the commercial position of the user in the markets in which the user is active."*

101 Proposal for a Regulation of the European Parliament and of the Council on contestable and fair markets in the digital sector (Digital Markets Act), COM(2020) 842 final, 15.12.2020.

102 See a detailed discussion on the matter in the context of possible implications of ownership right design in the sector in Atik and Martens, n. 16, pp. 382-384. See also section 4.2.1 above.

103 See similar considerations in this regard in Ibid., p. 394.

Therefore, a similar design may need to be included in future sectoral intervention to ensure that ag-data would not be accumulated in the hands of a few agricultural conglomerates – beyond the necessity of inalienability design for farm data rights to protect original allocation.

Article 6 regulates *"[o]bligations of third parties receiving data at the request of the user";*

> *"A third party shall process the data made available to it pursuant to Article 5 only for the purposes and under the conditions agreed with the user, … and shall delete the data when they are no longer necessary for the agreed purpose."*[104]

This is a clear purpose limitation obligation for third parties. It has to be noted that such an obligation can also stand in the way of combining datasets for new purposes, which is key for data-driven innovation in the sector. As explained above, data re-use possibilities in the Data Act proposal are already restricted. The difference here is the data deletion obligation for third parties as a further restriction. Although this may generate a positive impact on the trust of users (farmers) by relieving their fear of unintended data re-use, this erects an additional barrier before data re-use possibilities in the DAS. This may also result in data losses in exceptional situations. Whenever the data is lost by the data holder for any reason and the data is deleted by the third party due to this obligation, there might be user harm owing to the deleted data sets. In this regard, any company (regardless of the original data holder or third-party recipient), which holds data sets, should first take explicit confirmation from the user before the destruction of data sets.[105] This, at least, could be reconsidered before the Regulation enters into force even if the legislators insist on the restrictive approach regarding data re-use conditions.

Article 6(2)(e)[106] is a restatement of Article 4(4) (that prevents users from developing a competitive product by using the accessed data) in the context

104 Article 6(1).

105 See a discussion on purpose limitation and its (in)appropriateness in the context of non-personal ag-data, including the data deletion obligations in Atik and Martens, n. 16, p. 388.

106 *"The third party shall not: … use the data it receives to develop a product that competes with the product from which the accessed data originate or share the data with another third party for that purpose…"*

of third-party data access.[107] It is difficult to see what these provisions really aim to achieve especially when considering that Chapter II brings provisions to unlock data sharing at the business-to-consumer and business-to-business levels. Article 4 and Article 5 regulate data access and sharing with third parties upon the request of users to ensure smooth switching. Indeed, one of the objectives of the Data Act proposal is to foster data access while keeping incentives for data generation.[108] However, these provisions (Article 6(2)(e) and Article 4(4)) seem to serve only the latter. The legislator might have considered that easy access to data sets can generate free-riding, which reduces data collection and innovation incentives. However, both of these provisions are about user-generated data, which can only be accessed or shared upon the request of individual users. There is no risk of opening up all the data sets of the existing players. It is unlikely to destroy the data collection or innovation incentives in this regard.[109] Contrarily, the possibility of users switching to new entrants can stimulate existing players to invest more in data collection and innovation to keep users inside based on merit. This limitation of the right to transfer (with a kind of a 'new product test'[110] for new entrants) can only serve to keep entry barriers as is while reducing the expansion barriers of existing rivals, and this distinction makes no sense from the perspective of competition policy. To foster competition and innovation in emerging the DAS, new entries might even be considered more important than rivals' expansion within the existing market. Therefore, this approach further limits the potential of

107 It is noteworthy to mention the wording of these clauses. The forbidden action is developing a competing 'product'. This may entail that developing 'related service' is out of the scope of these restrictions. See also Recital 35. It is not clear whether this is only an omission or an intentional choice. If the latter is the case, there is no hint regarding the reason behind this distinction.

108 Recital 28.

109 See Kerber, n. 5 above for a detailed evaluation of the Data Act from the perspective of the general incentive problem regarding underinvestment in the generation of IoT data even though he did not mention this specific criticism against the design of Article 6(2)(e).

110 New product condition is an additional criterion when evaluating whether a dominant undertaking abused its dominant position by refusing to deal with a downstream rival. If other conditions are all met, granting access to an essential facility (that is protected by intellectual property rights) can be possible if the access seeker generates a new product, for which there is considerable consumer demand. See, for instance, Case C-241/91 P *Radio Telefis Eireann and Independent Television Publications Ltd v Commission of the European Communities (Magill)*, ECLI:EU:C:1995:98, paras. 50-58; Case C-418/01 *IMS Health v NDC Health*, ECLI:EU:C:2004:257, paras. 38-45; See also Case T-201/04 *Microsoft Corp. v Commission*, ECLI:EU:T:2007:289, para 643-647 for a more lenient application.

the Data Act in the sector. This should be fine-tuned before the Regulation enters into force. If not, the possible future follow-up sectoral intervention should not limit such a re-use possibility for ag-data sets to let new players in more easily.

Chapter III starts with Article 8 on *"[c]onditions under which data holders make data available to data recipients".* Article 8(1) mainly obliges data holders[111] to be fair, reasonable and non-discriminatory as well as transparent when making data available to data recipients[112] under the provisions of Article 5 or any other (future) regulation that mandates data sharing. Article 8(3) forbids data holders discriminatory actions between their own enterprises[113] and other data recipients when making data available: *"...it shall be for the data holder to demonstrate that there has been no discrimination."*[114] Article 8(4) states that *"[a] data holder shall not make data available to a data recipient on an exclusive basis unless requested by the user under Chapter II."* These provisions could have theoretically been an *ex-ante* cure against exclusive control of proprietary input performance data sets[115] if they had been designed broadly, but Article 8 regulates the data (generated by the use of a product or related service) sharing situations under Article 5, which is based upon users' requests. Therefore, conditions for direct access to wide farm data sets by third parties or accessing proprietary agricultural input's performance data controlled by vertically integrated giants should be regulated in a sectoral regulation with more effective and targeted provisions to make the balance

111 defined as *"legal or natural person who has the right or obligation, in accordance with this Regulation, applicable Union law or national legislation implementing Union law, or in the case of non-personal data and through control of the technical design of the product and related services, the ability, to make available certain data"* See Article 2(6).

112 defined as *"a legal or natural person, acting for purposes which are related to that person's trade, business, craft or profession, other than the user of a product or related service, to whom the data holder makes data available, including a third party following a request by the user to the data holder or in accordance with a legal obligation under Union law or national legislation implementing Union law"* See Article 2(7).

113 *"'enterprise' means a natural or legal person which in relation to contracts and practices covered by this Regulation is acting for purposes which are related to that person's trade, business, craft or profession"* See Article 2(8).

114 Recital 41 states that *"[i]t is not unlawful discrimination, where a data holder uses different contractual terms for making data available or different compensation, if those differences are justified by objective reasons."* This is very close to the abuse of dominance defence model. It seems that the data holders are considered a dominant player in terms of exclusively controlling the necessary data sets.

115 that are about input performance data, which are necessary to provide competitive services, especially in markets for input usage prescription services. See section 2 above.

between more data access and protecting investment incentives to ensure sector-specific objectives.[116]

Article 11(2) provides that in case of unauthorised data access, the data recipient shall destroy the data sets and stop all related business activities developed based on this unauthorised access. The latter sanction shall not apply if such data use did not generate significant harm to the data holder or if such a strict imposition on data recipients would be disproportionate compared to the data holder's interests.[117] This is an attempt to create a balance between sanctioning unauthorised access to data and not being too destructive. Although the rationale seems to protect users from unauthorised access to 'their' data, the formulation of the provision centralises the commercial interests of the data holders and penalises the commercial activity if that is detrimental to the one conducted by the data holder. The framework seems reasonable at first sight, but centralising the commercial interests of the data holders instead of users' confidentiality in the design of the provision is an interesting choice. Also, the statements are too open. Especially, it is not clear what unauthorised data access really is. One can assume any access without users' request would be considered unauthorised, but the data holder centric design of the provision may be interpreted in a way that this can be any access without the data holders' confirmation.[118] More importantly, there is no clear test to evaluate whether such unauthorised re-use caused 'significant harm' to data holders and whether the destruction of the business built on the unauthorised access is 'proportionate' or not. The Commission may publish guidelines for these details, but clarification of all the matters may take several years to have precedents via judgements. Such harsh sanctions for unauthorised re-use should only be exercised in really exceptional conditions.

4.3.3 Addressing Trust-Related Problems in the DAS

Article 3 provides an *"obligation to make data generated by the use of products or related services accessible"*;

116 See a proposal in this regard in Atik, n. 31 (Chapter 5 of this thesis below).

117 Article 11(3).

118 As explained in section 4.3.1.1 above, Article 9 regulates that a reasonable compensation shall be paid to the data holder for the data access. This means, accessing data without paying compensation may also be considered unauthorised access.

> *"Products shall be designed and manufactured, and related services shall be provided, in such a manner that data generated by their use are, by default, easily, securely and, where relevant and appropriate, directly accessible to the user."*[119]

Imposing such a clear obligation on the product (ag-machine) manufacturers is certainly a positive development for the DAS. Article 3(2) states that *"[b]efore concluding a contract for the purchase, rent or lease of a product or a related service, at least the following information shall be provided to the user, in a clear and comprehensible format"*, and lists the details of this disclosure obligation such as data access conditions, possible third-party access or communication channels with data holders. These could all be useful to increase farmers' trust as far as they are applicable to them due to the limitations explained above.

Article 4(6)[120] brings important obligations to data holders that are relevant from the perspective of farmers' concerns about, for instance, undesirable re-use of farm data to increase the prices of commodities, agricultural inputs or land rental prices based on their dependencies.[121] Indeed, it is not difficult to notice that this provision is written based on the farmers' concerns when looking at Recital 25 of the Regulation.[122] No doubt that this is an improvement for the sector, especially to increase farmers' trust in data sharing despite the explained limitations in the design of the core notions. However, as discussed in the above section, the first sentence of Article 4(6)[123] limits all the data re-use possibilities with contractual

119 Article 3(1).

120 *"...The data holder shall not use such data generated by the use of the product or related service to derive insights about the economic situation, assets and production methods of or the use by the user that could undermine the commercial position of the user in the markets in which the user is active."*

121 See more in Sykuta, n. 6, pp. 64-65, and 70-71; Neal Rasmussen, 'From Precision Agriculture to Market Manipulation: A New Frontier in the Legal Community' (2016) 17 Minn. J.L. Sci. & Tech. 489, pp. 511-515; Barbero and others, n. 26, p. 224; Jouanjean and others, n. 22, p. 7.

122 *"This would, for instance, involve using knowledge about the overall performance of a business or a farm in contractual negotiations with the user on potential acquisition of the user's products or agricultural produce to the user's detriment, or for instance, using such information to feed in larger databases on certain markets in the aggregate (,e.g. databases on crop yields for the upcoming harvesting season) as such use could affect the user negatively in an indirect manner."*

123 *"The data holder shall only use any non-personal data generated by the use of a product or related service on the basis of a contractual agreement with the user..."*

clauses unnecessarily. The remaining part of the provision[124] could have been enough to address concerns of unintended data re-use with a relatively clearer scope: undermining the commercial position of the user. Connecting all the re-use possibilities at the users' discretion might not be the best way of regulation from the perspective of the DAS when considering the need for broader data access in and out of the farm-to-fork chain.[125]

Article 6(2) prohibits third parties from *inter alia* (a) acting in a coercive, deceiving or a manipulative way to limit autonomy, decision making or freedom of choice of users, (b) using the data for profiling individuals by referring to GDPR, (c) transferring data to another third party unless it is necessary for providing services to the user. Without prejudice to the points argued above,[126] these obligations can be useful to build trust amongst farmers even if they are only imposed on third parties when it comes to their relations with users. There is no rationale for excluding data holders from these obligations. Similar obligations could have also been imposed on the data holders, who have the first contractual relationship with users.[127]

In particular, the emphasises on autonomy, decision making and choice in Article 6(2)(a)[128] can be interpreted in light of the statements in Recital 34 regarding dark patterns,[129] and this would certainly be useful for possible problematic actions in the DAS as well. For instance, if downstream operations of upstream input producers suggest their own brand agricultural

124 See footnote 120 above.

125 See similar considerations about the consent provisions of EU and US voluntary codes of conduct in this regard in Atik and Martens, n. 16, pp. 384-386.

126 This is also restricted with data generated by the use of a product or related service as the provision refers to data sharing under Article 5.

127 One can argue that Article 5 (the right to share data with third parties) fulfils a role in making data holders behave similarly, but provisions in Articles 3, 4 and 5 are not equally functional as what is proposed here with particular and detailed obligations. Also, it is not clear whether the data rights can be contracted out from the original entitlement holders as discussed above.

128 *"The third party shall not ... coerce, deceive or manipulate the user in any way, by subverting or impairing the autonomy, decision-making or choices of the user, including by means of a digital interface with the user."*

129 *"... third parties should not rely on so-called dark patterns in designing their digital interfaces. Dark patterns are design techniques that push or deceive consumers into decisions that have negative consequences for them. These manipulative techniques can be used to persuade users, particularly vulnerable consumers, to engage in unwanted behaviours, and to deceive users by nudging them into decisions on data disclosure transactions or to unreasonably bias the decision-making of the users of the service, in a way that subverts and impairs their autonomy, decision-making and choice."*

4

inputs (seed, pesticide or insecticide) without a legitimate reason over alternative brands (self-preferencing) or if they suggest farmers to use more input than needed so as to increase their upstream sale, this provision can be considered as breached. However, the provision is only for third parties, who access data upon users' requests. If the scope of this obligation is extended from third parties to all data holders before the Regulation enters into force, the potential impact on the sector would increase.

Chapter IX starts with Article 31 on competent authorities by stating that '*Each Member State shall designate one or more competent authorities as responsible for the application and enforcement of this Regulation…'*[130] The article also clearly declares that *"for specific sectoral data exchange issues related to the implementation of this Regulation, the competence of sectoral authorities shall be respected"*[131] This entails that an ag-data authority can be created to be responsible for the enforcement of the Data Act in the sector and also potentially for the enforcement of future follow-up sectoral ag-data regulation.[132] This might also be useful to increase trust among the players in the DAS if it is designed diligently to address sectoral concerns.

Article 31(3) sheds more light on the competent authorities' tasks and powers such as *"handling complaints arising from alleged violations…"* or *"imposing, through administrative procedures, dissuasive financial penalties."* It is critical to have the power of financial penalties for the sake of ensuring wide compliance with the proposed rules and obligations. It is understandable that the legislator intentionally designed the intervention power of these authorities limited to financial penalties and leaving competition oversight to the Commission and the National Competition Authorities, which have the power of imposing broader remedies. Having, at least, the financial penalty tool against breachers could be useful to increase trust among users (farmers). Article 33 leaves the regulation of penalties to the Member States by providing generic statements including *"[t]he penalties provided for shall be effective, proportionate and dissuasive"*[133] and *"Member States shall … notify the Commission of those rules and measures … without delay of any subsequent*

130 Article 31(1).
131 Article 31(2)(b).
132 Explanatory Memorandum of Data Act, pp. 5, 15; Recitals 25, 79, 87; and more importantly Article 40(2); See, in particular, Recital 81: "*…competent authorities designated under sectoral legislation should have the responsibility for application of this Regulation in their areas of competence.*"
133 Article 33(1).

amendment affecting them."[134] However, there is no clear framework about maximum or minimum fines or calculation methods that the Member States can follow when regulating at the national level. This may result in coherence issues and dissatisfaction of users (farmers) in certain Member States if there are very different sanctions for the same action across the Member States. Even if the legislators do not prefer to impose uniform fines for all Member States, they should, at least, provide a follow-up guideline for the Member States to ensure the coherent application of the Data Act within the EU.

Article 31(4) states that a national coordinating competent authority can be constituted in case of multiple authorities are designated by the Member States. This is really important to ensure consistent enforcement and smooth cross-sectoral data flow at the national level. However, to ensure coherence, there should also be an EU-wide coordinating competent authority to ensure smooth cross-border data flow. Also, a sectoral coordinating authority (or a body under the general coordinating authority) may be created for the EU-wide coordination of sectoral competent authorities. That may also be responsible for the smooth enforcement of the future ag-data rules within the EU. These can be fine-tuned before the Regulation passes. If not, the sectoral intervention, at least, should carefully consider this mechanism for the sake of coherent ag-data governance across the EU for the sake of functional enforcement and, thus, to increase trust in the sector.

Article 34 provides that *"[t]he Commission shall develop and recommend non-binding model contractual terms on data access and use to assist parties in drafting and negotiating contracts with balanced contractual rights and obligations."* If the Commission provides some model contracts, especially for the most prominent DAS services,[135] this may create a kind of reference for, at least, new farmers when choosing an ATP or ag-machine. Also, this may create indirect pressure for the digital agriculture players to comply with the model terms to maintain their reputation in the sector. However, this can only be fully functional when market conditions force companies to adopt these model contracts such as via competition on better terms and conditions. This possibility should not be excluded from the DAS as the digital transformation of farms is an ongoing process in Europe and new

134 Article 33(2).

135 Recital 83: *"the Commission should develop and recommend non-mandatory model contractual ... taking into account the conditions in specific sectors and the existing practices with voluntary data sharing mechanisms."*

'digital farms' may prefer ATPs or ag-machines, which provide terms and conditions in line with the model terms. If the expected profits from new customers (farms) are more than the exclusive exploitation of data sets, more ATPs and machine producers may join the competition on better terms. One may expect that the fate of the already locked-in farmers is dependent on this trend. However, it has to be noted that there is no clear incentive for first-movers to change earlier contracts, and thus, the possible effects of a trend to have better terms may not be enough to unchain existing digital farmers retrospectively.[136] In that case, the remaining concerns should clearly be solved by the follow-up sectoral regulation.

4.4 Summary and Findings

The Data Act proposal has several provisions to address different angles of the problems in the data economy. However, the definitions of the core notions and the scope of the provisions are highly limited from the perspective of the DAS. It seems there is an apparently intentional choice of keeping the scope of this horizontal intervention restricted to the basic principles. Indeed, there are many signals for future sectoral interventions with more detailed rules to achieve sector-specific regulatory objectives later on. Until then, this intervention can only partly ease the sectoral problems in the DAS.

From the perspective of data lock-ins, data access (Article 4) or data sharing (Article 5) rights are critical, but they are only valid for *"data generated by the use of a product or a related service."* Definitions provided for 'product' and 'related service' limit the application of these provisions in the DAS setting significantly. Farm data sets that are locked in the first mover ATPs, which are independent of products (farm machinery and other IoT devices), seem unaffected by these provisions. Also, the 'user' definition is not comprehensive enough from the DAS perspective. The data rights in Chapter II are granted to 'users', who purchase, rent or lease the products or related services from the manufacturers of the IoT devices. This further limits the potential of data rights in the sectoral setting. Only machine-generated farm data sets fall under these very limited definitions if the farm data is collected by an agricultural machinery that is owned, rented or leased by the farmer from the manufacturers. Farmers would not have any right to force machine

136 Still, if there will be a strict competition on the better terms, some firms may prefer to revise their contracts retrospectively to align all their contracts with the better terms. After Data Act enters into force, this may also be considered as a matter of compliance.

manufacturers to access or share data if the data is collected via others' (such as contractors or cooperatives) machinery. Other ag-data collection and storage practices are also outside the scope of the Regulation. There can also be practical problems due to the 'user' definition. For instance, in case of multiple ownership over an IoT device, everyone can access data sets, which may create confidentiality issues. Also, a new operator of a field may not claim any rights on historical farm data sets unless it acquires the legal person that runs the farm including the ownership of IoT devices in it. Also, it is not fully clear who has which rights over historical data sets when the IoT device is sold separately. Beyond the limitations deriving from the restrictive definitions, there are some ambiguities owing to the design of the provisions in the Regulation. It is not clearly declared that the data rights proposed by the Regulation are inalienable or un-waivable. In markets where bargaining power imbalances are prominent like the DAS, this may generate unintended results as powerful players can hoover up the control of data or may prevent users (farmers) to use such rights effectively. [137] Also, the provisions in Chapter II are not applicable to data holders if they are SMEs.[138] This means users (farmers) cannot enforce their access or portability rights vis-à-vis small service providers such as start-ups. However, it is not reasonable to let small players lock users in. For the technical side of the farmers' lock-in problem, the Regulation provides the essential horizontal requirements for the operators of (sectoral) data spaces towards interoperability.[139] Operators of CEADS will need to follow them, but there is no direct obligation to ensure interoperability amongst the services of ATPs and ag-machines. Also, Chapter IV provides valuable provisions regarding the invalidity of unilaterally imposed unfair terms vis-à-vis SMEs. Although this might help SME farms to overcome some of the problems connected to standard terms and conditions, bigger farms in terms of size adopt digital technologies more than small-scale ones[140] and they will not be able to benefit from these provisions when they exceed the definition of SME. Beyond that, 'unfairness' is not clearly defined and this uncertainty is likely to be solved by courts in time.[141] Taken

137 See similar discussions in the context of ag-data ownership in Atik and Martens, n. 16, pp. 382-383 and Atik, n. 31; Instead, it has been argued that inalienable data entitlements should be linked with the particular 'farm unit'. See Atik, n. 31, pp. 719-722.

138 Article 7(1).

139 See Article 28.

140 Shang and others, n. 96, p. 12.

141 The certainty can be more easily achieved for *per se* unfair terms provisions (Article 13(3)) though. For the remaining issues, the Commission may need to release guidelines to increase clarity.

together, although the horizontal Data Act provides progressive rules and rights for data-driven industries including the DAS, there are significant limitations and ambiguities when it comes to their potential application to the lock-in problems in the sector owing to the explained reasons.

With regard to the problems of the broader data access puzzle,[142] there is no provision regarding direct access to broader data sets by third parties without users' individual requests. Third-party access to (farm) data can only be possible upon the requests of users (farmers) for the specific data sets generated through ag-machines and their related services.[143] In this regard, various players' direct data access needs for broader data sets to enhance innovation remain unaddressed.[144] Even for the specific data access upon users' requests, there are some limitations. For instance, Article 6(2)(e) and Article 4(4) prevent re-using data to develop a competitive product. This limitation of the right to data sharing can only serve to keep entry barriers as is while reducing the expansion barriers of existing rivals, and this distinction makes no sense from the perspective of competition policy. Also, conditions for the voluntary data exchange between data holders are not crystal clear as relevant Recitals and provisions are open to possibly different interpretations. It seems voluntary data sharing/exchange can only be possible when the data sharing is stated in the contract between data holders and users, but no details are provided on whether users can change their minds later on or whether there will be a 'consent' mechanism like the GDPR regime.

Another concern in the sector is the exclusive data exchange practices amongst already powerful agricultural giants, which generates insurmountable data advantage for them, but results in exclusionary outcomes for weaker rivals and new entrants.[145] Chapter IV provides some obligations on data holders to be transparent and non-discriminatory when sharing data. This may seem useful for access seekers, but the scope of the obligations is limited to situations of data sharing upon users' requests

142 See section 4.2.2 above.
143 Regarding the public access to ag-data sets to realise related policies, Chapter V (Article 15(c)) provides a legal base, but it is designed for exceptional situations.
144 See similar considerations for the broader IoT data in Kerber, n. 5, p. 23. This is also strictly related to the farmers' lock-in problem as one of the reasons behind this is indirect network effects and first-mover advantage. Without clear channels of direct access to data for rivals, new entrants might not be competitive enough vis-à-vis first-movers.
145 See section 4.2.2 above.

and unilateral imposition of the contractual clauses against SMEs. This means data holders are free (not) to grant access to weaker downstream rivals when they request direct access to wide data sets.[146] Even if vertically integrated players grant access to farm data to their own downstream operations, they are not obliged to enter into a contract with downstream rivals on equal terms. Also, proprietary data sets (referring to performance data of agricultural inputs) controlled by upstream input producers do not fall under the Data Act provisions. This means exclusive data exchange practices amongst big players and their downstream subsidiaries in the sector are largely unaffected as well.

When it comes to the question of whether this horizontal intervention can build trust in the DAS (especially amongst farmers), there is more targeted progress compared to the other problems in the sector. Article 4(6) prohibits data holders from using data to undermine users' commercial operations. Although this is also only valid for '*data generated by products or related services'*, this kind of targeted provision would increase farmers' trust. Another possibility to build trust can be connected to the idea of creating competent authorities to process complaints and issue penalties.[147] However, Article 33(1) leaves the regulation of penalties to the Member States without framing enough boundaries. This may cause coherence issues. Finally, Article 34 states that the Commission will develop non-binding model contractual terms that may also be useful to increase farmers' trust to adopt digital technologies and to share data despite the fact that these kinds of soft tools can only function when the benefits of adopting voluntary practices exceed the rent deriving from the exclusive control of data for companies.

Taken together, some provisions should be fine-tuned before the Regulation enters into force while some issues can be more effectively addressed by a follow-up sectoral intervention. On the one hand, *inter alia* this paper particularly suggests inserting clear statements in Chapter II to declare that data rights are inalienable, and they cannot be assigned to third parties, transferred or waived via contracts. Also, relevant obligations for third parties in Article 6 should be valid for the data holders in the first place. This would not only increase the effectiveness of the obligations, but also help build trust

146 This is fundamentally different from individual users' requests to transfer their specific data.

147 Article 31; Also, Article 31(2)(b) declares that sectoral authorities may be created to be responsible for sectoral data exchange.

amongst farmers. The restrictive approach in Article 6(2)(e) and Article 4(4) should particularly be re-evaluated for the sake of reducing entry barriers. Dispute settlement under Article 10 can be made mandatory and access and data sharing rights should be enforced without waiting for 90 days. Thus, switching might be more functional with immediate data access. Beyond specific provisions, EU-wide coordination of competent authorities and coherent enforcement should be ensured with additional clarifications. On the other hand, follow-up sectoral intervention can better design/allocate ag-data access rights for both farms and other prominent access seekers in the sector, and it can impose tailored interoperability obligations for ATPs and machine producers by taking into account distinct sectoral conditions.[148] Also, designing additional sector-specific provisions regarding unfair terms to cover remaining situations in the DAS can be more useful instead of expecting changes in the horizontal rules in Chapter IV of the Data Act just because of the sectoral needs.

In sum, the DAS will be affected by these horizontal provisions positively, but the Data Act is inadequate to remove all the sectoral issues alone as some of the underlying problems that cause high entry/expansion barriers and, thus, anti-competitive risks in the sector will remain a large extent. Revision of the related provisions and definitions can be an option before the Regulation enters into force to increase their functionality for the DAS if this would not result in detrimental consequences for other sectors. However, it is difficult to expect a huge change in this horizontal proposal just because of the identified limitations in one sector. A follow-up sectoral intervention should address all the remaining issues with targeted specifications according to the sectoral needs in future without harming further investment and innovation incentives in the sector.

It should be noted that the Data Act will apply 12 months later than its entry into force[149] and possible follow-up sectoral regulatory interventions will come much later on. First-movers may use this time to reinforce their positions with more aggressive actions by considering that some really strict rules are coming to regulate the market failures that they benefit from. If this happens, traditional competition law enforcement would become much more important during this time.[150]

148 See a proposal in this regard in Atik, n. 31, 718-733.
149 See Article 42.
150 despite its own limitations. See more evaluations on the matter in Chapter 6 of this thesis below.

CHAPTER 5

Towards Comprehensive European Agricultural Data Governance: Moving Beyond the "Data Ownership" Debate

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5.1 Introduction

The Internet of Things (IoT) revolution has influenced various industries and has been transforming both companies and competition.[2] The agricultural sector is one of the affected industries. Today's agricultural practices are becoming densely data-driven[3] with the proliferation of digital technologies and IoT systems in the farm setting.[4] Thus, farmers are able to make agronomic decisions more accurately.[5] Data-driven analytics are used, for instance, to track crop developments, to diagnose (or even predict) plant diseases, to estimate harvesting times and to determine the right time for inseminating livestock, as sensors are much more sensitive and precise than human observation.[6] This technological transformation has led to a paradigm shift from traditional agricultural decision-making to data-driven "smart farming",[7] and created the digital agriculture sector (DAS),[8] in which agricultural technology providers (ATPs)[9] equip farmers with data-driven

2 See Michael E. Porter and James E. Heppelmann, 'How Smart, Connected Products Are Transforming Competition' (*Harvard Business Review*, 2014) <https://hbr.org/2014/11/how-smart-connected-products-are-transforming-competition> accessed 3 August 2022 and Michael E. Porter and James E. Heppelmann, 'How Smart, Connected Products Are Transforming Companies' (*Harvard Business Review*, 2015) <https://hbr.org/2015/10/how-smart-connected-products-are-transforming-companies> accessed 3 August 2022.

3 Michael E. Sykuta, 'Big Data in Agriculture: Property Rights, Privacy and Competition in Ag Data Services' (2016) 19 International Food and Agribusiness Management Review 57, p. 58.

4 Ibid., p. 60; Harald Sundmaeker and others, 'Internet of Food and Farm 2020', in Ovidiu Vermesan and Peter Friess (eds), *Digitising the Industry – Internet of Things Connecting the Physical, Digital and Virtual Worlds* (River Publishers, 2016), pp. 132–133; Sjaak Wolfert and others, 'Big Data in Smart Farming – A Review' (2017) 153 Agriculture Systems, pp. 69–75; See also Case No COMP/M.8084 – *Bayer/Monsanto*, European Commission Decision (29 May 2018), para. 2442.

5 See Keith Coble and others, *Advancing US agricultural competitiveness with big data and agricultural economic market information, analysis, and research* (FARE Report, 2016), p. 3; Wolfert and others (2017), n. 4, pp. 73–74.

6 Krijn J. Poppe and others, 'Information and Communication Technology as a Driver for Change in Agri-food Chains' (2013) 12 EuroChoices 60, pp. 60–63; Krijn J. Poppe and others, 'A European Perspective on the Economics of Big Data' (2015) 12 Farm Policy Journal 11, pp. 11–12.

7 See more discussion about the economic implications of this change in Can Atik and Bertin Martens, 'Competition problems and governance of non-personal agricultural machine data: comparing voluntary initiatives in the US and EU' (2021) 12(3) Journal of Intellectual Property, Information Technology and E-Commerce Law (JIPITEC) 370, pp. 370–379.

8 This notion is used by the Commission when defining the sector. See *Bayer/Monsanto,* n. 4, para. 2442 *et seq.*

9 This refers to "*a company that aggregates farmer's data, combines it with other relevant*

agronomic solutions, prescriptions and predictions.[10]

This transformation has brought with it new challenges. One of the most prominent data-related debates in this nascent sector is about 'ownership' of agricultural data (ag-data). Although 'data ownership' as a legal concept has been discussed and has faded over time in the broader literature on non-personal data,[11] the discussions in the sectoral literature still revolve around whether data belongs to farmers, ATPs, machine producers or other stakeholders, such as data collectors (if not farmers), landowners or even financial lenders.[12] The majority of the existing publications advocate the idea of providing data ownership right for farmers[13] or,

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data sets, and applies algorithms to analyze the data." See Sykuta (2016), n. 3. p. 58, footnote 1.

10 *Bayer/Monsanto,* n. 4, paras. 2442 and 2562–2565.

11 The focus seems to have shifted from the question of "who owns" to "who would access". See Josef Drexl, 'Connected devices – an unfair competition law approach to data access rights of users', in German Federal Ministry of Justice and Consumer Protection and Max Planck Institute for Innovation and Competition (eds), *Data access, consumer interests and public welfare* (Nomos, 2021), pp. 483–485 for a concise brief of how the broader literature has developed in this regard. See also Christine Godt, '"Data property" – entitlements between "ownership", factual control and access to commons', in Bram Akkermans and Anna Berlee (eds) *Sjef-Sache: essays in honour of Prof. mr. dr. J.H.M. (Sjef) van Erp on the occasion of his retirement*. (Eleven Int.´l Publ., 2021), in general.

12 Coble and others (2016), n. 5, p. 6; See also Joan K. Archer and Cordero A. Delgadillo, 'Key Data Ownership, Privacy and Protection Issues and Strategies for the International Precision Agriculture Industry' (2016) Proceedings of the 13th International Conference on Precision Agriculture, p. 2.

13 See the literature review regarding data ownership discussions in the DA sector in Simone van der Burg, Marc-Jeroen Bogaardt and Sjaak Wolfert, 'Ethics of smart farming: Current questions and directions for responsible innovation towards the future' (2019) 90–91:1 NJAS: Wageningen Journal of Life Sciences, pp. 3-5; See also Monty Guild and Tony Danaher, 'Big Data Comes to the Farm' (*Financial Sense*, 2014) <https://www.financialsense.com/contributors/guild/big-data-farm> accessed 3 August 2022; Juanita C. Posada, 'Rights of farmers for data, information and knowledge' (2014) GFAR, p. 9; Todd Janzen, 'A Closer Look At Farm Data Ownership' (*LexisNexis® Legal Newsroom*, 2015) <https://www.lexisnexis.com/legalnewsroom/environmental/b/environmentalregulation/posts/a-closer-look-at-farm-data-ownership> accessed 3 August 2022; Coble and others (2016), n. 5, p. 6; Neal Rasmussen, 'From Precision Agriculture to Market Manipulation: A New Frontier in the Legal Community' (2016) 17 Minn. J.L. Sci. & Tech. 489, pp. 505, 507 and 515; 'Main Principles Underpinning the Collection, Use and Exchange of Agricultural Data' (*Copa-Cogeca,* 2016) <https://ec.europa.eu/futurium/en/system/files/ged/main_principles_underpinning_the_collection_use_and_exchange_of_agricultural_data_.pdf > accessed 15 November 2021, p. 4 ['Copa-Cogeca (2016)' henceforth]; See *Data Revolution: Emerging New Data Driven Business*

at least, removing uncertainties regarding ag-data ownership.[14] This

Models in the Agri-Food Sector (EIP-AGRI Report, 2016), p. 5 <https://ec.europa.eu/eip/agriculture/sites/agri-eip/files/eip-agri_seminar_data_revolution_final_report_2016_en.pdf> accessed 5 January 2021;'High level conference on building a data economy – summary of the discussion' (*European Commission*, 2016) <https://ec.europa.eu/information_society/newsroom/image/document/201648/17_october_high_level_conference_report_final_40080.pdf> accessed 20 Oct 2021, p. 4 ['European Commission (2016)' henceforth]; *EIP-AGRI WORKSHOP Data sharing: ensuring fair sharing of digitisation benefits in agriculture – Final Report* (EIP-AGRI Report, 2017), p. 5; Mihalis Kritikos, *Precision Agriculture in Europe – Legal, Social and Ethical Considerations* (EPRS | European Parliamentary Research Service, 2017), p. 47; Igor Ivanov, 'How to approach data ownership in AgTech?' (*medium.com*, 2018) <https://medium.com/remote-sensing-in-agriculture/how-to-approach-data-ownership-in-agtech-486179dc9377> accessed 15 Nov 2021; John Fulton, Kaylee Port, and Trey Colley, 'The Data Ownership Confusion' (*Ohionline*, 2018) <https://ohioline.osu.edu/factsheet/fabe-55201> accessed 15 Nov 2021; ''EU Code of conduct on agricultural data sharing by contractual agreement' (*Copa and Cogeca at all*, 2018) <https://www.cema-agri.org/publication/brochures/37-eu-code-of-conduct-on-agricultural-data-sharing> accessed 4 March 2021, pp. 3–4 ['EU Code (2018)' henceforth]; Chris Addison , Didier Muyiramye and Foteini Zampati 'Who owns farmer data? exploring the rights and codes of conduct for transparent agricultural data sharing' (*cta.int*, 2019) <https://www.cta.int/en/blog/all/article/who-owns-farmer-data-exploring-the-rights-and-codes-of-conduct-for-transparent-agricultural-data-sharing-sid00667e698-f9c6-4a78-b48c-9b6cfc7b9330> accessed 14 Nov 2021; 'Global Forum for Food and Agriculture 2019 Agriculture Goes Digital – Smart Solutions for Future Farming' (*GFFA*, 2019), p. 42. However, there are some divergent views. One argues that forgoing ownership rights for farmers may be unfair, and essential property rights can be granted for ATPs. See Archer and Delgadillo (2016), n. 12, p. 3. The non-rivalrous nature of data, and its incompatibility with an exclusive understanding was mentioned in Jeremy de Beer, 'Ownership of Open Data: Governance Options for Agriculture and Nutrition' (*GODAN*, 2016), pp. 5–6; It is highlighted that good data governance in terms of data collection, control and access instead of dealing with the legal complexities of data ownership in Leanne Wiseman, Jay Sanderson, and Lachlan Robb, 'Rethinking Ag Data Ownership' (2018) 15(1) Farm Policy Journal 71–77. More recently, an OECD paper also repeated the legal complexities argument, and mentioned the lack of de jure ownership right for data sets, as well as difficulties in evaluating data. See Marie-Agnes Jouanjean and others, 'Issues around data governance in the digital transformation of agriculture' (*OECD*, 2020) Food, Agriculture and Fisheries Papers No. 146, pp. 12–13. Härtel suggests the notion of "data sovereignty" instead of data ownership by considering the potential problems of the latter in terms of technical implementation and economic handling. Ines Härtel, 'Report on the topic of "European Guidance and Rules for Agricultural Data" (European Agricultural Data Governance)' (2020), pp. 40–41; This paper approaches the debate from a different perspective: whether data ownership (or an alternative legal design) can address the market failures and help the development of the sector.

14 Jop Esmeijer and others, *Data-driven Innovation in Agriculture: Case Study for the OECD KBC2-Programme* (TNO Report, 2015) R10154, p. 26; Copa-Cogeca (2016), n. 13, p. 4; Jan Willem Kruize and others, 'A reference architecture for Farm Software

general tendency has resulted in various initiatives, which have created voluntary ag-data rules and rights in various countries.[15] For Europe, the EU code of conduct on agricultural data sharing by contractual agreement (the EU Code) was generated by stakeholders in 2018.[16] The EU Code also used the popular understanding of 'data ownership' as the central legal concept when designing its ag-data rules, rights and principles.[17] Beyond voluntary initiatives and active debates in the literature, stakeholders also predominantly accept the understanding of data ownership, as can be observed from the views of participants in the recent expert workshop run by the European Commission (the Commission)[18] on how to build a 'Common European Agricultural Data Space' (CEADS).[19]

These developments provided the stimulus for this study to identify whether 'data ownership' as a central legal concept is really preferable for regulating ag-data, as very little attention has been paid to the potential legal consequences of such a choice for the DAS, especially from the perspective of competition and innovation.[20] To provide a sound analysis based on an analytical framework, the paper identifies prominent data-related market failures in the sector to be used as a benchmark when discussing to what extent a data ownership right or an alternative regulatory design[21] can

Ecosystems' (2016) 125 Computers and Electronics in Agriculture, p. 22; See many other papers in this regard in the literature review by van der Burg, Bogaardt and Wolfert (2019), n. 13 above.

15 See a comprehensive list of countries in Jouanjean and others (2020), n. 13, p. 14.

16 EU Code (2018), n. 13 above.

17 See also a previous voluntary initiative in the US at 'Privacy and Security Principles for Farm Data' (*Fb.org*, 2016) <https://www.fb.org/issues/innovation/data-privacy/privacy-and-security-principles-for-farm-data> accessed 4 March 2021. However, these initiatives have significant limitations. See more in Atik and Martens (2021), n. 7.

18 See, in particular, 'Expert Workshop on a Common European Agricultural Data Space' (*Shaping Europe's digital future*, 2020) <https://digital-strategy.ec.europa.eu/en/library/expert-workshop-common-european-agricultural-data-space> accessed 4 August 2022, p. 13 ['European Commission (2020)' henceforth]. See also section 5.4.3 below for detailed considerations of the participant's views.

19 See the broad idea of creating "Common European Data Spaces" in nine strategic sectors including agriculture in Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A European Strategy for Data – COM(2020) 66 final ['COM(2020) 66 final' henceforth].

20 Although there has been a long discussion in the broader literature on non-personal data. See section 5.3.1 below.

21 See section 5.4 below.

address those failures and serve sectoral development. As new regulatory initiatives are already starting to appear or are on the way,[22] it is necessary to contribute in good time to the question of how to frame the development of a sectoral data governance regime by investigating the policy options in this regard. This paper will provide a proposal in order to address sectoral issues with a holistic approach. The suggestions will also be compared with the legal framework provided under the recent horizontal Data Act.[23] The contribution made to the literature by this research will be twofold: (1) for the digital agriculture literature, the paper provides a deeper legal discussion of the potential effects of 'data ownership' on sectoral dynamics and contributes to the ag-data governance debate by highlighting alternatives, and (2) for the broader legal literature, it presents a detailed sector-specific analysis on non-personal data governance issues.

The rest of the paper consists of three main sections. Section 5.2 highlights prominent data-related market failures in the emerging DA sector. Section 5.3 provides a discussion on the legal concept of 'data ownership' and explores its possible implications in the DA sector. Section 5.4 presents an alternative approach for regulating the sector, which is also compared with the recent horizontal Data Act proposal. Finally, Section 5.5 concludes with the main findings of the paper.

22 Beyond the aforementioned plans for creating a sectoral data space (CEADS), a new Data Act proposal has recently been released to address IoT data access issues at horizontal level. See Proposal for a Regulation of the European Parliament and of the Council on harmonised rules on fair access to and use of data (Data Act), COM(2022) 68 final, 2022/0047 (COD), 23 (February) 2022 ['Data Act' henceforth]; The document also declares that possible sectoral regulations will follow up this horizontal framing to provide more detailed rules for the achievement of sector-specific regulatory objectives. See Art. 40(2), Explanatory Memorandum p. 5, and Recitals 25 and 87 of Data Act; see also previous documents in this regard at COM(2020) 66 final, n. 19 and 'Carriage Details | Legislative Train Schedule' (*European Parliament*, 2022) <https://www.europarl.europa.eu/legislative-train/theme-a-europe-fit-for-the-digital-age/file-data-act> accessed 4 August 2022; Indeed, the horizontal framework in Data Act seems to have significant limitations to address the ag-data problems due to the design of the horizontal provisions and definitions of the core notions. See for a comprehensive analysis of the Data Act proposal's possible effects on the emerging DAS in Can Atik, 'Data Act: Legal Implications for the Digital Agriculture Sector' (2022) TILEC Discussion Paper No. DP2022-013 <https://dx.doi.org/10.2139/ssrn.4172957> accessed 4 August 2022.

23 See relevant comparisons in sections 5.4.2 and 5.4.3 below.

5.2 Prominent Data-Related Market Failures in the Emerging Digital Agriculture Sector

In order to evaluate the consequences of a possible data ownership right for farmers or an alternative design for sectoral regulation, it is critical to understand the sectoral conditions, as well as prominent data-related market failures[24] and the reasons for them. Thus, it can be discussed more systematically whether the widely advocated understanding of data ownership (or an alternative design) is capable of addressing the sectoral issues.

5.2.1 Data Lock-In and Farmers' Weak Bargaining Power

Farmers struggle to transfer historical data sets[25] when they want to switch to a new company or machine, and this locks them in even if their existing setting becomes insufficient or expensive compared with an innovative or cheaper alternative.[26]

There are various reasons for this. First of all, there is no undisputed legal framework applicable to ag-data sets.[27] The General Data Protection Regulation (GDPR)[28] with its right to data portability is unlikely to be

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24 This is "*a general term describing situations in which market outcomes are not Pareto efficient*". Market failures can become grounds for government intervention. See 'OECD Glossary of Statistical Terms – Market Failure Definition' (*Stats.oecd.org*, 2002) <https://stats.oecd.org/glossary/detail.asp?ID=3254> accessed 19 September 2021. Identifying market failures when designing a regulatory intervention for data access rights is critical for being aware of what to address. See, for instance, Drexl (2021), n. 11, p. 496; see also COM(2020) 66 final, n. 19, p. 13 – footnote 39.

25 It is important to note that farmers do not have control over the data sets that are directly stored in the databases of machine providers or ATPs. The consequences of this 'distance to data' are discussed in detail in Can Atik, 'Understanding the Role of Agricultural Data on Market Power in the Emerging Digital Agriculture Sector: A Critical Analysis of the Bayer/Monsanto Decision' in Michal Gal and David Bosco (eds), *Challenges to Assumptions in Competition Law* (Edward Elgar 2021), pp. 64–68.

26 See detailed discussion on the consequences of lock-in in Härtel (2020), n. 13, p. 50; see more about data-related entry barriers in the emerging DAS in Ibid., pp. 56–73.

27 The Commission has also been aware of this problem for a long time. See, for instance, Commission Staff Working Document on the free flow of data and emerging issues of the European data economy accompanying the document communication building a European data economy – SWD(2017) 2 final, p. 28 ['SWD(2017) 2 final' henceforth].

28 Regulation (EU) (2016) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), Official Journal of the European Union, L 119.

applicable here[29] or, at best, might not be sufficient to address data lock-in situations in connected devices setting.[30] Moreover, farms, especially those operating on a smaller scale, might not be able to properly understand and negotiate the standard contractual terms and conditions.[31] Even if they have a high level of awareness, farmers have a weak bargaining position vis-a-vis ATPs or machine producers.[32] There are also technical barriers to transferring ag-data, owing to the lack of interoperability[33] and data standards[34] that are sometimes intentionally designed to be incompatible in order to nudge farmers to buy all digital agriculture operations from the same group.[35] On top of these factors, there are also indirect network effects from positive feedback loops (having more users (farmers) gives an ag-data advantage that can be used to develop better services, in order to attract more customers in turn).[36]

29 See more detailed discussions on the applicability of the GDPR regime to agricultural data sets in Atik and Martens (2021), n. 7 and Atik (2021), n. 25. See the general limitations of the GDPR's right to data portability regime in Inge Graef, Martin Husovec and Nadezhda Purtova 'Data Portability and Data Control: Lessons for an Emerging Concept in EU Law' (2018) 19(6) German Law Journal 1359–1398.

30 See Josef Drexl, *Data access and control in the era of connected devices* (BEUC Report, 2018) <https://www.beuc.eu/sites/default/files/publications/beuc-x-2018-121__data__access__and__control__in__the__area__of__connected__devices.pdf> accessed 12 November 2021, pp. 17–18; See the considerations on the recent Data Act in section 5.4.2 below.

31 See Jouanjean and others (2020), n. 13, p. 9; Härtel (2020), n. 13, pp. 7–9.

32 See a detailed discussion on the matter in Atik and Martens (2021), n. 7, pp. 350–359. See, for instance, a specific analysis of the questionable practices of Deere (as a machine producer) in Thomas J. Horton, Dylan Kirchmeier, 'Monopolizing the digital agricultural information market: John Deere's nefarious ''right to repair'' scheme' (2020) Competition Policy International <https://www.competitionpolicyinternational.com/monopolizing-the-digital-agricultural-information-market-john-deeres-nefarious-right-to-repair-scheme/> accessed 10 November 2021.

33 See more about interoperability problems in Esmeijer and others (2015), n. 14 pp. 24–25; Sundmaeker and others (2016), n. 4, pp. 142–143.

34 Copa-Cogeca (2016), n. 13 p. 3; Martina Barbero and others, *Study on emerging issues of data ownership, interoperability, (re-) usability and access to data, and liability* (Deloitte Report, 2016) <https://op.europa.eu/en/publication-detail/-/publication/74cca30c-4833-11e8-be1d-01aa75ed71a1/language-en> accessed 15 November 2021, pp. 229–233; Jouanjean and others (2020), n. 13. There have been attempts to address the interoperability problem in the DA sector. See 'ATLAS - Aagricultural Interoperability And Analysis System' (*ATLAS*, 2022) <https://www.atlas-h2020.eu/> accessed 4 August 2022. However, there is no clear obligation or incentive for data holders to follow such initiatives.

35 Kritikos (2017), n. 13, p. 19.

36 *Bayer/Monsanto,* n. 4, para. 2837; Atik (2021), n. 25, pp. 72–73.

These legal, contractual, technical, and economic conditions are likely to create insurmountable switching costs for farmers, erecting barriers to entry into the emerging DAS, and thus potentially resulting in a first-mover advantage for a few vertically integrated agricultural giants.[37] So, the first analysis in the sections below will be on whether granting farmers data ownership rights (or an alternative design) may help mitigate their data-related lock-in problems, increase their bargaining power or address any of the reasons behind these problems.

5.2.2 Fragmentation of Data Sets and Exclusive Data Sharing Clusters

Connected with the reasons for lock-in, data fragmentation is another issue in the emerging DAS. There are unconnected data silos controlled exclusively by certain players.[38] This isolated data control environment works in favour of integrated big players, which cooperate with each other to increase their data capabilities and create synergies, while erecting higher data access barriers for smaller rivals or new entrants.

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The Commission stated in the *Bayer v. Monsanto* decision that *"[l]arger companies with more proprietary data, economic and digital resources are more likely to attract key partners* interested *in sharing their areas of expertise and own data".*[39] Indeed, there are some alliances for exclusive data sharing amongst vertically integrated agricultural giants and machine producers,[40] which result in both larger exclusively controlled data sets and communication channels between already powerful ATPs and machinery producers. For example, Monsanto (now Bayer) has agreements with machine manufacturers John Deere, Agco and CNHI through its subsidiary, the Climate Corporation, which specialises in data-driven agronomic services.[41] Monsanto also has data-sharing partners, including Growmark, AgIntegrated Inc., Agrian, Deere & Company, AgStudio, Software Solutions Integrated Inc., MZB Technologies, and EFC Systems.[42] Similarly, technology providers Maglis and Proagrica agreed to create an interface to

37 See more detailed discussion in Atik (2021), n. 25, pp. 56–62; see also Atik and Martens (2021), n. 7, pp. 373–379.
38 Copa-Cogeca (2016), n. 13, p. 3.
39 *Bayer/Monsanto*, n. 4, para. 2470.
40 Sykuta (2016), n. 3, p. 62.
41 *Bayer/Monsanto*, n. 4, para. 2815.
42 Ibid., para. 2519.

share data.[43] John Deere as a machine producer and BASF as a vertically integrated service provider aim to develop a joint project regarding *"precision farming and farm management solutions."*[44] Deere also has data integration arrangements with DuPont – another integrated input giant.[45] Additionally, there are other collaborations that might also indirectly result in *de facto* cross-access to related exclusive data sets. For instance, there has been a research and development collaboration worth $2.5 billion between BASF and Monsanto since 2007, specifically on breeding, biotech, pesticides, agricultural microbials, agricultural biologicals, and precision agriculture.[46] Similar practices are common amongst the so-called ''Big Six'' (Monsanto, Syngenta, DuPont, BASF, Bayer, Dow), which have complicated and interconnected cross-licensing agreements to enhance their technologies.[47]

This cooperation tendency might make sense to participants as it has significant potential to improve the quality and accuracy of their data-driven agronomic services.[48] Indeed, data exchange is presented as a positive activity against business model disruptions in the wider agricultural value chain, as players can access and combine related data sets in order to improve their business.[49] However, participation in these agreements is not open to every interested party and/or new entrants. Instead, major

43 'BASF and Proagrica Sign Agreement to offer Interface for Farm Management Systems' (*Basf.com*, 2017) <https://www.basf.com/global/en/media/news-releases/2017/08/p-17-292.html#%3A~%3Atext%3DBASF%20and%20Proagrica%20have%20signed%20a%20development%20and%2Cfarming%20applications%2C%20including%20their%20preferred%20farm%20management%20system> accessed 15 November 2021.

44 'John Deere and BASF partner to develop sustainable yield enhancement solutions' (*Basf.com*, 2015) <https://agriculture.basf.us/crop-protection/news-events/news-releases/john-deere-basf-partner.html> accessed 15 November 2021

45 There are also similar practices amongst various software and hardware providers in the sector. See some examples in Esmeijer and other (2015), n. 14, pp. 31–33.

46 'Breaking Bad: big ag mega-mergers in play Dow? DuPont in the pocket? Next: Demonsanto?' (2015) ETC Group Communiqué 115 <http://www.etcgroup.org/sites/www.etcgroup.org/files/files/etc_breakbad_23dec15.pdf> accessed 15 November 2021, p. 11.

47 Maurice E. Stucke and Allen P. Grunes, 'An Updated Antitrust Review of the Bayer-Monsanto Merger' (2018) The Konkurrenz Group White Paper <https://www.farmaid.org/wpcontent/uploads/2018/03/An_Updated_Antitrust_Review_of_the_Bayer-Monsanto_Merger-03.06.2018.pdf> accessed 28 April 2022, pp. 17–18; Ioannis Lianos and Dmitry Katalevsky, 'Merger Activity in the Factors of Production Segments of the Food Value Chain – A Critical Assessment of the Bayer/Monsanto Merger' (2017) UCL-CLES Policy Paper Series: 2017/1, p. 17.

48 *Bayer/Monsanto,* n. 4, para. 2638.

49 Copa-Cogeca (2016), n. 13, p. 2.

players exchange their isolated data sets only amongst themselves. Big data sets attract other complementary big data sets. This closed system of data collaboration between already powerful players, while creating insurmountable advantages for them, could also have exclusionary effects for smaller rivals and new innovative start-ups that face data access problems.[50] A data advantage as a result of these exclusive practices can also be used as leverage to dominate connected markets throughout the whole agricultural value chain if not addressed in time by traditional competition law enforcement. This process may result in the emergence of a few powerful data clusters by excluding weaker players, and may render the emerging DAS into an oligopolistic sector. So, the second criterion of the analysis in the sections that follow will be whether a data ownership (or alternative) legal design may help prevent these risks.

5.2.3 The Data Access Puzzle

Another connected issue can be presented as a puzzle rather than a problem. Beyond farmers, there are a variety of ag-data access seekers.[51] Different elements of the comprehensive notion of ag-data[52] can be critical for them. The fragmentation and isolation of data result in bigger problems in this regard (beyond the exclusionary consequences in the DAS markets), especially when considering numerous potential data-driven innovations. For instance, access to soil data might be needed by various ATPs, from agronomic irrigation services to fertilising or pesticide/insecticide solutions. Harvesting data is important not only for farmers, but also for landowners or other relevant players in the farm-to-fork value chain. Even financial institutions need data access in order to estimate the credibility of farm businesses. Input performance data can be a critical element in generating agronomic solutions for farmers despite the exclusive control of the input producers. Beyond existing markets, innovative players may create completely new services or products both inside and outside of the agricultural value chain. The accessing of ag-data sets by public institutions

50 See similar concerns in Tom Verdonk, 'Planting the Seeds of Market Power: Digital Agriculture, Farmers' Autonomy, and the Role of Competition Policy', in Leonie Reins (ed.), *Regulating New Technologies in Uncertain Times* (Springer, 2019), pp. 120–121.

51 See some examples in Härtel (2020), n. 13, p. 9.

52 To generate agronomic solutions, ATPs need, besides farm data sets, also "complementary data" (such as land and soil maps, weather, satellite and other environmental data) and "proprietary data" (such as agricultural input performance data, which are generated and held by input producers). See *Bayer/Monsanto*, n. 4, para. 2453 and subsequent paras.

can also be useful for monitoring, for instance, environmental obligations or CAP enforcement. There may be many more examples, as different components of ag-data sets are related to different services, products or policies that are not even limited to the agricultural sector. However, there is no clear mechanism to respond to or reconcile these various access interests, despite the fact that wider access to ag-data sets would, in terms of the economies of scale and scope enabled by ag-data,[53] open up enormous potential for Europe. In this regard, the third analytical criterion in the sections below will be whether ag-data ownership regulation (or an alternative design) can help ensure broader ag-data access for all related access seekers.

5.2.4 Farmers' Lack of Trust

As pointed out in earlier studies, farmers also hesitate to share data with third parties or even to adopt digital technologies, owing *inter alia* to the unclear and unforeseeable consequences of adopting 'smart farming' and data sharing.[54] Two main reasons behind this stand out in particular. The first relates to the lack of clear legal rules that frame the consequences of adopting the technologies and sharing data.[55] The second relates to

53 See a detailed analysis of the economics of ag-data in Atik and Martens (2021), n. 7, pp. 377–379; see also Atik (2021), n. 25, pp. 72–73.

54 See in general, for instance, 'Digital Disruption on the Farm' (*The Economist*, 2014) <https://www.economist.com/business/2014/05/24/digital-disruption-on-the-farm> accessed 14 November 2021; Esmeijer and others (2015), n. 14, pp. 26–27; Michael Carolan, 'Publicising Food: Big Data, Precision Agriculture, and Co-Experimental Techniques of Addition' (2017) 57(2) Sociologia Ruralis 135–154; Aysha Fleming and others, 'Is big data for big farming or for everyone? Perceptions in the Australian grains industry' (2018) 38(3) Agronomy for Sustainable Development 24; Emma Jakku and others, '"If they don't tell us what they do with it, why would we trust them?" Trust, transparency and benefit-sharing in Smart Farming' (2019) 90–91 (1) NJAS: Wageningen Journal of Life Sciences 1–13; Leanne Wiseman and others, "Farmers and their data: An examination of farmers' reluctance to share their data through the lens of the laws impacting smart farming" (2019) 90–91(1) NJAS Wageningen Journal of Life Sciences 1–10; Simone van der Burg, Leanne Wiseman and Jovana Krkeljas 'Trust in farm data sharing: reflections on the EU code of conduct for agricultural data sharing' (2020) 23 Ethics and Information Technology 185-198; Jouanjean and others (2020), n. 13; See also Ines Härtel, 'Discussion paper on the topic of "European Guidance and Rules for Agricultural Data" (European Agricultural Data Governance)' (2020), p. 2.

55 See more at Wiseman and others (2019), n. 54; Jouanjean and others (2020), n. 13, pp. 24–25; Copa-Cogeca (2016), n. 13, p. 2. See a US case on farm data sharing without the consent of farmers in order to keep prices below the competitive level United States District Court Eastern District of Oklahoma, January 27,

whether 'smart farming' is a really cost-effective method of compensating investment in these technologies and services.[56] The latter seems more of a feasibility issue, but both reasons are interconnected. If there is a higher adoption rate and more data sharing with legal clarity, then cheaper and more efficient services can be expected with the help of the economies of scale and scope in data.[57] This, in turn, can increase the rate of adoption of digital technologies among farmers.[58] As an important component of building trust is developing good data governance,[59] the considerations in the sections below will also take into account whether a regulatory intervention to the sector with data ownership right (or an alternative design) can address the trust-related challenges in the emerging DAS.

5.3 'Data Ownership' as a Legal Concept and Its Possible Implications in Agriculture

5.3.1 Envisioning "Ownership" for Data

The idea of designing a right to data ownership is not unique to the DAS. Data ownership as a legal concept has been mentioned in various documents released by the Commission.[60] At the time of EU Commissioner Oettinger, it

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2017, Case No: 6:2017cv00033 – *Haff Poultry, Inc. et al v. Tyson Foods, Inc. et al.*; See farmers' fear about commodity price speculation in relation to ag-data re-use at 'Stakeholders Dialogue on Common European Data Spaces - Reports of the workshops on common European data spaces' (*Shaping Europe's digital future*, 2019) <https://digital-strategy.ec.europa.eu/en/library/stakeholders-dialogue-common-european-data-spaces> accessed 4 August 2022, pp. 6–7.

56 See, for example, Iria Soto and others, *The Contribution of Precision Agriculture Technologies to Farm Productivity and the Mitigation of Greenhouse Gas Emissions in the EU* (JRC Report, 2019) JRC112505.

57 See general considerations on the economic dynamics of agricultural data in Atik and Martens (2021), n. 7, pp 353–359.

58 Indeed, EU Member States aim to increase the rate of adoption of digital technologies and smart farming across the EU. See 'EU Member States Join Forces on Digitalisation for European Agriculture and Rural Areas' (*Shaping Europe's digital future*, 2019) <https://digital-strategy.ec.europa.eu/en/news/eu-member-states-join-forces-digitalisation-european-agriculture-and-rural-areas> accessed 4 August 2022 ['European Commission (2019)' henceforth]. See previous sectoral considerations in this regard at Copa-Cogeca (2016), n. 13, p. 3. See also European Commission (2020), n. 18, p. 7. The future CAP also aims to promote innovation and enable farmers to benefit from the digital transition in agriculture. See 'The New Common Agricultural Policy: 2023-27' (*agriculture.ec.europa.eu*, 2021) <https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/new-cap-2023-27_en#innovation> accessed 5 August 2022.

59 Wiseman and others (2019), n. 54, p. 1.

60 See at Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of

was even indicated that the Commission would consider adopting a horizontal data ownership right for IoT data.[61] In 2017, a slightly different approach of a *"data producer's right"* was put forward by the Commission: *"A right to use and authorise the use of non-personal data could be granted to the 'data producer', i.e. the owner or long-term user (i.e. the lessee) of the device"*.[62] There are different grounds for proposing or rejecting a property rights understanding for data.[63] Researchers, who advocate data ownership, focus on different rationales behind their argument, such as expecting more control for individuals or creating incentives for further investment with exclusive control.[64] Their common position in advocating data ownership with a liberal approach does not mean they all agree on the questions of "who should originally own the data?" and "why?".[65] The main argument presented by opponents highlights the problematic consequences of such a legal design from the perspective of competition and the functioning of markets.[66]

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the Regions – towards a thriving data-driven economy – COM(2014) 0442 final, p. 5; Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – A digital single market strategy for Europe – COM(2015) 192 final, p. 15; Commission Staff Working Document on A Digital Single Market Strategy for Europe – analysis and evidence accompanying the document communication a digital single market strategy for Europe – SWD(2015) 100 final, p. 61.

61 'Big Data: « Pour Un "Code Civil" Des Données Numériques »' (*Le Monde.fr*, 2016) <https://www.lemonde.fr/idees/article/2016/10/14/big-data-pour-un-code-civil-des-donnees-numeriques__5013610__3232.html> accessed 15 November 2021.

62 See Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – building a European Data Economy – COM(2017) 9 final, p. 13; see also SWD(2017) 2 final, n. 27 above. Indeed, this design is not far from the one in the Data Act. See section 5.4.2 below.

63 See a comprehensive evaluation of the literature and valuable comments on the matter in Godt (2021), n. 11. See also Drexl (2018), n. 30, p. 139 for a good brief on the different arguments. See also Nadya Purtova *Property rights in personal data: A European perspective* (Wolters Kluwer, 2011) for earlier discussions on property rights for personal data.

64 See a comprehensive literature review in this regard in Godt (2021), n. 11, p. 462.

65 Ibid.

66 See, for instance, Wolfgang Kerber, 'A New (Intellectual) Property Right for Non-Personal Data? An Economic Analysis' (2016) Joint Discussion Paper Series in Economics No. 37-2016; Wolfgang Kerber, 'Rights on data: the EU communication 'Building a European Data Economy' from an economic perspective' in Sebastian Lohsse, Reiner Schulze and Dirk Staudenmayer (eds) *Trading data in the digital economy: legal concepts and tools* (Nomos, 2017) 109–134; Daniel Zimmer, 'Property rights regarding data?' in Sebastian Lohsse, Reiner Schulze and Dirk Staudenmayer (eds) *Trading data in the digital economy: legal concepts and tools* (Nomos, 2017) 101–108; Josef Drexl, 'The Future EU legal framework for the digital economy: a competition-based

Even though data ownership is discussed in the broader non-personal data literature and was once considered by policymakers as a regulatory tool,[67] there is currently no data ownership regulation or *de jure* ownership right on data in the EU or at the Member State level.[68] At the time of writing this paper, the heated public debate about data ownership seems to have cooled with the GDPR for personal data and the broader non-personal data literature has shifted towards the question of 'who would access data?'.[69] However, this does not mean that the data ownership debate has definitively ended, especially for agricultural data.[70] This was clearly recognised in the Commission's summary report of the high-level conference on ''Building a Data Economy'':

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response to the 'ownership and access' debate' in Sebastian Lohsse, Reiner Schulze and Dirk Staudenmayer (eds) *Trading data in the digital economy: legal concepts and tools* (Nomos, 2017) 221–244, pp. 224–225; Reto M. Hilty, Josef Drexl and Dietmar Harhof, 'Arguments against data ownership – ten questions and answers' (2017) Max Planck Institute for Innovation and Competition <https://www.ip.mpg.de/fileadmin/ipmpg/content/forschung/Argumentarium-Dateneigentum_eng.pdf> accessed 15 November 2021; Drexl (2018), n. 30; Josef Drexl 'Legal challenges of the changing role of personal and non-personal data in the data economy', in Alberto Franceschi and Reiner Schulze (eds), *Digital revolution – new challenges for law* (Nomos, 2019) 19–41. There are two prominent factors for this opposition: property rights for data would exacerbate power imbalances and hamper data access. See in Godt (2021), n. 11, p. 462.

67 Indeed, the Commission's property-oriented approach was criticised in the literature. See, for instance, Daria Kim, 'No one's ownership as the status quo and a possible way forward: A note on the public consultation on Building a European Data Economy' (2017) 13(2) Journal of Intellectual Property Law & Practice 154–165, pp. 162–163; See especially, Josef Drexl and others, 'Data ownership and access to data – position statement of the Max Planck Institute for Innovation and Competition of 16 August 2016 on the current European Debate' (2016) Max Planck Institute for Innovation and Competition <http://www.ip.mpg. de/en/link/positionpaper-data-2016-08-16.html> accessed 15 November 2021, paras. 17–19; Drexl (2017), n. 66; Josef Drexl, 'Designing competitive markets for industrial data – between propertisation and access' (2017) 8 Journal of Intellectual Property, Information Technology and E-Commerce Law (JIPITEC) 257-292; Drexl (2018), n. 30, p. 15 – para. 47, pp. 38–39 and p. 141.

68 Jacques Crémer, Yves-Alexandre de Montjoye and Heike Schweitzer, *Competition Policy for the digital era – Final Report* (Publications Office of the European Union, 2019), pp. 27–28 <https://ec.europa.eu/competition/publications/reports/kd0419345enn.pdf> accessed 14 November 2021.

69 See a brief overview of the rise and fall of ownership discussions in Godt (2021), n. 11, p. 450–451; see also Drexl (2021), n. 11, pp. 483–485. It is important to note that the recent Data Act seems to follow the same approach, with access rights (Art. 4) and data-sharing rights (Art. 5) granted to users of a "product" or "related service". See the substantial discussion in section 5.4.2 below.

70 See footnotes 12, 13, 14, 15, 16 and 17 above.

> *"The vast majority of participants from different sectors agreed that identifying the 'owner' of the data is not the key question; instead, defining rights for data access and reuse would be more important. However, the agricultural sector constitutes an exception here, as several stakeholders advocate for a discussion on data ownership for farmers."*[71]

According to Wolfert and others, data ownership problems in the DAS should be regulated, but the method needs to be designed diligently; otherwise, the intervention might reduce the pace of innovation in the sector.[72] However, the question is 'how?'. Could bringing a *de jure* 'ag-data ownership' design be the ultimate solution for sectoral concerns?

5.3.2 Possible Consequences of a de jure Ag-Data Ownership Right

"Ownership" is a specific and distinct legal concept that needs to be understood clearly and used consistently. The modern understanding of the ownership concept dates back to property rights in Roman Law, which confers three core rights on the owner of an asset: (1) the right to use the good (*usus*), (2) the right to encumber or transfer the good (*abusus*), and the right to the fruits of the good (*fructus*).[73] In this regard, the ownership right is not a stand-alone right, but rather intrinsically consists of sub-rights. Thus, it is essential to evaluate the consequences of these particular sub-rights before advocating them as a regulatory tool for any sector.

5.3.2.1 Why might an ag-data ownership right design not help change the status quo in the DAS?

An ownership right covers the right to use the asset (*usus*); thus, ownership of data can be perceived as a possible legal tool for farmers to enable them using their farm data with another technology provider. In this sense, providing *de jure* data ownership for farmers might seem to be a solution to mitigate data lock-in or to increase farmers' trust in their data-sharing decisions. However, a data ownership right does not change the dynamics of contractual relations for using, processing and sharing the data. More importantly, a property design does not remove the underlying problem of

71 European Commission (2016), n. 13 above.
72 Wolfert and others (2017), n. 4, p. 78.
73 See Ilya Segal and Michael D. Whinston, 'Property rights' in Robert Gibbons and John Roberts (eds) *The handbook of organizational economics* (1st edn, Princeton University Press 2010), pp. 100–158.

unequal bargaining power.[74] So, the existing practice based on contractual freedom may continue as before.[75] For that reason, *ex-ante* ownership of ag-data might not fundamentally ease existing concerns. Having an ownership right by default could only be useful for farmers when they are deciding the fate of data anew if a contract is found null and void, but this would bring very limited benefits for farmers, especially compared with the risks, which are discussed in detail below. The same dynamics may be valid for the control of complementary and proprietary agricultural data sets beyond farm data.[76] In this sense, it is difficult to argue that ownership as a legal concept would help change the *status quo* in general.[77]

5.3.2.2 How can such a policy choice exacerbate existing failures?

Consequences for the lock-in problem

It is also critical to take into account the 'right to transfer' element of the ownership right. This element can be imagined as a two-edged sword because transferability provides the owner of an asset with flexibility and discretion regarding the fate of the asset, but also means that the owner

74 See Drexl (2018), n. 30, p. 39; see more about the farmers' weak bargaining position and standard contractual terms in the sector in Kritikos (2017), n. 13, pp. 1 and 39; see also, Ashley C. Ellixson and Terry Griffin 'Farm data: ownership and protections' (2017) AREC Fact Sheet | FS-1055, p. 7 and de Beer (2016), n. 13, p. 14.

75 There have already been similar discussions in the broader IoT data literature. The holder of a property right has the right to provide an exclusive licence to a manufacturer of smart devices/machines for free; taking into account the possibly stronger bargaining position of the latter vis-a-vis users, the intended function of such a right would fail. See Kerber (2016), n. 66, pp. 16-17; Drexl (2017), n. 66, p. 235; See an example from a connected car setting in Drexl (2019), n. 66, pp. 28–29. Drexl also explains why the rationale behind intellectual property rights is not valid for the data setting in question. See Drexl (2018), n. 30, p. 3. See a more general discussion on the inappropriateness of data ownership in Drexl (2018), n. 30, pp. 132–149.

76 Components of ag-data can be seen in *Bayer/Monsanto*, n. 4, para. 2453 and subsequent paras.

77 There are similar considerations for the DAS as well, but with different reasoning: as there is no legally recognised property right for data, copyright protection could be granted to data sets. However, even in this situation, contractual arrangements would be the main determiner of data access, control and re-use. See Leanne Wiseman and Jay Sanderson, 'The legal dimensions of digital agriculture in Australia: an examination of the current and future state of data rules dealing with ownership, access, privacy and trust' (2017) CRDC <https://research-repository.griffith.edu.au/handle/10072/374454> accessed 15 November 2021, pp. 7–11 and Wiseman and others, n. 54, (2019), p. 8; For a direct criticism of the property rights design in an ag-data setting see Atik and Martens (2021), n. 7.

could lose control.[78] Property rights for data can easily be alienated from right holders.[79] It was demonstrated a long time ago that, regardless of original allocation, property rights end up in the hands of those who attach the most value to them.[80] Thus, a data ownership design might even result in stronger data holders (owing to their superior bargaining power and interest in controlling data) rather than removing the chains from weaker entitlement holders.[81]

In line with these insights, it should be taken into account that farmers can transfer/sell their data ownership rights to ATPs or agricultural machine producers via standard terms and conditions.[82] This might reinforce those

78 Problems and dangers of exclusive property rights for data have also been discussed in the broader non-personal data literature with a horizontal focus. See, for instance, Kerber (2016), n. 66; Drexl (2018), n. 30; Drexl (2019), n. 66.

79 Among other problems. See more in Wolfgang Kerber 'Governance of Data: Exclusive Property vs. Access' (2016) 47 IIC - International Review of Intellectual Property and Competition Law 759–762, p. 761. Regardless of original allocation, data ownership rights would be transferred to machine manufacturers with greater bargaining power. See Josef Drexl and others, 'Position statement of the Max Planck Institute for Innovation and Competition of 26 April 2017 on the European Commission's "Public consultation on Building the European Data Economy"' (2017) Max Planck Institute for Innovation and Competition <https://pure.mpg.de/rest/items/item_2450915_4/component/file_2450913/content> accessed 15 November 2021 paras. 13–18; Drexl (2017), n. 66, p. 223; Drexl (2018), n. 30, p. 4 – para. 14, p. 8 – para. 25, p. 16 – para. 51, and pp. 38–40. See also a brief overview of the flow of discussions in the literature in Godt (2021), n. 11, p. 463.

80 If the good is freely tradable and the transaction costs are low. See more in Guido Calabresi and A. Douglas Melamed, 'Property Rules, Liability Rules, and Inalienability: One View of the Cathedral' (1972) 85(6) Harvard Law Review 1089–1128, pp. 1094–1098.

81 Drexl (2021), n. 11, p. 495.

82 There are indications that ATPs would seek to obtain ownership rights from farmers in the event of *de jure* ownership of ag-data. See Simone van der Burg and others, *D7.4 Analysis Report of the Interactive Sessions Futures of Farm Data Sharing Practices Perspectives of European Farmers, Researchers and Agri-Tech Businesses* (IoF2020 Report, 2020) <https://www.iof2020.eu/deliverables/d7.4-analysis-report-of-the-interactive-sessions.pdf> accessed 15 Nov 2021, p. 23. One can argue that a rational party would not renounce its rights. However, practice does not always match theory. For instance, 74% of the Australian farmers, who participated in a research survey, were not aware of the terms and conditions of their digital service providers. See Wiseman and others (2019), n. 54, p. 3. A similar pattern can be observed in a personal data setting as well. Users have a careless tendency to use free services, which is becoming ever stronger. See Hilty, Drexl and Dietmar Harhof (2017), n. 66, p. 2. See also the economics of ag-data, and particularly, the incentives for machine producers or ATPs to lock in existing farmers in Atik and Martens (2021), n. 7, pp. 373–379.

companies' already powerful *de facto* data control with *de jure* ownership rights.[83] Bearing in mind, in particular, that the historical data sets can be crucial when changing service providers,[84] farmers would face harsher lock-in and more dependency if they lose *de jure* rights to related data sets. So, transferable ag-data ownership might be more problematic than beneficial. With legally recognised ownership rights, few integrated agri-tech giants can actively prevent the transfer of historical data and make existing customers more dependent on them. This might make first-mover players more powerful, and further raise already high entry barriers in this emerging sector.[85] In brief, a data ownership understanding should be avoided as it is likely to exacerbate power imbalances and the lock-in problem in the sector.

Consequences for the data fragmentation problem and data access puzzle

Another element of the 'ownership' concept is the 'right to encumber'. Entitlement holders can legally prevent use by others. The application of this right to a data setting is strictly related to the longstanding discussion on the dilemma of wider access to data sets versus exclusive control.[86] It has been argued that there should be an optimal balance between the two.[87] However, providing an exclusive data ownership right is one of the two extremes, as it contradicts wider access and further innovation possibilities.[88]

83 Data concentration in the hands of a few has both positive and negative aspects. Economic efficiency losses from monopolistic behaviour constitute the main risk. Economic efficiency gains from data aggregation and concentration are the positive outcome. Which of these effects outweighs the other is an empirical question that cannot be settled with *a priori* theoretical reasoning. See Luís Cabral, *The EU Digital Markets Act – A Report from a Panel of Economic Experts* (JRC Report, 2021) <https://doi.org/10.2760/139337> accessed 15 November 2021. However, the paper focuses on societal welfare, which is broader than economic efficiency considerations. Moreover, data is non-rivalrous, and the same efficiencies can theoretically be realised by multiple players without harming the original data holder except in situations that need excludability for extracting value from data access. Therefore, the potential benefits of broader ag-data access are assumed to be much greater than the private exploitation of data by a few companies.

84 See more at Sykuta (2016), n. 3, p. 69; Sundmaeker and others (2016), n. 4, p.143; see also Jouanjean and others (2020), n. 13, p. 18.

85 See more about the first-mover advantage and high switching costs in the emerging DAS in Atik (2021), n. 25, pp. 56–62.

86 See, for instance, Kerber (2016), n. 79, p. 761; Kim (2017), n. 67; Drexl (2018), n. 30.

87 See, for example, Cabral and others (2021), n. 83.

88 Drexl (2021), n. 11, pp. 495–496; Drexl cites the farm machine data example against the Commission's plans to create a data producer's right by arguing that such a right may result in *"excessive, sometimes even prohibitive, transaction costs for*

There is no clear incentive for first-movers to let others access data. More importantly, data holder companies can be extra hesitant to share data, on the assumption that renouncing exclusive control might be detrimental to their competitive position, particularly with regard to possible future operations or other benefits of exclusive data access.[89] This means that each data silo can enforce its ownership rights to legally block the re-use of data not only by rivals but also by other parties that are not in direct competition. In such an environment, it is difficult to expect positive consequences from an ownership design. For instance, soil data is needed by many different services in the DAS, such as seeding, irrigation, or fertilising solutions. A first-mover irrigation service provider might prefer to keep soil data sets to itself by using *de jure* ownership rights[90] with a view to possible future expansion to connected markets or other types of exclusive exploitation. Thus, companies in these connected markets may even become unable to provide competitive solutions to individual farms without legal access to main soil data input even if data access is technically possible. And there are many more examples. With the right of ownership including the right to encumber, it would become much more difficult to access the required data sets, which would mean a scarcity of data for rivals and third parties, thus hampering data-driven innovation in the DAS. Also, if the exclusive ownership right becomes the sector reality, then exclusive data exchange clusters amongst a few integrated giants[91] would be legally protected by property rights, which would increase the risk of an oligopolistic sector structure. In this regard, an intervention with a *de jure* ag-data ownership right would only exacerbate existing failures.

Consequences for farmers' trust in digital technologies and data sharing

An ag- data ownership regulation would potentially increase farmers' trust and reduce their reluctance to share data in the short run by giving them the perception that they can control any unintended re-use of data via their ownership rights. However, in the long term, the potential accumulation of data rights in the hands of a few vertically integrated agricultural giants,

the commercialisation of the data sets." See Drexl (2018), n. 30, p. 39.

89 'Dutch Digitalisation Strategy - Dutch vision on data sharing between businesses' (*Ministry of Economic Affairs and Climate Policy*, 2019) <https://www.permanentrepresentations.nl/documents/publications/2020/01/06/dutch-vision-on-data-sharing-between-businesses> accessed 5 August 2022, pp. 13-14.

90 As discussed above, ATPs or machine producers are more likely to hoover up the data rights via their take-it-or-leave-it contractual terms.

91 See section 5.2.2.

which have more incentives and opportunities to acquire data entitlements, might frustrate farmers far more and irreversibly. This process might cancel out or even erode any previously increased trust in digital technologies and data sharing in the DAS, which would not be compatible with the EU policy aim of increasing the rate of adoption of digital technologies[92] in the sector. Therefore, the data ownership approach should be avoided in any ag-data regulation from the perspective of trust-related problems as well.

5.4 Seeking Fit-for-Purpose Agricultural Data Governance in the EU

The section above was about 'what not to do': use the popular concept of 'data ownership' when regulating the DAS. This section seeks answers to the questions of 'what to do' and 'how to do it' in order to address the failures identified above more effectively via a functional ag-data governance regime in the EU. In particular, the following analysis aims to (1) explore alternative legal concepts, (2) discuss possibilities for a fit-for-purpose sectoral regulation compared with the recent horizontal Data Act proposal, and (3) highlight the synergistic potential of creating a data access infrastructure to complement sectoral regulation by providing some suggestions for the forthcoming CEADS.

5.4.1 Understanding Alternative Legal Concepts

Before diving into the question of how a functional legal design can be configured in accordance with the needs of the emerging DAS, it is critical to be aware of alternatives (the legal concepts of "*access rights*" and "*co-generated data rights*")[93] to the 'data ownership' understanding in the broader connected-devices setting. Thus, the following sectoral analysis will benefit from those insights when

92 See European Commission (2019), n. 58.

93 These concepts do not have the same limitations (exclusiveness and alienability) as the ownership concept, and provide further opportunities if aligned well with the sectoral dynamics in a regulatory design. It is important to note here that the prominent alternative concept discussed in the sectoral literature is "data sovereignty". However, the definition of this notion indicates that it mainly refers to alienable exclusive control of the fate of the data, which is not functionally different from the ownership concept. See, for instance, European Commission (2020), n. 18, pp. 10, 27 and 29; van der Burg and others (2020), n. 82, p. 32. Härtel tried to use the same notion more comprehensively, but the proposed rights under the 'data sovereignty' concept are still waivable, and rights are linked to 'farmers' as individuals. See Härtel (2020), n. 13, p. 45 and Härtel (2020), n. 54, p. 4 – para. 6, respectively. For these reasons, it is excluded from the discussion in this section regarding alternative concepts to be taken into account for a sectoral regulation.

focusing on the deeper questions of how to design and allocate ag-data rights.

5.4.1.1 Concept of Access Rights

Many researchers, such as Hilty and others,[94] Kerber[95] or Drexl,[96] propose data access rights instead of data ownership rights for the IoT setting in the broader literature not specifically focussed on agriculture. In particular, Drexl argues that data access rights might be a more appropriate focus when addressing lock-in problems.[97] The main advantages of access rights over an ownership understanding are as follows: (1) they can provide a more targeted mechanism to solve data lock-in problems; (2) they can be designed to be non-waivable to protect the entitlement holder; (3) they can be flexibly allocated to relevant right holders with an interest-based approach; (4) they can be regulated as a stand-alone legal concept – not an exception to ownership; and (5) they are a more suitable tool for a competition-oriented regulation with the objective of enhancing new data-driven markets.[98]

Drexl[99] and Kerber[100] rightly suggest that designing data access rights should be sector-specific, as the needs and distinctive features of sectors and stakeholders vary considerably. Still, Drexl proposed a list of general principles for designing data access rights, which emphasises *inter alia* the need for a non-waivable/non-transferable statutory design,[101] broader coverage for all kinds of data for functionality of access, allocation of rights based on the legitimate interest in making the best use of the data (instead of on machine ownership

94 Hilty, Drexl and Dietmar Harhof (2017), n. 66, p. 4.
95 Kerber (2016), n. 66; Kerber (2016), n. 79.
96 Drexl (2018), n. 30; Drexl (2019), n. 66; Drexl (2021), n. 11.
97 Drexl (2017), n. 66, p. 236. See an earlier study in Drexl and others (2016), n. 67. Drexl argues that to overcome data lock-in in a connected devices setting, data access should not be based on the question of whether data is qualified as personal or not. He gives an example of non-personal farm machine data here. See Drexl (2021), n. 11, p. 497.
98 Drexl (2018), n. 30, p. 18 para. 55. Indeed, the approach of the horizontal Data Act regulation is compatible in this regard. See Recital 6: "*... In order to realise the important economic benefits of data as a non-rivalrous good for the economy and society, a general approach to assigning access and usage rights on data is preferable to awarding exclusive rights of access and use.*" Considering that the Data Act draws the boundaries as a horizontal framework, the data ownership design for sectoral interventions (including for ag-data) is not likely to be a possibility anymore, at least not in Europe.
99 Drexl (2017), n. 66, p. 238; Drexl (2017), n. 67, para. 110; see also Drexl (2018), n. 30 in general; Drexl (2019), n. 66 p. 39; Drexl (2021), n. 11, pp. 496 and 517–518.
100 Kerber (2016), n. 79, p. 762.
101 Drexl (2018), n. 30, p. 18.

or usage),[102] the right to transfer data directly to third parties, precedence over trade secrets and database rights to ensure free data flow without harming device manufacturers' confidentiality,[103] and ensuring a flexible FRAND regime in the case of a paid access design.[104] Drexl also claims that regardless of the data rights design, regulatory intervention should be based on economic justification instead of purely considerations of justice, which can be done via an analysis of market failures.[105] In his approach, a sector-specific focus can generate optimal outcomes on the basis of targeted solutions for sectoral market failures when it comes to data access by multiple stakeholders.[106]

In this regard, Drexl provided highly valuable insights and even principles for data regulation in the digital economy. Section 5.4.2 below aims to apply *inter alia* these insights and principles to the ag-data setting by filtering them according to sectoral conditions where necessary.

5.4.1.2 Concept of Co-Generated Data Rights

This concept was originally developed by the ELI-ALI project,[107] while

102 He also gives a very relevant example from the DAS: access rights for soil data should be granted to farmers instead of machine producers or owners who rent machines to various farms. Drexl (2018), n. 30, pp. 43 and 157–158; Drexl (2021), n. 11, pp. 485–486; It should be noted here that the Data Act proposal is flawed at this point from the sectoral perspective because user definition is linked with ownership, rent or lease of an IoT device. See more in section 5.4.2 below.

103 See more in Drexl (2018), n. 30, pp. 10, 19, 67–85.

104 Drexl (2018), n. 30, pp. 164–165. A very similar list of principles is repeated in his recent study as well. See Drexl (2021), n. 11, pp. 517–518. Indeed, some of these suggestions has been adopted by the recent Data Act proposal as well. See a more detailed evaluation of the Data Act proposal in Atik (2022), n. 22 above and in section 5.4.2 below.

105 Drexl (2018), n. 30, p. 6; Drexl (2021), n. 11, pp. 480–481.

106 Drexl (2018), n. 30, p. 19.; see also Drexl (2021), n. 11, pp. 480–481 and 517. Drexl argues that horizontal data regulation can be combined with specific sectoral regulations. See Drexl (2021), n. 11, p. 488. Potential benefits of horizontal intervention could guide sector-specific legislation. See Drexl (2018), n. 30, p. 2; Drexl (2019), n. 66, p. 27; Drexl (2021), n. 11, pp. 484–485. In his recent study, he argues that horizontal access rights can be designed under the unfair trading/competition law provisions in the EU. See Drexl (2021), n. 11, pp. 519–527.

107 The European Law Institute (ELI), together with the American Law Institute (ALI), initiated a project, namely "Principles for a Data Economy: Data Transactions and Data Rights", with a view to generating potential legal rules applicable to transactions in data. See more about the project at 'Principles for a Data Economy: Data Transactions and Data Rights (with the ALI)' (*europeanlawinstitute.eu*, 2018) <https://www. europeanlawinstitute.eu/projects-publications/completed-projects-old/data-economy/> accessed 15 November 2021.

the Commission mentioned *"usage rights for co-generated data"* in its communication on 'A European strategy for data'.[108] Although the ELI-ALI project has not published its ultimate proposal, it is obvious that this idea has already been seriously considered by the Commission.[109]

Some publications give valuable hints on what this concept brings for addressing data access issues in the digital economy. For instance, Thomas and Wendehorst, who are contributors to the ELI-ALI project, submitted a response to the Commission's public consultation.[110] Their response states that many parties contribute to the generation of non-rivalrous data in many different ways, and these contributors need to be taken into account when considering data rights. This entails going beyond contractual relations and a classic understanding of exclusive ownership to maximise overall welfare with data being economically exploited in multiple ways.[111] Beyond the types of data rights envisaged,[112] they revealed five main criteria for allocating rights for co-generated data;

- the scope and nature of the contribution to data generation by the party asserting a data right;
- the weight of that party's legitimate interest in being granted said right;
- the weight of any possibly conflicting interests on the part of the other party or of third parties, taking into account any potential compensation arrangements;
- the interests of the general public; and
- the balance of power between the party asserting the data right and the other party.[113]

108 COM(2020) 66 final, n. 19, p. 13.

109 See a similar consideration in Charlotte Ducuing, ''Data rights in co-generated data': The ground-breaking proposal under development at ELI and ALI' (*CITIP blog*, 2020) <https://www.law.kuleuven.be/citip/blog/data-rights-in-co-generated-data-part-1/> accessed 12 November 2021.

110 Lord John Thomas, Christiane Wendehorst and Sebastian Schwamberger, 'Response to the public consultation on "A European strategy for data" COM(2020) 66 final' (2020) European Law Institute <https://www.europeanlawinstitute.eu/fileadmin/user_upload/p_eli/Projects/Data_Economy/ELI_Response_European_Strategy_for_Data.pdf> accessed 12 November 2021.

111 Ibid., p. 6.

112 (1) Access or porting of co-generated data; (2) desisting from use of co-generated data; (3) correction of co-generated data; (4) economic share in profits derived from co-generated data.

113 Thomas, Wendehorst and Schwamberger (2020), n. 110, pp. 6–7. Although these principles can also be used when designing a regulatory intervention, they seem

Although the contribution to data generation is the main justification for granting rights to stakeholders vis-a`-vis *de facto* controllers (as can be understood from the name of the proposal), there are valuable complementary elements for the allocation of data rights that increase the flexibility of the concept to cover potential specificities in different sectors.

The project also provides certain case studies from different industries, one of which relates to farm data re-use, which is important to note here. The case discusses a situation where a machine producer/ATP uses collected farm data for a purpose other than providing tailored services to the farmer.[114] If a farmer's contribution was for an entirely different purpose, this kind of data re-use could harm the farmer. Moreover, such data generation would not have been possible if the farmer had known the purpose beforehand; the authors of the case study implied that the farmer should have the right to prevent producers/ATPs from data re-use for purposes other than generating agronomic solutions for the customer farm.[115] Although this evaluation seems reasonable at first sight, it has significant limitations and ambiguities. Limiting data (re-use) solely to providing services to the customer farm would be a highly restrictive outcome, which would not be compatible with the broader data access needs of the sector. Indeed, in this case, the application does not directly consider the five principles proposed above. Instead, the analysis focuses overly on the purpose of data sharing. There is no discussion of the balance of power or the legitimate interests of the conflicting parties or the general public.[116] Also, even if these factors are included in an analysis, weighing the conflicting interests correctly to ensure a fair conclusion is a delicate matter. Nonetheless, the proposed principles have significant potential as a general framework (maybe with some particular reconfigurations) for sectoral data rights.

designed mainly to help the courts evaluate contracts (especially the fairness thereof). See Thomas and Thomas, Wendehorst and Schwamberger (2020), n. 110, p. 3. The authors also state that these principles can be useful for deciding modalities for access such as data formats and access timing or (the existence or amount of) access fees. Thomas, Wendehorst and Schwamberger (2020), n. 110, p. 7.

114 Ibid., p. 8.

115 Ibid.

116 The same case can also be found on the website of the European Law Institute, where some of these missing points are addressed. See 'Case Studies' (*Europeanlawinstitute.eu*, 2021) <https://www.europeanlawinstitute.eu/projects-publications/completed-projects-old/data-economy/case-studies/> accessed 15 November 2021.

The discussions regarding the concept of data access rights explored above were more about 'how to design' the rights part of the issue, while the criteria explained in the ELI-ALI project complement the aspect of 'how to allocate' them. In this regard, the following discussion about sectoral data regulation in agriculture will take into account both of these valuable insights.

5.4.2 Designing Specific Provisions to Address Specific Failures

In their seminal contribution to the fields of law and economics, Celabresi and Melamed explained why a society allocates entitlements as property,[117] liability[118] or inalienability rules[119] by emphasising that, without any entitlement, *"might makes right"* as the strongest or shrewdest in a conflict ultimately prevails.[120] The law's role in deciding the prevailing party with entitlement is critical, but the mere allocation of entitlements might not be able to eradicate the *"might makes right"* environment.[121] Thus, different degrees of state intervention is needed, depending on the situation.[122] This section will take into account this valuable framework in addition to the recently developed concepts of *"data access rights"* and *"co- generated data rights"*[123] in order to generate preliminary insights into a fit-for-purpose ag-data governance that eliminates/prevents sectoral failures and promotes sectoral development in a tailored way, in the hope of moving discussions in the sector beyond the popular "ownership" debate.

The discussion in this section might also be relevant to the ongoing process of EU law-making. In February 2022, the Commission issued the Data Act proposal containing a horizontal framework for data sharing to unlock competition and innovation.[124] Although the regulation provides binding

117 Only the original entitlement is allocated by the collective decision. After the initial entitlement, transactions are based on the voluntary decisions of the rightsholders. This scenario has the least degree of state intervention. See Calabresi and Melamed (1972), n. 80, p. 1092.
118 The original entitlement can be destroyed if its value is determined objectively by the state rather than subjectively by parties in the free market. See detailed discussion on property and liability rules in Ibid., pp. 1092 and 1106–1110.
119 The original entitlement cannot be transferred by decisions of a willing seller and buyer. In this scenario, the state determines the original entitlement, and the compensation/sanction in the event of a breach, and forbids the sale completely. See more in Ibid., pp. 1092–1093 and 1111–1115.
120 Ibid., p. 1090.
121 As discussed in detail when evaluating the data ownership concept above.
122 Calabresi and Melamed (1972), n. 80, p. 1090.
123 See section 5.4.1.
124 Data Act - COM (2022) 68 final.

rules, obligations and even data rights for users of connected devices at the horizontal level, it seems the details are left to follow-up sectoral data regimes, which are repeatedly mentioned as a possible means of providing *"more detailed rules for the achievement of sector-specific regulatory objectives."*[125] In this regard, the suggestions for a sectoral regulation in this section will also be compared with the horizontal provisions of the recent Data Act proposal, as any sectoral intervention will follow or, at least, should not contradict this horizontal framework when laying down more detailed rules for the achievement of sector-specific regulatory objectives. This can also help demonstrate to what extent the Data Act is applicable to sectoral problems and highlight the remaining issues that need to be addressed by a future sectoral regulation,[126] and better explain how the proposed model in this paper can be used to mitigate the (remaining) sectoral problems.

125 See Explanatory Memorandum, pp. 5, 15; Recitals 25, 79, 81; and, more importantly, Art. 40(2) of the Data Act; Recital 87 states that *"[t]his Regulation should be without prejudice to rules addressing needs specific to individual sectors or areas of public interest. Such rules may include additional requirements on technical aspects of the data access, such as interfaces for data access, or how data access could be provided, for example directly from the product or via data intermediation services. Such rules may also include limits on the rights of data holders to access or use user data, or other aspects beyond data access and use, such as governance aspects. This Regulation also should be without prejudice to more specific rules in the context of the development of common European data spaces."* In particular, Recital 25 explicitly declares that *"[s]ectoral legislation may be brought forward to address sector-specific needs and objectives"* immediately after stating that *"[t]his Regulation should therefore build on recent developments in specific sectors, such as the Code of Conduct on agricultural data sharing by contractual agreement."* This can be understood as a clear signal for a follow-up ag-data intervention. Indeed, the Commission recently offered funding and tenders for research on *"Data economy in the field of agriculture – effects of data sharing and big data"* and *"digital and data technologies for the agricultural sector in a fast changing regulatory, trade and technical environment"* as a signal for sectoral (intervention) considerations. See 'Data economy in the field of agriculture – effects of data sharing and big data' (*Euro-access.eu*, 2021) <https://www.euro-access.eu/jart/prj3/euroaccess_eu/main.jart?rel=en&reserve-mode=reserve&content-id=1462988008267&programm_call_id=1626128177295> accessed 5 August 2022 and 'Development of the markets and use of digital technologies and infrastructure in agriculture – digital and data technologies for the agricultural sector in a fast changing regulatory, trade and technical environment' (*Euro-access.eu*, 2021) <https://www.euro-access.eu/jart/prj3/euroaccess_eu/main.jart?rel=en&reserve-mode=reserve&content-id=1462988008267&programm_call_id=1626128177081> accessed 5 August 2022 respectively. This paper, therefore, particularly aims to provide preliminary insights for this future ag-data governance regime.

126 which have indeed been provided in detail in Atik (2022), n. 22 above.

5.4.2.1 Addressing the Lock-in Problem

To address farmers' data lock-in problem,[127] this paper has a rather more direct proposal: there is a need for an inalienable data portability right for 'farm units' in addition to complementary measures relating to data standards and interoperability in the DAS. So, the solution needs to have more than one element, with each one filling different gaps.

The first element of this proposal is inalienability. The farm data portability right should be designed in such a way that it cannot be transferred or waived via contracts.[128] Thus, bargaining power imbalances vis-a`-vis companies would not defuse the expected outcomes, unlike the risks in ownership design.[129] To compare with the design in the recent Data Act, it has to be noted that there is no clear statement of inalienability or non-waivability for the rights of data access (Art. 4) and data sharing with third parties (Art. 5) in the Data Act proposal.[130] This creates ambiguity as to

127 See section 5.2.1 above.

128 See general considerations regarding the need for *"non-waivable rights"* in an IoT setting in Drexl (2018), n. 30, pp. 140 and 158. Härtel mentioned a similar approach by stating the possibility of designing some rules that *"may not be contracted out"*, but this is stated to protect (only) *"small farmers"* by referring to consumer protection understanding. Härtel (2020), n. 13, p. 23. However, this idea is not backed by the conceptual discussion on data rights, and determining the threshold for ''small farmers'' is neither objectively easy nor capable of solving all the problematic lock-in situations in the sector. Härtel also mentions *"non contracted-out"* legal safeguards for achieving data sovereignty. Härtel (2020), n. 13, p. 41. However, it is not clear whether *"legal safeguards"* refers to ag-data rights/rules or to supportive mechanisms for enforcement. Indeed, this is only one option amongst many others such as *"waiver of rights for financial advantage"*. See Härtel (2020), n. 13, p. 45. The position of this paper is much closer to the suggestion made by Drexl (non-waivable access rights) in the broader IoT literature. See section 5.4.1.1 above.

129 The inalienable and non-waivable design might not be limited with a portability right. If lawmakers aim to grant other right to farm units, the same design should be kept in mind to protect the original allocation.

130 There have been some fragmented attempts with different wording in other provisions to protect the original allocation of obligations, but they are not enough to fully protect users (farmers). For instance, Art. 6(2)(f) of the Data Act obliges the third party (which, under Art. 5, receives the data upon request by a user) not to prevent users, through contracts, transferring data to other parties. However, there is no equal provision to prevent data holders (ATPs or machine producers) in the first place from doing so. Art. 12(2) indirectly states: *"Any contractual term in a data sharing agreement which, to the detriment of one party, or, where applicable, to the detriment of the user, excludes the application of this Chapter, derogates from it, or varies its effect, shall not be binding on that party"*, which may serve to maintain the original allocation of obligations in Chapter III. However,

whether users' rights can be changed via free contractual relationships. Therefore, the proposed model with two elements (inalienability and non-waivability) should be taken into account when designing follow-up sectoral intervention, in order to ensure more effective protection for original entitlements. The scope of the portability right should be aligned with the particular needs of the DAS.

It is also important to identify whether portability would be limited to raw data or include the required derived data.[131] For seamless continuity of digital agriculture services with a new supplier, the scope should be defined as broadly as possible without harming the investment incentives for companies that generate or store the derived data. Achieving this balance is a necessary, if not easy, task for the EU rule-makers. The right to share data with third parties under Art. 5(1) of the recent Data Act is normally valid for 'data generated by the use of a product or related service', but Art. 5(8) states that *"[t]rade secrets shall only be disclosed to third parties to the extent that they are strictly necessary to fulfil the purpose agreed between the user and the third party [...]"*. This creates some ambiguity regarding the scope of the portability design in the Data Act. One must also wonder whether other derived data (that are strictly necessary for the purpose of data transfer but are not trade secrets) can be ported to the third party or not, but Recital 14 makes clear that *"[t]he data represent the digitalisation of user actions and events and should accordingly be accessible to the user, while information derived or inferred from this data, where lawfully held, should not be considered within scope of this Regulation"*. However, in this case, one must wonder how raw data can be a trade secret of data holders. More importantly, the formulation in Art. 5(8) opens the way for disputes between parties to determine what is really "necessary".[132] Sectoral regulation should be clear about such issues based on sector-specific regulatory objectives. If the aim is to fully unlock farms, all necessary data should be portable, with clear specifications of what forms of derived data are included. If the aim is to respect technology providers' efforts to process raw data, then the exclusion should be specified to remove any ambiguities in the aforementioned provisions of the Data Act. If the aim is some kind of balance, then what is included and what is excluded should be clearly stated.

these obligations are imposed on data holders vis-a`-vis data recipients, not vis-a`-vis users (farmers). See a detailed discussion on the matter in Atik (2022), n. 22 above.

131 The idea of including necessary derived data in the data portability design was originally proposed by Drexl. See Drexl (2021), n. 11, p. 485.

132 See more in Atik (2022), n. 22 above.

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Also, a functional portability design should cover ongoing (real-time) data flows[133] beyond the transfer of historical data sets. This would allow there to be more than one service provider or machine from different brands on the same farm. For instance, soil data is a common input for various players that provide, for example, irrigation services, fertilising services, or plant growth proposals. So, regardless of the party that collects the soil data, the real-time flow of this data to all these service providers is critical for farm interoperability with various companies/machines. Indeed, the real-time emphasis is rightly stated in the right to access (Art. 4) and the right to share data with third parties (Art. 5) of the Data Act. If a follow-up sectoral intervention were to follow this approach, it would definitely be an improvement and a step towards functional ag-data governance in the EU. A clearly defined right to real-time data portability should be complemented by technical measures for interoperability[134] amongst different machines and ATPs. This is necessary for farmers to work feasibly with multiple brands for each service or machine. More importantly, this would reduce switching costs and let farmers change ATPs or machines with less difficulty - based on their quality, price or performance, instead of being nudged to buy entire services and machines from the same group because of a lack of data standards and interoperability.

It is also particularly important to dwell for a moment on the notion of the ‘farm unit’[135] as an entitlement holder. The distinction between farmers and farm units is not a trivial nuance. If data entitlements were given to individuals (farmers) or legal persons (such as SMEs or companies), this could limit the development of the sector for several reasons. As these rights are proposed to be designed as inalienable in order to prevent the accumulation of data rights in the hands of a few, rights would be limited to the lifetime of entitlement holders. Even if the inalienability design were to provide an exception for inheritance to prevent forfeiture of rights, non-farmer heirs could not transfer related rights to actual farmers active in the business. Furthermore, right holders might not have heirs. Similarly, if data rights were linked with companies that run the farm business, new operators

133 As proposed also in the broader literature. See, for instance, Drexl (2018), n. 30, p. 110; Drexl (2021), n. 11, pp. 498–499.

134 See more detailed discussion and suggestions for functional interoperability, including comparisons with the Data Act provisions, in section 5.4.3 below.

135 This paper supports and further develops the view that rights should be linked to farm units instead of to farmers as individuals. See the original considerations in Atik and Martens (2021), n. 7, p. 364, para. 57.

in the fields or barns could not acquire rights with the farm business for the same reason (inalienability) – if the legal person (company) is not sold as a whole with its rights. There is also the risk of insolvency, which would result in the forfeiture of rights. Therefore, for the sake of uninterrupted agricultural production with all the necessary farm data rights, inalienable rights need to be linked to farm units, not individuals or legal persons that may be disconnected from the farm at any time. If the rights are linked to farm units, rights can always be used by the active operator regardless of the reason for the change.[136] New operators would only need to demonstrate that they are in charge of the unit. The definition of the 'farm unit' could be based on the scope of farm data collection and the geographical location of the farm. Alternatively, there might be a registration system with a unique identification number,[137] especially for movable farming operations. An active individual or company in charge of a unit (related fields, greenhouses or barns) in which data sets are collected would, thus, be able to enforce farm data (portability) rights without interruption.[138]

In the recent Data Act proposal, the entitlement holder for the right to access data (Art. 4) and the right to share data with third parties (Art. 5) is referred to as the "user", which is defined, in Art. 2(5), as *"a natural or legal person that owns, rents or leases a product or receives a services."* As the entitlement holder is the one, who originally enters into a contract with the data holder (ATP or machine producer), the same problems identified above are also valid here whenever the farm changes hands (except where the company that holds data rights as a legal person is sold as a whole).

It has to be noted that the scope of Arts. 4 and 5 also has other limitations from the perspective of the sector. Only *"the data generated by its use of a product or related service"* can be accessed or shared with third parties.[139]

136 See preliminary insights in this regard in Ibid.

137 See a similar suggestion of farms' *"digital identity"* by agdatahub to enforce farmers' consent rights under the EU code of conduct on agricultural data sharing by contractual agreement at 'Information Session on a Common European Agricultural Data Space' (*Shaping Europe's digital future*, 2021) <https://digital-strategy.ec.europa.eu/en/events/information-session-common-european-agricultural-data-space> accessed 5 August 2022; see a detailed discussion on the possibly questionable outcomes of consent rules for non-personal farm data sets though in Atik and Martens (2021), n. 7, pp. 384–386.

138 This model might be able to remove the legal reason for the lock-in problem. To address the technical part of it, see a detailed discussion in section 5.4.3 below.

139 See Art. 4(1) and Art. 5(1) respectively.

The "product" refers to *"a tangible, movable item, including where incorporated in an immovable item, that obtains, generates or collects data concerning its use or environment, and that is able to communicate data via a publicly available electronic communications service and whose primary function is not the storing and processing of data"*,[140] while the "related service" refers to *"a digital service, including software, which is incorporated in or inter-connected with a product in such a way that its absence would prevent the product from performing one of its functions."*[141] This entails that related data rights are valid only for the data generated as a consequence of, for instance, the use of agricultural machines or connected services that make the machines functional.[142] This excludes services provided by ATPs that are mostly independent of farm machine functionality, and thus, data under their control. Also, the *"that owns, rents or leases a product"*[143] part of the "user" definition may exclude some of the farm machinery data access in the practice of the sector. Sometimes, farm machinery is not rented or leased itself but a company that owns farm machinery is hired to carry out, for instance, the harvesting operation, in which case there is no control over the machine in terms of rent or lease. This entails that farmers, in this case, would not be able to force the machine producer to access or port the related data. Nor could the service rendered be considered a "related service", because it is not related to the functioning of a "product" (farm machinery) but is about harvesting the crops. In any case, it is unlikely that the related framework of the Data Act can be applied without any difficulty here.[144] Therefore, a sectoral intervention should move beyond all these limitations by taking into account the proposed (ag-data portability) entitlement model above.

5.4.2.2 Addressing Data Fragmentation and the Broader Data Access Puzzle

To address the fragmentation of data sets and the broader data access puzzle in the sector,[145] the allocation of access rights is the main challenge. The

140 Article 2(2).
141 Article 2(3).
142 See Recital 14 for a clear declaration that agricultural machinery can fall under the 'product' definition. However, it is unclear whether embedded sensors in soils or animals can be considered a 'product'. Camera recordings using drones or stable tools are likely to be outside the scope of this Regulation according to Recital 15. See more discussion in Atik (2022), n. 22.
143 Article 2(5).
144 See more detailed discussion in Atik (2022), n. 22.
145 See sections 5.2.2 and 5.2.3 above.

ELI-ALI principles[146] provide a valuable set of criteria that can be applied in the ag-data setting with any necessary reconfigurations based on sectoral needs. As the Data Act proposal does not allocate any rights for third parties to let them access relevant data sets directly,[147] the model proposed in this section might be useful for lawmakers if they are considering a broader sectoral data access regime beyond farms' data portability.

Various entities (besides farmers) have interests in accessing farm data. For farmland owners, details about the fields, such as fertility rates, soil data or harvesting information, are important when, for instance, they cultivate the soil themselves after a rental period or advertise the land for new tenants. Small or new ATPs may need to access both farm data and proprietary input performance data sets to train algorithms. Machine producers or leasing firms may demand access to the technical performance of agricultural machines,[148] which might cross the line into farm data sets. Banks or

146 See section 5.4.1.2.

147 Mandatory data access for third parties can only be possible, under Art. 5 of the Data Act, upon request by a user. This has significant limitations, as explained above. It might still be important to mention two provisions of the Data Act in the context of the explained access puzzle. The first one is Art. 8, which obliges data holders to be fair, reasonable, transparent and non-discriminatory vis-a`-vis data recipients. One can consider the application of this provision to force data holders to open up their data sets to all access seekers on equal terms. However, this provision is only applicable to the data sharing upon users' request or other regulation that mandates data access. (See Art 8(1)) In other words, it cannot be used by access seekers as a mechanism to direct access to the vertically integrated giants' (proprietary) data sets. Refusal to deal precedents of the EU competition law enforcement still seems to be the only valid way to mandate data access for (downstream) rivals. See more about this in Chapter 6 of this thesis below.; The other relevant provision regarding the re-use of data sets in the Data Act proposal is Art. 15, which is on making data available to the public sector in 'exceptional' situations such as public emergencies. Article 15(c) appears to provide more flexibility by stating that public access can also be possible when lack of access prevents the public body from realising its tasks that are imposed by law. So, one can wonder if this can be used by the public sector to access related ag-data to realise relevant policies such as CAP, food safety or public health policies. However, to access the related data in the scope of this provision, the public body must demonstrate that there are no alternative channels to access the data and there is an urgency for timely action that cannot wait for the adoption of new legislative measures (Art. 15(c)(1)). Therefore, it seems this does not regulate regular data access situations that need to be specified by possible sectoral interventions. See more in Atik (2022), n. 22. So, the sectoral intervention should also be clear about the public sector access conditions to the relevant ag-data sets.

148 See Atik and Martens (2021), n. 7, p. 394.

financial institutions may want to access farm data sets when farmers apply for financial support.[149] Beyond commercial purposes, there may be non-profit organisations, research institutions or public bodies that need to access ag-data sets for various reasons. This causes much ambiguity[150] regarding who can access what data, under what conditions and for what period, as well as whether they can re-use the data without the farm's consent. Moreover, the attribution or allocation of rights to farm data re-use can be more complicated than it seems. For instance, if a contagious (plant or animal) disease comes from a neighbouring area, preventive measures can be taken only by accessing data sets for the entire region. When various farmers work with various ATPs, none of them individually would be able to foresee a threat. These data sets, for instance, might be open to all, but the open data model might affect data collection and investment incentives detrimentally through free-riding. Therefore, instead of having to open up entire data sets in the same market, service providers might be obliged to disclose when they detect any contagious disease. While only one example of a particular situation among possible many, this demonstrates how there might be a need for a dynamic mechanism to address different needs or newly emerging situations beyond the *ex-ante* allocation of rights and obligations, especially for those other than farmers.[151]

Proprietary data (producers' exclusive information on their products such as agricultural inputs) and complementary data sets (on environmental conditions)[152] are also important to consider here. For complementary data, access is possible via non-rivalrous environmental data providers, and the EU policy seems to be as open as possible for these data sets.[153] However, accessing exclusively controlled proprietary data sets is an issue beyond farm data lock-ins,[154] especially for non-integrated (weaker) rivals. As

149 As financial institutions' access to such data is strictly related to farmers' credibility, the farmers' position on the data access decision should be carefully taken into account, as this presents another dilemma between exclusivity and broader access.

150 See some of them in Atik and Martens (2021), n. 7, p. 394.

151 See a more detailed discussion on the possible role of a sectoral ag-data authority in this regard in section 5.4.3 below.

152 See *Bayer/Monsanto*, n. 4, para. 2453 and subsequent paras.

153 See Directive (EU) (2019) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information (recast), OJ L 172; see previous arguments in this direction in Drexl (2018), n. 30, pp. 149–150.

154 *Bayer/Monsanto*, n. 4, paras. 2453–2455.

smart farming solutions reduce farmers' consumption of agricultural input (seeds, fertilisers, herbicides, etc.), integrated agricultural input producers are strategically entering the DAS to compensate for their losses from their traditional business, and they have a significant competitive advantage, especially in input usage prescription markets.[155] As rightly argued in the broader IoT data literature, although data holders have a legitimate interest in developing their own business model with their data, third-party data access should also be possible when identifiable interests justify this access.[156] On the one hand, providing broader data access is beneficial for competitiveness and innovation in the sector. On the other hand, mandatory access to proprietary data sets may cause free-riding and reduce further investment incentives for the upstream input producers.[157] Policymakers should keep these delicate dynamics in mind when designing regulation in the sector.

As the allocation of rights is a big challenge in this confusing puzzle of data access in the sector with its variety of stakeholders, motives and data sets, sectoral regulation could generate a certain set of principles for data re-use instead of relying on a conclusive data access rights allocation. These principles could be developed on the basis of the valuable insights of the ELI-ALI project discussed above[158] by taking into account the distinctive conditions of the DAS.[159] This kind of system would provide a more flexible model.[160] Thus, identifying and addressing (and possibly changing) legitimate interests could be more feasible, also with follow-up insights based on deeper economic and empirical sectoral experience during the enforcement of sectoral regulatory intervention.

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155 Ibid., paras. 2712–2714.

156 Drexl (2018), n. 30, p. 43. This approach is very close to the application of the essential facilities doctrine for data in competition law enforcement. See detailed research on the matter in Inge Graef, *EU competition law, data protection and online platforms: data as essential facility* (Kluwer Law International, 2016).

157 Designing access fees might to some extent help reconcile these two conflicting outcomes. However, such design can only be realised via a data infrastructure and well-designed governance system. See section 5.4.2.3.

158 See section 5.4.1.2.

159 This line of inquiry deserves a separate study and is outside the scope of this paper.

160 See a connected discussion on how to enforce this mechanism in section 5.4.3.2 below.

5.4.2.3 Ensuring Farmers' Trust

To address farmers' trust-related problems,[161] defensive rights such as consent for re-use might play a role despite some negative consequences for the broader data access needs in the sector. So, to achieve an optimal solution, there is a need for a well-balanced and nuanced mechanism.

What farmers fear most is the unintended re-use of farm data by third parties in order to manipulate (increase) the price of commodities, agricultural inputs or land rents according to the identifiable dependencies of farmers.[162] Similarly, it is mentioned that intermediaries in the food supply chain might also reduce purchase prices for agricultural products, for instance by looking at harvesting estimations, and this would further diminish smallholder farmers' bargaining power vis-a`-vis big buyers.[163] Some farmers do not want insurance companies, advertisers or even consumers and the government to access 'their' data.[164] So, policymakers have to decide whether farms should have rights to prevent others from accessing or re-using the data, and if so, the extent and limits thereof.

Defensive data rights could theoretically increase farmers' weak bargaining power, and result in a feeling of control that could positively affect farmers' rate of adoption of digital technologies and might decrease their hesitation in sharing data. However, defensive data rights could also create an additional barrier to the free flow of data in the sector.[165] Drexl addresses the same concern in the connected-devices setting in general with his suggestion to provide effective trade secrets protection instead of an exclusive data ownership understanding,[166] but the demands of farmers stated above go far beyond the protection of trade secrets. So, policymakers

161 See section 5.2.4 above.
162 See Sykuta (2016), n. 3, pp. 64–65 and 70–71; Rasmussen (2016), n. 13, pp. 511–515; Barbero and others (2016), n. 34, p. 224; Jouanjean and others (2020), n. 13, p. 7.
163 Sykuta (2016), n. 3, pp. 64–65 and 70–71. Apart from the risk for farmers, uncontrolled access to this data can also affect global crop/food prices. See also Barbero and others (2016), n. 34, p. 224.
164 Copa-Cogeca (2016), n. 13, p. 5.
165 Atik and Martens (2021), n. 7, p. 386.
166 Drexl (2018), n. 30, p. 7, para. 24. Privacy or trade secret protection does not matter. The core message here is the balancing of interests. Protection in the DAS can be focused on a more comprehensive understanding in order to increase farmers' trust in adopting digital technologies and sharing data: the protection of data sets that are considered confidential by farmers.

have to balance societal welfare gains[167] from non-exclusive access to ag-data against farmers' welfare gains from defensive rights.[168] Only when the latter overrides the former, exclusive/defensive rights on ag-data might be justified.[169] It is also important to note that not all concerns of farmers are legitimate. In particular, demands to prevent government access seem related to fear of certain sanctions, such as those relating to environmental obligations or CAP payments. In this regard, the rule-makers should ensure that they respond proportionately to an overriding legitimate interest without excessively harming other stakeholders' interests or jeopardising the enforcement of other public policies.[170]

Recalling the broader data access needs, some hybrid models can also be considered, such as prohibiting certain actions for data re-use rather than granting farmers complete preventive rights based on their sole discretion. Indeed, Art. 4(6) of the recently released Data Act proposal can be categorised under this suggestion despite its limitations. It states that "*[t]he data holder shall only use any non-personal data generated by the use of a product or related service on the basis of a contractual agreement with the user. The data holder shall not use such data generated by the use of the product or related service to derive insights about the economic situation, assets and production methods of or the use by the user that could undermine the commercial position of the user in the markets in which the user is active.*" Indeed, this seems a direct response to farmers' concerns.[171] However, the first sentence restricts all kinds of data re-use

167 This is strictly related to the data fragmentation problem and broader data access needs in the sector, as exclusive defensive rights for farms can be detrimental thereto. However, societal welfare is broader than that.

168 It is also important to note that defensive rights might increase farmers' bargaining position and also their trust in sharing more data with third parties, which might, in turn, also positively affect societal welfare deriving from broader data re-use to some extent.

169 See a similar discussion in Atik and Martens (2021), n. 7, pp. 384–386.

170 In line with the ELI-ALI criteria for the allocation of data rights in an IoT setting. See sections 4.4.1.2 above.

171 See Recital 25: "*[...] the data holder should not use any data generated by the use of the product or related service in order to derive insights about the economic situation of the user or its assets or production methods or the use in any other way that could undermine the commercial position of the user on the markets it is active on. This would, for instance, involve using knowledge about the overall performance of a business or a farm in contractual negotiations with the user on potential acquisition of the user's products or agricultural produce to the user's detriment, or for instance, using such information to feed in larger databases on certain markets in the aggregate (,e.g. databases on crop yields for the upcoming harvesting season) as such use could affect the user negatively in an indirect manner. The user should be given the necessary technical interface to manage*

possibilities to that with the contractual agreement between the users and data holders. Without it, the sentence that follows it could have been enough to address the concerns. Thus, other data re-use could have been possible if it does not harm the commercial position of users. Also, the scope is again limited to 'data generated by products or related services' and, owing to the inapplicability of this definition to data stored and processed by ATPs, this would only cover machine producer and farmer relationships. Nonetheless, this can help increase farmers' trust in data sharing.[172] A sectoral design should ensure that the scope of a similar provision will cover all the farm data sets unlike the limited model in the existing text of the Data Act. In particular, when designing the sectoral intervention, lawmakers should carefully re-evaluate the restriction of other data re-use possibilities that do not harm users by taking into account the broader ag-data access needs inside and outside of the farm-to-fork chain.

Furthermore, Art. 34 of the Data Act states that the Commission will develop non-binding model contractual terms. Model contracts – if widely applied in the sector – would also increase farmers' trust in adopting digital technologies and sharing data. However, it has to be kept in mind that the wide adoption of model contracts is possible only when the benefits of such voluntary action exceed the advantages of exclusive control of data and locked-in users for companies. So, it is not rational to expect too much from non-binding tools unless market dynamics force the players to adopt them, for instance as a result of competition on better contractual terms. This kind of market pressure can still be observed in the sector though, considering the fact that the digital transformation of European farmers is still in its early phases.[173]

5.4.3 Synergistic Potential of a Complementary Ag-Data Infrastructure

Sector-specific rulemaking to address particular concerns is a necessary

permissions, preferably with granular permission options (such as ''allow once'' or ''allow while using this app or service''), including the option to withdraw permission." The recital gives an indication of some of the details envisioned for the sectoral intervention as well.

172 See Atik (2022), n. 22 for detailed discussions.

173 Especially if new 'digital farmers' are sensitive enough about contractual clauses when choosing their first machines and ATPs. Still, it is difficult to expect a retrospective change of contracts to the benefit of farmers who are already locked-in. See more in Atik (2022), n. 22.

step, but might not be sufficient in itself. For instance, granting a clear portability right can remove the legal reason for the lock-in problem, but not the technical barriers regarding interoperability and data standards per se. Focussing on access rights instead of an exclusive ownership understanding can overcome the risk of the *de jure* isolation of already fragmented ag-data sets, but cannot in itself create an equal and easy-access data platform for all stakeholders. The *ex-ante* allocation of rights is theoretically possible, but it is difficult to respond to each particular data re-use request from a variety of changing access seekers. Having a clear set of rights would positively affect farmers' trust, but possible enforcement problems (especially owing to technical incompatibilities) might create frustrations. For all these reasons, this section argues that designing sectoral rules should be complemented by a central ag- data access infrastructure run by a public authority, which could also be responsible for enforcing the sectoral data access rules.

The Commission's plan to create a Common European Agricultural Data Space (CEADS)[174] may be critical in this regard. As the details of the CEADS were not yet clear,[175] the Commission[176] organised an expert workshop entitled 'How to build a 'Common European Agricultural Data Space' in September 2020 together with IT and data specialists and interested participants working in the agri-food sector.[177] The main aim of the

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174 COM(2020) 66 final, n. 19, pp. 12–13 and 21–23 in general and 31–32 in particular; see also earlier documents Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – towards a common European data space – COM(2018) 232 final and Commission Staff Working Document on Guidance on sharing private sector data in the European data economy Accompanying the document Communication Towards a common European data space – SWD(2018) 125 final.

175 Apart from the general statements in COM(2020) 66 final, n. 19 above.

176 DG CONNECT, in cooperation with DG AGRI.

177 The workshop focused on four main points: achieving a well-functioning CEADS, required standards, farmers' trust, and data sovereignty (control of data flows) beyond the need for adequate investment in the sector. See European Commission (2020), n. 18, p. 4. Before the Commission's workshop, AIOTI (Alliance for Internet of Things Innovation) also organised a workshop namely 'Data sharing in agriculture. Towards a European agriculture data space' in July 2020, See 'Data sharing in agriculture. Towards a European agriculture data space' (*AIOTI*, 2020) <https://aioti.eu/wp-content/uploads/2020/07/Report_Data_Sharing_in_Agriculture_Online_Webinar_10.06.2020_Final.pdf> accessed 20 Mar 2022 ['AIOTI (2020)' henceforth]. It is also important to summarise the discussion there. Wide participation when designing CEADS is declared critical. Trust is indispensable for wide participation and is strictly related to transparency and clear rules for data governance, for which it is rightfully stated that focusing

workshop was to collect stakeholders' views on the question of how to realise data interoperability in practice to reach a functional common data space in agriculture.[178] The workshop report concludes that trust is one of the main issues to be addressed for ensuring farmers' involvement and motivation (to share data), apart from the compatibility and interoperability of existing data sharing mechanisms. It seems several data standards will remain, but a need to increase dialogue is emphasised. A federated arrangement of existing ag-data systems was considered a feasible option as opposed to creating central architecture from scratch, and this would require public-private cooperation.[179] Many participants such as IDSA,[180] DFKI,[181] AIOTI[182] and ILVO[183] focussed on data ownership or data sovereignty[184] for farmers as the central legal concept, in line with the general trend in the sector discussed above.[185] With all these preliminary discussions, the workshop was a first step towards reaching the insights required for optimal implementation of a CEADS instead of solving all the issues. Indeed, plans were announced for further events.[186] In December

on the questions of what, how and with whom the data is shared is preferable over the data ownership discussions. The creation of a certification scheme for compliance is also proposed to increase trust. Participants acknowledged that different systems will co-exist, but interoperability mechanisms and the adoption of standards are critical to overcoming possible inconsistencies. The need was stressed for simple (preferably automated) data sharing within the scope of the EU Code. Another point stressed in the workshop was facilitating 'data discovery', which refers to the easy availability and findability of related data within the space for the whole supply chain to overcome data silos and facilitate the creation of a single market for a wide range of ag-data. The Commission's envision of integrating existing systems rather than creating a completely new ag-data pool seems adopted. Participants stated the need for public-private cooperation to run the technical implementation of distributed architectures as well as data sharing and data use. The workshop report also suggests taking lessons from existing local/regional initiatives when creating the sectoral data space. See AIOTI (2020), n. 177, p. 30.

178 European Commission (2020), n. 18, p. 12.
179 Ibid., pp. 22–23.
180 Ibid., pp. 15-16.
181 Ibid., p. 16.
182 Ibid., pp. 18-19.
183 Which even suggested a digital identity system to track entitlements. See Ibid., p. 19
184 Which was used with different meanings, such as data security, data safety, control of data flows or sharing in profits from data. However, the main function is exclusive control of farm data sets.
185 Criticisms against the ownership concept above are completely valid also against these ideas.
186 European Commission (2020), n. 18, p. 23.

2021, the Commission organised an information session on the CEADS.[187] It was declared that the aim was *"facilitating the trustworthy sharing and pooling of data for the sector, by creating a single data space, which in turn will be based on a set of data spaces/platforms"*, and that there was a need for a clear governance structure and business models to achieve this objective.[188] Ensuring *"alignment with the design of the European data spaces in other sectors with respect to common elements, such as the data space building blocks and reference architecture, some common standards, and protocols"* was also stated as critical.[189] Stakeholders emphasised various points, such as the need for design principles, sovereign infrastructure, the inclusion of stakeholders, technical security and conformance measures to ensure trust and reliability, and standards and protocols for data exchange for the CEADS, in addition to a need for consent rights and digital identity for farmers, the integration of various ag-data types, the stimulation of dialogue among stakeholders, and addressing all stakeholders' expectations.[190] The following analysis aims to contribute to the ongoing discussions to create a binding[191] data infrastructure for the sector, especially from the perspective of building functional and holistic ag-data governance in the EU.

187 'Information Session on a Common European Agricultural Data Space' (*Shaping Europe's digital future*, 2021) <https://digital-strategy.ec.europa.eu/en/events/information-session-common-european-agricultural-data-space> accessed 5 August 2022.

188 'Information Session on a Common European Agricultural Data Space - Agriculture Data Space Event Report' (*Shaping Europe's digital future*, 2021) <https://digital-strategy.ec.europa.eu/en/events/information-session-common-european-agricultural-data-space> accessed 5 August 2022, pp. 3–4.

189 Ibid., p. 4.

190 See the presentations of these stakeholders at the source cited in footnote 187 above.

191 It has to be noted that similar data pooling can theoretically be organised by farmers' cooperatives or by any other voluntary mechanism with broader stakeholder participation. However, there are some limitations to this idea. Existing data holder companies would not have any incentive to let these initiatives access historical farm data. So, this cannot solve existing lock-ins completely. Also, it is difficult to organise collective bargaining for various farmers with different ATPs. More importantly, the rules and arrangements of cooperatives may create another set of switching costs for farmers. See Atik (2021), n. 25, pp. 67–68. See also limitations for neutral intermediaries in Atik and Martens (2021), n. 7. Nor would this address the data fragmentation problem essentially, as there would be many unconnected voluntary cooperative pools across Europe. Also, this would not bring any solution for the broader ag-data access seekers in the sector. For all these reasons, a voluntary pooling option including fragmented farmers' cooperatives will be excluded as a potential solution in this section.

5.4.3.1 Addressing the Lock-in Problem

To address the lock-in problem, the CEADS should prioritise ensuring sectoral data standards and interoperability,[192] which can be a natural consequence if data access rights are enforced via this central data access hub, as stakeholders would have to align their data sharing formats with the infrastructure's requirements in time. So, possible obligations regarding technical standards in the sectoral regulation could be implemented via a central data access hub. If the CEADS were able to provide a functional ecosystem in this regard (a transparent central data hub accessible for stakeholders in line with a clear ag-data regulation), it would reduce data-related asymmetries between market players. This could, in turn, help farmers to choose, split and switch the 'smart farming' operations on their farms more easily, as dictated by their needs. In such an environment, the main determinant of competitive power would come from better services or more advanced data analytics technologies, instead of the first-mover advantage and data lock-in.[193]

The recent Data Act proposal provides interoperability obligations for operators of data spaces, cloud service providers and smart contracts.[194] Therefore, these provisions will have to be taken into account when designing the governance framework for CEADS. However, this does not mean that these obligations will be applicable to ATPs or agricultural machines to force them to generate common standards. In other words, direct interoperability in farm operations amongst different machines and ATP services still has to be solved.[195] Comparing what has been envisioned by interoperability provisions in the Data Act, the statements above refer to the indirect effect of mandatory central data access hub usage when enforcing data portability rights in order to naturally create interoperability standards amongst stakeholders (including ATPs and agricultural machines) over time. However, the Data Act's right to share data with third parties (Art. 5) refers to direct B2B data transfer independent of the interoperability obligations on operators of data spaces (Art. 28).[196] Therefore, when designing a sectoral

192 As stated by many stakeholders in the European Commission (2020) n. 18.
193 See a more detailed discussion on the first-mover advantage and its consequences for the DAS in Atik (2021), n. 25, pp. 56–62.
194 See Arts. 28–30.
195 See detailed discussion in Atik (2022), n. 22.
196 These are generic horizontal obligations, such as making data sets publicly available and findable, as well as accessible, with clear classification schemes and taxonomies "*to enable automatic access and transmission of data between parties,*

intervention, farm interoperability with different machines and digital services (ATPs) should be ensured by imposing the necessary technical obligations on machine producers and ATPs[197] as well as operators of data spaces, and also taking into account the above suggestion of portability enforcement via the CEADS.

5.4.3.2 Addressing Data Fragmentation and the Broader Data Access Puzzle

To address the fragmentation of ag-data sets and the broader ag-data access puzzle, a central data infrastructure might bring some additional opportunities. A 'one- stop-shop' central data access option[198] with a clear catalogue of data sets[199] as opposed to the dispersed data sets within the isolated data silos of a variety of companies is the most prominent benefit in this regard. The CEADS could be an important infrastructural base for responding to various stakeholders' complicated data access needs. It is expected to ease further data access and increase sectoral momentum and innovation. However, digital services often evolve rapidly, and regulatory intervention might not match this pace in every setting.[200] So, instead of trying to achieve a nearly impossible quality standard of tech neutrality[201] or future-proofness for ag-data regulation, some criteria can be determined for third-party data access and data re-use, with a non-exhaustive list

including continuously or in real-time in a machine-readable format" in addition to the requirements to enable the interoperability of smart contracts within their services and activities. Further sectoral specifications can also be possible in future. See Art. 28(1).

197 Indeed, the Commission has enough power to take further action with the Data Act, as it is *"empowered to adopt delegated acts [...] by further specifying the essential requirements referred to in paragraph 1"* See Art. 28(2); The Commission can request European standardisation organisations to draft harmonised standards. See Art. 28(4); It may also adopt guidelines regarding interoperability specifications, including architectural models and technical standards that foster data sharing. See Art. 28(6).

198 As an *"easy access to a large pool of high quality data"*; see European Commission (2020), n. 18, p. 7; facilitating *"data discovery"* was also mentioned as an important function of the CEADS in AIOTI (2020), n. 177, p. 30.

199 Article 28(1) of the Data Act imposes generic obligations on operators of data spaces in this regard.

200 OECD (2019). Indeed, flexibility for evolving situations when designing the CEADS was mentioned in the expert workshop by a stakeholder; see European Commission (2020), n. 18, p. 17.

201 Suggested by Jouanjean and others (2020), n. 13, p. 25.

of access seekers and access modalities.[202] A sectoral authority[203] could be constituted to manage these requests on the basis of certain principles. The ELI-ALI principles explored in section 5.4.1.2 above could be a valuable starting point by also taking into account sectoral conditions in order to amend some nuances. The sectoral authority might declare and reconfigure third-party access or re-use modalities (such as access fees[204] or the scope, time and conditions of re-use) according to the sectoral needs (which might change over time). This authority could also run the CEADS, investigate breaches, impose sanctions, and thus be responsible for the enforcement of rights via the technical infrastructure of the CEADS by ensuring neutrality,[205] data security,[206] and the fair enforcement of ag-data rights.[207]

Indeed, the recent Data Act proposal has provisions regarding 'competent authorities' that process complaints and impose penalties for breaches.[208] What it envisions is multiple competent authorities designated by the Member

202 See section 5.4.2.2 above.

203 The idea of an ag-data authority was proposed before the Commission's plans for the creation of the CEADS. See Kritikos (2017), n. 13, p. 10. However, particular consideration in this section is not only related to the functionality of sectoral rules, but also to the management of the CEADS.

204 Article 9 of the Data Act covers "*[c]ompensation for making data available*" by clearly stating that (1) any compensation must be reasonable; (2) compensation must not "*exceed the costs directly related to making the data available*" if the recipient is an SME; and (3) these provisions must not preclude other regulations without compensation or with lower compensation. It is important to keep in mind that the compensation here is designed to be paid by data recipients upon users' request. Therefore, this does not cover direct access requests of third parties. Also, when the data recipients are not SMEs (nearly all ATPs and machine producers) the question of "what is reasonable?" must be answered. It has to be noted that access costs paid by recipients would ultimately be transferred to users through higher service/machine prices. There is no rationale for the distinction between SMEs and others in this regard from the users' perspective. So, compensation could be designed to be as low as possible and uniform for all. Possible sectoral intervention may need to specify this further. See more in Atik (2022), n. 22.

205 In line with EU policy aims. See Proposal for a Regulation of the European Parliament and of the Council on European data governance (Data Governance Act), COM(2020) 767 final, 2020/0340 (COD) 25 (November) (2020), p. 6.

206 Kritikos (2017), n. 13, p. 53.

207 A similar mechanism is proposed in Directive (EU) 2019/944 of the European Parliament and of the Council of 5 June 2019 on common rules for the internal market for electricity and amending Directive 2012/27/EU (recast), OJ L 158 – despite the less central form, with flexibility for the Member States. See Art. 23 in particular.

208 See Arts. 30–33.

States instead of one central European authority.[209] Article 31(2)(b) of the Data Act further states that *"for specific sectoral data exchange issues related to the implementation of this Regulation, the competence of sectoral authorities shall be respected."* This is a positive development towards comprehensive ag-data governance in the EU, as it explicitly provides a green light for this paper's above proposal. However, while the sectoral authority's powers should not be limited to the enforcement of the Data Act, it should be responsible for enforcing future sectoral regulation and the management of the CEADS, because frictionless interaction between the rules and the technical infrastructure is critical for overcoming complicated problems in the sector that arise for legal, technical, contractual or economic reasons. Also, fragmented authorities in each Member State may generate problems in terms of coherence in European ag-data governance. Therefore, a central European ag-data authority that is responsible for coherent enforcement might be useful,[210] and is also critical for the consistency of penalties for breaches across Europe, as Art. 33(1) leaves the regulation of penalties to the Member States, stating that *"[t]he penalties provided for shall be effective, proportionate and dissuasive."* Member States are responsible for notifying the Commission of such rules or any amendments thereto.[211] However, these are generic statements and there is no clear framework about maximum/minimum fines or details for their calculation methods. It might not be desirable to have very different sanctions for the same action across the Member States. Therefore, at least, providing a detailed framework to ensure that the Member States act coherently is critical even if the legislator prefer not to impose a uniform penalty mechanism across Europe.[212] A follow-up sectoral intervention might need to take into account these nuances beyond the substantial suggestions made above for effective enforcement.

5

209 *"Member States may establish one or more new authorities or rely on existing authorities."* See Art. 31(1).

210 The formulation of Art. 31(4) can be a legal basis for this suggestion: *"Where a Member State designates more than one competent authority, [...] relevant Member States shall designate a coordinating competent authority."* However, it seems that the wording only covers national coordination. This might be fine-tuned before the Data Act enters into force. If not, a sectoral intervention should clearly include a functional provision for European coordination of national ag-data authorities. See more in Atik (2022), n. 22.

211 Article 33(2).

212 See Atik (2022), n. 22 above.

5.4.3.3 Ensuring Farmers' Trust

To address the farmers' trust issue, a neutral public authority to run the CEADS and be responsible for enforcing the sectoral rules might be helpful. It might be useful *inter alia* to increase trust amongst farmers as it would not have separate commercial interests in data sets. However, there might still be some hesitation towards public bodies or governments.[213] So, to increase trust, wider stakeholder participation[214] (by, for instance, including the stakeholders, especially farmers' representatives, in the management or at least the auditing body of the sectoral authority) should be ensured when setting up the sectoral authority.

Despite said limitations/ambiguities of the provisions on 'competent authorities' in the recent Data Act proposal, it is definitely a positive step, which might generate trust amongst farmers. In particular, Art. 31(3) of the Data Act provides horizontal tasks and powers when designing the competent authorities, such as promoting awareness among users and entities, handling complaints arising from alleged violations, imposing dissuasive financial penalties, and cooperating with other competent authorities to ensure consistent application. Each of these actions can help build trust amongst farmers, especially when enforcement is aligned with sectoral needs with possible future follow-up sectoral regulation.

5.5 Conclusion

Digital transformation in agriculture has opened up various opportunities thanks to data-driven agronomic solutions, but it has also brought about new ambiguities and concerns. The lack of clarity regarding who has what rights to non-personal agricultural data causes a *"might makes right"*[215] situation,

213 For instance, some farmers, especially from central European EU Member States expressed negative opinions about the "data library" scenario – which is not too different from a sectoral data space – that was *inter alia* presented to stakeholders in a workshop. The main arguments for rejecting public bodies are the risk of corruption and the lack of efficiency. See van der Burg and others (2020), n. 82, p. 30.

214 In line with Ostrom principles. See Elinor Ostrom and others, 'Revisiting The Commons: Local Lessons, Global Challenges' (1999) 284 Science as well as Thomas Dietz, Elinor Ostrom and Paul C. Stern, 'The Struggle to Govern the Commons' (2003) 302 Science; See an attempt to apply a common knowledge framework for agricultural data issues, particularly from the food safety perspective, in Jeremiah Baarbé, Meghan Blom and Jeremy De Beer, 'A Proposed "Agricultural Data Commons" in Support of Food Security' (2019) 23 The African Journal of Information and Communication (AJIC). Farmer participation is also emphasised in van der Burg and others (2020), n. 82, p. 30.

215 See Calabresi and Melamed (1972), n. 80, p. 1090.

with various market failures including farmer lock-in, exclusionary data clustering within a fragmented data environment, a variety of unsatisfied access seekers, and lack of trust on the part of farmers in sharing data or even adopting digital technologies. The sectoral literature and voluntary initiatives predominantly envisage 'data ownership' rights for farmers and link all third-party data re-use possibilities to the discretion of data owner farmers.[216] This paper discussed the possible consequences of a data ownership regime for agricultural data and demonstrated that an ag-data ownership regime is unlikely to change the *status quo* and solve sectoral problems in the DAS as it does not solve underlying bargaining power imbalances.[217] More importantly, such a legal design could even exacerbate existing failures, mainly due to the alienability and exclusivity features of a property rights understanding. Transferable ownership rights for ag-data could be accumulated in the hands of a few vertically integrated agricultural conglomerates regardless of the original allocation of entitlements. These few data owners could acquire exclusive rights, which could be used to prevent any kind of data portability, access or re-use, which means more dependent farmers, legally protected data isolation/clustering and, thus, unsatisfied access seekers, not to mention a deeper distrust amongst stakeholders. As this design might bring more harm than benefit, this paper opposes ownership or any form of traditional property rights understanding for regulating the emerging DAS.[218]

For the 'what to do' part of the research, this paper first explored the alternative concepts of data access rights[219] and co-generated data rights,[220] which do not carry the same limitations as data ownership. Although originally developed in the broader connected devices literature, some of their functionalities involved can be useful in an ag-data setting, as well. The paper concluded that, instead of adopting one of these concepts directly, each sectoral failure or particular progressive policy aim should be addressed through specific data rights, which might include different elements from various concepts, including but not limited to data access, portability, re-use and other measures if needed – leading to a flexible and fit-for-purpose design for possible sectoral data regulation.

216 See footnotes 12, 13, 14, 15, 16 and 17 above.
217 Based on valuable insights from the broader literature on connected devices. See, for instance, in Drexl (2018), n. 30, p. 39; See Section 5.3.2.1.
218 See section 5.3.2.2.
219 See section 5.4.1.1.
220 See section 5.4.1.2.

In particular, an inalienable right to data portability for 'farm units' might remove the legal ambiguity of the lock-in problem. This right should be applicable to both historical and real-time data flows as well as to raw and essential processed data sets in order to ensure functional service/machine switching and interoperability. Linking inalienable data rights and individual farmers or companies might result in the forfeiture of rights because people can die and legal persons can be dissolved. Instead, linking inalienable rights to farm units (from which data has been collected) could ensure the continuity of agricultural production even if the person or company that runs the farm business changes for any reason. To address the technical part of the problem, clear obligations should be imposed on machine producers and ATPs in the sector in order to achieve clear interoperability and data standards. However, a sole regulation might not be enough for this. The creation of the CEADS as a central data access hub could be a significant catalyst in this regard. If this infrastructure were to be the common gateway to access-related data sets, then standards and the interoperability of systems/machines would emerge naturally over time. Thus, it would be possible for farmers to change services or work with multiple brands at the same time.

Data access is a critical issue not just for farmers, but for various players inside and outside of the farm-to-fork chain. It is essential to design a flexible mechanism to address broader access needs. It might not be realistic to determine or foresee all the legitimate access seekers *ex-ante*, though. So, determining a set of criteria for third-party data re-use conditions could be considered instead of the nearly impossible task of future-proofing the *ex-ante* allocation of rights to numerous entities. The ELI-ALI principles[221] could be an invaluable starting point for determining general principles for third-party access by also taking into account distinct sectoral conditions. To respond flexibly to possibly changing needs in this dynamic and still emerging sector, the access modalities could be reconfigured by the sectoral authority over time with possibly deeper economic and empirical insights – of course within the margins of the main set of criteria that needs to be designed carefully in the sectoral regulation. Still, a non-exhaustive list of data access situations might be useful at first. In implementing this model, a well-designed CEADS might play a complementary role. A 'one-stop-shop' data access gateway[222] run by a neutral sectoral authority could be very

221 For the allocation of rights, see section 5.4.2.1 above.
222 With the benefits of maximised economies of scale and scope enabled by data.

useful for addressing the data access puzzle in the sector by ensuring that access seekers can reach the data required without difficulty via a central access hub.

To address farmers' trust issues, a consent mechanism or right to prevent some data re-use could create a feeling of control for farmers and might result in higher rates of adoption of digital technologies and less concern about data sharing. However, this would inherently create a legal barrier to free data flow in the sector. The rule-makers should consider these two conflicting outcomes on the basis of deeper insights acquired through a comprehensive investigation of the sector. If defensive rights for farmers are considered inevitable for building trust amongst them and fostering digital transformation, the boundaries of such rights should be carefully contemplated so as not to undermine broader access needs. Instead of granting farmers ultimate preventive rights, an alternative could be to provide strict data re-use conditions.[223] In addition to rules, rights and obligations, a neutral public authority[224] to run the CEADS could also be helpful if it is designed with broader stakeholder participation, including farmers' representatives. Thus, farmers might have an indirect say in data re-use conditions or could, at least, participate in the related processes, which would help establish trust.[225]

223 Art. 4(6) of the Data Act prohibits undermining the commercial position of users, for instance. Similarly, Art. 34 mentions developing model contractual terms, which can be useful for increasing trust despite the limitations discussed in section 5.4.2.3 above. Until there is a comprehensive regulatory intervention, these insights can also be used to reconfigure existing voluntary initiatives. For instance, the EU Code has been criticised as ineffective; see Verdonk (2019), n. 50, p, 127; van der Burg et al (2020), n. 54; Härtel (2020), n. 13, pp. 36 and 47–48; and Atik and Martens (2021), n. 7. In particular, the EU Code has a data ownership design that goes beyond what has been repeatedly stated and favours contractual freedom over the principles proposed. This undermines how the rules are expected to function. See in Atik and Martens (2021), n. 7, pp. 381–390. Although there is no cure for the inherent limitation of voluntary participation and, also, stricter design for data rights in the EU code might further reduce incentives of the first-mover data-rich players to participate, having clear and to-the-point rules, such as the right to data portability for farm units, obligations regarding interoperability and standards, and clear sanctions in the event of a breach of the rules would, at least, be helpful for farms that receive services from participating companies.

224 The Data Act proposal opens up this possibility with its Art. 31 even though there are nuances to be fine-tuned before the Act enters into force or in a follow-up sectoral intervention. See section 5.4.3 above.

225 Indeed, this has been signalled before. See 'Public consultation on the Data

The recently released Data Act proposal provides horizontal provisions including a data access right for users (Art. 4), the right to share data with third parties (Art. 5), general obligations on third parties (Art. 6) and data holders (Art. 8), interoperability obligations on operators of data spaces (Art. 28), provisions about competent authorities (Arts. 31–33) and model contractual terms (Art. 34). This general framework, with its attempt to cover various relevant issues in the data economy, is valuable. However, as explained above, the definitions of the core notions and the scope of the provisions do not fully cover ag-data issues.[226] Indeed, it may not be fair to expect a horizontal regulation to solve all the issues in a specific sector considering that the Data Act proposal was not designed based on the particular problems in the DAS. It seems that keeping the scope of horizontal intervention limited is intentional, as many signs point to future sectoral interventions with more detailed rules for achieving sector-specific regulatory objectives. In this regard, although providing binding rules, obligations and rights at the horizontal level is a significant step towards the fit-for-purpose European agricultural data governance,[227] it is difficult to say this on its own will be the ultimate cure for the sector in its existing form. Therefore, the remaining issues[228] need to be addressed in a follow-up

Act' (*Shaping Europe's digital future*, 2020) <https://digital-strategy.ec.europa.eu/en/consultations/public-consultation-data-act> accessed 15 November 2021; This is a significant achievement compared to the previous non-personal data regulation (Regulation (EU) (2018) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union, OJ L 303); see early considerations on the limitations of the voluntary provisions in Regulation (EU) 2018/1807 from the sectoral perspective in Atik and Martens (2021), n. 7, pp. 380–381.

226 Only farm machinery data falls under the related provisions under certain conditions. See section 5.4.2.1 above. See also Atik (2022), n. 22 for a more detailed evaluation of the Data Act proposal from the sectoral perspective.

227 Indeed, this has been signalled before. See 'Public consultation on the Data Act' (*Shaping Europe's digital future*, 2020) <https://digital-strategy.ec.europa.eu/en/consultations/public-consultation-data-act> accessed 15 November 2021; This is a significant achievement compared to the previous non-personal data regulation (Regulation (EU) 2018/1807). See some evaluations on the limitations of the voluntary provisions in the Regulation (EU) 2018/1807 from the sectoral perspective in Atik and Martens (2021), n. 7, pp. 380–381.

228 Such as the need for an inalienable data portability right for 'farm units' (see section 5.4.2.1); full interoperability for farm operations including machines and ATP services (see sections 5.4.2.1 and 5.4.3.1); designing a mechanism to address broader data access needs based on ELI-ALI principles (see section 5.4.2.2); optimising defensive rights for farmers in order to increase their trust and power without preventing the free flow of data (see section 5.4.2.3); ensuring a more comprehensive role for the sectoral authority that is to be responsible for enforcement, responding to third-party access requests, management of the CEADS, and coordinating public-sector access

sectoral regulation with targeted provisions, using the prominent problems of the sector as a benchmark for the evaluation as proposed above.

Further studies might also be useful to deepen insights into achieving a holistic ag-data regime. The optimal allocation of entitlements (especially for parties other than farmers), data re-use conditions, and the existence or level of farmers' preventive powers are still important questions to be addressed separately by law/economics studies. Despite the synergistic potential explained, the idea of a sectoral regulation and the creation of the CEADS are discussed separately. They should be taken into account jointly to realise the synergistic benefits of a complementary design. Beyond that, governing agricultural data might have potential effects on various policies, such as the CAP,[229] food safety and traceability regulations,[230] public, animal and plant health/welfare,[231] and environmental policies.[232] Therefore, it is critical to take into account all relevant aspects when shaping the ag-data governance regime in the EU in order to ensure frictionless interaction amongst policies and maximise societal welfare with the help of digital transformation in agriculture.

when it comes to relevant policies, in addition to ensuring farmer representation in order to increase trust (see sections 5.4.2.2, 5.4.3.2, and 5.4.3.3).

229 The new CAP aims to use digital data to track environmental obligations. See 'The New Common Agricultural Policy: 2023-27' (*agriculture.ec.europa.eu*, 2021) <https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/new-cap-2023-27_en#innovation> accessed 5 August 2022.

230 European Commission (2020), n. 18, p. 19; see also earlier insights on using ag-data for the purposes of other policies in Kritikos (2017), n. 13, p. 4.

231 Kritikos (2017), n. 13, pp. 4–10.

232 Indeed, the Farm to Fork Strategy is one of the sectoral pillars of the Green Deal with the clear sectoral objectives of achieving a more sustainable agricultural value chain. See Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – a farm to Fork Strategy for a fair, healthy and environmentally-friendly food system – COM(2020) 381 final. Serving environmental policy is also emphasised in COM(2020) 66 final, n. 19.

CHAPTER 6

Addressing Data Access Problems in the Emerging Digital Agriculture Sector: Potential of the Refusal to Deal Case Law to Complement Ex-ante Regulation*

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6.1 Introduction

Implementation of 'Internet of Things' (IoT) systems in agricultural production processes opens up a new form of data-driven decision-making for farmers, namely, 'Smart Farming'.[1] This, in turn, created the 'Digital Agriculture sector' (DAS) in which 'Agricultural Technology Providers' (ATPs) compete to generate the best data-driven agronomic solutions, prescriptions, and services for farmers in a broad range of emerging markets.[2] Although data-driven solutions for farms provide significant benefits such as cost-efficient production and better management of the agronomic processes, and thus, constitute a big potential for sustainable food supply for people and agricultural raw material supply for the economy, there are also 'agricultural data' (ag-data) access problems in this emerging sector.[3]

Possibilities to address the problems related to ag-data access have been discussed predominantly from a regulatory perspective so far.[4] The potential of competition law enforcement is neglected to a large extent in the sector-specific literature[5] although there has been a comprehensive discussion in the

1 Harald Sundmaeker and others, 'Internet of food and farm 2020' in Ovidiu Vermesan and Peter Friess (eds), *Digitising the Industry - Internet of Things Connecting the Physical, Digital and Virtual Worlds* (River Publishers 2016), p. 132-133; Sjaak Wolfert and others, 'Big Data in Smart Farming - A review' (2017) 153 Agriculture Systems, p. 69-75; see also Case No COMP/M.8084 – *Bayer/Monsanto*, 29 May 2018, para. 2442.

2 *Bayer/Monsanto*, n. 1, paras 2442-2449.

3 See one of the first statements of concern in this regard in Mihalis Kritikos, 'Precision agriculture in Europe - Legal, social and ethical considerations' (*EPRS | European Parliamentary Research Service,* 2017), p. 18-19; Tom Verdonk, 'Planting the Seeds of Market Power: Digital Agriculture, Farmers' Autonomy, and the Role of Competition Policy' in Leonie Reins (ed), *Regulating New Technologies in Uncertain Times* (Springer 2019); Also see Can Atik and Bertin Martens, 'Competition problems and governance of non-personal agricultural machine data: comparing voluntary initiatives in the US and EU' (2021) 12(3) JIPITEC; Can Atik, 'Towards a Comprehensive European Agricultural Data Governance: Moving Beyond the 'Data Ownership' Debate' (2022) International Review of Intellectual Property and Competition Law 53 (5).

4 The central concept is 'data ownership' in these discussions in the sector. See, for instance, the literature review in Simone van der Burg, Marc-Jeroen Bogaardt and Sjaak Wolfert 'Ethics of smart farming: Current questions and directions for responsible innovation towards the future' (2019) NJAS - Wageningen Journal of Life Sciences 90-91(1); also see Atik (2022), n. 3 above.

5 Verdonk investigated the data-driven power of those who have a vertically integrated position in agricultural inputs and Digital Agriculture sectors, but he focused more on unfair trading by saying that competition law enforcement is an *ex-post* instrument with limited scope (taking into account dominance prerequisite) and stating that it might not be adequate alone to address data-related concerns. See Verdonk (2019), n. 3 above.

general literature in which some argue that competition law enforcement has significant limitations[6] whereas others state that there is noteworthy flexibility in traditional enforcement to address data access problems.[7] This paper aims to fill this gap in the sectoral literature with a detailed discussion on the potential of the EU competition law[8] to address the ag-data access issues.

With the hypothesis that competition law enforcement has a significant potential to address the problems in the DAS and it will remain a complementary tool even beyond (sectoral) regulatory intervention(s), the paper particularly inquires to what extent the refusal to deal case law in the EU[9] can be helpful to remove or mitigate the data access-related concerns in the sector.[10] By doing this, this study also highlights the main functional difference of the competition law enforcement compared to an *ex-ante* (sectoral) regulatory intervention option and explains how they could complement each other.

The remainder of the Chapter is divided into four sections. Section 6.2 outlines the structure of the sector, explains prominent ag-data access problems and their reasons, provides possible ag-data access request scenarios, and briefly outlines the extent to which the recent horizontal Data Act proposal[11] applies to

6 See, for instance, Joseph Drexl, ‘Connected devices – An unfair competition law approach to data access rights of users’ in German Federal Ministry of Justice and Consumer Protection and Max Planck Institute for Innovation and Competition (eds), *Data Access, Consumer Interests and Public Welfare* (Nomos 2021). Also, there is previous literature on the inadequacies of competition law enforcement in the digital age. See, for instance, Jason Furman and others, *Unlocking Digital Competition: Report of the Digital Competition Expert Panel* (Crown, 2019) <https://www.gov.uk/government/publications/unlocking-digital-competition-report-of-the-digital-competition-expert-panel> accessed 16 January 2022, pp. 54-81.

7 See, for instance, Wolfgang Kerber, ‘Data-Sharing in IoT Ecosystems from a Competition Law Perspective: The Example of Connected Cars’ (2019) 15 Journal of Competition Law & Economics.

8 Referring to Article 102 of the Treaty on the Functioning of the European Union (TFEU) OJ C 326/47, 26 October 2012.

9 as this framework is the most compatible one amongst other forms of abuses within the broader Article 102 TFEU case law when it comes to data access problems.

10 Beyond the data access, there might be connected problems such as exploitation of locked-in users or other exclusionary conduct that are not directly related to the data access. However, this paper solely focuses on the data access situations and leaves any possible connected issues in the sector to another study.

11 See Proposal for a Regulation (COM/2022/68 final) of the European Parliament and of the Council on harmonised rules on fair access to and use of data (Data Act), 23.2.2022 [‘Data Act’ henceforth]; However, the proposal has certain limitations from the DAS perspective. See more detailed discussion in Can Atik, ‘Data Act: Legal Implications for the Digital Agriculture Sector’ (2022) TILEC Discussion

these scenarios, in order to highlight the remaining issues for the competition law enforcement. Section 6.3 discusses to what extent the refusal to deal case law can be applied to the identified ag-data access scenarios. This section also provides a broader discussion about the appropriateness of the traditional refusal to deal test in the age of 'Big Data', and proposes a revision for the existing legal test. Section 6.4 evaluates the opportunities and limitations of the EU competition law enforcement compared to the regulatory intervention option in this context and explains how they could complement each other. Section 6.5 provides an overall summary of the findings of this study.

6.2 Emerging Digital Agriculture Sector and Ag-data Access Problems

This section aims to present the necessary basics by explaining the importance of ag-data, ag-data-driven markets, major players, prominent problems and possible ag-data access request scenarios in the emerging Digital Agriculture sector (DAS). Also, the section demonstrates the possible impact of the recent Data Act proposal and remaining problems briefly before diving into the substantial discussion on refusal to deal case law below.

6.2.1 Concept of 'Agricultural Data' and Its Components

Provided services in the DAS are based on the collection and combination of different ag-data sets to process them in order to reach tailored solutions for specific farms.[12] There are three important components of the broader term of ag-data that are necessary to generate competitive services in the sector: (1) farm data (collected from farms via sensors, machines or directly by farmers); (2) complementary data (such as weather, satellite and other environmental data, including precipitation events, evapotranspiration, and heat unit accumulation); and (3) proprietary data (performance information of agricultural inputs [seed, pesticide, insecticide, fertiliser etc.] deriving from the research and development processes and field tests conducted by upstream input producers).[13] Data access problems that are discussed in this paper are mostly related to the exclusive control of farm data and proprietary data sets.[14]

Paper No. DP2022-013.

12 *Bayer/Monsanto*, n. 1, para 2442.

13 Ibid., para 2453 and subsequent paras.

14 Climate data seems open as much as possible thanks to the relevant EU policies. See, for instance, Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC (OJ L 41, 14.2.2003 and Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open

6.2.2 Major Players in the Sector

To better understand the sectoral problems outlined below, it is important to be aware of the fact that ‘Smart Farming’ threatens the upstream traditional agricultural input producers because targeted data-driven solutions promise to eliminate unnecessary input usage.[15] This means that upstream players in the oligopolistic input production markets have strong incentives to penetrate the emerging markets in the DAS in order to compensate for revenue losses in the upstream input sales.[16] Indeed, they are amongst the ones, who initiated digital agriculture services earlier, in the DAS, especially in the downstream markets for agricultural input prescriptions, and this results in the first-mover advantage derived from indirect network effects and positive feedback loops (more farm data means better-trained algorithms and more precise services that attract more users, which generate additional data sets in turn).[17] Also, input producers’ exclusive control over proprietary (input performance) data sets is of high importance for input prescription services in the sector, and thus, creating further barriers to entry and expansion for rivals in these markets.[18] In addition, vertically integrated input producers have wide financial and operational advantages to expand into connected downstream data-driven markets in the DAS.[19] Taken altogether, downstream subsidiaries of input giants are considered as the main actors in the emerging DAS.[20]

The strongest potential challengers of input producers are agricultural machinery (‘ag-machine’) producers as they also have non-negligible capabilities to enter downstream digital agriculture markets considering that they have technical control over machine-generated data sets in the sector.[21] However, they mainly prefer to act as collaborators/partners of the input producers’ downstream digital agriculture operations for now – unless

data and the re-use of public sector information (recast), OJ L 41/26.

15 beyond the need for accessing farm data sets and complementary climate data. See *Bayer/Monsanto*, n. 1, paras 2712-2714.

16 Ibid.

17 Ibid., paras. 2830-2846.

18 Ibid., paras. 2562-2578, 2715-2738, and 2830-2846.

19 See early discussions in this regard in Ioannis Lianos and Dmitry Katalevsky, ‘Merger Activity in the Factors of Production Segments of the Food Value Chain: – A Critical Assessment of the Bayer/Monsanto merger’ (2017) CLES Policy Paper Series 2017/1 <https://www.ucl.ac.uk/cles/sites/cles/files/cles-policy-paper-1-2017.pdf> accessed 14 July 2022.

20 This was also stated by the Commission. See *Bayer/Monsanto*, n. 1, para. 2749.

21 See Atik and Martens (2021), n. 3, pp. 373-379 for a detailed discussion on the position of machine producers in the DAS.

input producers decide to enter the ag-machinery sector.[22] Other players such as agricultural input distributors, software companies, agricultural equipment companies or start-ups have very limited capacity to challenge the vertically integrated input conglomerates in the DAS even if they intend to do so.[23] Of course, each digital agriculture market may have certain particularities that need to be considered case by case.[24]

6.2.3 Three Main Ag-data Access Problems and Possible Data Access Request Scenarios

Problem 1: Farm data lock-ins – Locked-in farm data sets in the hands of first-mover ATPs or machine producers are the first prominent problem in the sector.[25] This is strictly related to i) the ambiguity on enforceable rights to farm data sets[26] and bargaining power imbalances,[27] ii) technical incompatibility when

22 *Bayer/Monsanto*, n. 1, paras. 2769-2775.

23 Ibid., para. 2750.

24 There may still be potential for other players to be successful in markets beyond input usage prescriptions. For instance, general tech giants such as Microsoft and IBM are also interested in the DAS. See, for instance, 'Farmbeats: AI, Edge & IoT For Agriculture - Microsoft Research' (*Microsoft Research*, 2022) <https://www.microsoft.com/en-us/research/project/farmbeats-iot-agriculture/> accessed 14 July 2022; See also the cooperation between Growers Information Services Cooperative and IBM in the US in 'IBM Dashboard - Grower's Information Services Coop' (*Grower's Information Services Coop*, 2022) <https://www.gisc.coop/tools/ibm-dashboard/> accessed 14 July 2022; See more discussion on the potential of alternative players in the sector in Atik and Martens (2021), n. 3, pp. 391-392.

25 Commission Staff Working Document on the free flow of data and emerging issues of the European data economy accompanying the document communication building a European data economy – SWD(2017) 2 final, p. 28; Sundmaeker et al. (2016), n. 1, p. 144; Leanne Wiseman and others, 'Rethinking Ag Data Ownership'(2018) 15 Farm Policy Journal, pp. 71–72; Marie-Agnes Jouanjean and others, 'Issues Around Data Governance in the Digital Transformation of Agriculture: The Farmers' Perspective' (2020) OECD Food, Agriculture and Fisheries Papers No. 146; See also a detailed discussion in Atik and Martens (2021), n. 3, pp. 373-379.

26 Jouanjean and others (2020), n. 25, p. 9; It is unlikely to apply the General Data Protection Regulation (GDPR) to ag-data sets for various reasons. See more detailed discussion in Can Atik, 'Understanding the Role of Agricultural Data on Market Power in the Emerging Digital Agriculture Sector: A Critical Analysis of the Bayer/Monsanto Decision' in Michal Gal and David Bosco (eds), *Challenges to Assumptions in Competition Law* (Edward Elgar 2021) and Atik and Martens (2021), n. 3; The recent Data Act brings rights for data access and sharing with third parties, but the definitions of the core notions and the design of the provisions are highly limited from the DAS perspective. See more in Atik (2022), n. 11 and section 6.2.4 below.

27 See Sundmaeker et al. (2016), n. 1, p. 144; Verdonk (2019), n. 3, pp. 118–119; Kritikos (2017), n. 3, pp. 14-19; Atik (2021), n. 26, pp. 55 and 67-68; Atik and Martens (2021), n. 3, p. 379.

changing services or machines owing to the interoperability problems and lack of data standards[28], and as an additional factor iii) indirect network effects deriving from positive feedback loops that make the first-movers more attractive.[29]

Scenario 1: Farmers request to access 'their' farm data sets – As farm data makes the agronomic solutions tailored to the specific farms, farmers need these data sets when they wish to change their existing service providers or smart agricultural machines with a more innovative or cheaper alternative.[30] This may cause two major interlinked competition issues: exploitation of locked-in farmers and exclusion of rivals that restrains competition and hampers innovation. Therefore, farmers are the first possible access seekers from the first-mover ATPs or machine manufacturers that exclusively control the collected farm data sets.

Problem 2: Fragmentation of isolated data sets – Accessing farm data sets is critical not only for farmers, but also for other ATPs for various purposes such as generating tailored services for their customers (farmers), training algorithms and developing new products or services.[31] However, it is not easy to reach the necessary data sets for new or smaller players in the DAS as well as different players in the farm-to-fork chain because the explained reasons for the farm data lock-ins also lead to the fragmentation of farm data sets into isolated data silos.[32] This limits the potential of data-driven innovation in the existing markets and even prevents the emergence of new markets with innovative services.[33] To overcome farm data fragmentation, vertically integrated agricultural input producers and machine manufacturers often seek possibilities to collaborate by integrating their separate data sets with exclusive data exchange agreements that create significant economies of scale and scope advantages for them.[34] Even though this is useful for the participants, this closed data clustering is likely to exacerbate the data access problems in the sector by resulting in exclusionary outcomes for non-integrated rivals

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28 Sundmaeker et al. (2016), n. 1, pp. 142-143; Kritikos (2017), n. 3, p. 19; Jouanjean and others (2020), n. 25.
29 See *Bayer/Monsanto*, n.1, para 2837.
30 See detailed discussions on the matter in Atik (2021), n. 26, pp. 56-65.
31 See Ibid.
32 Similar concerns were also stated previously. See, for instance, Copa-Cogeca, 'Main Principles Underpinning the Collection, Use and Exchange of Agricultural Data' (2016) <https://ec.europa.eu/futurium/en/system/files/ged/main__principles__underpinning__the__collection__use__and__exchange__of__agricultural__data__.pdf> accessed 15 May 2022, p. 3.
33 Atik (2022), n. 3, pp. 706-707
34 See some examples in Ibid.

or start-ups owing to higher data-related entry barriers.[35] Creating exclusive data clusters may also generate coordination channels amongst these already powerful players.[36] The possible communication channels through data exchange agreements, exclusion of rivals' data access and exploitative lock-in of farmers cumulatively generates a risk of domination in the plethora of connected ag-data-driven markets by a few oligopolistic players.[37]

Scenario 2: Various companies' access needs for wide farm data sets – The problem explained above naturally mean that there is a data access dependency on the first-mover vertically integrated giants. Therefore, the second data access request scenario is about farm data access needs by various players such as new or smaller ATPs in the same market, ATPs in the neighbouring DAS markets or other companies in the farm-to-fork chain. Also, public bodies, non-profit organisations (NGOs) or scientific institutions may need to access the closed farm data sets without commercial purposes.

Problem 3: Input producers' exclusive control of proprietary data sets – Agronomic inputs production conglomerates, such as Bayer, BASF, or DowDuPont, have 'proprietary data' sets, which are about the performance of their inputs (seeds, pesticides, insecticides etc.).[38] Just like farm-specific data that is nearly always the main determiner of tailored solutions for farms, input performance data is particularly an invaluable component in the data-driven agronomic input prescription markets, and this, in turn, creates an insurmountable competitive advantage for the downstream Digital Agriculture operations of these input production giants compared to non-vertically integrated rivals in the downstream markets in the DAS.[39] This is a significant concern when considering the wide capabilities of upstream input producers to dominate the downstream data-driven agronomic solutions markets.[40]

Scenario 3: Downstream ATPs' request to access proprietary data sets – If input producers keep these proprietary data exclusively for their downstream

35 Ibid.
36 via the increased transparency regarding various levels of the food supply chain. See Verdonk (2019), n. 3, pp. 120-121. He also mentions farmers' coordination as a risk, especially via the hub and spoke arrangements, product-market sharing and production limitations. These practices may draw the Commission's attention from the Article 101 enforcement at some point, but this is outside the scope of this particular paper.
37 See earlier discussions in Lianos and Katalevsky (2017), n. 19 above; See also Atik (2022), n. 3, pp. 706-707.
38 See *Bayer/Monsanto*, n. 1, paras. 2830-2836.
39 Ibid., paras. 2724, 2746-2747, 2453-2455.
40 Ibid.; See Atik (2021), n. 26; Atik and Martens (2021), n. 3; and Atik (2022), n. 3.

operations, it might be expected that each of their downstream subsidiaries would dominate the markets for the input usage prescriptions of their particular brand. Therefore, the third access-seeking scenario is about the downstream rival ATPs' need for accessing exclusively controlled proprietary input performance information from upstream input producers to train algorithms, provide more accurate prescriptions, and, thus, gain customers in the downstream data-driven input usage prescription markets.

Table 1 –Overview of Potential Access Seekers for Ag-data Sets

	Access Seekers	**Farm Data controlled by first-mover ATPs or machine manufacturers**	**Proprietary Data controlled by upstream input producers**
Scenario 1	Farmers	may request access	Not required for the access seekers
Scenario 2	Direct Rivals of First-mover ATPs	may request access	Not required for the access seekers unless they are in input usage prescription markets
	Players in Other Digital Agriculture Markets	may request access	Not required for the access seekers unless they are in input usage prescription markets
	Access Seekers Beyond Digital Agriculture Markets	may request access	Not required for the access seekers except for exceptional situations
Scenario 3	Players in (Downstream) Input Usage Prescription Markets	may request access	may request access

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In order to address these problems and data access needs in the sector, previous studies have focused on regulation-centric solutions.[41] This focus is definitely not irrelevant, and one can expect an acceleration in these debates, especially after the proposal for a Regulation on harmonised rules on fair access to and use of data ('Data Act').[42] However, this paper aims to move beyond the regulation-centric focus by investigating the role of competition law enforcement to address the sectoral issues and possible interrelation between EU competition law as an *ex-ante* tool and *ex-post* regulatory intervention(s) in the EU. This focus is strictly related to the fact that the horizontal Data Act proposal barely addresses a part of the sectoral data access issues and having a more targeted sectoral regulation may take several years.

41 See footnote 4 above; see also Atik (2022), n. 3.
42 See Data Act, n. 11 above; see also an analysis of this regulatory proposal from the sectoral perspective in Atik (2022), n. 11.

6.2.4 To What Extent Does the Recent Data Act Proposal Cover the Different Data Access Needs in the DAS and What are the Remaining Issues?

As the Data Act will be the main regulatory framework for IoT-driven sectors including the DAS, it is necessary to be aware of the possible implications of the Data Act proposal from the sectoral perspective before moving to the competition law enforcement discussion below. As this research has already been carried out in a previous study,[43] this section only summarises the relevant findings for the purposes of this particular paper.

Chapter II of the Data Act proposal constitutes special importance as it provides the right to access (Article 4) and the right to share (Article 5) data for 'users' if the data is "*generated by use of a product or related service*". However, the notion of 'product' refers to *"tangible, movable item"* and 'related service' refers to the services that make 'products' functional (incorporated services).[44] 'User' refers to the ones who own, rent or lease a 'product'.[45] This entails that only farmers can access to the farm data sets controlled by the manufacturers of ag-machinery if the data is collected through the use of ag-machineries, which are bought, rented or leased by the farmers directly from their manufacturers.[46] This also means there is no any mechanism for other access seekers (apart from users of a 'product' or 'related service') to access the data.[47]

Therefore, the recent Data Act can only be applicable to a part of Scenario 1: if the data sets are locked-in by the ag-machine providers and if farmers own, rent or lease the machines. Locked-in data sets under the control of the ATPs appear to be out of scope. Scenario 2 and Scenario 3 are undisputedly outside the scope of the recent Data Act proposal because the Data Act framework does not go this far to cover third-party access issues as it only regulates user-centric data rights.[48]

In this regard, competition law enforcement can be an important tool at hand for the remaining issues. Section 3 below will investigate the possible role of the refusal to deal case law in this regard.

43 Atik (2022), n. 11.
44 Articles 2(2) and 2(3) of Data Act.
45 Article 2(5) of Data Act.
46 See a more detailed discussion in Atik (2022), n. 11, pp. 7-11.
47 Articles 4 and 5 of Data Act.
48 See more discussion on the limitations of the Data Act proposal from the DAS perspective in Atik (2022), n. 11 above.

Table 2 – Possible Implications of the Data Act over Different Ag-data Access Request Scenarios[49]

	Access Seekers	**Farm Data controlled by ATPs - M. Manufacturers**		**Proprietary Data controlled by upstream input producers**
Scenario 1	Farmers	x	✓(partly)	x/not required
Scenario 2	Direct Rivals of First-mover ATPs	x		x
	Players in Other Digital Agriculture Markets	x		x
	Access Seekers Beyond Digital Agriculture Markets	x		x/not required
Scenario 3	Players in (Downstream) Input Usage Prescription Markets	x		x

6.3 Article 102 TFEU and Ag-data Access Issues in the DAS

Article 102 TFEU prohibits the abuse of a dominant position.[50] There are two elements in this assessment: dominance and abuse. The first one requires determining a 'relevant market' and assessing the 'market power' of the undertaking under scrutiny. If an undertaking is dominant in the relevant market, then it can be discussed whether its conduct (refusal to ag-data access requests in this specific context of the paper) is abusive or not.

This study focuses on the concept of abuse, particularly the theory of harm in refusal to deal situations and the potential application of this framework to the ag-data access setting in depth. However, it is necessary to convey the necessary basics regarding markets and data-driven market power in the DAS first.

6.3.1 Brief Overview of Markets and Reasons for Data-driven Market Power in the DAS

As the details regarding relevant markets and assessment of market power in the DAS were discussed in earlier studies,[51] this section only outlines the divergence of agricultural data-driven markets and common characteristics of data-driven dominance in the sector before diving into the substantial discussion of 'abuse' below.

49 '✓' means access is possible if farmers own, rent or lease the machine. 'x' means access is not possible.
50 See footnote 8 above.
51 Atik (2021), n. 26 and Atik and Martens (2021), n. 3.

6.3.1.1 Variety and Segmentation of Data-driven Markets in the DAS

The DAS has a wide range of different data-driven markets. There are various services from the insemination of live-stock prescriptions to yield monitoring solutions or from irrigation suggestions to automated ag-machine guidance applications.[52] An important segment of this emerging sector is markets for agricultural input (seeds, pesticides, insecticides, fertilisers etc.) usage prescriptions.[53] Markets in this segment of the sector are diversified based on the types of input for which the services are specialized such as herbicides, insecticides, fungicides, fertilizers, plant growth regulators or seeds plants.[54] Crop groups such as broadacre crops, e.g. corn, wheat, or barley constitute an additional layer for distinguishing markets.[55] For instance, the European Commission ('the Commission') paid particular attention to the market *'for the provision of digitally-enabled prescriptions of fungicides for broadacre crops in the EEA'* in the *Bayer/Monsanto* merger decision.[56] This entails that different components of the broader term of ag-data may have different importance in different data-driven markets in the DAS.[57] Despite possible differences according to specific markets' peculiarities, exclusive control of different ag-data sets creates significant advantages for ATPs in terms of generating market power in all segments of the sector.[58]

6.3.1.2 Data-driven Market Power in the DAS

The underlying reasons for ag-data access problems, which are explained in section 6.2 above, create insurmountable advantages for first-movers, dependencies and data-driven lock-in situations for farmers, and very high data-related entry barriers for (potential) rivals – as there are legal, technical, and economic barriers that prevent access to relevant farm data and proprietary data sets for access seekers.[59]

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52 Jonathan McFadden and others, 'The digitalisation of agriculture - A literature review and emerging policy issues' (2022) ECD Food, Agriculture and Fisheries Working Papers No. 176 <https://doi.org/10.1787/285cc27d-en> accessed 29 August 2022, pp. 37-40.

53 See more in *Bayer/Monsanto*, n. 1, paras 2564.

54 Ibid., para 2576.

55 Ibid., paras 2577-2578.

56 Ibid., para 2612.

57 Still, farm-specific data makes the data-driven solutions tailored to the customer farm, and it is the core input nearly all the time. See ibid., para 2442 and subsequent paras; See detailed discussions in this regard in Atik (2021), n. 26 and Atik and Martens (2021), n. 3 above.

58 See more detailed discussion of data-driven market power in the DAS in Atik (2021), n. 26, pp. 56-73.

59 Ibid.

In particular, the prominent elements of data-driven market power in the sector can be listed as *inter alia* i) insurmountable switching costs for farmers due to farm data lock-ins exacerbated by the special importance of historical data sets for retrospective evaluations to reach tailored suggestions, ii) lack of farm data substitutability when it comes to providing targeted services to specific farms,[60] iii) the importance of combining different ag-data sets that are mostly dispersed in isolated data silos, iv) scarcity of alternative farm data collection sources for ATPs, v) positive feedback loops for first-mover ATPs (more data means better-trained algorithms, which in turn attract more users(farmers) to enlarge the data advantage), and vi) significant costs of digital transformation for farmers.[61] The harsher these conditions occur in a market, the higher the risk of first-mover ATPs' data-driven dominance gets.[62] This is the case mostly in favour of the downstream operations of the vertically integrated agricultural input producers that have several capabilities and enough incentives to dominate the emerging DAs markets.[63]

While controlling wide farm data sets plays the main role in the market power of ATPs in nearly all the markets of the DAS considering the fact that farm data makes the 'Smart Farming' solutions targeted to the specific farms, proprietary data control could be in the forefront beyond farm data control, especially in markets for input usage prescriptions. Therefore, each case should be evaluated carefully by taking into account the peculiarities of the given services in the DAS.[64]

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6.3.2 The Concept of 'Abuse' Under EU Competition Law

There is no single definition for the concept of 'abuse' in the EU competition law. Article 102 TFEU gives some examples without describing what the 'abuse' is,[65] but the boundaries of the forms of 'abuse' are not limited to this non-exhaustive list of examples.[66] It is commonly categorised as i) exploitative, ii)

60 This is particularly important for the purposes of this paper's discussion. It will be elaborated when providing the substantial discussion below

61 See detailed discussions in Atik (2021), n. 26 and Atik and Martens (2021), n 3.

62 Ibid.

63 See section 6.2.2 above.

64 See more in Atik (2021), n. 26 above.

65 including i) imposing unfair purchase or selling prices or other unfair trading conditions, ii) limiting production, markets or technical development, iii)) applying dissimilar conditions to equivalent transactions that place them at a competitive disadvantage, and iv) making the conclusion of contracts subject to supplementary obligations that have no connection with the subject of such contracts. See Article 102 TFEU.

66 There may be other ways of abusing a dominant position that is forbidden

exclusionary and iii) single market abuses, and the vast majority of Article 102 TFEU cases were on the exclusionary abuses in the EU so far.[67]

The concern in the sector is strictly related to i) the exclusive control of different ag-data sets by first-movers, who have significant incentives to keep this advantage and related to ii) data access needs of various players to develop (new) services or enter into a market in and outside of the farm-to-fork chain.[68] This creates an inherent conflict between exclusive ag-data controllers and access seekers, which makes the 'refusal to deal' framework the most relevant abuse to be discussed in this paper.[69]

Therefore, the following section will explore the refusal to deal case law in the EU, the rationale behind it, and the possible application of the existing legal test to the identified ag-data access request scenarios. The section will also discuss how the existing test can be refined to more effectively address the problems in the age of 'Big Data', in general, and the problems in DAS, in particular.

6.3.3 Refusal to Deal as the Form of Abuse and Ag-data Access Issues in the DAS

The Commission used refusal to deal as a form of abuse in various cases, especially in the 1990s, regarding the downstream rivals' rejected requests

under the EU competition law. See Case T-6/72 *Europemballage and Continental Can v Commission*, ECLI:EU:C:1973:22, para. 26; Case C-52/09 *TeliaSonera Sverige*, ECLI:EU:C:2011:83, para. 26; Case T-336/07 *Telefónica and Telefónica de España v Commission*, ECLI:EU:T:2012:172, para. 174.

67 See general considerations on taxonomy of abuses in Richard Whish and David Bailey, *Competition Law* (9th edn, Oxford University Press 2018), pp. 197, and 208-209.

68 See section 6.2.3 above.

69 It is important to note that Case No. COMP/AT.39740 - *Google Shopping,* European Commission Decision (27 June 2017) and Case No. COMP/ AT.40099 - , *Google Android,* European Commission Decision (18 July 2018) are also discussed in the literature to identify whether they also provided remedies similar to refusal to deal cases, but with lighter conditions. However, it was argued that bypassing refusal to deal case law is not appropriate for the sake of legal consistency. Therefore, a revision of refusal to deal test in the digital age is suggested instead of being in search of alternative case law to unlock data. See Inge Graef, 'Rethinking the Essential Facilities Doctrine for the EU Digital Economy' (2019) 53 RJTUM 33, pp. 55-66. More importantly, the facts of these cases and the ag-data access request scenarios identified above are not comparable. Therefore, it is not possible to apply these cases' theories of harm in the ag-data access request scenarios to reach the expected outcome of unlocking data.

to access infrastructures such as ports[70] or railroads[71] in order to unlock competition in downstream markets, in which players are dependent on these upstream infrastructures to provide related services. Although this trend has faded over time,[72] the theory of harm has gained importance once again because of the possibility to apply the refusal to deal framework to the new problems of data access in the digital age.[73]

6.3.3.1 Rationale to Intervene the Refusal to Deal Situations

The strictness level of the conditions for finding a refusal abusive and forcing essential facility holders to grant access is a challenging issue to determine. If access is provided too easily, this would reduce rivals' incentives to develop competitive facilities, and equally importantly, this would detrimentally affect the facility holders' incentives to invest in new facilities.[74] Therefore, Advocate General Jacobs warns that granting access may foster competition in the short term, but it may harm long-term competition incentives.[75]

This distinction is also presented as the policy choice between 'competition *in* the market' and 'competition *for* the market'.[76] From the competition law enforcement perspective, the former refers to opening up competition in the existing markets by competition authorities' intervention, which aims to

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70 See, for instance, Case No. IV/34.174 – *B&I Line plc v Sealink*, European Commission Decision (11 June 1992); Case No. IV/34.689 – *Sea Containers v. Stena Sealink – (Interim Measures)*, European Commission Decision (21 December 1993).

71 See, for instance, Case No. IV/32.490, *Eurotunnel*, European Commission Decision (13 December 1994).

72 At a later date, the General Court kind of confirmed this inactivity in 2017 by upholding the Commission's decision in *Contact Software* where the Commission did not apply the essential facilities doctrine and rejected the complaint's argument that dominant companies' refusal to deal on accessing interoperability information was abusive. See Case T-751/15 *Contact Software v Commission*, ECLI:EU:T:2017:602.

73 Especially after the so-called 'Franko-German report' on the matter. See Autorité de la concurrence and Bundeskartellamt, *Competition Law and Data* (2016) <https://www.bundeskartellamt.de/SharedDocs/Meldung/EN/Pressemitteilungen/2016/10_05_2016_Big%20Data%20Papier.html> accessed 20 August 2022; See also a comprehensive discussion in this regard in Inge Graef, *EU competition law, data protection and online platforms: data as essential facility* (Kluwer Law International, 2016); and Graef (2019), n. 69.

74 See the Opinion of Advocate General Jacobs in *Oscar Bronner GmbH & Co. KG v Mediaprint Zeitungs*, C-7/97, ECLI:EU:C:1998:264, para 57.

75 Ibid.

76 See a comprehensive discussion over this distinction in Paul A. Geroski, 'Competition in Markets and Competition for Markets' (2003) 3 Journal of Industry, Competition and Trade 151-166; See a specific discussion in this context about determining the strictness level of applied test in refusal to deal cases in the EU in Graef (2019), n. 69, pp. 47-53.

result in competition on lower prices, better quality and gradual innovation within the market while the latter refers to the non-interventionist approach that is expected to result in increased incentives for rivals or new players to develop new services or approaches that change the market dynamics.[77] Competition *for* the market approach was criticised as it fails to cover the dynamic nature of the digital economy.[78] Instead, Larouche concentrates on the concept of competition *on* the market, which also refers to the non-interventionist approach if there is a possibility of competition via disruptive innovation to change the entire market structure, value network or architectural design.[79] Each approach has a certain rationale behind it, and the policy choice of the competition authorities to intervene or not to intervene should be justified by explaining the reasons by using this framework - according to the circumstances of the particular case.[80]

This paper argues that the non-interventionist approach (allowing competition *for* the market or expecting competition *on* the market) is not suitable for the conditions of the DAS. The adoption of digital technologies is very expensive for farmers and the first challenge, for now, is increasing the adoption rates of digital technologies amongst European farmers to complete the digital transformation of agricultural production.[81] If the non-interventionist approach is applied to the ag-data access problems, it is unlikely to expect competition *for* the market or disruptive innovation in the DAS in the medium or even the long term – as the sector is still in the infancy period, but this preference would even hamper the disruptive innovation in the traditional agriculture sector that is shifting from old-school decision-making toward a data-driven and tech-intensive agricultural operations

77 Ibid.
78 Pierre Larouche, 'Platforms, Disruptive Innovation, and Competition on the Market' (*Competition Policy International*, 2020) <https://www.competitionpolicyinternational.com/platforms-disruptive-innovation-and-competition-on-the-market/> accessed 10 September 2022.
79 This means market boundaries are changeable by the firms endogenously. However, this does not mean disruptive innovation always happens to unlock competition in digital markets as we have also observed longstanding dominance of some tech giants in the last decades. See more in Ibid.
80 See Graef (2019), n. 69, pp. 47-53 and Larouche (2020), n. 78.
81 See 'EU Member States Join Forces on Digitalisation for European Agriculture and Rural Areas' (*Shaping Europe's digital future*, 2019) <https://digital-strategy.ec.europa.eu/en/news/eu-member-states-join-forces-digitalisation-european-agriculture-and-rural-areas> accessed 4 August 2022; Copa-Cogeca (2016), n. 32, p. 3; 'The New Common Agricultural Policy: 2023-27' (*agriculture.ec.europa.eu*, 2021) <https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/new-cap-2023-27_en#innovation> accessed 5 August 2022.

paradigm.[82] Therefore, it cannot be a policy choice to allow a few vertically integrated giants to dominate the DAS and let them charge higher prices or make the farmers dependent on their vertically integrated products and digital services, especially given the fact that first-movers have exclusive control over the data without having any overwhelming incentive to renounce this advantage by letting others access the non-substitutable data sets.[83]

The policy preference should be opening up the competition *in* the digital agriculture markets so as to reduce the prices, increase quality, and more importantly let small start-ups access necessary data sets to both train algorithms and gain new customers (farms) within relevant markets in the DAS. This can also remove certain barriers before the innovation and digital transformation of agricultural production. Therefore, this paper strongly suggests an interventionist approach to address ag-data access issues in the emerging DAS, at this stage. This positioning due to current conditions of the sector does not necessarily mean that the potential and benefits of disruptive innovation in the DAS from the farmers' perspective are neglected. Contrarily, competition law intervention can also indirectly stimulate disruptive innovation sometimes as it is argued that opening up the competition *in* the market can also serve as a base for the next stage of disruptive innovation.[84]

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The same reasoning is valid for the argument that the strictness level of the conditions to grant access to ag-data should be as low as possible, of course, without harming the data collection and innovation incentives of the data holders too much. In other words, data in the hands of vertically integrated agricultural input producers should be accessible for those, who need this data, such as farmers, non-integrated rivals or any other third party that needs this data to develop potentially innovative services without removing the data collection and further investment incentives of the *de facto* data controllers.

82 This is extra problematic from the perspective of the farmers' autonomy. See earlier discussions about vertical integration and possible risks for the DAS in Atik and Martens (2021), n. 3.
83 See more about the role of incentives in this regard and lack of substitutability for farm data access seekers in Atik (2021), n. 26, p. 68 and in Atik and Martens (2021), n. 3, pp. 375, 387 and 392.
84 Gintare Surblyte, 'The Refusal to Disclose Trade Secrets as an Abuse of Market Dominance – Microsoft and Beyond' in J. Drexl, ed, *Munich Series on European and International Competition Law*, vol. 28 (Bern, Switzerland: Stämpfli Publishers Ltd., 2011), p. 131 cited in Graef (2019), n. 69, p. 53.

The following parts will identify the existing case law, investigate to what extent its application can serve to mitigate the problems in the sector, and discuss how it can be improved by updating the conditions of the existing legal test for determining whether a refusal to deal is abusive or not.

6.3.3.2 Refusal to Deal Case Law in the EU

As the norm is freedom of trade and freedom to contract,[85] it is stated that any intervention to force a dominant undertaking for supplying its facility needs very careful consideration.[86] Indeed, the Commission[87] and the EU courts[88] aimed to have a position to ensure a delicate balance between freedom to trade and unlocking competition.

6.3.3.2.1 The legal test for assessing whether a refusal is abusive or not

In order to grant access to an essential facility by finding the refusal to deal as abusive, there are three main criteria to be met: i) indispensability of the facility,[89] ii) elimination of all the effective competition in order to reserve the market for the facility holders' downstream operations,[90] and iii) lack of objective justification for the refusal[91] in addition to the iv) 'new product condition'[92] criterion for intellectual property ('IP') protected facilities.[93] This is a very strict test that may not be easily satisfied in every case.

85 See, for instance, Case T-41/96 *Bayer v Commission*, ECLI:EU: T:2000:242 at para 180.

86 See the Opinion of Advocate General Jacobs, n. 74, para. 56.

87 See Guidance on the Commission's enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings [2009] OJ C45/7, paras 75 and following part ['Guidance paper' henceforth.

88 For instance, Joined cases C-241/91 and C-242/91 *Telefis Eireann and Independent Television Publications Ltd v Commission of the European Communities (Magill)*, ECLI:EU:C:1995:98, para 50 ['*Magill*' henceforth]; Case C-418/01 *IMS Health v NDC Health*, C-418/01, ECLI:EU:C:2004:257, paragraph 35 ['*IMS Health*' henceforth]; Case T-201/04 *Microsoft v Commission* ECLI:EU:T:2007:289, para 421 ['*Microsoft*' henceforth], paras. 319, 330, 331, 332 and 336.

89 See *Magill*, n. 88, paras 52-56; The facility is considered indispensable when "*the service in itself be indispensable to carrying on that person's business, inasmuch as there is no actual or potential substitute…*" and if "*it is not economically viable to create*" a substitute facility that is comparable with the existing one. See Case C-7/97 *Oscar Bronner GmbH & Co. KG v Mediaprint Zeitungs*, ECLI:EU:C:1998:569, para 41 and 46 respectively ['*Bronner*' henceforth].

90 See *Bronner*, n. 89, para. 25; *Magill*, n. 88, paras 52-58.

91 Ibid.

92 A conduct can be found abusive if "*refusal is preventing the emergence of a new product for which there is a potential consumer demand, that it is unjustified and such as to exclude any competition on a secondary market.*" *IMS Health*, n. 88, para 38. This means it is not possible to grant access for the purpose of "*duplicating the goods or services already offered on the secondary market.*" See *IMS Health*, n. 88, para 49.

93 Ibid.

However, the Commission, later on, used a lighter version of this test in *the Microsoft*[94] case, in which Microsoft refused to license interoperability information to Sun, which needed this access to ensure its services in the downstream market to communicate with the Windows operating system. The first relaxation in the standards is on the indispensability element. The General Court confirmed that the viability of an alternative can be considered whether it is *"capable of interoperating with the Windows domain architecture on an equal footing"*[95] instead of the criterion in *Bronner* which looks at whether there are alternatives even if they are less advantageous.[96] Another relaxation in the standard is that showing *"the refusal at issue is liable to, or is likely to, eliminate all effective competition on the market"*[97] would be sufficient instead of demonstrating the elimination of all effective competition.[98] With regards to the new product condition, the General Court upheld that the test could not be limited to the envision in *IMS Health*,[99] and consumer harm could also be mentioned when the refusal results in *"a limitation not only of production or markets, but also of technical development."*[100] So, the rejection of Sun's access request by Microsoft was considered restrictive to technical development in this case even though it was not going to produce a completely new product benefiting from access to the interoperability information.[101]

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The following part will evaluate a possible application of the existing case law to the ag-data access request scenarios identified above by also considering whether the lighter or stricter version of the test can be better justified in the ag-data access requests context.[102]

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94 Case No. C-3/37.792, *Microsoft* European Commission Decision (24 March 2004).
95 *Microsoft,* n. 88.
96 *Bronner,* n. 89, para. 43. See also paras 45-46 for further considerations on economic viability.
97 *Microsoft*, n. 88, para. 563; A similar approach was repeated by saying *"a risk of all effective competition being eliminated"* in Case T-712/14 *CEAHR v Commission* ECLI:EU:T:2017:748, para 91.
98 See, for instance, *Bronner*, n. 89, para. 38.
99 The standard here was demonstrating access is needed for *"new goods or services not offered by the owner of the right and for which there is a potential consumer demand."* See *IMS Health*, n. 88, para. 49.
100 *Microsoft*, n. 88, paras 643 and 647.
101 Ibid., para. 665.
102 Stricter test refers to the cumulative knowledge about the criteria of the refusal to deal test so far instead of limiting this with a specific case like *Bronner, IMS Health* or *Magill. Microsoft* is clearly distinct from this line, and so, I refer to it as the lighter version in the following discussion.

6.3.3.3 Potential Application of the Existing Refusal to Deal Precedents to Unlock Ag-data

In this section, possible access requests for farm data sets and proprietary data sets[103] will be evaluated separately as the latter is likely to be considered as the natural extension of the IP-protected agricultural inputs, and thus, it is likely to be subject to the 'new product' condition of the refusal to deal test. Therefore, farm data access requests in Scenarios 1 and 2 will be discussed together, and proprietary data access requests in Scenario 3 will be investigated separately.[104]

6.3.3.3.1 Application to Locked-in Farm Data Access Requests

Farm data refers to any data collected from farms.[105] There are different access seekers for locked-in farm data sets. Primarily, farmers need to access or transfer their data sets.[106] Accessing big farm data sets may also be needed by various players.[107] Here, therefore, access seekers can be categorised as farmers and third parties.

6.3.3.3.1.1 Scenario 1 – Farmers' request to access 'their' farm data sets

Addressing farmers' switching problems is critical to mitigate the exclusionary consequences for rival ATPs and exploitative outcomes for farmers. However, the typical application of the refusal to deal case law in the EU deals with the upstream facility holders' refusal of downstream rivals' request to use the upstream indispensable facility – not for users' access requests.[108] Therefore, farmers' farm data access requests from the first-mover ATPs do not fit in well with the typical application of the case law.[109] Still, the *IMS Health* decision states that a potential

103 See section 6.2.1 above for the Commission's categorisation of ag-data sets.

104 It has to be noted that the focus of this paper is the public enforcement of EU competition law by the European Commission. See a detailed presentation of public/private enforcement distinction in the EU in Kai Hüschelrath and Heike Schweitzer, *Public and Private Enforcement of Competition Law in Europe – Legal and Economic Perspectives,* (Springer 2014).

105 See *Bayer/Monsanto*, n. 1, para 2453.

106 See Keith H. Coble and others, 'Big Data in Agriculture: A Challenge for the Future' (2018) 40 Applied Economic Perspectives and Policy, pp. 87 and 91.

107 See section 6.2.2 above.

108 See the first establishment of upstream and downstream market consideration in Case C-6/73, *Istituto Chemioterapico Italiano and Commercial Solvents v Commission*, ECLI:EU:C:1974:18. However, it is important to note that this was relaxed later on as the determination of separate markets was used in Case C-311/84, *Télémarketing v CLT and IPB* ECLI:EU:C:1985:394, at paras 26-27 ['*Télémarketing*' henceforth].

109 By reminding the fact that the Data Act proposal has a very limited coverage on the part of machine-generated farm data sets, this is an open problem to be addressed unless the definitions in the Data Act are adapted to ensure farmers' data access needs. See more in Atik (2022), n. 11 above.

market or a hypothetical market could be identified where the requested facility is indispensable for a business activity for which there is actual consumer demand.[110] If this is applied in this scenario, an upstream hypothetical market for farm data can be defined where the first-mover data holders would be dominant.[111] Farmers may request access with a claim that accessing farm-specific data is indispensable for the downstream market for agricultural production.

Although proving indispensability might not be easy because data-driven smart farming only makes farming operations more efficient and less costly, indispensability can still be proved if the lenient *Microsoft* test is applied by looking at whether the farmer is *"capable of"* running the agricultural operations *"on an equal footing"*[112] compared to the other farms, which benefit from data-driven Smart Farming solutions. Still, data holder ATPs may argue that they already provide data-driven services to the access seeker user (farmer). Then, the discussion may revolve around the purpose of the access request and whether the new use of data is indispensable for the farmers or not.

However, this scenario may still fail because farmers and first-mover data holders do not compete in the downstream agricultural production markets while the test looks for whether the facility holder is active in the access seeker's market and whether the refusal excludes competition in the downstream market to reserve the market for the facility holder's own downstream operations.[113] So, it is difficult in this scenario to argue that the access is refused to exclude competition in the market for agricultural production with the aim of reserving the market because the data holder is not even active there. One can still consider whether the refusal to access would result in indirect exclusion for the ATPs, for which farmers would like

110 *IMS Health,* n. 88, para. 44; Even though this was generated for an IP-protected facility in this particular case, IP protection is not the central focus in this envision. It is more related to the fact that regardless of whether there is an actual upstream market for the demanded facility, one can assume a hypothetical market and discuss whether the facility holder is dominant there. Comparably, United States Supreme Court had a highly restrictive approach in this regard because it considered the existence of two separate markets is one of the essential factors to condemn refusal to deal. See Verizon Communications Inc. v. Law Offices of Curtis V. Trinko, LLP, 540 U.S. 398 (2004); The *IMS Health* decision opens up a more flexible interpretation that is really necessary, especially in the digital age. *Microsoft* decision also clearly repeated the broader approach provided by *IMS Health.* See *Microsoft*, n. 88, para 335.

111 They may even be considered monopolists because farm-specific data cannot be substituted for farms at all.

112 *Microsoft*, n. 88, para 421.

113 See *Bronner*, n. 89, para. 25; *Magill*, n. 88, paras 52-58.

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to switch as they compete with the data holders. The refusal can be linked with the strategy to reserve the digital agriculture market in this regard. However, it is difficult to include indirect results of a refusal within the existing refusal to deal test because it basically aims to evaluate whether conditions are adequate to mandate a contractual relationship between the access seeker and facility holder, not to protect third parties (rival ATPs). This exclusion evaluation can be discussed more relevantly when considering direct access requests of rivals, which will be done below.

In this regard, it is difficult to expect from the Commission to apply the refusal to deal framework for farmers' direct access requests due to the strict conditions of the test, especially the criterion of 'exclusion of competition to reserve the downstream market for the refusing party's own operations'.

6.3.3.3.1.2 Scenario 2 – Third-party access seekers for farm data sets
Scenario 2 is about the other farm data access seekers apart from farmers. There might be different access seekers in and outside the farm-to-fork chain for farm data controlled by first-mover ATPs, but the exclusion of the effective competition criterion cannot be met in situations where access seekers are unrelated to the operations of the exclusive data holders in the DAS. Therefore, this part of the section only looks for potential access seekers in the DAS where the refusal may result in the exclusion of effective competition to reserve the relevant DAS market. In particular, potential data access requests coming from the direct rivals of the first-mover farm data holders and (potential) rivals in the neighbouring digital agriculture markets will be discussed below.

Scenario 2.1 – Direct rivals' farm data access requests
New ATPs or smaller rivals can request access to farm data sets controlled by first-movers as farm data sets are essential to train algorithms or to provide the necessary service to the specific customer farm. However, it is not common to get a decision to force the direct rival in the same market to share the facility (data) with direct competitors, who are going to generate the same product/service in the same market.[114] The prominent exception may be the *British Midland v. Aer Lingus* case.[115] The Commission found Aer

114 Typical application deals with a downstream rival. The Commission also focuses on vertical refusal to deals. See Guidance paper, n. 87, para 76.
115 See Case No. IV/33.544, *British Midland v. Aer Lingus,* European Commission Decision (26 February 1992), paras. 25-31.

Lingus' refusal to interline (acceptance of each other's tickets in a route) with its rival on the London – Dublin route (after British Midland entered the route) abusive by stating that this behaviour was a highly unusual measure to generate an artificial entry barrier. Here, there is conduct against the direct rival, but it may be debatable whether having an interlining arrangement can be considered indispensable for the related service, and whether this particular conduct can also be found abusive within today's refusal to deal framework.[116] Still, having a precedent, at least, can be considered promising for a possible application of this framework to the direct rivals' farm data access requests in the DAS. If the data holder is dominant, the refusal of direct rivals' data access requests may theoretically be found abusive in this scenario. Apart from this, assuming an upstream hypothetical market for data can also be valid in this data access scenario. This, indeed, may have more potential to be successful because there would be little or no hesitation to consider exclusive data controller as dominant in a hypothetical upstream market for the requested farm data by taking into account the fact that farm data sets are unique for tailored digital agriculture services and they cannot be substituted with other farm data sets if the purpose of the access is to provide targeted services to specific farms from which the data was collected.[117] If the data access is requested for the purpose of training algorithms, then, this may affect the market definition and it may be necessary to examine whether the data holder is dominant in the hypothetical upstream market for farm data sets to be used for training algorithms, and whether the related data access is really indispensable in view of the other potentially accessible farm data sets in the hypothetical market.

Therefore, there may also be a difference according to the purpose of data access requests when it comes to indispensability assessment. A general distinction between training algorithms and providing tailored data-driven agronomic solutions to specific farms can also be relevant here. There might

116 Considering the case dates back to 1992 and there have been significant developments in the refusal to deal test since then. See section 6.3.3.2 above; Apart from this discussion, it may be interesting to note that the economic rationale (*genus of abuse*) behind Aer Lingus' refusal (*species of abuse*) is defending the dominant position in the relevant route. See more about the categorisation of abuses in Giorgio Monti, 'The General Court's Google Shopping Judgment and the scope of Article 102 TFEU' (2022) SSRN. A refusal to grant access to ag-data can also be linked with a similar economic rationale.

117 See Atik (2021), n. 26 above for more detailed discussion on non-substitutability of farm data sets.

be an argument for the availability of alternative farm data sets to train algorithms[118] while it might not be possible to provide tailored services to the particular farm without accessing farm-specific data, and thus, indispensability can be more easily demonstrated.[119] For this reason, each case should always be evaluated based on its particularities. The purpose of the access request can be an important parameter to look at in this regard.

For the exclusion of the effective competition criterion, unlike Scenario 1, one can logically argue here that the refusal aimed to reserve the market for the data holders' own operations if the access request of a rival is rejected by the data holder. However, it may be relevant to clarify whether a single rejection of an existing rival regarding a particular farm's data leads to exclusion of competition in the relevant market or whether the rejections of multiple access requests should reach the point that may affect the market dynamics in favour of the first-movers. Although there is no (significant) effect requirement for the application of refusal to deal test,[120] exclusion of competition criterion can be satisfied more easily in some situations, especially if the data holder rejects all the access requests coming from, for instance, a start-up, which cannot develop or provide a competitive service to penetrate the market without access to that specific data set. Indeed, this discussion is strictly related to the indispensability and non-substitutability of farm data discussion.[121] The purpose of the access request (training algorithms or providing services), therefore, plays a role here as well beyond the other specific conditions of each case.

Taken together, Scenario 2.1 has a greater chance of success in a possible future case compared to Scenario 1. However, there might be distinct situations. As explained above, machine producers are mostly collaborators of the vertically integrated input producers' downstream digital agriculture

118 For the algorithm training purposes, the situation would still be evaluated case by case by looking at the possible farm data access alternatives.

119 See more discussion about non-substitutability of farm data sets when it comes to providing digital agriculture services in Atik (2021), n. 26.

120 It has to be noted that Advocate General Colomer suggested a more effect-based analysis in the refusal to deal test even though the Court of Justice did not comment on these suggestions in the decision. See Joined cases C-468/06 to C-478/06 *Sot. Lélos kai Sia EE and Others v GlaxoSmithKline AEVE*, ECLI:EU:C:2008:504 and see the *Opinion* ECLI:EU:C:2008:180.

121 See similar evaluations regarding the inter-relation of these two criteria in the refusal to deal test in Graef (2016), n. 73, pp. 221-222.

operations.[122] This means that data sometimes can be accumulated in the databases of machine producers technically even though the collaborator ATPs access and use the data.[123] This can be a challenge for direct access requests of non-integrated rival ATPs. If the machine producer refuses the access request, this refusal would not be found abusive when machine producers are not active in the downstream digital agriculture markets. If the access seeker requests data access from the ATP that has collaboration with the data controller machine manufacturer, then it may hide behind the excuse that it does not have control over the requested data sets (technically). Thus, the strategy to defend the collaborator ATP's dominance in the relevant downstream digital agriculture market may remain untouched. Overcoming this possible challenge is way beyond the capabilities of the existing test in the EU as long as 'to reserve the market for itself' part of the exclusion of competition criterion is applied strictly.[124]

Scenario 2.2 – Farm data access requests of the players in neighbouring markets
Access requests may also come from adjacent markets. For instance, the collected soil data controlled by a first-mover ATP in the seeding prescription market may be requested by an undertaking to provide other services (such as irrigation or fertilisation suggestions) in the adjacent markets because the specific farm data sets (soil data, in this example) can be a common component of the required data combination for Smart Farming services in neighbouring markets. However, the first-mover data controllers may prefer to keep this advantage by considering future expansion possibilities to these neighbouring markets.[125] This may result in refusal to deal situations.

As access seekers are typically downstream rivals in the traditional case law and, therefore, one can wonder whether this prevents the application of the refusal to deal framework in this scenario. However, the notion of

122 See section 6.2.2 above.
123 This would not be a problem for farmers' access requests as data rights under the Data Act mainly cover the user (farmer) and machine provider relationships if farmers own, rent or lease the machine. See Section 6.2.4 above. See Atik (2022), n. 11 above for a detailed analysis.
124 Discrimination case law may be relevant in this kind of situation, but it is outside the focus of this particular paper.
125 Indeed, this kind of positioning is related to incentives of the exclusive data holders in the digital economy. See 'Dutch Digitalisation Strategy Dutch vision on data sharing between businesses' (*government.nl*, 2019) <https://www.government.nl/documents/reports/2019/02/01/dutch-vision-on-data-sharing-between-businesses> accessed 21 May 2022.

'neighbouring market' was also used in some cases instead of downstream markets.[126] This creates an opportunity for this data access scenario. Thus, the refusal of data access requests coming from the neighbouring markets can well be considered abusive if the data holder is dominant in the relevant market. Also, defining a hypothetical upstream market for the requested farm data can also be an option for possible refusal to deal cases similar to this scenario. The considerations in scenario 2.1 above regarding the indispensability of the farm data sets are also valid in this scenario.

The main challenge here is the 'to reserve the market for itself' part of the exclusion of competition criterion. It is hard to argue that by refusing access requests, the data holder 'reserves' the neighbouring market for itself if it is not yet active there.[127] The condition of reserving the market for itself limits the scope of the refusal to deal enforcement significantly. If the test is applied with this strict rule, it has to be noted that the chance of this scenario (Scenario 2.2) is less compared to Scenario 2.1 when it comes to the possibility to impose a duty to deal obligation on first-mover ATPs, which are not active in the access seekers' markets.[128] If data controllers are also active in the neighbouring markets, this scenario is at least as compatible with the case law as Scenario 2.1, and even more so.[129]

6.3.3.3.2 Application to Proprietary Data Access Requests

Proprietary data refers to information about the performance of agricultural inputs (such as seeds, fertilizers, pesticides, insecticides or herbicides) which is exclusively controlled data by agricultural inputs producers.[130] As this information is generated through research and development processes of agricultural inputs, it is likely to be considered a natural extension of the IP-protected agricultural inputs. Therefore, granting access to this data may have to meet an additional criterion (the 'new product' condition) unlike

126 See *Microsoft*, n. 88, para 332; *Télémarketing*, n. 108, para 27.

127 See Ekaterina Rousseva, *Rethinking Exclusionary Abuses in EU Competition Law*, (Hart Publishing, 2010), p. 124-125 and Damien Geradin, 'Limiting the scope of Article 82 EC: What can the EU learn from the U.S. Supreme Court's judgment in Trinko in the wake of Microsoft, IMS, and Deutsche Telekom?' (2004) Common Market Law Review 41(6), p. 1531; See more in Graef (2016), n. 73, pp. 201 and 220-223.

128 Suggestions to change this strict application will be discussed in depth in section 6.3.3.4 below.

129 When considering there are case laws dealing with refusal to deals in neighbouring markets. See more detailed discussion regarding the need for revising the existing refusal to deal test in the digital age in below section 6.3.2.4.

130 See *Bayer/Monsanto*, n. 1, para 2453 and forthcoming paras.

raw farm data sets. Therefore, this section discusses the access-seeking for proprietary data sets separately.

6.3.3.3.2.1 Scenario 3 – Downstream ATPs' request to access proprietary data sets from upstream input producers

In the markets for agricultural input usage prescriptions, accessing proprietary (input performance) data sets is critical for ATPs because this component of the broader term of ag-data is the main factor to generate effective input usage prescriptions.[131] As the possible access requests for proprietary data sets (controlled by upstream agricultural input producers) can come from non-integrated downstream rival ATPs, the form of this access-seeking scenario is much closer to the typical application of the case law in the EU. This means rejection of downstream rivals' access requests by the upstream input producers may result in the elimination of effective competition in the downstream markets for data-driven agronomic prescriptions in order to reserve the markets for vertically integrated input producers' own downstream digital agriculture operations.

Without accessing input performance data, a non-integrated rival ATP would not be able to provide competitive solutions for customer farms in the markets for input usage prescription services while the downstream operations of input producers, who exclusively access these data sets, can dominate the relevant markets. Unlike the farm data sets that have different substitutability levels for the purposes of training algorithms and providing targeted solutions to the specific customer farms, there is no or very little difference for the proprietary data in this regard. Without accessing the particular brand of inputs' performance data, non-integrated rivals can neither train algorithms nor provide any services regarding the particular brand's input usage because this proprietary information on specific input performance is not substitutable with other brands' performance data by nature. In this regard, proving indispensability could be equally possible for both access purposes in Scenario 3.

The main challenge in this scenario is about satisfying the 'new product' condition that is additionally applied if the facilities are IP-protected. As proprietary data sets are the fruits of the previous innovative efforts during research and development processes of IP-protected agricultural inputs, they may be considered under the IP protection of inputs, and a refusal to

131 Ibid., paras 2576-2612

deal case may need to investigate whether the access is indispensable for generating a 'new product' for consumers. However, expecting a completely 'new product' from the access seekers would prevent the success of Scenario 3 where input usage prescription services are already provided by downstream Smart Farming operations of input producers, and non-integrated rivals need to access data to enter the markets for data-driven input usage prescriptions. If this strict criterion is applied, non-integrated access seekers may not be able to access proprietary data to develop competitive prescription services to penetrate the relevant markets even if other conditions are all met.

A lighter version of the 'new product' condition (that was applied in the *Microsoft* decision) could be useful to a certain extent though. Instead of expecting a completely 'new product', the *Microsoft* decision stated that demonstration of *"limitation not only of production or markets, but also of technical development"* would suffice.[132] In this regard, it is important to evaluate the proprietary data sets compared to the interoperability information in the *Microsoft* case in order to estimate how strict a test would be applied in a possible future case dealing with a refusal of proprietary data access request in the DAS.

To do this comparison, it may be useful to particularly discuss to what extent granting access would affect the relevant interests and incentives of IP-protected data holders,[133] considering that balancing the interests and incentives of IP-protected facility holders and benefits for consumers is mentioned in the case law when applying the additional 'new product' condition.[134]

132 *Microsoft*, n. 88, paras. 643 and 647.

133 The IP rights holders have the exclusive right to legally prevent reproduction and refusal to deal can only be found abusive in exceptional circumstances. See *Magill*, n. 87, paras 49-50; However, it is stated that *"... refusal to provide basic information by relying on national copyright provisions thus prevented the appearance of a new product, ... for which there was a potential consumer demand. Such refusal constitutes an abuse ..."* at *Magill*, n. 88, para 54. Obviously, the Court of Justice considered 'prevention of a new product with a potential consumer demand' as an exceptional circumstance in this case.

134 See the role of balancing interests before granting access to an IP-protected facility at *IMS Health*, n. 88, para 48; For the role of incentives in refusal to deal assessments, see the Opinion of Advocate General Jacobs in *Bronner*, n. 74, paras 57 and 62; a more specific and recent discussion on 'incentives to innovate' and IP protected facility (interoperability information) was provided in *Microsoft* case. See *Microsoft*, n. 88, paras 688-712; See a more progressive discussion about the potential role of taking into account 'incentives' in the refusal to deal test in section 6.4 below.

Interoperability information was not the core element or fruit of the innovative efforts of Microsoft in the upstream market of client PC operating systems as it was only a technical realiser of software communication, which is indispensable for rivals to provide services in the Microsoft ecosystem.[135] Although refusal to access can play a key role in protecting Microsoft from competition in the market for work group server operating systems, opening this data for rivals does not kill the main income or investment incentive of Microsoft in the (upstream) market for client PC operating systems.[136]

Comparably, proprietary data is not a stand-alone product, instead, it is a natural outcome of research and development processes of agricultural input production. As the main income of the input producers comes from selling more inputs that are demanded based on their quality, it is expected that granting access to this data to downstream ATPs would not detrimentally affect this main motivation of upstream input production in the current structure of the business.[137] Opening up proprietary data sets to independent ATPs can even result in positive effects on the relevant incentives here as the best input would be prescribed by the downstream ATPs according to their quality and performance. In both situations (for ag-data and interoperability information), granting access is likely to generate benefits to consumers through variety of services provided by other players with limited or no harm to upstream facility holders' incentives to invest and innovate. In this regard, there are significant similarities between the proprietary data in the DAS and the interoperability information in the *Microsoft* case.

Taken together, it can be argued that the application of the lighter *Microsoft* test can be more compatible with Scenario 3 here. If it is applied, Scenario 3 would be the most probable scenario to successfully unlock the data despite the fact that access seekers would still have to demonstrate "*limitation not only of production or markets, but also of technical development*". It is important to note that Microsoft did not appeal the judgement and, therefore, it is not clear whether this relaxation

135 See evaluations in *Microsoft*, n. 88, paras 697-712.

136 Ibid.

137 However, it is important to be aware of the fact that data gets more and more value in the economy and society, and the frontier between an undertaking's core business and by-product data sets is getting less clear. As these companies transform their core business into a more data-centric model in time, they may position themselves as agricultural input prescription providers in future. Then, the protection of their data production incentives would be a more central element in the refusal to deal cases.

of the standards is also adopted by the Court of Justice from then on or whether the relaxed application of the General Court was only done due to, for instance, Microsoft's super dominant position in this particular case.[138] In this regard, the opportunities for the lighter test in *Microsoft* should be considered cautiously.

An overall situation regarding the possible application of the existing case law to the identified data access request scenarios can be seen in the below table.

Table 3 – To What Extent is the Existing Case Law able to Address Different Ag-data Access Request Scenarios?[139]

	Access Seekers	**Farm Data controlled by ATPs – M. Manufacturers**	**Proprietary Data controlled by upstream input producers**
Scenario 1	Farmers	x? x?	x/not required
Scenario 2	Direct Rivals of First-mover ATPs	✓ ?	Not required for the access seekers unless they are in input usage prescription markets
	Players in Other Digital Agriculture Markets	x? (if the data holder is not active in the neighbouring market) ✓ (if the data holder is active)	Not required for the access seekers unless they are in input usage prescription markets
	Access Seekers Beyond Digital Agriculture Markets	x	x/not required
Scenario 3	Players in (Downstream) Input Usage Prescription Markets	Variations in Scenario 2 are also valid here when seeking farm data	✓ (if the lighter *Microsoft* test is applied)

6.3.3.4 Refining the Refusal to Deal Test in the Digital Age

The above discussion demonstrates that there are two prominent problems in the existing refusal to deal test from the ag-data access request scenarios' perspective. For farm data access seekers, 'to reserve the market for itself' part of the exclusion of competition criterion prevents data access possibilities for users (farmers) of ATPs, neighbouring market players in the DAS, and possible other possible access seekers in and out of the

138 See, Inge Graef, 'Differentiated treatment in platform-to-business relations' (2019) 38 Yearbook of European Law, p. 46.

139 '✓' means access is possible. '✓?' means access is possible despite incompatibilities. 'x' means access is not possible. 'x?' means access is unlikely due to ambiguities or limitations. It is important to recall here that the recent Data Act proposal is barely helpful to unlock the farm data sets if they are collected through IoT machinery, which is owned, rented or leased by the farmer and if the data sets are stored by the manufacturer of the machinery. See 6.2.4 above.

farm-to-fork chain. For the IP-protected proprietary data access seekers (downstream rival ATPs), the 'new product' condition erects a barrier before easy access to the necessary proprietary data sets in the markets for input usage prescriptions.[140]

6.3.3.4.1 Refining the 'to reserve the market for itself' part of the exclusion of competition criterion

The problem in this condition is related to the requirement that the facility holder should already be active in the access seeker's market.[141] If the facility holder is not yet active in a downstream market, granting access under the refusal to deal precedents is not possible.[142] This limits the coverage of the refusal to deal case law in the ag-data setting significantly, especially, for the situations expressed in Scenarios 1 and 2.2 above. The same limitation was also discussed in the broader literature. As a solution to this problem, Graef argued in her online platforms-centric research that granting access should be possible even if the facility holder is not active in the access seeker's market because there is no rationale to limit the enforcement scope of the refusal to deal case law with the situations where the facility holder is active in the access seekers' market.[143] Indeed, the prevention of a new market development due to a facility holder's refusal is considered more detrimental to consumer welfare and innovation than the prevention of rivals in a downstream market

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140 Although the lighter *Microsoft* test is useful to a large extent for Scenario 3, the view of Court of Justice is still not known regarding this lighter application. Also, even in this version, it is not possible to request access to generate an identical service (input usage prescription services in our case) with the downstream operations of the upstream input producers. The access seeker has to demonstrate "*limitation not only of production or markets, but also of technical development*" in case of refusal to deal.

141 This was also discussed in the broader literature. See Graef (2019), n. 69, pp. 66-68.

142 Indeed, inactivity in the access seekers' market was expressed as a reason to reject the allegation of abuse in refusal to deal cases. See, for instance, Case T-504/93 *Tiercé Ladbroke v Commission*, ECLI:EU:T:1997:84 at para 133.

143 Graef (2016), n. 73, pp. 201 and 220-223. In another study, the author stated a more restrictive version of this suggestion: *"an essential facility claim should also be possible in case a refusal to deal blocks the opening up of a new market in which the dominant firm itself is not present."* Graef (2019), n. 68, p. 68. Apparently, she changed her position towards a relatively interim solution instead of complete dropping the 'to reserve the market' requirement for all situations. However, this may not be wide enough from the DAS perspective. If we limit the access possibility with 'opening up a new market', new players in existing markets cannot access the data. Therefore, the first approach is more appropriate from the perspective of this particular paper's positioning.

where, at least, there is a service or product for consumers.[144] Therefore, the removal of the requirement of facility holders' presence in the access seekers' market from the legal test is a valuable suggestion to adapt the refusal to deal test according to the needs of the digital age where data can be indispensable in various markets. This could remove the ambiguities and result in broader application scope for the scenarios discussed above and even other third-party access seekers as long as they are undertakings[145] regardless of whether they are active in the DAS or not.

Even if the Commission and European courts do not prefer to undisputedly drop the 'to reserve the market for itself' part, they should, at least, interpret the 'to reserve the market for itself' more broadly by looking at whether there is a plan or possibility to enlarge toward neighbouring markets, and whether keeping the exclusive data control can be related to this strategy. This would also mitigate the problem if not solved completely by assuming that the exclusive data holders would be more lenient for access seekers from unrelated markets to voluntarily enter into contracts than the ones from connected markets, for which they can expand their business through, in future.

6.3.3.4.2 Refining the 'new product condition'

The problem in Scenario 3 regarding the 'new product condition' is that unless access seekers in the downstream input prescriptions markets prove they would develop a 'new product' with access to IP-protected proprietary input performance data, they would not be able to access the required data to compete with input producers' own downstream operations. This significantly limits the competition in the markets for input usage prescriptions in favour of vertically integrated players' downstream digital agriculture operations because potential rivals are not eligible to access the proprietary data if they plan to provide the same kind of prescription services as the existing players. In this regard, it is important to re-evaluate the appropriateness of this criterion.

In the broader literature, it was proposed that the 'new product' condition should be a part of the test (regardless of IP protection) to protect the investment and innovation incentives of the facility holders and it should only be dropped whenever there are external market failures (such as

144 See Rousseva (2010), n. 127, p. 125.

145 This means other possible access seekers such as non-profit organisations, research institutions or public bodies are still outside the scope of this possibility.

switching costs or network effects) that result in the extension of the incumbents' dominance: "*The key issue for determining the presence of external market failures would be whether market characteristics enable a dominant firm to artificially extend its dominance in time.*"[146] External market failures refer here to the problems that cannot be overcome by the natural market dynamics and, therefore, result in dominant players' further expansion in a market. Graef explains the rationale behind this distinction by stating that markets, which do not suffer from external market failures, are open for self-correction, and thus, competition intervention in these markets should be subject to very strict conditions to avoid unnecessary interference while markets with external failures, which are not able to self-correct the distorted competition, need intervention with loosened standards to unlock competition *in* the market as soon as possible.[147]

This suggestion would also help to unlock the competition *in* various markets for input usage prescriptions within the broader DAS, where these markets are mostly suffering from external market failures.[148] Comparing the *Microsoft* case's lighter requirement, which still inquires whether there is *"a limitation not only of production or markets, but also of technical development"*[149] before granting access to data, dropping the 'new product' condition for proprietary data access cases would result in much broader coverage in the DAS.

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However, as data is a non-rival product that can be used by multiple players without harming the original use,[150] this paper states its hesitations toward

146 Graef (2019), n. 69, pp. 69-71.
147 Ibid., p. 70. See section 6.3.3.1 above for the concepts of competition *in, on* or *for* the market.
148 such as insurmountable entry barriers connected to farm data lock-ins, a few giants' exclusive control over indispensable proprietary data sets or positive feedback loops in favour of first-movers. See the detailed discussion about the market failures in the DAS in Atik (2021), n. 26, pp. 53-73; and the economic reasons behind these failures in Atik and Martens (2021), n. 3, pp, 373-381.
149 *Microsoft*, n. 88, paras 643 and 647.
150 See suggestion for a lower threshold for refusal to data access requests in Heike Schweitzer and others, *Modernizing the Law on Abuse of Market Power* (2018) Report for the Federal Ministry for Economic Affairs and Energy (Germany), para 10; However, this does not mean all the data should be opened up for everyone's access as there are significant incentive issues that require nuanced evaluations. See more detailed discussion, for instance, in Charles I. Jones and Christopher Tonetti, 'Nonrivalry and the Economics of Data' (2020) 110(9) American Economic Review 2819–2858. See also why neither complete openness nor exclusive 'data ownership' is the right choice for designing ag-data rights in Atik (2022), n. 3.

the idea that the new product condition should be subject to all refusal to deal cases unless there are external market failures, especially in data-driven markets. Instead, even if the market is free from market failures, the Commission may completely drop the 'new product' condition in the cases dealing with refusal to data access requests, but it should centralise a general discussion of whether the re-use of data significantly harms the data collection and innovation incentives of the data holders compared to the consumer harm in case of refusal to access. Indeed, the rationale behind the 'new product' condition in the *IMS Health* decision is more related to balancing between opening up competition and protecting incentives of (IP-protected) facility holders.[151] However, innovation and investment incentives are important parameters for all facility holders regardless of whether the facilities are IP protected or not.[152] This is certainly true, but this does not necessarily require the generally applicable 'new product' condition. The real problem here is restricting the analytical framework with the 'new product' condition when granting access to the requested facility instead of looking at possible different elements that potentially overweight the importance of facility holders' incentives. The balance between innovation, investment or data collection incentives of facility holders and ensuring competitive process or preventing consumer harm cannot be measured solely by the 'new product' condition. There should be a total legal analysis that focuses on evaluating to what extent granting access would harm the incentives and interests of facility holders and to what extent refusing access would result in consumer harm in the access seeker's market by also considering all the potential benefits deriving from the data access - as a general test.[153]

Of course, investigations of whether access is indispensable and whether a refusal would result in the exclusion of effective competition in the access seeker's market can be part of this general evaluation to reach an accurate conclusion when balancing interests. Also, market failures can still be a

151 *IMS Health*, n. 88, para 48.

152 This was stated by Graef as the reasoning for her suggestion to a general application of 'new product' condition except for external market failures. See Graef (2019), n. 69, pp. 69-71.

153 This suggestion is somehow accordant with Advocate General Colomer's effect-based analysis suggestion. See, for instance, his statement: "*A mere comparison of the positive and negative consequences for consumers and for other operators in the same market provides sufficient information to draw the relevant conclusions.*" See the Opinion of AG Colomer in Joined cases C-468/06 to C-478/06 *Sot. Lélos kai Sia EE and Others v GlaxoSmithKline AEVE*, ECLI:EU:C:2008:180. Balancing interests was also stated in the Franko-German report. See Franko-German report, n. 73, pp. 105-107.

significant reference point in this evaluation. If the market failures lock the competition in digital markets, then opening up the competition should be more seriously considered over the protection of facility holders' incentives. If a market is free from any failures and, thus, there is no burning need to intervene, then, the general test of balancing incentives of data holders and potential harm to consumers or competitive process can be considered more neutrally. The core point here is the necessity of having a broader and a more flexible 'balancing of interests' criterion for the refusal to deal cases in the digital age to ensure continuous innovation and development to the benefit of consumers.

6.4 The Role of EU Competition Law Enforcement together with Regulatory Intervention to Address Ag-data Access Problems in the DAS

The above section has demonstrated the potential of EU competition law enforcement to address the sectoral issues, especially if the refusal to deal test is updated for data access-related cases. This section examines the relationship between regulatory intervention and competition law enforcement in this context.

The EU is very active in regulating data and digital technologies. Especially, the recent Data Act proposal[154] is a progressive step for the DAS although it has limitations when it comes to covering all the ag-data access problems as explained above.[155] Future follow-up sectoral regulation(s) can address the remaining issues as it is indeed clearly signalled in this horizontal intervention.[156] By considering the sectoral peculiarities, the legislator can design specific ag-data rights for the prominent access seekers in the sector.[157] These access seekers can be farmers or other very prominent actors such as landowners, start-up ATPs or other relevant companies in the farm-

154 See Chapter II and Chapter VIII of Data Act proposal; See more for the policy background in Commission Staff Working Document on the free flow of data and emerging issues of the European data economy accompanying the document communication building a European data economy – SWD(2017) 2 final and Commission Staff Working Document on Guidance on sharing private sector data in the European data economy Accompanying the document Communication Towards a common European data space – SWD(2018) 125 final.

155 See section 6.2.4 above.

156 Explanatory Memorandum, pp. 5-15; Recitals 25, 79, 81, and 87; and, more importantly, Art. 40(2) of the Data Act proposal, n. 11 above.

157 See earlier suggestions for a follow-up ag-data regulation in Atik (2022), n. 11 and Atik (2022), n. 3.

to-fork chain as well as public bodies, scientific institutions or non-profit organisations.[158] However, the Data Act proposal has a user-centric approach when designing and allocating data access rights, i.e. it does not regulate broader data access needs of third parties.[159] Also, there is no clear sign that the follow-up sectoral regulation after the horizontal Data Act will have a comprehensive approach to cover, at least, the prominent third-party ag-data access needs beyond farmer-centric rights.[160] This entails that expecting comprehensive ag-data re-use rights in the possible follow-up sectoral regulation might not be realistic in light of the available information.

If the sectoral rules will come with a farmer-centric design, it may help to address the remaining problems of farmers about data lock-ins and trust-related issues as the Data Act provisions can barely cover a part of farm data sets produced by agricultural machinery.[161] However, broader data access needs would not be addressed. As third parties' direct data access needs would remain untouched in this case, competition law enforcement can be an important tool at hand for broader access requests for ag-data sets, especially if the refusal to deal test is refined. Indeed, the user-centric approach of the Data Act mainly aims to address the exploitation of IoT device users while the EU competition law enforcement focused more on addressing exclusionary conduct,[162] and thus, it can cover the remaining exclusionary refusal to ag-data access situations with its flexible and case-by-case structure despite its own limitations.

Even if the follow-up sectoral regulatory intervention will aim to address the data access needs in the sector more comprehensively than expected, this does not fade the role of competition law enforcement as it is difficult to establish *ex-ante* provisions to address all the (possibly changing) data access needs of various existing or new players.[163] Also, having a clear

158 There might be a need for a comprehensive empirical study to identify major access seekers in the sector.
159 Atik (2022), n. 11 and Atik (2022), n. 3.
160 Ibid.
161 Ibid.
162 See Guidance on the Commission's enforcement priorities in applying Article 82 of the EC Treaty to abusive exclusionary conduct by dominant undertakings [2009] OJ C45/7; *Continental Can v Commission*, n. 66, para 12 is considered an early indication in this regard. See more discussion on the exploitation part of the matter in Giorgio Monti and Alexandre de Streel, 'Exploitative Abuses: The Scope and the Limits of Article 102 TFEU' (2022) – forthcoming.
163 There are some suggestions though for a possible sectoral ag-data regulation to minimise this problem. See Atik (2022), n. 3, pp. 723-725 and 735.

right to data access does not guarantee that the data controllers will not abuse their positions. Sometimes, facility holders may create struggles to negotiate the access terms, or they may refuse to negotiate even in well-regulated environments. This means the rejected party can go for both litigation (or apply for the related authority) based on its rights under the regulation and also it can apply competition authorities with the claim of abuse. Indeed, there are competition law investigations in highly regulated sectors.[164] For instance, breaching "*the patent system and the procedures for marketing pharmaceutical products*" was found abusive in the *AstraZeneca* case.[165] Also, Dutch Competition Authority recently found the conduct of 'not negotiating effectively and seriously' abusive in a pharmaceutical sector case.[166] Similarly, French Competition Authority investigated whether Google abused its dominant position by *inter alia* circumventing the copyright law and avoiding negotiation and remuneration for the reproduction and display of content,[167] or the German Competition Authority found an excessive collection of personal data abusive in the Facebook case.[168] This implies that breaching or misusing the existing legal framework can be considered

164 The pharmaceutical sector, in which marketed products are highly protected by IP rights, can be the most obvious example in this regard. See a detailed discussion in Chris Fonteijn, Ilan Akker and Wolf Sauter, 'Reconciling competition and IP law: the case of patented pharmaceuticals and dominance abuse - Chapter 25' in G. Muscolo and M. Tavassi (eds), *The interplay between competition law and intellectual property: An international perspective* (Kluwer Law International, Alphen a/d Rijn 2019) 411-425.

165 For instance, breaching the patent system and the procedures for marketing pharmaceutical products was found abusive in Case T-321/05, *AstraZeneca v Commission*, ECLI:EU:T:2010:266.

166 See, for instance, the Dutch case of *Essetifin S.p.A., Leadiant Biosciences S.p.A., Leadiant Biosciences Ltd. and Leadiant GmbH (jointly: Leadiant)* (2021) ACM/UIT/554938, ACM/20/041239.

167 See the decision of Autorité de la concurrence in Decision No. 20-MC-01 of 9 April 2020 relating to requests for interim measures presented by the Syndicat des éditeurs de la presse magazine, l'Alliance de la presse d'information générale e.a. et l'Agence France-Presse.

168 See the decision of Bundeskartellampt in Decision No. B6-22/16 of 6 February 2019 relating to Facebook's different alleged conduct on data collection. Recently, Advocate General Rantos stated in its opinion that a competition authority may take into account the compatibility of conduct with the General Data Protection Regulation while exercising its powers. Non-compliance to the GDPR *may be an important indication of whether that conduct amounts to a breach of competition rules.* See Press release no 158/22 about Advocate General's Opinion on C-252/21 <https://curia.europa.eu/jcms/upload/docs/application/pdf/2022-09/cp220158en.pdf> accessed 8 October 2022.

as a benchmark criterion when evaluating the alleged abusive conduct.[169]

The reason for the higher standards in the refusal to deal test is strictly related to balancing between freedom to contract and maintaining the competitive process.[170] In case there is already a legal obligation to enter into a contract with binding sectoral rules, then there would be no need to check indispensability or new product condition. This means regulatory intervention may also increase the application scope of the EU competition law in ag-data access request cases in the EU because one can even expect that exclusion of competition as a result of the refusal without objective justification would suffice to find the conduct abusive where there is a clear obligation to grant access to data.

Beyond addressing data access problems, competition law enforcement and regulation can also be interrelated and complementary for broader issues.[171] Powerful players in the emerging DAS may abuse their positions in plenty of other ways that are not necessarily related to data control.[172] Therefore, instead of prioritizing one tool over the other and making a choice between these two, it can be concluded that competition law enforcement and (sectoral) data regulation may play complementary roles as they can fill each other's weaknesses. The application scope of these tools in the sector may be broader, especially if the refusal to deal test is relaxed and the follow-up sectoral intervention is designed beyond farmer-centric data rights.

In sum, competition law enforcement provides significant opportunities. However, it has also its own limitations such as long procedures and having strict conditions for granting access to data. Therefore, clear *ex-ante* rules

169 See similar evaluations for the pharmaceutical sector setting in Fonteijn, Akker and Sauter (2019), n. 164.

170 See section 6.3.3.

171 See the more detailed discussion about this relationship in 'Competition Enforcement and Regulatory Alternatives' (*OECD.org*, 2021) <http://oe.cd/cera> accessed 26 August 2022, and, in particular, see Giorgio Monti, 'How Competition Authorities' Regulation and Remedies Influence Competition Law' (OECD, 2021) <https://youtu.be/_cnxLGiSN9U> accessed 26 August 2022; See also complementary nature of IP and competition law regimes in the pharmaceutical sector in Fonteijn, Akker and Sauter (2019), n. 164.

172 For instance, there are concerns regarding prescribing upstream input brands (more than needed) to leverage the downstream market position to foster upstream input (e.g. seeds, pesticides, insecticides, or fertilisers) sales. See section 6.2 above.

and rights are critical for the sector. Possible future sectoral regulation should be tailored to all the sectoral data access needs by identifying the prominent data access seekers. However, competition law enforcement can still play a complementary role even after the sectoral regulation.

Obvious needs can be addressed through sectoral regulation, while unpredictable data access needs that may arise over time can be addressed through flexible and case-by-case competition law enforcement. The following table demonstrates the potential of different combinations with *ex-ante* regulation and *ex-post* competition law enforcement in this regard.

Table 4 – Potential of Different Options over Ag-Data Access Needs in the DAS[173]

		Farmers	Rivals in the Same Market
Current Situation	User-Centric Data Act	✓? (only some farm data controlled by machine producers)	X (no access rights for those other than users)
	Strict Refusal to Deal Test	X (no exclusion of competition to reserve the market)	✓ ? (no separate markets - it does not fit the typical application of the test)
Expected Improvement	Lighter Refusal to Deal Test (*Microsoft*)	X (no exclusion of competition to reserve the market)	✓? (lighter conditions: indispensabi-lity and exclusion of competition)
	Follow-up Sectoral Data Regulation (with User-centric Data Rights)	✓ (all farm data if well designed)	X (no access rights for those other than farmers)
Ideal Solution	Follow-up Sectoral Data Regulation (with Broader Coverage) [Main Challenge: *the impossibility of future proof and tech-neutral allocation of rights*]	✓ (all farm data [maybe even proprietary data] control-ed by all players)	✓ (if the allocation of access rights for third parties is organised well)
	Proposed Refusal to Deal Test for the DAS Cases [Advantage: *addressing broader and possibly changing problems with flexible and case-by-case application* Challenge: *balancing of data holder's incentives and consumer harm*]	✓ (if refusal to access indispensable farm data results in the exclusion of competition in the access seekers' market)	✓ (if the refusal to access indispensable farm data results in the exclusion of competition in the access seekers' market)

173 '✓' means access is possible. 'X' means access is not possible. '✓?' means access is possible, but there are still ambiguities or limitations. 'X?' means access is unlikely due to ambiguities or limitations.

	Rivals in Neighbouring Markets	Rivals in Downstream Markets	Other Undertakings	NGOs, Academia, Public Bodies
	X (no access rights for those other than users)	X (no access rights for those other than users)	X (no access rights for those other than users)	X (no access rights for those other than users)
	X? ('to reserve the market') ✓(if data holder is active in adjacent m.)	X? (proprietary data access is only possible if a 'new product' is provided)	X (no exclusion of competition to reserve the market)	X (only undertakings can benefit from the typical case law)
	X? ('to reserve the market') ✓(lighter conditions if data holder is active in adjacent m.)	✓ ? (access to proprietary data with lighter conditions than 'new product')	X (no exclusion of competition to reserve the market)	X (only undertakings can benefit from the typical case law)
	X (no access rights for those other than farmers)	X (no access rights for those other than farmers)	X (no access rights for those other than farmers)	X (no access rights for those other than farmers)
	✓ (if the allocation of access rights for third parties is organised well)	✓ (if the allocation of access rights for third parties is organised well)	✓? (determination of all possible access seekers in and out of the farm-to-fork chain is challenging)	✓? (if the allocation of access rights for prominent access seekers is organised well)
	✓ (if the refusal to access indispensable farm data results in the exclusion of competition in the access seekers' market)	✓ (if the refusal to access indispensable ag-data results in the exclusion of competition in the access seekers' market)	✓ (if the refusal to access indispensable farm data results in the exclusion of competition in the access seekers' market)	X (only undertakings can benefit from even the updated test)

6.5 Conclusion

This study investigated the potential application of refusal to deal case law to address possible ag-data access request scenarios. It also discussed how the refusal to deal test could be improved and used in line with *ex-ante* (sectoral) regulatory intervention.

This paper concludes that some of the access-seeking scenarios do not fit in well with the typical application of the refusal to deal test provided by the EU precedents so far, and the conditions of the legal test may not be satisfied easily even in the compatible scenarios. However, the *Microsoft* decision seems to offer an avenue for an updated version of the test for data access requests in the digital age with its relaxed standards, which are also more compatible with the ag-data access request scenarios in the DAS. Even this relaxed test could still be improved, especially by explicitly removing the 'to reserve the market itself' part of the exclusion of competition criterion and dropping the 'new product' condition completely for data access request cases. Instead, inserting a more general effect-based evaluation to ensure a balance between protecting investment, innovation and data collection incentives of data holders and ensuring consumer welfare and the undistorted competition would be a more functional and flexible framework to address the data access needs.

Regulatory intervention is also an important tool to be developed in parallel. There can be various players who need to access different ag-data sets in and out of the farm-to-fork chain, for instance, to track agricultural products and monitor food or environmental safety, to consider the financial capability of the players, or even to realise certain policy aims.[174] Addressing these wide data access needs beyond data rights for farms requires good data governance.[175] As the coverage of the recent horizontal Data Act proposal seems to be barely functional in unlocking agricultural machine data sets for the owners, renters or leasers of these machines,[176] sector-specific *ex-ante* regulation can come to mind as a follow-up solution to address the remaining issues in a tailored way with effective design and allocation

174 See these and more examples in Ines Härtel, 'Report on the topic of "European Guidance and Rules for agricultural Data' (European Agricultural Data Governance) (2020), pp. 9-10; See also Keith H. Coble and others, *Advancing US agricultural competitiveness with big data and agricultural economic market information, analysis, and research* (FARE Report, 2016), pp. 6-10.

175 Atik (2022), n. 3.

176 See more in Atik (2022), n. 11.

of data access rights according to the specific needs of prominent access seekers.[177] However, designing tech-natural and future-proof provisions, identifying all the (possibly changing) relevant players and allocating data entitlements in this complex environment constitute the major problems.[178]

In this regard, *ex-ante* regulation and *ex-post* competition law enforcement can go hand in hand to more effectively cover each other's weaknesses, to address various and possibly changing data access needs more functionally, and thus, to ensure unrestrained innovation and undistorted competition in the emerging DAS. A well-designed sectoral intervention may have significant potential to mitigate the identified sectoral concerns while competition law enforcement can be a valuable safety net to cover the dynamic data access needs by providing a parallel (or in some situations alternative) channel for access seekers – especially if the refusal to deal test will evolve into a more flexible form that is compatible with the requirements of the age of 'Big Data'. In general terms, repetitive structural problems are better sorted by sectoral regulation while new issues, which may be one-off and are unexplored yet, may be better suited for competition law enforcement to be addressed.

177 Beyond allocation of data rights, generating some principles and assigning an sectoral ag-data authority to decide about data access requests according to the general principles would also work if designed well. See more discussion in Atik (2022), n. 3.

178 Ibid.

CHAPTER 7

Conclusions

The book chapter and four academic articles that constitute this dissertation contain their own specific conclusions, which are brought together in this Chapter by way of an overall discussion regarding the general conclusions and the broader evaluation of the extent to which these pieces as a whole contribute to the existing body of knowledge. In this regard, the following part will only touch upon particular conclusions in order to provide an overall evaluation regarding the PhD research in general.

7.1 Data-driven Transformation in Agriculture and Connected Legal Problems

Digital transformation in agriculture is a critical development, and policymakers should ensure that it is completed as smoothly as possible for the sake of sustainable production of food for society and agricultural raw materials for the economy. Indeed, the new Common Agricultural Policy (CAP) aims to promote this transformation in Europe.[1] More data means a more accurate understanding not only of the agricultural production processes but also of the various other connected processes in farm-to-fork chain.[2] Digitalisation makes farmers better decision-makers with accurate data-driven parameters and insights regarding farming operations, and thus, farmers are able to produce more and better products with less agricultural input usage. This paradigm shift results in a productivity gain.[3] The higher this gain is, the more sustainable and cheaper agricultural supply can be provided for people and the economy. Equally importantly, avoiding unnecessary agricultural input (e.g. pesticides, herbicides, insecticides or chemical fertilisers) usage is highly beneficial for the environment, public health and food safety.

Despite all the benefits, switching from traditional practices to 'Smart Farming' is a big decision for farmers as it requires high investments in IoT infrastructures, managing contractual relations with technology providers, and implementing data-driven solutions on their farms.[4] Also,

1 See 'The New Common Agricultural Policy: 2023-27' (*agriculture.ec.europa.eu*, 2021) <https://agriculture.ec.europa.eu/common-agricultural-policy/cap-overview/new-cap-2023-27_en#innovation> accessed 5 August 2022; See the evolution and aims of the CAP and its relevance from the perspective of this research in Chapter 1 above.

2 See Chapters 2 and 3 above for a detailed discussion on the digital transformation in agriculture.

3 See Chapter 3 for the reasons and effects of this gain.

4 See more in Chapter 2.

unclear consequences of this transformation when it comes to data access and control create further hesitations for farmers.[5] These conditions in the sector make the already collected farm data sets distinctively valuable for both companies (ATPs) and farmers. ATPs are dependent on the digital transformation decision of farmers to be able to reach more farm data from new customers while farmers are dependent on ATPs to get data-driven solutions and to access or transfer the collected data sets from their farms. Therefore, farmers and ATPs have a kind of mutual dependence when it comes to data collection, processing and data access respectively considering the lack of substitutability of the farm-specific data sets, especially for the purposes of providing/getting tailored digital agriculture services.[6]

From the legal perspective, the most urgent question is about the ambiguity of who has which rights over the different components of the broader term of agricultural data. This is connected to the unclarity of the legal status of agricultural data and (the existence of) applicable legal regime(s) to the data access-related issues in the emerging DAS.[7] These uncertainties *inter alia* result in the four interconnected problems: i) locked-in farm data sets in the hands of the first-mover ATPs and machine manufacturers that prevent farmers from freely switching to rival service providers when it is necessary,[8] ii) fragmentation of data sets in the isolated data silos controlled by different actors, iii) unanswered broader data access needs of various players in the farm to fork chain, and iv) farmers' lack of trust to adopt digital technologies or share data with third parties.[9] In general, these conditions cumulatively restrain the full potential of 'Big Data' in the agriculture sector, and particularly, prevent the development of a competitive Digital Agriculture sector.

Law follows societal and economic developments, and making the decision 'to intervene or not to intervene' to free market relations is not an easy task for legislators.[10] The dynamism of the digital age further complicates the decision

5 See Chapters 2 and 3 above.
6 See the asserted concept of 'distance to data effect' in Chapter 2 above. See also Chapter 6.
7 See Chapters 2 and 3 for the legal status of ag-data discussions.
8 From the technical side, lack of data standards and interoperability are the major reasons for the lock-ins in the sector. See Chapters 2 and 3 for more.
9 as identified and discussed in Chapters 2, 3, 4 and 5 in detail.
10 See comprehensive perspective in this regard at 'Better Regulation: Guidelines and Toolbox' (*European Commission* 2021) <https://commission.europa.eu/law/law-making-process/planning-and-proposing-law/better-regulation/better-

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of whether or not to 'intervene' considering the pace of developments is sometimes unprecedentedly fast. This also makes designing a long-lasting intervention more difficult. Balancing possibly changing and conflicting interests connected to sectoral stakeholders' positions and existing policy aims is another layer of challenge for policymakers, lawmakers and enforcement bodies. This requires a flexible design for the policy or regulatory interventions. Even in the perfect identification of the problems and different (possibly conflicting) interests among market players, determining the required method and the degree of the intervention is critical to realise the identified solutions. This constitutes a deeper layer of challenge before the ultimate challenge of effective enforcement to reach the intended aim of an intervention. Considering these challenges, this dissertation particularly investigated to what extent voluntary rules (EU Code of Conduct),[11] traditional EU competition law enforcement,[12] legislative intervention (both horizontal in the form of the Data Act[13] and vertical in the form of future follow-up sectoral ag-data regulation[14]) and/or infrastructural designs (such as Common European Agricultural Data Space)[15] are able to remove or, at least, mitigate these problems. In particular, the dissertation focused on the possible ways to improve the effectiveness of these tools in the sectoral application in order to ensure competition on the merits, further innovation, and eventually to foster smooth digital transformation in the agriculture sector and development of the emerging Digital Agriculture sector.

7.2 Prominent Findings of the Dissertation

7.2.1 Applicability of the Existing Legal Frameworks in the EU to the Sectoral Problems

The applicability of the General Data Protection Regulation (GDPR)[16] regime in the ag-data access setting is highly disputed as it is not always possible to link the natural persons and the ag-data. More importantly, even if the

regulation-guidelines-and-toolbox_en> accessed 24 January 2023.

11 'EU Code of conduct on agricultural data sharing by contractual agreement' (*Copa and Cogeca at all*, 2018) <https://www.cema-agri.org/publication/brochures/37-eu-code-of-conduct-on-agricultural-data-sharing> accessed 4 December 2022.

12 See Chapters 2 and 6.

13 See Chapter 4.

14 See Chapter 5.

15 Ibid.

16 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), OJ L 119, 1

data is assumed personal, the only beneficiaries of the GDPR regime are natural persons, and thus, management of data access rights in big farms with various workers might not be feasible as separation of who collected which data sets would be the main challenge. Moreover, as the data rights are inalienably granted to natural persons in the GDPR regime, this possible enforcement mechanism would fail whenever the related workers leave the job or die.[17] In this regard, the data rights (especially, the right to data portability, which theoretically has special potential for the farm data lock-in problem) provided in the GDPR may not be effectively enforceable in the DAS in practice.

Indeed, the sectoral stakeholders in the EU apparently had a similar perception regarding the GDPR's inapplicability to ag-data issues, which stimulated them to write down a voluntary code of conduct on agricultural data sharing in 2018.[18] This voluntary initiative was in line with the objectives of the Regulation on free flow of non-personal data even though the regulation mainly focusses on moving data between cloud service providers.[19] However, as discussed in Chapter 3 in detail, beyond the general limitation of voluntary participation, the EU Code of Conduct (and also the equivalent voluntary initiative in the US) has significant drawbacks when it comes to the possibility of addressing sectoral problems. In particular, the EU Code of Conduct prioritises contractual freedom over its principles with repetitive statements like *"[u]nless specified in the contract"* or *"[u] otherwise agreed in the contract"*. This means even if ATPs declare that they follow the EU Code of Conduct to convince farmers, the text of the code lets them deviate from the principles with contractual clauses. More importantly, there is no mechanism to sanction the participants for the breach of the principles in the code. In this regard, this initiative has very limited potential to ensure farmers' autonomy in the existing environment where there are strong bargaining power imbalances and non-negligible incentives of vertically integrated agricultural giants to hoover up and exclusively control the data sets. Also, as the EU Code of Conduct does not provide more than farmer-centric principles, broader data access problems remain untouched as discussed in detail in Chapter 3.

17 See more detailed discussion in the main body of the dissertation above, especially in Chapters 2, 3 and 5.
18 See footnote 11 above.
19 See Regulation (EU) 2018/1807 of the European Parliament and of the Council of 14 November 2018 on a framework for the free flow of non-personal data in the European Union, OJ L 303, 28.11.2018.

There are also other potentially relevant regulatory developments in the EU even though they do not particularly target the sectoral problems that are discussed in this dissertation. For instance, the Digital Markets Act (DMA)[20] defines mandatory business-to-business data-sharing obligations for commercial data. However, this applies only to very large “gatekeeper platforms” that provide “core platform services”. Digital Agriculture services provided by ATPs are not covered by these DMA definitions, and therefore, there is no possibility to cover the sectoral problems in the DAS. The Data Governance Act (DGA)[21] includes regulation of data-sharing services. Article 9 restricts the scope of the regulation to three categories of data intermediaries: providers of bilateral or multilateral data exchange services, personal data sharing services and data cooperatives. However, it is unlikely to consider ATPs or agricultural input conglomerates under any of these categories. Even if there would be any agricultural data platforms that could be considered data intermediary services under Article 9, the conditions that apply to these platforms under Article 11 are very general and do not go beyond what is already foreseen in the EU code of conduct that is investigated in detail in Chapter 3 above.[22]

The recent Data Act proposal[23] provides a more compatible framework when it comes to ag-data access problems, especially when considering that it provides binding data rights for both personal and non-personal data. Indeed, this intervention is an important step towards the solution in the ag-data setting. However, this horizontal regulation has also significant

20 Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act), OJ L 265.

21 Regulation (EU) 2022/868 of the European Parliament and of the Council of 30 May 2022 on European data governance and amending Regulation (EU) 2018/1724 (Data Governance Act), OJ L 152.

22 See some evaluations about these initiatives in Chapter 3 above. The Digital Services Act (DSA) [Regulation (EU) 2022/2065 of the European Parliament and of the Council of 19 October 2022 on a Single Market For Digital Services and amending Directive 2000/31/EC (Digital Services Act), OJ L 277] is more about the EU e-commerce legal framework with a specific focus on online marketplaces and it is not relevant to the problems deriving from exclusive ag-data control by ATPs and machine manufacturers in the DAS or vertically integrated giants in the broader agriculture sector.

23 Proposal for a Regulation of the European Parliament and of the Council on harmonised rules on fair access to and use of data (Data Act), COM(2022) 68 final, 23.02 2022.

limitations from the DAS perspective mainly owing to the highly restrictive definitions of key notions such as ‘user’, ‘product’ or ‘related service’. Therefore, the right to data access (Article 4) and the right to share data with third parties (Article 5) designed in the Data Act can barely cover the farm data sets generated through the usage of an agricultural machinery if it is owned, rented, or leased by users (farmers). Even in this possible applicability, there may be additional problems when farmers do not buy, rent or lease the machine, but receive services from companies, which own, rent or lease the IoT device from the manufacturer, to run the particular agricultural operation. More importantly, the Data Act provides rights only for ‘users’, and there is no provision for third parties to access the necessary data sets directly from the data holders for their various purposes. Thus, the broader ag-data re-use needs are left unanswered. In that sense, although one should not overlook the fact that the Data Act intervention is a progressive horizontal framework for industries based on IoT technology including for the DAS, this is not the ultimate solution to remove all the ag-data access problems in the emerging DAS.[24]

7.2.2 The role of EU Competition Law in Addressing Sectoral Issues

Despite the great potential of clear rules and rights in the digital age, the main challenge of *ex-ante* regulation is ensuring a tech-neutral and future-proof set of rules, determining all the (possibly changing) access-seekers, and designing a fine-tuned access regime for all situations. In this regard, the EU competition law enforcement can be a valuable complementary tool to address sectoral problems with its *ex-post* and case-by-case investigations.

In particular, the refusal to deal case law is of particular importance here because if the refusal to data access requests is found abusive, the Commission can apply a remedy to grant access to data by forcing the data holders to enter into agreements with the data access seekers with specific obligations according to the nuances of each specific case.[25] Although traditionally a very strict test is applied to determine whether the refusal is abusive or not, the *Microsoft* case applied a lighter set of standards recently for an interoperability information access request. This is an important development for the data access problems in the digital age. However, there

24 See the particular analysis of the Data Act proposal in Chapter 4 above and suggestions for a follow-up ag-data regulation in Chapter 5 above.

25 See more in Chapter 6 above.

are further possibilities to refine the refusal to deal test in the age of Big Data to more effectively cover and address growing data access problems in various sectors including the DAS, especially when taking into account the non-rival nature of data that allows multiple re-use possibilities without technically preventing the original use.[26] This dissertation also discussed these opportunities for more compatible abuse of dominance enforcement in the digital age, in general, and for the possible DAS cases, in particular.[27]

As discussed in Chapter 2 above, exclusive control of different ag-data sets can create significant market power for the first-mover ATPs in the emerging Digital Agriculture sector. The main players in the sector are downstream operations of the vertically integrated agricultural conglomerates and there are concerns regarding the further concentration of data sets as a result of strategic mergers in the sector. The *Bayer/Monsanto* merger is the first case in this regard. The decision of the Commission also demonstrates that the EU merger control regime can play an important role to prevent the accumulation of data in the hands of a few vertically integrated agricultural giants considering the BASF divestment package, which aimed to ensure keeping competitive constraints in the post-merger period by transferring Bayer's digital agriculture operations (with the relevant data sets) to another undertaking in the sector, BASF.[28]

It has to be noted that competition law enforcement has its own limitations such as long procedures or having strict standards for imposing a data access obligation. Still, it can play a valuable role to support regulatory intervention in the DAS, especially if the Commission and courts update the existing 'refusal to deal' test in line with the requirements of the digital age and if the Commission continue to prevent detrimental ag-data concentrations in line with the EU merger control regime.

7.2.3 Seeking Possibilities for an Appropriate Legal Design for the Possible Future Sectoral Regulation

When it comes to the discussions regarding sectoral regulation, the sectoral

26 Still, there might be other legitimate reasons to limit data re-use such as privacy concerns, trade secrets, protecting incentives, or economic benefits of monetary exploitation of exclusive data access etc. See more in Chapter 3.
27 Ibid.
28 See Chapter 2 for more. See also the divestment package in Case No COMP/M.8084 – Bayer/Monsanto, European Commission Decision (29 May 2018), para 3046 and subsequent paras.

literature and stakeholders predominantly focused on the concept of 'agricultural data ownership' with the envision that farmers should own 'their' data.[29] However, ownership as a legal concept is not an appropriate choice to address the sectoral concerns including farm data lock-ins, the isolation of data sets, data access needs of various parties, and farmers' trust-related problems.[30] As discussed in Chapters 3 and 5, the ownership concept would bring more harm than benefits to the sector given that ownership consists of a bunch of sub-rights including the right to prevent others from using the asset and the right to transfer the ownership right itself to others. The latter entails that regardless of the original allocation of rights to farmers, the data rights would end up in the hands of a few powerful players who attach more value to them. Vertically integrated agricultural conglomerates have the required capabilities and incentives to organise the acquisition of data rights from farmers. If that happens, a few giants can prevent any kind of data re-use with their exclusive ownership right by considering future expansion possibilities to the connected digital agriculture markets. That is likely to exacerbate the sectoral problems. This would lead to more dependent and frustrated farmers, legally protected isolation of data sets controlled by vertically integrated giants, hindered data-driven innovation and restrained competition in the emerging DAS.[31]

Therefore, Chapter 5 provides an alternative conceptual design for the possible follow-up sectoral regulation on agricultural data. In this chapter, designing inalienable access rights for 'farm units' was suggested from the conceptual perspective. Entitlement holders should not be real or legal persons (farmers or their companies) that can be disconnected from the farming operation at some point with their data rights. Instead, farm data access rights should be linked with the 'farm units' that can be registered based on geographical location or digital identification number. Thus, any person or company, which runs a particular farming operation at a moment, can access the related farm data sets regardless of the legal status of the previous operator.[32]

Chapter 5 also proposes a mechanism to address the issues relating to third-party access requests. Access rights design can also open up opportunities for the broader data access needs in the sector as farmers' need for farm

29 See Chapter 5.
30 Ibid.
31 See Chapters 3 and 5.
32 See Chapter 5.

data access does not necessarily prevent wider data re-use.[33] However, apart from the prominent third parties with their relatively clear access needs, designing and allocating all the ag-data re-use rights *ex-ante* may not be easy for lawmakers. In this regard, Chapter 5 argues that a sectoral authority should be constituted to enforce the sectoral regulation, to run common European agricultural data space (CEADS), and also to evaluate third-party data access requests based on certain criteria[34] in order to realise the full potential of tailored sectoral rules and a technical data infrastructure to unlock ag-data, facilitate innovative data re-use and ensure unrestrained competition in the emerging DAS.[35] This would mitigate the limitations of the *ex-ante* design with a case-by-case *ex-post* evaluation for data re-use requests pursuant to the framework provided in the sectoral regulation. Even though this requires a costly mechanism, it would foster data-driven innovation in the sector – which is really necessary at this stage.

This does not alter the role of the competition law enforcement because having this mechanism does not ensure the compliance of the sectoral players. Data holders may still try to deviate from access obligations that can constitute abuse in certain conditions. Indeed, even in the heavily regulated sectors, there are parallel competition law investigations and sector-specific law enforcement that can address the issues complementarily. There is a synergistic potential to apply these two frameworks (i.e., EU competition law and sectoral regulation) to data-access problems as discussed above in Chapter 6. They can cover each other's weaknesses when it comes to unlocking ag-data for the sake of undistorted competition and fostered innovation in the DAS. Detailed sectoral regulation can solve the prominent problems in the sector while competition law enforcement can be a useful safety net for unpredictable market failures that may occur in time. Also, competition law enforcement will remain important for the sector considering there might be other anticompetitive practices in the DAS beyond ag-data access and control issues.

33 Ibid.
34 inspired by the broader ELI-ALI principles. The European Law Institute (ELI), together with the American Law Institute (ALI), initiated a project, namely 'Principles for a Data Economy: Data Transactions and Data Rights', with a view to generating potential legal rules applicable to transactions in data. A set of criteria should be designed in the sectoral regulation benefiting from these principles. See more in Chapter 5 above.
35 See the details in Chapter 5.

7.3. Contributions to the State of the Art

This thesis provides a detailed discussion about the ongoing data-driven transformation in the agriculture sector and its legal implications by identifying the prominent challenges and inquiring about alternative ways to address them in this regard. By doing this, this dissertation contributes to the several layers of the state of the art. The following part will present the contributions under three main categories.

7.3.1. Contributions to the Competition Law Literature

Chapter 2 and Chapter 6 focus on the application of the competition law to sectoral issues. The former inquires about the reasons for the data-driven market power in the emerging DAS by using the *Bayer/Monsanto* merger decision of the Commission as a reference for the discussions. There were plenty of publications regarding data-driven market power in the digital age, but they mostly focused on the economic characteristic of personal data and business models of online platforms.[36] Chapter 2 provides a detailed analysis regarding the distinct features of the emerging Digital Agriculture sector and the role of agricultural data control on the market power of ATPs. This analysis demonstrates that exclusive control of different agricultural data sets by a few vertically integrated players in the sector creates insurmountable entry barriers. It also provides a detailed discussion regarding the most relevant elements to be considered when assessing data-driven market power in the DAS. In this regard, this research contributes to the broader data-driven market power literature with distinct sectoral evaluations.

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Chapter 6 concerns the role of EU competition law enforcement to unlock ag-data sets. It particularly focuses on the refusal to deal case law in the EU so far and its possible application to the identified ag-data access request scenarios. In this regard, this chapter demonstrates the adequacy and limitations of the traditional refusal to deal test in the ag-data access setting. Hence, it contributes to the relevant literature with a distinct sectoral perspective as the publications regarding data access requests so far were mostly about personal data or technical (interoperability) data.[37] The chapter also provides a more general discussion regarding to what extent the strict refusal to deal test developed for traditional infrastructures is appropriate to apply the data access requests in the digital age by suggesting

36 See more about the gap in the literature in Chapter 1, section 1.1.5 above.
37 Ibid.

certain improvements. By doing this, it also contributes to the ongoing debates about adapting traditional competition law enforcement (refusal to deal test, in this particular research) to the requirements of data-driven problems with a specific sectoral focus.

7.3.2 Contributions to the Broader Data Governance Literature

This dissertation also contributes to the broader data governance debate, which has been flourishing in the last decade, on addressing the challenges deriving from Big Data with regulatory interventions.[38] However, sectoral implications concerning ag-data access problems were largely neglected.[39] In this regard, existing and forthcoming regulatory initiatives in the EU are discussed from the DAS perspective in detail, and thus, their gaps, uncertainties and limitations are identified so as to make profound suggestions to improve their effectiveness in the emerging DAS.[40]

This investigation reveals a clear regulatory gap for the ag-data access issues. The most relevant framework is provided by the Data Act proposal, but it has significant limitations in the ag-data setting. Chapters 4 and 5 discuss to what extent the Data Act proposal could be improved before entering into force, and conclude that revising the definitions of the core concepts and providing additional provisions would increase the scope of application of this regulation in the DAS. Also, changing the user-centric design in the Data Act might be helpful, but this requires a complete revision of the regulation and design of the rights and rules. Therefore, it is not realistic to expect a comprehensive change in this initiative such as expanding the definitions to cover all the farm data access needs or including the data access rights for third-party access seekers to address broader data re-use needs. This dissertation demonstrates that there is a need for sector-specific regulatory intervention to address the remaining sectoral concerns with tailored provisions to the sectoral needs.[41] Therefore, beyond the research regarding the application of the existing and forthcoming

38 See Ibid.

39 Despite some research on the matter such as Mihalis Kritikos, *Precision Agriculture in Europe – Legal, Social and Ethical Considerations* (EPRS | European Parliamentary Research Service, 2017) and Michael E. Sykuta, 'Big Data in Agriculture: Property Rights, Privacy and Competition in Ag Data Services' (2016) 19 International Food and Agribusiness Management Review 57. See more in Chapter 1, section 1.1.5 above.

40 See Chapters, 3, 4, and 5.

41 See Chapters 4 and 5 above.

legal frameworks to the ag-data access problems, the dissertation also provides detailed discussions on the aspect of to what extent a sectoral regulatory intervention can be useful and how it should be designed to more effectively address the sectoral problems. In this regard, one of the main contributions of this dissertation is its conceptual and regulatory suggestions for policymakers and legislators, who will need to focus on an ag-data regulation at some point by considering the limitations of the horizontal interventions in the DAS.

From a conceptual point of view, the dissertation provides a detailed discussion regarding the possible consequences of an ag-data 'ownership' regime and demonstrates that possible unintended effects would outweigh the expected benefits. Instead, it suggests a data access regime building on the existing knowledge, but nuanced according to the peculiarities of the DAS. The most prominent element of the suggested data access right in terms of its design is about the entitlement holder: linking the entitlements (inalienable data access rights) with the 'farm units' as explained above.[42]

The dissertation also investigates opportunities for synergies by using different tools together, which are mostly discussed in the literature separately, to unlock ag-data in the DAS. The roles and limitations of traditional competition law enforcement in the EU, the potential of the *ex-ante* sectoral rules, and the complementary role of technical infrastructures such as the common European agricultural data space (CEADS) are discussed together to demonstrate their synergistic potential to complement each other.[43] They can be used harmoniously to more effectively address the data access issues and connected problems of hindered innovation and restrained competition in the DAS.[44] By doing this, the thesis contributes to the discussions on these fields from a holistic perspective.

As there is no declared plan of the Commission for a follow-up ag-data regulation yet, the suggestions for the design of the sectoral data rights are purely generated within the scope of this research by benefiting from the general discussions in the broader literature on the concepts of 'data access rights' and 'ELI-ALI principles'[45] and applying the derived insights

42 Details can be seen in Chapter 5.
43 See Chapters 3, 5 and 6.
44 Ibid.
45 See more in Chapter 5.

on the ag-data access setting. The considerations on the need for a sectoral data access hub are based on the Commission's announced plans to create sectoral data spaces including one in agriculture (i.e., common European agricultural data space).[46] However, as there is not much detail apart from the broad idea of creating an ag-data access hub, this dissertation also contributes to this preliminary idea by providing suggestions to design a sectoral technical data infrastructure for ag-data access. By exploring the possible ways of developing a holistic ag-data governance in the EU to fully cover the sectoral needs, the dissertation, thus, also aims to initiate a deeper discussion to address the challenge of creating effective rules, rights and an enforcement mechanism for the sector.

In general, the dissertation contributes to the legal scholarship with a unique sectoral focus by highlighting the fact that each sector is likely to have peculiarities that need to be addressed with tailored regulatory design as one size does not fit all.

7.3.3 Contributions to the Sectoral Literature

The digital agriculture literature was rich in terms of publications that revolve around the sectoral problems and their possible reasons, but it was missing a comprehensive legal study on data control issues.[47] Particularly, the sectoral literature focussed on the idea that 'data ownership' rights on ag-data should be granted to the farmers without considering the possible consequences of such a legal design for the sectoral players.[48] This dissertation demonstrates that the intuitively used 'ownership' concept in the sectoral literature is not the right choice for regulating ag-data from the legal perspective because it is not only inadequate to remove the underlying problems of the farm data lock-ins and other ag-data access problems but also likely to exacerbate the sectoral issues. In this regard, the dissertation contributes to the sectoral discussions among non-legal scholars by suggesting to focus on alternative concepts when envisioning the sectoral rules and rights.

As explained in Chapter I above, the legal literature and sectoral literature focus on different aspects of the matter. Considering the generated insights with a holistic perspective, the thesis contributes to a more overarching

46 Ibid.
47 As explained in Chapter 1, section 1.1.5 above.
48 See detailed literature on the topic in Chapter 5 above.

understanding regarding the issues revolving around agricultural data access and control – going beyond each of the two lines of literature.

7.4. Societal Relevance and Implications for the Practice

The provided insights in this dissertation can be useful for stakeholders, practitioners, competition authorities, policymakers, and future sectoral authorities.

In particular, the dissertation contributed to the practical needs of the stakeholders (i.e., farmers, ATPs, machine manufacturers and other players in the sector) when it comes to understanding the (existence of) possibly applicable legal regime(s) to ag-data access issues and their limitations.[49]

For legal practitioners, there are also some takeaways that may be useful in future sectoral cases. For instance, Chapter 2 provides a critical analysis of the *Bayer/Monsanto* decision and explores how the data-driven market power of ATPs in the emerging DAS should be assessed. Similarly, Chapter 6 explores the possible application of the existing refusal to deal test in the most prominent data access request scenarios in the sector. This chapter particularly evaluates to what extent and how the existing test can be used to create some opportunities for the various access seekers in the sector. The dissertation may also be useful for competition authorities when they face any sectoral case in the future.[50]

For policymakers, lawmakers and (sectoral) authorities, the dissertation provides a comprehensive discussion regarding alternative legal designs and their potential implications in the sector.[51] The dissertation also contains valuable discussions about possible conflicts between stakeholders related to accessing ag-data and contractual dependencies.[52] These discussions and subsequent suggestions may be used as preliminary insights by these relevant actors when they design or enforce the sectoral intervention.

49 Discussions in Chapters 2, 3, 4 and 5 contribute to this with different levels.

50 See Chapters 2 and 6. Even though the focus was more on the Commission's competition law enforcement and the substantive focus was on EU competition law in this thesis, national authorities may also proceed sectoral cases, and discussions in the dissertation may be useful for national cases as well.

51 Chapter 5 may be considered the most focussed contribution in this regard. Also, Chapter 3 and 4 provides some useful evaluations.

52 See Chapters 3, 4 and 5.

7.5 Suggestions for Further Research

Deeper insights gained through empirical research about the ag-data access puzzle in the sector would be quite useful to guide the legislator when designing follow-up sectoral regulation and creating a common European agricultural data space (i.e., CEADS). For instance, identifying the most prominent third-party ag-data access seekers for different types of ag-data, exploring the perceptions and expectations of stakeholders regarding a sectoral regulatory intervention, and mapping and determining different (possibly conflicting) interests in this regard may help shape a more sound regulatory design.

The thesis approached the potential of EU competition law enforcement with a specific focus on the possibilities to unlock data in the sector. However, there might be broader competition problems. Especially, frequently stated concerns regarding the self-preferencing practices of downstream digital agriculture operations (i.e., ATPs) of vertically integrated agricultural giants when prescribing agricultural inputs could be one of them.[53] From the competition law analysis perspective, different possible abusive conduct may need to be explored and discussed to identify to what extent the EU competition law enforcement can address these issues and to what extent the sectoral regulatory intervention should also take into account the issues beyond data access as data-driven sectors may also suffer from other problems.

Future research can also investigate the formulation of CEADS in compliance with competition law. One can wonder to what extent creating CEADS would increase the transparency in the relevant digital agriculture markets and to what extent this data exchange hub is compliant with Article 101 TFEU, which deals with anti-competitive agreements and tacit collusions. Conducting such research can be precious in providing a recipe to create CEADS without infringing the competition law in the EU. This may be particularly important research because a well-functioning data infrastructure (CEADS) could be an

53 There are inherent conflict of interests between the upstream agricultural input producers, who aim to sell inputs as much as possible, and their downstream digital agriculture services, which claim to provide solutions to use less input to achieve the same or even more yields. See Jop Esmeijer and others, 'Data-driven innovation in agriculture: Case study for the OECD KBC2-programme' (TNO 2015) – R10154, p. 27; Jacob Bunge, 'Big Data Comes to the Farm, Sowing Mistrust' (*WSJ*, 2014) <https://www.wsj.com/articles/SB100014240527023044509045793692838 69192124> accessed 12 February 2022.

important element for comprehensive ag-data governance in the EU and its compliance with existing law is a critical issue to be ensured.

Also, regulating ag-data may have impacts on numerous EU policies beyond the competition policy from environmental policy to Common Agricultural Policy or from food safety to health policy.[54] In this regard, identification of all the relevant policies, which might be affected by the sectoral regulatory intervention concerning ag-data access and connected rules, constitutes particular importance. Inquiring whether there are conflicting issues and discussing how an inclusive and smooth law-making process can be ensured would be highly beneficial to design a solid regulatory intervention that does not harm other policies, but preferably supports their aims.

7.6 Concluding Remarks

This research provides a comprehensive investigation on the data access-related problems in the DAS and presents deep insights to address the sectoral issues by considering several layers of challenges. Mitigating the sectoral concerns is critical to ensure smooth digital transformation in the agriculture sector as a paradigm shift from traditional decision-making to 'Smart Farming' by fostering the adoption rate of digital technologies amongst European farmers. Removing ag-data access problems would be an essential improvement for further innovation and development of the emerging DAS, and thus, sustainable agricultural production for the growing population and economy. In this regard, the thesis constitutes one of the first endeavours to approach sectoral issues from the legal perspective with a specific focus on competition law and policy.

It is critical to unlock the agricultural data without harming the data collection, investment and innovation incentives of the technology providers and machine producers. Striking this balance is not an easy task for policymakers and lawmakers. Vesting all the rights regarding the fate of the data to a party by excluding others is not the optimal solution for the sector. Instead, lawmakers should address the underlying reasons for the identified problems and design the regulatory responses accordingly. In particular, instead of giving all the rights to farmers or providing a user-centric consent regime for all the data re-use situations with an intuitive positioning, the design should be more sophisticated with tailored solutions to each problem or need. While this is a necessary step, it may not be

54 See Chapter 1, sections 1.1.1 and 1.1.2.

sufficient because sectoral problems are also strictly related to technical, economic and practical issues. This dissertation provides some answers with a holistic perspective to inflame the debates among scholars, policymakers and societal actors – towards better policy-making, legal design for sectoral regulation and enforcement of the relevant legal frameworks in the sector.

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without a compassionate support from a life companion. I am incredibly grateful for my wife, who is not only pursuing her own PhD but has also been a source of unwavering support and selfless devotion throughout my journey. Her unconditional love and dedication have been the main pillar of my success, providing me with the strength and encouragement to overcome the challenges we have faced together. I am deeply fortunate to have such an amazing partner by my side, and I cherish her immeasurable contributions to my accomplishments. Ayşegül, embarking on the journey of a PhD by relocating to a foreign country as a newly married couple was no small decision in 2017. Together, we took a leap of faith and ventured into the unknown, facing numerous challenges including financial ones along the way. As we set foot in the Netherlands, we found ourselves standing alone, with only each other to rely on. I am filled with immense gratitude for your resilience and pure love during this transformative chapter of our lives. From the moment we arrived, we rolled up our sleeves and diligently worked to build our new life together. We not only moved and set up even our home furnishings by hand, but we also faced countless obstacles head-on, determined to conquer them as a team. The countless hurdles we encountered tested our resilience, but through it all, we remained steadfast. Together, we overcame each difficulty, emerging stronger than ever. Our determination and commitment to one another have made us true self-made individuals. Ayşegül, I want to express my heartfelt appreciation for your dedication, strength, and belief in our shared dreams. You have been my mainstay, my guiding light, and my constant source of inspiration. Without you by my side, this remarkable journey would not have been possible. Together, we have grown, overcome challenges, and achieved milestones that once seemed insurmountable. Our journey as challenge achievers and self-made individuals has been nothing short of extraordinary, and I am privileged to have you by my side. I hope with all my heart that after all these difficulties, sweat and tears, we will be rewarded for our efforts.

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The proliferation of IoT implementations and the utilization of advanced data analytics technologies in agriculture have initiated a paradigm shift from traditional agricultural decision-making to data-driven 'smart farming'. However, this digital transformation is accompanied by a set of challenges. Effectively addressing the complexities surrounding access to agricultural data is crucial for fostering competition and driving innovation in emerging markets for digital agriculture services. This dissertation offers a comprehensive legal analysis, providing profound insights and proposing regulatory measures to establish a more consistent and functional legal framework for holistic agricultural data governance in Europe.