Regulating data infrastructures for new mobility markets

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ABSTRACT

Global negative externalities in the transportation sector are higher than in any other sector. In the last few decades, progress on reducing them has been scant. Three mobility revolutions promise to drastically cut these externalities: decarbonization, digitalization and automation. So far, none of them made much progress. Most importantly, synergies among them struggle to materialize. This paper argues that those synergies directly depend on the regulation of the mobility data layer. The latter can be understood as the new data infrastructure controlling the traditional physical infrastructures. The paper adopts a Law and Economics approach to identify the incentive effects stemming from the interplay of horizontal and sector-specific legal regimes for mobility data. Three issues are investigated: first, how interoperability and data sharing can be regulated; second, how to avoid dominant positions in new mobility markets; third, how to match new mobility services with strong data protection. For each issue, proposals are made on how to reshape the traditional competences of transportation authorities and foster synergies among the three revolutions.

OUTLINE

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1. *Three mobility revolutions or no revolution at all?*

The transportation sector displays the highest level of global negative externalities: the combined impacts of congestion costs (by far the largest externality), greenhouse gas (GHG) emissions, air pollution, noise, water and biodiversity losses, deforestation, accident costs, and health costs sum up to the staggering amount of over $13 trillion (Sovacool et al. 2021). This is likely to be an underestimation of real negative impacts. If the social costs of mobility injustices were included, the total amount could increase considerably (Sheller 2018; Schwanen 2021; Cidell 2024). In the last few decades, indicators for most externalities went in the wrong direction. GHG emissions in the transport sector kept increasing, despite improvements on the energy efficiency front (ITF 2023). Congestion costs, too, showed an upward trend (EC 2023). Accidents costs did not decrease uniformly everywhere (WHO 2023;). In the EU, a handful of Member States are on track to halve road deaths and serious injuries by 2030 (European Road Safety Observatory 2024). According to Miner et al. (2024), since their invention, cars and the automobility system killed an estimated 60-80 million people, a number not far from the total number of deaths caused by the two world wars in the twentieth century.

Three mobility revolutions should drastically cut all these externalities: decarbonization, automation and digitalization promise to work synergistically and transform mobility systems. So far, the promised synergies struggle to materialize. Progress is being (slowly) made with the electrification of transport. However, even this revolution seems to reinforce traditional mobility patters and cultures. The private automobility regime dies hard (Dangschat and Stickler 2023; Milakis and Seibert 2024). The automation of driving tasks faces technological barriers and is not expected to lead to the large-scale replacement of human-driven vehicles in the short term. Even in the limited domains in which it is already commercially viable, advanced automation could not significantly contribute to reduce environmental and congestion costs (Hensher 2024). Digitalization is powerfully driven by platform business models. But its competitive dynamics risk worsening the prospects for the transition toward intermodal and sustainable mobility services. In brief, mobility systems appear to be ready to replace propulsion technologies, but modal transitions (shifting between transportation modes) and mobility transitions (changing mobility demand patterns) are hard to fathom (Hawxwell et al. 2024).

This paper makes the argument that each of the three revolutions, as well as their synergies, directly depend on the regulation of the mobility data layer. The latter can be understood as the intermediate level connecting physical transport infrastructures to transport services. While both infrastructures and services have been the targets of regulation for decades, the mobility data layer started to be regulated more recently. Most importantly, how to regulate it is still unclear. The EU is heading toward continental-wide mobility data spaces grounded on broad principles of interoperability and data sharing. Still, many details of the data governance regimes need to be worked out. Conflicts and trade-offs abound. Is mandatory data sharing always the best option? Or should there be different regimes for some categories of personal, non-personal data and machine-generated data? What about the impact of data sharing on innovation and competition? Are sustainable mobility services compatible with data protection? To what extent is data governance able to redress existing mobility injustices or avoid new ones?

Without pretending to provide final answers to all these questions, this paper uses them as starting points for the analysis of the more recent developments in the EU data governance regimes. The mobility data layer is conceived of as a new infrastructure the transportation sector depends on. This perspective has deep implications for the selection of the regulatory strategy. From a methodological point of view, the Law and Economics (L&E) approach is drawn upon to identify the incentive effects of such strategy. More specifically, the L&E approach can be extended from the analysis of single policy tools (e.g. congestion pricing, emissions trading systems, etc.) to the analysis of the interactions among the sector-specific and horizontal data governance regimes. While the EU legal framework tries to clearly define the boundaries of each regime, many types of interactions are possible. Identifying them helps understand the criteria to be prioritized to foster the synergies among the three mobility revolutions. Adapting the classification proposed by Graef et al. (2020), three types of interactions are focused on:

1) Sector-specific spillovers: in this case, data governance regimes for the mobility sector introduce solutions that differ from the ones adopted by horizontal regimes and can even change them
2) Horizontal spillovers: in this case, the horizontal regimes displace or constrain sector-specific rules
3) Regime redundancy: in this case, sector-specific and horizontal regimes overlap. If conflicts arise, they are solved on a case-by-case basis (by regulators or through litigation), although not necessarily according to a coherent approach.

Section 2 delineates the infrastructural meaning of the mobility data layer and its implications for the regulatory tasks of transport authorities. Section 3 deals with the interactions among mobility data regimes. Section 4 turns to the impact that mobility data regimes could have on the competitive dynamics of markets for mobility services. Section 5 discusses the possibility to align the legal regime for passengers' rights with data protection law.

2. *Governing data infrastructures*

The analogy between data and commodities was at the centre of the debate about markets for data. The main criticism levelled against such an analogy is that the legal entitlements related to both personal and non-personal data do not fit the traditional category of the property right, no matter how the latter is defined in each legal system (Pistor 2020). A more fruitful analogy was proposed with the concept of infrastructure (Ducuing 2020, 2024; Fisher and Streinz 2022; Cohen 2024). The latter does not only refer to physical infrastructures. It can also be applied to the whole set of intangible resources human activities become dependent on. From this point of view, the 'infrastructuralization of data' describes the processes that enable to collect and process huge amounts of data. To the extent that no human activity can be carried out without accessing and using such data, the governance of data infrastructures becomes the main issue to be addressed. To put it bluntly: you cannot regulate the transport sector without regulating mobility data infrastructures.

How can a symmetry between the regulation of physical and data infrastructures be established? The starting point is the observation that mobility data are different from other data under several respects: they are always related to space and location, always have a temporal dimension, require frequent updates, and raise privacy concerns that cannot simply be addressed by deleting location information. Furthermore, the integration of terrestrial and space data sources is going to gain in importance in the coming years. These features impact on all stages of the mobility data cycle, from collection to cleaning to analytics. They suggest that management practices and protocols should be tailored to the mobility sector. These features are explored by the nascent branch of mobility data science (Mokbel et al. 2024; Stocker et al. 2024).

What these features of mobility data do entail from the point of view of data governance? At the most general level, three dimensions can be singled out:

1) Degree of interoperability across data sets
2) Data sharing regime for different categories of data
3) Public, private, or co-regulation approach

Interoperability takes on different meanings (Wiewiorra et al. 2022; Scott Morton et al. 2023). The well-know distinction between syntactic and semantic interoperability captures the gist of the debate within the technological domain. However, it fails to convey the broader effects that regulatory choices about interoperability generate. While full interoperability is generally not cost-effective, larger or narrower interoperability could affect competition, innovation rates, and the protection of individual rights. Sec. 4 discusses the interplay between competition law and regulation with regard to interoperability issues.

Data sharing regimes can be arranged along a continuum from open data to secret data. Here legal categories matter a lot, but their details can significantly shift the content of entitlements. For example, when the regime of knowledge commons is implemented, sharing patterns can follow three models: they are defined by public institutions, by members or by a private decision-maker. Each of the models regulates information flows within a sector or community, but what is shared can significantly differ (Sanfilippo et al. 2021). Similarly, when reference is made to data commons (Potts et al. 2024; Purtova and van Maanen 2024) or urban data commons (Fia 2024), the main issue is how to and to whom distribute data value.

The institutional contexts of each legal system may prompt policymakers to balance public and private regulatory authority in different ways. Sharply distinct paradigms are emerging in the debate about the regulation of digital platforms (Bietti 2023). With specific regard to data governance, the role to be played by data intermediaries is the key dimension. In the mobility sector, how public regulators and managers of mobility platforms structure their relationship directly affects control over data infrastructures.

How can these three dimensions be connected to the three types of interactions described in sec. 1? As to interoperability, the argument can be made that sector-specific regulation should be preferred. Only solutions tailored to the features of mobility data allow to select the technical requirements ensuring information flows across data sets and data holders. Sector-specific rules on interoperability are likely to spill over to horizontal regulation. As to data sharing regimes, it can be expected that horizontal regulation represents the 'regulatory floor', that is the minimum requirements to be fulfilled in all sectors. More detailed sector-specific rules cannot be excluded, especially at a mature stage of development of the data governance regime. Finally, it can be expected that horizontal and sector-specific regulation will adopt converging solutions when balancing public and private authority. This dimension is tied to the broader institutional context, so significant symmetries between horizontal and sector-specific regimes are not surprising. Finally, where should the regime redundancy type of interaction should be expected? It could play a gap-filling role whenever specific

conflicts are not clearly addressed. Both horizontal and sector-specific regulation could apply, or one of them could be deemed to be suitable for a specific conflict.

3. *Managing interactions among mobility data regimes in the EU*

We can now apply this theoretical framework to the EU mobility data governance regimes. With regard to the horizontal regimes, it is generally agreed that the protection of personal data (Reg. 2016/679 or GDPR), non-personal data (Reg. 2018/1807) and public sector data (Reg. 2019/1024) apply to the mobility sector. The horizontal regimes introduced for different categories of data by the Data Governance Act (Reg 2022/868 or DGA) and the Data Act (Reg. 2023/2854 or DAct) apply as well. Furthermore, mobility platforms could fall within the scope of application of the Digital Services Act (Reg. 2022/2065 or DSA) and the Digital Markets Act (Reg. 2022/1925 or DMA). Informational platforms, providing mobility data to users, should comply with the DSA. Conversely, a case by case assessment is needed for transactional mobility platforms, selling mobility services to users (Ballel 2023). Mobility platforms could also fall within the scope of application of the DMA if they offer two core platform services: online intermediation services, including all online services facilitating direct transactions between business users and consumers; cloud computing services, including digital services that enables access to a scalable and elastic pool of shareable computing resources. Of course, which obligations they have to fulfil depends on whether they cross the dimensionality thresholds of the DSA and the DMA. Mobility data spaces are unlikely to cross such thresholds. At the same time, the DMA could become relevant in two cases: first, if the participants to mobility data spaces use core platform services of gatekeepers; second, if gatekeepers join mobility data spaces (this is already the case with Amazon Web Services joining Catena-X: see PrepDSpace4Mobility, 2023, 99). Besides the horizontal regimes directly related to data regulation, EU competition law and intellectual property law play a non-secondary role and will be further discussed below.

As far as sector-specific regulation of mobility data is concerned, three different domains can be identified. The first one has to do with the data sharing obligations introduced by the Intelligent Transport Systems (ITS) Dir. 2010/40 and its implementing Regulations. The second one has to do with the data sharing obligations for vehicle data introduced by Reg. 2018/858 on type-approval of vehicles. The third one has to do with the establishment of common European mobility data spaces (EC 2023, 2024; PrepDSpace4Mobility 2023; DeployEMDS 2024). A related initiative is the inclusion of mobility data among the high-value data sets to be made available for re-use by public bodies (Reg 2023/138). In the current European Commission's mandate, two additional legislative

initiatives on mobility data can be expected: first, an initiative on multimodality (announced in the EC's Political Guidelines 2024-2029); second, an initiative on in-vehicle data (EC 2022; Gill 2022).

Table 1 summarizes the main features of the horizontal and sector-specific legal regimes with regard to interoperability, data sharing and types of data. From the point of view of types of interactions, two observations can be made. Firstly, horizontal spillovers prevail at this stage because sector-specific regimes are still in the making. It can be expected that the interaction will be reversed over time, with sector-specific spillovers becoming dominant as mobility data regimes mature. Another possible development is the reduction of both horizontal and sector-specific spillovers, with mobility data regimes becoming more independent from external influences. Secondly, regime redundancy can be expected to play a non-secondary role with regard to the interaction with competition law, IP law and private law. These domains form the broader institutional contexts in which mobility data regimes have to be designed. Hence, the infrastructural dimension of mobility data can only emerge when those contexts are taken into account. This also means that convergence toward common data governance models within the EU should not be expected in the short term. Continental-wide mobility data spaces should allow for experimentation with different models, while at the same time ensuring a minimum degree of interoperability.

Table 1. The interplay of horizontal and sectoral regimes for mobility data governance.

Data regime type	Interoperability	Data sharing	Type of data
Horizontal	GDPR DAct Common data spaces	Open data Dir. Non-pers. data Dir. DGA DAct Common data spaces DSA DMA Competition law IP law Contract law	Pers. Non-pers. Pub. Sec. Synthetic
Sectoral	ITS Mobility data space	Vehicle data Mobility data space	Pers. Non-pers. Pub. Sec. Synthetic

What about the roles of public, private and co-regulation? For public regulation, there are two main challenges: on one hand, to update the mandate of transport authorities; on the other hand, to foster synergies among public authorities located at different institutional levels or in different sectors. National transport authorities are usually charged with tasks related to physical infrastructures and sometimes to transport services. Can they be charged with tasks related to mobility data infrastructures? Such a choice was already made by the French legislator with law 2019-1428 (Loi d'orientation des mobilités or LOM). Local governments are designated as authorities for the organization of mobility (AOM). Their competences embrace all transport modes. Regions are in charge of coordinating the local plans. The French Transport Regulator (FR-ART) was charged with competences related to the control of the mobility data transferred by public and private operators. It also can be addressed to solve disputes about mobility data. A different choice is being discussed in Germany. According to the proposal for the Mobility Data Act (Mobilitätsdatengesetz), submitted by the German government in May 2024, the Federal Highway Research Institute (BASt), a branch of the Ministry of Transport already in charge of the National Access Point (NAP) tasks according to the ITS Dir., will coordinate the collection and use of mobility data. The BASt was already charged with data collection tasks related to new mobility services by the 2021 reform of the Passenger

Transport Act. Sanctioning powers will be granted to the Federal Logistics and Mobility Office (BALM), an independent federal agency with regulatory powers for road freight and passenger transport. These two countries also made different choices about the development of national mobility data spaces. In France, the collection and distribution of data is entrusted to the Ministry of Transport. In Germany, the mobility data space was established through an industry initiative.

Italy could decide to adopt either regulatory model. The extension of competences of the IT-ART could be proposed for the monitoring of data sharing regimes. This aspect would be in line with the traditional goal of promoting competition in the transport sector. The IT-ART could also be empowered to deal with dispute related to data sharing. Issues related to interoperability and standardization could be delegated to the Center for the Coordination of Information on Road Safey (CCISS), who is already charged with the NAP functions. Co-regulatory solutions could be adopted for the development of an Italian mobility data space. The Ministry is currently orchestrating the participation of public and private parties to the MaaS4Italy project. A consultation was held in 2022. The goal is to develop a national repository facility whose governance mechanisms are in line with the requirements for European data spaces. This initiative should be coordinated with the developments taking place in the field of electric mobility. The decree 16 March 2023 of the Italian Ministry of Environment established the national platform of recharging points for electric vehicles. Data from the platform can be shared with both public authorities and private operators. The interoperability and integration with the other Italian mobility data spaces should be a priority.

More worrisome are the developments announced with regard to mobility platforms for taxi services and private hire vehicles with driver (PHV). The draft decree on mobility platforms, circulated by the Italian government in the first half of 2024, and the Ministry of Transport decree of July 2024 on the national registry of transport companies (both taxi services and PHV) only grant access to statistical data to the Ministry and local governments. As observed in a joint recommendation by the Italian Competition Authority and the IT-ART (June 2024), dynamic data collected to the platforms should be made available to improve the organization of mobility services. The platform will have to comply with the obligations about the availability of static and dynamic data for recharging services introduced by Article 20 Reg. 2023/1804 on alternative fuels infrastructure.

What about synergies with other public authorities? The impact of both digitalization and decarbonization has to be managed across sectors. For the transportation sector, this means that tight coordination is required with several horizontal and sector-specific authorities. From the point of view of data governance, close alignment is needed between transport authorities and data protection authorities. Crucial connections can also be identified with regard to the energy sector. The

electrification of transport has an impact on the planning of electricity networks. Moreover, the EU is pursuing a systems coupling strategy to coordinate the management of several energy infrastructures and several carriers. Transport infrastructures are directly involved in this strategy. How should regulatory choices and priorities be aligned? Memoranda of understanding are a widely used tool in Italy and elsewhere. Another solution is a permanent network of regulators, on the model of the UK Regulators Network, established in 2014. Apart from consultations, the most important issue is who is in charge of which regulatory initiative related to data governance. The two types of spillovers matter here as well. Horizontal or sector-specific regulators should be in the lead depending on whether the regulatory initiative is mainly related to the implementation of horizontal or sector-specific regimes.

4. Regulating data-opolies in mobility markets

Competition authorities around the world are trying to avoid the Big Tech's abuses linked to the control of huge amounts of data. The dominant position of the largest digital operators is difficult to challenge because of network effects and algorithmic effects (Montero and Finger 2021). Furthermore, Big Tech's advantage in developing the best performing algorithms leads to biased innovation processes. Competitors struggle to propose alternative products and services (Rikap and Lundvall 2021; Stucke 2022).

Mobility markets are heading in the same direction as other digital markets. Private mobility platforms already display the market concentration tendencies observed in other sectors. Mobility as a Service (MaaS) operators could become the new data-opolies, assuming they can scale up their business models. Indeed, the policies supporting multimodalities to address transport externalities could have the unintended effect of favouring highly concentrated markets. According to some authors, MaaS markets with CAVs are likely to be natural monopolies because of scale economies (Bahamonde-Birke et al. 2021; Goletz and Bahamonde-Birke 2021).

The usual recipes to fight data-opolies aim at reducing Big Tech's data control. Data portability, data openness and interoperability have all been implemented by EU law, both in horizontal and in sector-specific legal regimes. Doubts were expressed about their effectiveness. The main tension to be addressed is between increasing data access to foster competition and providing incentives to innovate through data collection and processing. The EU is currently tipping the balance toward the widest possible circulation of personal and non-personal data. The only exception so far is represented by in-vehicle data, but even in that domain new interventions are expected to broaden data access. The

case law of the EU Court of Justice already facilitated vehicle data access to independent repairers. It clarified that the protection of personal data cannot be used as a pretext to deny access (Cases C-296/22 and C-319/22). Article 6 and 7 Reg. 2022/670 already refers to sharing of in-vehicle data related to the state of the transport network and real-time use, but without any sharing obligation for data holders. Furthermore, the neutral data intermediaries envisaged by the DGA are expected to increase competition thanks to an alternative business model that should foster trust among data subjects. Whether such an alternative model is really feasible remains to be seen (Richter 2023; Carovano and Finck 2023).

How can dominant positions be avoided in new mobility markets? Apart from strengthening ex-post competition law enforcement, ex-ante regulation could develop along two axes. First, only MaaS operators whose governance structure is compatible with the implementation of data portability, data openness and interoperability principles should be supported with public funding. Second, ex-ante regulation should try to link the physical and digital layer. The latter cannot exist without the former. Hence, a share of the mobility data platforms' profits stemming from access to both data infrastructures and physical infrastructures should be diverted to public interest goals. The proposals to extend to digital platforms public service obligations (Busch 2021; Finger and Montero 2023) or the legal regime for public utilities (Rahman 2018; Bietti 2023) clearly move in this direction. Both the governance structure of mobility platforms and the public service obligations should also contribute to achieving the targets of the low-carbon transition.

The Android Auto case, decided by the Italian Competition Authority (2021), is a good example of the potential benefits of ex-ante mobility data regulation. In that case, Google was held to have abused of its dominant position in the market for operating systems for smart mobile devices by refusing to integrate a mobility app developed by Enel to locate, book, and pay for electric car charging. Hence, the main issue here was interoperability. The Italian Competition Authority mandated Google to release a version that could accommodate Enel' app functionalities. The problem with this decision is that it stretches the concept of essential facility beyond its usual boundaries and requires the implementation of a remedy that could be difficult to monitor on a large scale (Todino and Colombo 2022; Koolen 2022; Buzzelli 2022). While in first instance the Italian administrative tribunal confirmed the decision of the Italian Competition Authority (Tar Lazio 18.7.2022 no. 1407), the Italian Council of State referred to the EU Courte of Justice for a preliminary ruling on the possibility to extend EU competition law to cases of refusal to deal entailing lack of access to more convenient, but not indispensable, solutions, as well as to justify the obligation for dominant undertakings to develop new products. The judgement of the Court of Justice (Case C-233/23) is expected by the end

of 2024. Even assuming the Court will accept a broad interpretation of EU competition law, the two ex-ante interventions proposed above could be much more useful in reducing uncertainty about interoperability obligations. Whereas competition law requires a case-by-case balancing between providing incentives for innovation and reducing barriers to competition, regulatory measures on interoperability could already select the approach most suitable to each mobility market. Most importantly, the Android Auto case signals a more general trend toward the 'platformization of automobility' (Hind et al. 2022). The levels where such process is taking place encompass hardware, software and physical transport infrastructures. This means that, without effective ex-ante and ex-post remedies, the monopolistic trends of other digital markets will reproduce in mobility markets.

5. *Passengers' rights and data subjects' rights*

Tracking mobility data makes individual habits and preferences visible. A similar situation arises with smart meters data, allowing to use electricity consumption data to identify position and consumption habits. But mobility data are even riskier because they are not connected to a specific place. Moreover, privacy risks increase with the most advanced multimodal solutions exactly because they depend on the widest possible availability of data (Garroussi et al. 2023). Several leaks of mobility data, as well as unauthorized uses, already occurred in the recent past (Cottrill 2021). Privacy risks increase with connected and automated vehicles (CAVs) as well. Large amounts of vehicle data shall be collected in order to ensure the automation of driving tasks. As already pointed out by the European Data Protection Board (2021), the treatment of personal data is always required. Furthermore, the collection of additional data about the driver's behaviour will be needed to ensure that she's ready to take over driving tasks for Levels 3 and 4 of automation. This means that permanent surveillance is unavoidable and doomed to increase with the large-scale deployment of CAVs (Jannusch et al. 2021). Broader connections between the evolution of the transport sector and the organization of urban spaces also point to the increasing relevance of data governance. For example, platform urbanism describes the interactions within urban communities that are mediated by, and become dependent on, the digital platforms (Banerjee et al. 2023). A link with the infrastructural approach to mobility data is provided by the idea of infrastructural surveillance, developed with reference to CAVs: this concept suggests that, in a fully-automated world, data collection and aggregation takes place permanently, cannot be avoided and does not lend itself to being easily monitored by public authorities (Gekker and Hind 2020). Also, mobility data lend itself to multiple uses, from training of artificial intelligent systems to personalization of offers for

insurance contracts and other products (Hind et al. 2022: 8). It is difficult to believe that the consent requirement is an appropriate means to ensure the legality of personal data treatment.

Privacy concerns are being widely discussed, but answers have been unsatisfactory so far. Despite its broad enforcement apparatus, the EU GDPR was not able to prevent Big Tech from instrumentalizing privacy arguments to bludgeon competitors and foster its own market advantages (Stucke 2022). The technologies supporting digitalization and automation of mobility services multiply the risks of privacy loss because their success depends on the implementation of a permanent surveillance system within urban and non-urban spaces. Privacy-enhancing technologies, including anonymization techniques, face the usual trade-off between reducing the utility of data and fostering data sharing. Furthermore, machine learning strategies increase the risk of de-anonymization. No less relevant is the risk of new mobility injustices. MaaS, and more generally mobility platforms, could have built-in biases that exclude some categories because of age, income or knowledge. What counts as mobility data and who controls it are key questions raised by mobility data justice scholars (Behrendt and Sheller 2024).

Clearly, the most recent developments in EU law (the DMA and the DSA) are horizontal interventions that should also help reduce abuses of data-driven market power in mobility markets. Furthermore, data intermediaries should ensure that data subjects do not transfer control of their personal data to suppliers of mobility services. Still, more focused interventions might be needed in the field of transport regulation. Two preliminary suggestions are made here. First, national transport regulators should devise their own data policy to take into account both competition risks and privacy risks. The data policy should try to strike a balance between protecting competition to foster innovation and protecting privacy to foster autonomy. Privacy requirements for the supply of new mobility services could be laid down. The minimum parameters to be fulfilled by de-anonymization techniques could be selected. The risk that new mobility services lead to the exclusion of some categories could be assessed. The Transport Data Strategy of the UK Department for Transport (2023) represents a good starting point. Second, sector-specific procedures for mobility data sharing could be put in place. Such procedures could be grounded on both horizontal and sector-specific regimes. The goal should be to fully exploit the potential of national and European mobility data spaces. This kind of ‘monitored data sharing’ could be a co-regulatory regime that avoids chilling innovation with mandatory data sharing while at the same time goes beyond the limited impact of voluntary data sharing. The example of the UK Code of Practice for MaaS (2023) could prove useful to understand how to strike the balance among competing goals.