REGULATING AN INFRASTRUCTURALISED AIRBNB: ORGANISATIONAL, REGULATORY AND CIVIL SOCIETY CHALLENGES AND RESPONSES[1]*

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Abstract

As some of the most prominent contemporary socio-technical systems, sharing economy digital platforms have quickly become symbiotic with our way of life. Platforms that successfully tread this hallowed path begin exhibiting the infrastructural traits of embeddedness, dependency, ubiquity, invisibility, indispensability and extensibility, and have had an interesting but complex tryst with society, both positive and negative, and resultantly with regulation. Regulatory interventions by policymakers have seldom been able to keep pace with both technological development and scaled platform deployment, with responses being largely seen as slapdash and unfit for purpose, leaving other actors including the platforms themselves to enter the regulatory fray. This paper analyses one such prominent platform, Airbnb, which has in its short history, grown from a humble sharing economy service to a Unicorn, becoming an integral part of global accommodation infrastructure. Through this use case it highlights how sharing economy platforms infrastructuralise, underpinned by data gathering at scale, and the creation of information asymmetries inherent to their design and business models, arguing that understanding and analysing these tensions from a digital infrastructure perspective exposes challenges both familiar to infrastructure scholarship as well as newer ones unique to digital platforms, in ways that can help inform strategies for various stakeholders and the synergies required between them, offering an invaluable lens into the macro-level responses required to address novel regulatory challenges posed. As ways to address some of these, it relies on existing scholarship to present potential contextually relevant solutions grounded in consumer protection and data protection law, information fiduciaries, open APIs and transferrable sharing rights.

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I. Introduction

1.1 Airbnb and the sharing platform economy – celebrations and concerns

Based on familiar brick and mortar concepts such as carpooling, couch surfing and catalogue retail (Sundararajan, 2016) the sharing economy refers to the "*collaborative consumption made by the activities of sharing, exchanging, and rental of resources without owning the goods*" (Lessig, 2008, p. 143). Sharing economy digital platforms (SEPs) are those that "*leverage digital architectures to facilitate trusted transactions between strangers*" (Calo & Rosenblat, 2017, p. 1634) and enable unlocking and sharing 'excess capacity' of various assets through technology (Lobel, 2016, pp. 1, 9).

SEPs have clear benefits – low barriers to entry (for users), 'collaborative consumption' allowing people to monetise assets which may otherwise be gathering dust (such as cars, gadgets and homes), and new income generation methods that earlier didn't exist (Botsman & Rogers, 2011). In certain industries (such as taxis and hospitality) they have also been the drivers of major disruption, unsettling legacy power concentration, ostensibly leading to lower costs and greater choices, quality and competition ("Airbnb Blog"; Calo & Rosenblat, 2017, pp. 1626, 1644; Koopman, Mitchell, & Thierer, 2015; Zervas, Proserpio, & Byers, 2017, p.3). More broadly, SEPs position themselves as neutral drivers of contemporary empowerment, freedom and flexibility (Cohen, 2017 pp. 143-145; Gillespie, 2017 pp. 2-5; Rosenblat & Stark, 2016, p. 3758).

One such SEP is Airbnb, a short-term rental and experiences marketplace, which has in its short 9-year history grown to become a Unicorn, valued at US $ 31 Billion, with annual revenues of US $ 2.6 Billion (Bort, 2018). As outlined below, Airbnb acts as an intermediary between guests and hosts, through a web and app-based platform, enabling short-term renting transactions, for which it charges fees. It also enables multisided trust by providing verification, rating and feedback systems, insurance, and payment escrows ("Airbnb How It Works"; Puschmann & Alt, 2016; Tanz, J. 2014). Airbnb's 'network hospitality' approach has transformed the global hospitality industry, creating many of the benefits outlined above, as well as revitalising neighbourhoods, promoting diversity, and spawning a multicultural community of millions ("Airbnb Blog"; Molz, 2012, p. 216; Sans & Quaglieri, 2016, p. 209; Zervas, Proserpio, & Byers, 2017).

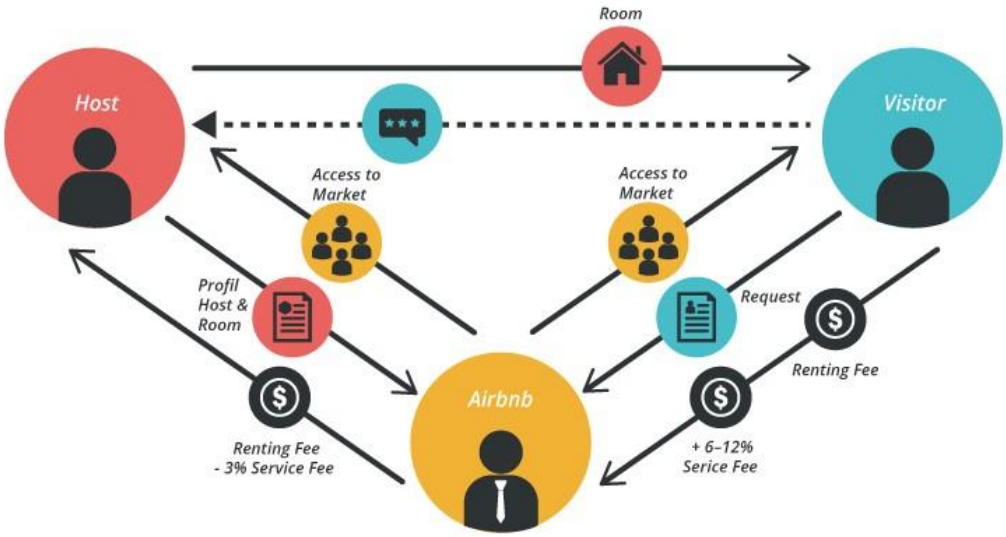

Fig. 1 – The Airbnb business model ("Business Model Toolbox")

However, that the carefully and cleverly constructed etymology of 'digital platforms' is a misnomer, and that they may not quite be the blissful marriage of common social goals and healthy capitalism as is outwardly portrayed, is now an open secret (Gillespie, 2010; Plantin, Lagoze, Edwards, & Sandvig, 2016, p. 297; Sans & Quaglieri, 2016, p. 211; van Dijck, 2013, p. 26; Zale, 2016, p. 951). Celebratory accounts of SEPs are offset by numerous allegations (Shabrina, Zhang, Arcaute & Batty, 2017), which for Airbnb include negative impacts on housing availability by people being either evicted or having to face fewer options and higher rents (Ball et al., 2014; Haar & Ainger, 2018; Lee, 2016; Sans & Quaglieri, 2016, p. 211; Wieditz, 2017), health and safety concerns attributable to sub-standard properties (McNamara, 2015), skirting taxation and regulation applicable to otherwise tightly regulated industries (Kaplan & Nadler, 2015; Pollman, & Barry, 2016, pp. 398-403), aiding gentrification ("Anti-eviction Mapping Project", 2014), aggregated race discrimination (Edelman, Luca, & Svirsky, 2017; Leong & Belzer, 2016) anticompetitive behaviour, and algorithmic obscurity, and unaccountability qua those 'employed' by them (Calo & Rosenblat, 2017; Cohen, 2017).

Responses to these concerns have been as diverse as the problems themselves, but have three primary axes – regulation, civil society action and organisational responses by Airbnb itself. Recent research has estimated the number of interventions in the first two categories at approximately thirty five (Mack et al., 2018). The primary approach, regulation of SEPs, has been ersatz, attempting to address unexpected problems arising out of novel platform business models (Cohen, 2017; Interian, 2016, pp. 157-161; Sans & Quaglieri, 2016, p. 211;

Zale, 2016). Different siloed approaches have been proffered, which fail to address a root cause attributable to many of these concerns arising in the first place, instead applying knee-jerk reactions, shuttering businesses and having limited impact (Cohen, 2017, pp. 177-191; Hsi, 2017; Interian, 2016; Zale, 2016).

Concerns raised by SEPs like Airbnb are sometimes created, and other times amplified when these otherwise seemingly docile privately owned and profit driven 'platforms' start becoming 'infrastructure' in the domains of public value in which they often function (here, accommodation) (Plantin et al., 2016, p. 295). It stands to reason that had SEPs not reached this infrastructural status, these concerns would either not have arisen, or would not have been widespread enough to warrant public criticism and regulatory responses in the present manner and scale.

While the end results, good and bad, of platforms becoming 'infrastructuralised' are well and widely documented, the causal analysis of these issues socio-technically, is lacking. Addressing this, analysing Airbnb through desk research, this study aims to unravel the critical role data gathering and information asymmetries play in SEPs infrastructuralising. It uses a number of approaches and concepts from platform and infrastructure studies (taken together), as well as information asymmetries to chart how SEPs do and could use their structures to create information asymmetries allowing them to infrastructuralise, and the resultant infrastructural properties SEPs like Airbnb exhibit.

This paper argues that understanding and analysing these tensions from a digital infrastructure perspective exposes challenges both familiar to infrastructure scholarship and policy, as well as novel ones unique to digital platforms, in ways that can help inform strategies for various stakeholders as well as the synergies required between them. It also stresses that addressing the fundamental issue of information asymmetries in infrastructuralised SEPs can help address a root cause of many of these issues, without having to resort to siloed approaches bandaging concerns individually (Calo & Rosenblat, 2017, p. 1631; Katz, 2015, pp. 1076-1084). Drawing on existing literature, it proffers a number of responses in context – applying consumer protection and data protection laws, recognising SEPs as information fiduciaries, and democratising data through relaxed APIs and the use of transferrable sharing rights.

II. Current responses

2.1 Regulation

A number of jurisdictions across the world where Airbnb operates have made regulatory interventions as responses to some (not all) of the concerns highlighted above. London, New York, Berlin, Barcelona, San Francisco and Seattle are among some prominent jurisdictions that have implemented a mix of ordinances, guidelines, legislation, memoranda of understanding and agreements as measures to address concerns. The primary focus of most of these interventions has been limiting the duration of stays allowed on Airbnb listings to ensure availability of properties for long-term tenants, and to either create or improve SEP taxation, and by and large, regulatory approaches between the United States, Europe and Asia have been similar. This has not been an easy ride however, and Airbnb has challenged regulatory interventions in a number of jurisdictions (Shabrina et al., 2017). Other less prominent interventions include among others, licencing, bans, age limits, neighbourhood regulation, rental standards, and rent control (Miller, 2016). Numerous other targeted regulatory solutions have also been offered, including self-regulation, transferrable sharing rights, reconfiguring regulatory tools, revising zoning provisions, and infrastructural gatekeeping (Cohen & Sundararajan, 2015; Edelman & Geradin, 2015; Gurran & Phibbs, 2017; Helberger, Kleinen-von Königslöw, & van der Noll, 2015; Koopman, Mitchell & Thierer, 2014; Miller, 2014). Some of these are discussed further in Section IV.

2.2 Airbnb

Perhaps unsurprisingly, Airbnb has itself been both proactively and reactively engaged in pre-empting and addressing challenges resulting from its growth. While in some cities this is in the form of actively fighting regulation through litigation (Mack et al., 2018), Airbnb's overall approach has (from its perspective) been positive, by seeking to engage in active public policy engagements, corporate social responsibility, community development, promoting healthy tourism and building trust and openness where it operates. Some of these include entering into voluntary agreements with governments to regulate the nature of its operations, and the opening of its 'Office of Healthy Tourism', which aims to drive economic growth in communities, promote environmental sustainability, and empowering destinations such as rural areas and emerging markets ("Airbnb Citizen"). In some markets such as the UK, SEPs also adopt self-regulatory measures such as entering into MoUs with

governments, and voluntarily adhering to good-practices by using seals ("Sharing Economy UK TrustSeal").

Somewhat more controversially (given concerns of regulatory capture), Airbnb has also been playing an active role in public policy engagement in various jurisdictions. In 2016 for instance it released a policy tool chest, updated in 2017 ("Airbnb Policy Tool Chest 2.0"). With a broader focus than the regulatory interventions seen above, the toolkit emphasises, among others, tax collection, increasing accountability through automated limits on number of nights spent, registrations of listings, increasing landlord-tenant cooperation, ensuring privacy, controlling guest and host quality, preventing discrimination and scams, and promoting sustainable tourism. With regard to data sharing, in a 2015 pledge ("Airbnb Community Compact"), Airbnb has agreed to release annual 'Home Sharing Activity Reports', with the following types of anonymised data in order to provide policymakers the data they need to craft 'fair, progressive rules'.

- The total annual economic activity generated by the Airbnb community in the city
- The amount of income earned by a typical Airbnb host in the city
- The geographic distribution of Airbnb listings in the city
- The number of hosts who avoided eviction or foreclosure by sharing their home on Airbnb
- The percentage of Airbnb hosts who are sharing their permanent homes
- The number of days a typical listing is rented on Airbnb
- The total number of Airbnb guests who visited
- The average number of guests per listing
- The average number of days guests stay
- The safety record of Airbnb listings

There are two noteworthy points in relation to this policy. Firstly, the data sharing may only supplement and address regulatory requirements for sharing Airbnb data with regulators (such a in Lisbon, Lazio, Tokyo, Seattle, Toronto Brussels and Vienna). Secondly, it has the potential to mask the data *not* being made available, to hosts, guests and regulators. Indeed in some cases where more detailed data has been sought, it does not appear to have been provided or has been legally contested (Kuchler, 2018; Mack et al., 2018). This is discussed in more detail in Section III below.

2.3 Civil society

For critics demanding deeper intervention, the positive narrative SEPs weave is an attempt at "sharewashing", and a number of civil society interventions have been on the rise in relation to Airbnb specifically, but accommodation SEPs in general. Numerous organisations have spawned initiatives under a 'Fairbnb' umbrella ("Fairbnb.Ca"; "Fairbnb Coop"). The primary goal of these organisations is creating non-extractive, collective, transparent and democratic peer-to-peer rental platforms that account for challenges such as the impact on local businesses, increased rental costs for long term residents, and ecological stresses of increased tourism. They also underscore their commitment to open data. Cooperative driven approaches such as this have also been proffered in academic literature (Zale, 2016). Additionally, they stress greater platform accountability for existing platforms like Airbnb and push for actively re-tooling their technology stack to account for evolving policy measures. To some extent, as seen above, Airbnb has initiated the implementation of greater accountability measures by automating certain key segments of signups and availability.

Inside Airbnb is an independent, non-commercial website providing a host of tools based on publicly available data from many key cities in which Airbnb operates, claiming to provide users "the data that Airbnb doesn't want you to see". These primarily include data around the number and types of listings (partial versus entire homes and tourists versus long term rentals), revenue generated, hosts with multiple listings and the like. The figure below is a snapshot view of the metrics Inside Airbnb provides based on publicly accessible Airbnb information.

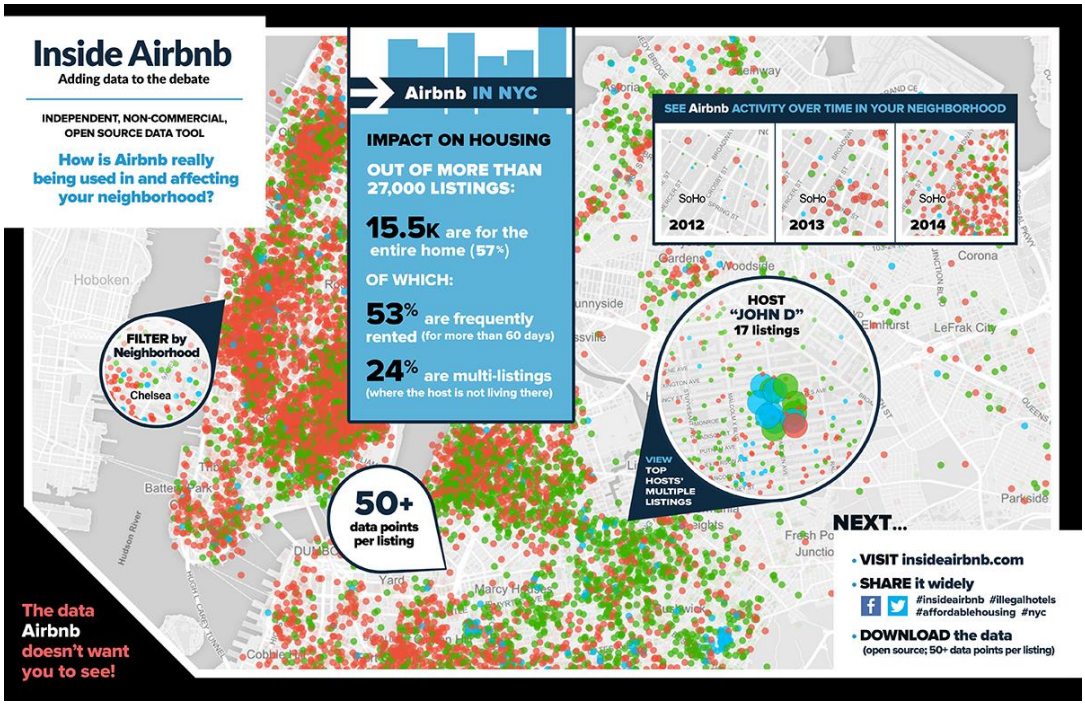

Fig. 2 – 'Inside Airbnb' snapshot view of New York city

Lastly, the Open Data Institute (ODI) received significant funding in 2017 to explore the impact of SEPs in the accommodation sector towards framing comprehensive, beneficial regulation (L'Hénaff, 2017). In March 2018, the ODI published an initial report on the discovery phase of this project (Mack et al., 2018). In following phases, the ODI aims to use various forms or public engagement and prototyping to inform regulatory interventions.

III. Missing links – platform infrastructuralisation and information asymmetries

3.1 The road to infrastructuralising

Studying SEPs as infrastructures allows us to utilise complimentary undercurrents in two fields of study typically seen as being disparate. Platforms like SEPs share many common traits with traditional infrastructure (Plantin et al., 2016, pp. 294, 306). As platforms, the ability to study data gathering and dissemination practices, affordances, connections and interfaces allows the study of the socio-technical underpinnings intrinsic to SEP business models (p. 297), which leads them to gain footholds and infrastructural stature (Ananny & Gillespie, 2016, p. 1), the fallout of which in turn, as argued earlier, is the creation of some, and exacerbation of other issues. Studying both together helps "*see the structures, the promises, and the perils of a world where (some) platforms become infrastructures, even as (many) infrastructures are*

being platformized." (Plantin et al., 2016, p. 306). Extending this to the policy realm, studying SEPs as infrastructuralised platforms allows us to borrow where relevant from a rich history of infrastructure policy (Gómez-Ibáñez, 2003), as well as contextually study precedents in order to create novel forms of regulatory interventions needed for novel digital infrastructure. The aggregation of activities of large numbers of small scale activities that go towards infrastructuralising SEPs are critical to their success, but also play a crucial role in creating the cumulative negative impacts discussed above (Zale, 2016, p. 983-990).

Taking the infrastructural approach allows us to account for a rising critique of SEP regulatory approaches as the policy landscape shifts from traditional ignorance of SEPs, allowing them to prosper in legal grey areas by flying under the regulatory radar, to the problems brought on when these activities scale and aggregate, exposing regulatory fractures (Zale, 2016). Studying SEPs like Airbnb in this way may also be seen as oppositional to their own alleged attempts to promote 'thinking small', distracting attention away from their scale, and in turn away from regulation (p. 953). Infrastructures operate at scale, and as Zale argues, "*scale is a defining feature of the sharing economy, and that effective governance of the sharing economy requires a more complete understanding of the role of scale*." (p. 956).

In Airbnb's case, infrastructuralisation may be seen as being two pronged, affecting both hospitality infrastructure by competing with traditional players such as hotels, as well as housing infrastructure by supplanting spaces otherwise used only for long term, domestic renting. An infrastructuralised SEP is one that is able to display properties of embeddedness, dependency, ubiquity, invisibility, indispensability and extensibility, like more traditional infrastructure (Plantin et al., 2016, pp. 294, 306).

The dependency on Airbnb can be exhibited by studying its reliance by travellers and impact on traditional players in hospitality, which it has in its short history, splintered and supplanted quite successfully in many major markets, although it remains a distant second to hotels overall (Cohen, 2017; Interian, 2016, p. 134; Zervas, Proserpio, & Byers, 2017). Outside actors or 'network orchestrators' (hosts and guests) extend and elaborate Airbnb, generating much of the content that drives it, and the resultant network effects ("Airbnb How It Works"; Zale, 2016, p. 979). Like infrastructure, it also adapts to changing scenarios and externalities (Cohen & Sundararajan, 2015; Cohen, 2017). Maintaining this infrastructure is important, given that the same structures also facilitate revenue and profit for Airbnb. Other important linkages are unintended structural exclusions of certain types of users from universal services, and interoperability being discouraged by design, restricting 'gateways',

expanding both information asymmetries, and infrastructuralisation (Leong & Belzer, 2016; Plantin et al., 2016, pp. 296-299, 301). Acknowledging themselves as infrastructure sometimes, SEPs use the information they hold to respond to crisis (such as allowing fee-free bookings during floods) but again, obscure the modalities of the approach (Ananny & Gillespie, 2016, p. 10; Cohen, 2017, pp. 154-157).

Economically, while Airbnb's market share continues to be a fraction of the overall hospitality industry, it is increasingly seen in second place with some empirical research already suggesting a direct impact on traditional hotel infrastructure in certain areas, especially on low-end and non business travel oriented hotels (Lehr, 2015; Zale, 2016; Zervas et al., 2017). Additionally, the peer to peer accommodation space may be seen as its own market distinct from the hotel industry, and in that market segment, Airbnb is a clear leader (see below). The current and projected market power of SEPs, especially Airbnb has not yet been studied in detail, and defining its relevant market, given the business model, nature of the product and lack of adequate information is indeed a challenge (Russo & Stasi, 2016). However, as Airbnb continues down the path towards an IPO, currently projected to be no later than 2020 (Lunden & Dillet, 2018) these assessments will no doubt become increasingly critical, and given the lack of adequate regulatory tools, infrastructuralisation could be an invaluable lens with which to study its market power.

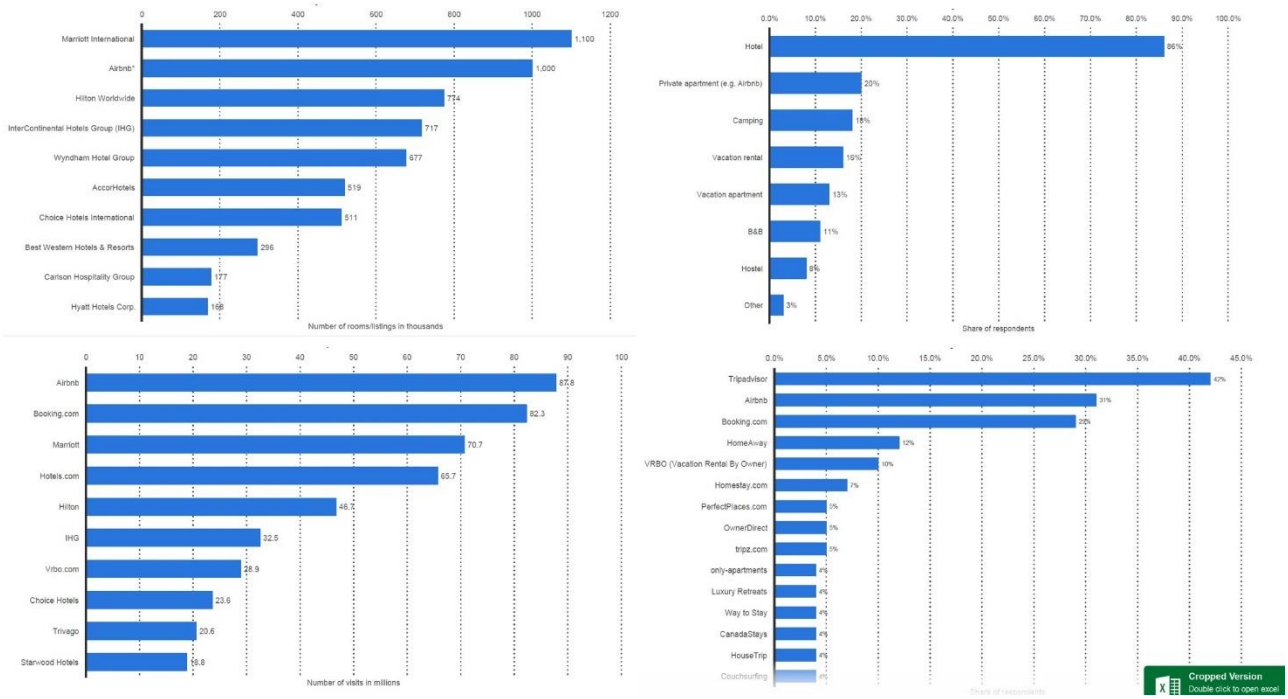

Fig. 3 – (clockwise from bottom left) leading accommodation websites by visits (US, 2016); Leading lodging companies worldwide by rooms (November, 2016); Types of vacation accommodation booked (US travellers, 2017); Preference for booking platforms (US travellers, 2017). (Statista, 2018)

3.2 Current and potential information asymmetries

Critical to SEP's ability to infrastructuralise, is how leveraging themselves as intermediaries, they become quickly systemic largely uncontested, running parallel to, then replacing existing infrastructure such as public transport, hotels and housing. Indeed, when it comes to infrastructuralised SEPs, this process can take place much faster, as being asset-light, they are in the first instance, able to capitalise on existing physical infrastructure in unregulated markets, which also allows them to offer lower prices (Guttentag, 2015; Shabrina et al., 2017, p. 6; Zale, 2016). The key underlying resource that enables them to do so, is the data and information they have access to, which for much of their predecessors (hotels and public transport) either did not exist, or was largely unused for monetisation. SEPs leverage the pervasive connectivity of and data generated by users to their advantage, and in arguably obscure ways (Gillespie, 2010). The information asymmetries they create through platform design, and the ones that emerge when platforms infrastructuralise, give them a monopoly over this data, allowing them to maintain their *status quo,* and assert increasing and diverse entitlements. In the tussle between broad sweeping allegations, this critical, causal factor is often overlooked (Calo & Rosenblat, 2017, pp. 1627, 1649; Cohen, 2017, p. 153; Moorhouse, 2003).

SEPs have an interesting tryst with information asymmetry. On the one hand, one of Airbnb's USPs is building trust by *reducing* information asymmetries, offering profiles, listings, ratings and feedback systems, allowing guests to be more aware about host and listing quality, and for hosts to gauge the reliability of prospective guests (Cohen & Sundararajan, 2015, pp. 120-121; Resetnaka & Yavuz, 2016). This information however is provided on a need-to-know basis, and the *need* is largely both determined and fulfilled by Airbnb. Conversely, SEPs build walled gardens elsewhere. Airbnb itself knows everything about everyone in its multisided ecosystem, by the sheer nature of its design, but *this* information is seldom democratised by SEPs (Cohen, 2017, pp. 154-156). All interactions, transactions, social buttons, rating systems, etc. generate *social data* which the SEP is able to aggregate and analyse for monetary purposes (Alaimo & Kallinikos, 2016; Alaimo & Kallinikos, 2017, p. 177; Cohen, 2017, pp. 157-61; Plantin et al., 2016, p. 297). Airbnb *needs* to, and does, know everything – for improving its service, but also its bottom line, as indeed, the reputational capital built by users translates in real terms into business profit (Botsman & Rogers, 2011).

This makes SEPs less simple platforms enabling connections and transactions, and more "*all knowing intermediaries*" able to indulge in what Calo and Rosenblat call "*digital market manipulation*" and exploit consumers' cognitive bias in incredibly precise ways (pp. 1628, 1649-50). They note, "*this combination of visibility and sociotechnical design confers upon sharing economy firms exquisite control of the interactions they facilitate.*" (Calo & Rosenblat, 2017, p. 1652). This control, facilitated by information asymmetries, in turn allows them to drive greater profit, consolidate their market standing, spurring critical growth for the business, but also collateral issues.

Unlike physical infrastructure which seldom re-shapes itself, SEPs are able to design the user experience and the environment within which people interact, centrally and from scratch, and tweak and shape it constantly, mediating and nudging users in the direction needed (Calo, 2013, p. 1002; Calo & Rosenblat, 2017, pp. 1628, 1651-1652; Edwards et al., 2007). In Airbnb's case, this could potentially include nudging one side (guests) to rate (up or down) certain aspects of hosts and listings facilitated simply by controlling what rating options are presented, in turn policing host behaviour to increase profitability (Barber, 2016; Calo & Rosenblat, 2017, pp. 1626, 1635, 1652-53). On the other side, hosts, some argue, are provided more information than guests, creating specific information asymmetries that could potentially cause hosts to select certain types of guests, and (discerning, regular) guests to feel compelled in turn to leave certain types of reviews (Acchiardo, 2017).

Similarly, a (voluntary) 'smart pricing' feature rolled out globally for hosts in 2016 offers dynamic pricing suggestions, initially promised to boost host revenue by an average of 13 percent (Taylor, 2016). According to Airbnb, the smart pricing feature considers over 70 factors including lead time, market popularity, seasonality, listing popularity and details, bookings history, review history, listing view count and length ("Airbnb Smart Pricing"). Within this, hosts are able to select minimum and maximum rental prices, as well as dates they do not wish to use smart pricing. Giving credit where due, Airbnb open-sourced the machine learning package used in its smart pricing, and has also taken steps to explain how the models used to determine dynamic pricing work, to users ("Airbnb Aerosolve"). However, the impact of this on both information asymmetries and nudging towards pricing remains to be seen. While these findings cannot be generalised, Airbnb hosts have voiced issues with pricing suggestions offering counterfactuals to set certain prices, as well as the suggestions being too low, too high or inexplicable in their view, on Airbnb's community forum ("Withairbnb"). What also remains to be seen, is whether the voluntariness of dynamic pricing will remain as the business grows and users become increasingly anchored,

and the impact a potential Uber style top-down pricing model could have in the future (Calo & Rosenblat, 2017).

Another example could be the 'superhost' feature, where Airbnb utilises information asymmetries to exert 'soft control' (Rosenblat & Stark, 2016, p. 3761) on hosts who are required to meet certain criteria (ratings, conversion, low cancellation fees) in order to be able to earn the coveted title ("Airbnb Superhost"). While third parties offer external analytics for hosts ("AirDNA"), they draw on limited data. Airbnb itself does not provide analytics to hosts which would enable them to deduce these asymmetries or nudges easily ("Airbnb How It Works"; "WithAirbnb"; "Airbnb Host Stats").

Lastly, information asymmetries are created on the platform on other miscellaneous issues, attributable to a lack of transparency in design and processes applied. A European Commission study in 2017 for instance found transparency concerns in pricing, the peer verification process, rights of guests and hosts in terms of legal status, concern redressal, distinctions between professional and homesharing, as well as the transfer of data to third parties, influence of smart pricing and listing and review moderation practices (Hausemer et al., 2017). The oceans of data SEPs have access to also allows them to 'weaponise' it, using supply and demand and their user base to drive out competition by determining suggested pricing and locations, as well as engage in 'regulatory entrepreneurship', public policy lobbying to seek pardon rather than permission when it comes to regulation (Hickey & Cookney, 2016; Pollman, & Barry, 2016, pp. 398-403), as also highlighted in Section 2.2 above.

Researchers have also argued that given the similarities in business models and practices, it would not be out of place to juxtapose questions and concerns raised through analysis of and findings on one large SEP on others (Calo & Rosenblat, 2017, p. 1654), opening up many other avenues for potential concern which have and continue to be studied and documented with regard to SEPs such as Uber.

IV. Regulating an infrastructuralised Airbnb

By its own account, "*Airbnb is democratizing capitalism by expanding the economic pie for ordinary people.*" ("Airbnb Policy Tool Chest"). Admittedly, it has done so, but clearly needs to be doing more, as one form of democratisation has led to infrastructuralisation and power concentration elsewhere, underpinned by information asymmetries.

As seen above, SEPs, in this case specifically Airbnb, increasingly exhibit a number of infrastructural traits (embeddedness, dependency, ubiquity, invisibility, indispensability and extensibility), and as these grow, the infrastructural nature of the platform becomes increasingly powerful. Analysing SEPs as infrastructuralised platforms allows us to both borrow from a rich history of regulatory interventions in critical infrastructure, both public and private, while using critical similarities between platforms and infrastructure to assess platforms *as* infrastructure in order to identify new responses needed to address the challenges posed, unaddressed by siloed responses such as improving taxation and limiting availability.

4.1 Regulatory solutions to information asymmetries

As seen above, a critical feature of SEPs being able to infrastructuralise in arguably detrimental ways is their ability to create and leverage information asymmetries, a re-balancing of which can help address issues at a more macro-level, which will in turn, have cascading effects on specific concerns. Regulatory solutions addressing the core issue of information asymmetries highlighted here should seek to rely on laws that have at the same time, a targeted approach and a broad ambit in their effect (Interian, 2016; Nash, 2018). Below are some relevant regulatory responses that may be considered in this context:

Consumer protection law: Scholars portend a unique concern with SEPs, where everyone is a *consumer,* but also a product (Calo & Rosenblat, 2017, p. 1652). From an information asymmetries perspective, consumer protection law's focus on preventing and controlling anticompetitive, unfair or deceptive activities which are against the interest of consumers is highly useful. It approaches information asymmetries in two ways, external and internal, together helping create a 'sovereign consumer'. The former seeks to preserve healthy competition in the market by ensuring a level playing field, and hence greater choice for the consumer. As Plantin et al. (2016), note "*the question is not only who profits and controls, but who, and what, is cast aside along the way*". From this perspective, regulators need to continually ask if and where information asymmetries leave behind healthy competitors. The latter approaches consumers more directly, restricting unfair practices by companies against consumers (such as aggressive marketing) (Katz, 2015, pp. 1121-1125). Sovereign consumers with these protections would then, in theory, be able to both have real choices and be able to exercise them meaningfully (Averitt & Lande, 1997, pp. 713, 714; Calo & Rosenblat, 2017, pp. 1673, 1674). In the US context, where Airbnb is based, the Federal Trade Commission

is the key organisation tasked with achieving these goals, backed by the Sherman Act, and has engaged with SEPs in the recent past (Katz, 2015).

Consumer protection law is still to take centerstage when it comes to the digital economy, with some regulators drawing archaic parallels to disruptive business models such as Amway, ignoring the affordances digital information asymmetries grant SEPs. However, these admonitions do show that SEPs are indeed subject to such regulation. Regulators need to look beneath the surface, scrutinising the technological underpinnings of these platforms that enable information asymmetries – a task not as simple as analysing brick and mortar entities and their relatively transparent manner of functioning (Calo & Rosenblat, p. 1679-80). The importance of consumer protection law as a powerful tool in this context is being increasingly recognised by regulators (Cohen, 2017; Thomson, 2017), and breaking monopolies in infrastructuralised services is also something which is precedented (Plantin et al., 2016, p. 300). Where instances of information asymmetries emerge, regulators can use powers of direct investigation and requiring reporting on certain aspects, although SEPs have so far, largely succeeded in avoiding this (Calo & Rosenblat, pp. 1682-84; 15 U.S.C. §§ 46, 49, 57b-1, 2012). Researchers can also be incentivised to conduct empirical research, exposing findings which may form the basis for intervention by consumer protection regulators. There is already growing precedent of this (Google, 2011, 2015). However, regulation will need to evolve to permit scrutiny of this nature without legal barriers to and consequences for researchers, such as Quattrone et al. (2016) who conducted well received research on Airbnb in London, proposing 'algorithmic regulation', and Shabrina et al., who used Airbnb data to visualise its complex spaciotemporal dynamics including gentrification. Additionally, regulation will need to evolve more nuances in understanding just *who* the consumer is in different contexts (here both guests and hosts), and in order to balance innovation with regulation, create discernible harm standards for SEPs so that innovation is not unreasonably constrained, and nuanced thresholds for when an SEP's design or features negatively affect consumers across the board need to be established (Calo & Rosenblat, p. 1685-86; Cooper & Wright, 2017). Consumer protection law will need to force a balance in the incentive structures in SEPs for both the platforms themselves and their consumers, so that the creation of information asymmetries does not continue to be incentivised, and hence as systemic as it is today.

Information fiduciaries: While consumer protection law aims to create more empowered SEP consumers, and creating more balanced market structures where competition addresses a variety of issues created by information asymmetries, market forces cannot be exclusively

relied on to address these challenges. Another approach could be categorising platforms as 'information fiduciaries', drawing parallels with approaches in other fields such as the practice of law and medicine, with a formal duty not to use the information platforms have access to, to the users' detriment (Balkin, 2015; Zittrain, 2018). This does of course involve a move from the current structure adopted by SEPs as being intermediaries with little liability for the actions of users on their platforms, towards a more accountable structure. In Airbnb's case, this accountability has been proffered in several forms, including, as seen above, through the policy tool chest, and (at times) legitimate pushback to share detailed information about users (hosts and guests in this case) with public authorities, which could potentially compromise user privacy. The identification of, and acceptance as information fiduciaries in an infrastructuralised SEP would allow for the formalisation of accountability and duty of care structures which currently are largely either reactionary or entirely voluntary, allowing SEPs to pick and choose their accountability towards users, their data, as well as the larger communities affected by their operations. This would also balance the legitimate interest SEPs have to maintaining close control over granular business critical aspects of their information use, whilst assuring users and regulators that the platform will walk the talk when it comes to comprehensive accountability.

Data protection law: Data protection law can be seen as aiding the goals of consumer protection law, and creating level informational playing fields between firms, as well as between firms and their customers (Calo, 2015, pp. 649, 683). In European contexts, Regulation (EU) 2016/679 (General Data Protection Regulation) brings important updates to concepts of control over personal data, data minimisation and purpose limitation (Art. 5(1)(b)(c)). Purpose limitation for data collected from users is an established requirement in the US as well (FTC, 2000, pp. 36–37). These requirements will restrict the kind and amount of pliable social data SEPs can gather, and how they can use it, controlling and turning off the 'data exhaust' underpinning information asymmetries.

4.2 Democratising data

A greater role for open APIs

As highlighted in Section 2 above, the availability (or lack) of data plays an increasingly significant role in relation to SEP-centric concerns, on various fronts. As gatekeepers of the data they gather from users on the platform, Airbnb currently has primary control over what, how and when data is made accessible, as well as to whom. It stands to reason that given

this, it is difficult to objectively determine whether the data made available both to users and regulators is comprehensive, and especially gauge what data is *not* made available. In infrastructure studies terms, application programming interfaces (APIs) act as gateways, in this case into networked digital systems such as Airbnb, allowing outside actors to 'plug in' and interact with the network in a variety of different ways (Plantin et al., 2016, p. 303). While Airbnb's API has remained restricted, with access in fact earlier being against its terms of use, it has taken the first steps towards partially opening up its API in 2017 ("Airbnb API Partners"). Currently limited to functionality around improving host usability across listing management, this is the first of what could be a big step towards breaking the API walled gardens and enabling greater civil society and academic involvement in researching the impact of an infrastructuralised Airbnb at scale and across jurisdictions, reducing a number of the information asymmetries outlined above and finding causes and responses to potential cumulative negative impacts on the communities it serves. Airbnb will of course, need to tread carefully in this regard especially in light of the abuse of Facebook's API which as a result of a number of high profile scandals, was largely locked down earlier this year. While the company has taken steps to open up other avenues for research ("Facebook Social Science One"), researchers have argued that restrictive approaches like this are detrimental to more open, ethical research and have instead proposed the setting up of a custom API for research purposes (Bruns, 2018).

Transferrable sharing rights

Miller (2014, 2016) proposes a transferrable sharing rights (TSR) marketplace structure for SEPs. Based on transfer of development rights, which indeed have roots in urban infrastructural contexts, an evolved TSR structure in Airbnb's context could see the allocation of TSRs to listing owners and tenants (not outside the SEP user base), allowing them to redeem TSRs through a portal (Airbnb or governmental) in order to use their property for a certain period of time. These TSRs could also be traded between different TSR users (to sell excess capacity or purchase TSRs where they have been exhausted), with a fee charged both for transfer and redemption, utilised for various redevelopment and upkeep services. Against a hard geography and day-centric limitation, the TSR platform could account for a number of dynamic factors based on data Airbnb will already have access to, in terms of tourism inflow, demand and supply, congestion, listing concentration, whilst of course, ensuring regulatory requirements and the rights of locals and long term tenants as well as the sustainability of areas is dynamically maintained, and accounts scaled regulation suggestions offered in SEP regulation research (Zale, 2016, p. 1013). This is a useful

approach particularly where interventions such as the '90 day' or similar rules (Mack et al., 2018) will start to be seen as arbitrary and not in line with shifting usage, tourism, and Airbnb's own infrastructural growth dynamics. It has also been argued that Airbnb's auto-limiting intervention can potentially be gamed by the use of other platforms, or tweaking listings (Manthrope, 2018). The relaxed API route suggested above could well also be utilised by SEP consumers to interact with Airbnb and run these transactions. Additionally, open sourced machine learning tools such as Aerosolve used for dynamic pricing could also be further developed and refined to address the dynamics involved in a TSR approach. Together, these could indeed further Airbnb's cause of democratising capitalism.

V. Limitations

The assumptions made in order to support the findings in this paper are based exclusively on desk research covering a review of publicly available articles, blogs, research papers, texts and news articles. The findings presented in this paper cannot thus be generalised. Airbnb was approached to partake in this research through interviews on the potential for information asymmetries through their platform and their public policy and practices in context but declined given business considerations. As such, the information asymmetries currently or potentially created discussed in this paper are speculative, given the lack of empirical data supporting their creation as well as access to detailed platform design information and public policy approaches underpinning what data is available to Airbnb and what is shared with third parties, whether users or regulators.

VI. Conclusion

Sharing is a balanced, multisided term, and while SEPs proffer it, they have arguably so far indulged more in *taking*. Objectively considering the role of SEPs like Airbnb, done right, they have real, tangible contributions to make to society in ways big and small. Academics, while critical, have also acknowledged the need for balanced approaches rather than throttling innovation (Interian, 2016), and while some have taken more aggressive, confrontational approaches, Airbnb is one platform which has on many fronts, made concerted efforts to proactively and reactively address the fallouts of its infrastructuralisation, including giving back to communities, healthy tourism initiatives, community empowerment, CSR campaigns, trust and safety updates, antidiscrimination policies, and using (some) Airbnb data for good ("Airbnb Blog"; "Airbnb Citizen"; Ananny

& Gillespie, 2016, p. 9-10). Building on this, addressing concerns arising out of its scale and infrastructuralisation as well as information asymmetries which may impact profitability may be a bitter pill to swallow, but as continuing revelations show, is one that will have to be swallowed nonetheless. These scales now do need to be balanced, and a number of carefully considered and evolved regulatory approaches, working in tandem with democratised data that underpins SEP's growth and promise are poised to do so.

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