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The Sharing Economy: Definition, Measurement and its Relationship to Capitalism

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Abstract

For the past decade, the sharing economy has not only grown but also expanded to cover a wide variety of different activities across the globe. Despite a lot of research, there is still no agreement on how to define and measure the sharing economy, and no consensus on whether the sharing economy is a part of or an alternative to a regular capitalist economy. This paper contributes by presenting a framework for classification of firms and services in three dimensions (decentralized supply, ad hoc matchmaking and microtransactions), thus effectively creating a definition of the sharing economy. Using clickstream data collected in 2016-2017, we show that the sharing economy consists of many services, but the distribution is highly skewed: Six percent of the services account for 90 percent of the traffic. Using cross-country regressions for 114 countries, we show that while the most important determinant of sharing economy usage is internet access, usage is significantly higher in countries with fewer regulation of capital, labor, and business. We conclude that the sharing enables new types of entrepreneurial efforts within the digitized capitalist economy.

Keywords: Economic freedom, sharing economy, broadband, capitalism

JEL-codes: O33, P12, O57, M20

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1. Introduction

What do we know about the relationships between capitalism, entrepreneurship, and the sharing economy? A large literature has examined how capitalist institutions and economic freedom shape the economy and society as a whole (for a survey see e.g. Hall & Lawson et al 2014), but so far little attention has been given to the empirical relationship between the sharing economy and economic freedom. Partly, this is explained by the fact that the term “sharing economy” is relatively new. According to Google trends, the term first appeared in 2013, when the popularisation of the term “sharing economy” marked the introduction and rapid growth of a new generation of sharing services based on digital multi-sided platform economies, partially made possible by the spread of smartphones.

While it is easy to provide examples of the sharing economy, research suffers, however, from the lack of a consensus definition of the concept. This paper contributes by arguing for and formulating an inclusive definition that captures all varying sharing economy activities and by examining empirically how usage of the sharing economy varies with economic freedom and other country level factors.

It is undisputed that digital technologies enable new types of transactions, especially between peers. A lot of attention has been directed towards the digital technologies as such, but the economic impact of the sharing economy comes from how social and economic activities change in response to opportunities and challenges that come with new technologies. Thus, the sharing economy has given rise to a wide range of new activities, ranging from non-profit collaborative consumption to new forms of entrepreneurship. Because it covers a wide range of activities and incentives, contrasting and sometimes conflicting views have emerged on the sharing economy and its relationship to capitalism and the rest of the economy. While some highlight its non-commercial side, others point to its commercial uses. We argue that these need not stand in opposition to each other.

Digitalization constitutes a *General-Purpose Technology* (GPT) on par with steam power and electricity (Bresnahan and Trajtenberg 1995, Lipsey et al 2005, McAfee and Brynjolfsson 2017). It is primarily characterized by the combination of three factors: computational capacity enabling information processing, large networks connecting people and generating data flows, and software which is used to build new applications that leverage computational capacity, network connectivity and data.

Taken together, digital technologies provide a potential access to information and other people that is unprecedented with respect to both extensive and intensive margins. However, the large increase and variation on the supply side entails a corresponding rise in transaction costs on the demand side associated with finding the right content or connection. This makes it harder for people to leverage the potential benefits of the new technology and hence creates a demand for curation of the large supply (Bhaskar 2016). Digital platform economies, ranging from search engines to social networking services and dating apps, lower transaction costs by acting as matchmakers in a wide variety of different markets (Evans and Schmalensee 2016).

This combination of pervasive digital connectivity and matchmaking through digital platforms makes it possible not only for businesses to be matched with potential customers or with each other, but also for large pools of individuals who are strangers to each other to be matched based on their preferences and resources.

Large-scale, decentralized matchmaking challenges and complements other, traditional ways of allocating resources in the economy. Given that the supply side is sufficiently large, each actor does not have to make their supply of a good or service continuously available if the total number of suppliers meets the needs of the demand side at every given point in time. This forms the basis for the so-called sharing economy that emerged in the early 2010s in the wake of the financial crisis, and by extension also the gig economy that is now growing world-wide. For example, a group of individuals offering access to their private cars when they are not themselves using them can substitute either professional rental service or car ownership. Thus, it becomes possible for individuals to mobilize the excess capacity of their property or time, which on an aggregated scale constitutes a considerable standing reserve (Benkler 2004).

This development enables a wide variety of different behaviors. On one hand, if people start borrowing each others property, each of them may refrain from some types of ownership in favor of sharing resources. Others may find it lucrative to rent out (some of) their property. Yet others may increase their ownership when it is easier to rent out excessive capacity. Along the same vein, some may volunteer their spare time to help others, while some make it available at a cost and others may substitute “gigging” for other types of work.

A similar argument can be made for excess capacity in firms and business to business matchmaking. That is, not traditional business to business sales mediated by a digital platform, but the possibility of making excess capacity, for instance office space or production time in factories, available freely or at a cost to other businesses.

There are several attempts at framing the sharing economy by exclusion, i.e. leaving out behaviors that are made possible by the same technologies, but which do not fit into a certain meaning of “sharing”. For example, some cast the sharing economy as a counter reaction to capitalism and consumerism (Heinrichs 2013) while others emphasize sustainability and environmental concerns a driver for sharing and collaborative consumption (Hamari et al 2015) or describe sharing as a social movement that stands in opposition to for-profit transactions (Schor 2016). Still others include both not for-profit and for-profit sharing, but instead put limitations on what is being shared. Frenken and Schor (2017) argue that if a person “were to buy a second home and rent it out to tourists permanently, that constitutes running a commercial lodging site, such as a B&B or hotel”.

We will argue, however, that such a debate is beside the point. Attempts at defining the sharing economy by exclusion will generate subsets of the wider behavioral change based on principal values rather than changes in the allocation of resources within the economy. Such reductions may even result in misleading or considerably limited analyses. Specifically, many of the existing definitions put limitations on the interactions between the sharing economy and the rest of the economy, making it a largely closed system. Yet, if individuals can rent out excess or idle capacity, this may lead to both decreases in ownership in favor of renting and increases in ownership due to the ability to rent out spare capacity as a way of covering expenses. If the sharing economy is large enough to merit specific analysis, we argue that it is safe to say that it will also have significant interactions with the rest of the economy, acting as both a substitute and a complement for other types of exchanges.

Instead, we propose an inclusive definition of the sharing economy to reflect how a variation of different behaviors give rise to a larger shift in the allocation of resources within the entire economy. We combine a set of different definitions to distill common denominators and then introduce a conceptual definition based on three factors: 1) Decentralized supply, 2) ad-hoc matchmaking and 3) micro transactions.

We then move to operationalise this definition and compile an international mapping of sharing economy services by measuring web traffic.

Finally, we run a OLS regression analysis to test the correlation between sharing economy activities and country level explanatory factors including the Economic Freedom Index (Gwartney, Block, and Lawson 1996), which is often used as a proxy for capitalist institutions and policies. This approach allows us to test if sharing economy activities (as defined using our inclusive definition) are more common in countries with higher economic freedom.

While we do find a significant positive correlation between sharing economy usage and economic freedom, the share of the population with broadband access is the most important factor explaining cross-country differences in sharing economy usage. Even so, for freedom to trade and regulatory freedom, the partial correlation remains significant and positive also when controlling for broadband access, GDP per capita, average years of schooling, and the share of the population younger than 40.

While these findings do not lend themselves to causal claims, they indicate that the relationship between sharing economy activities and economic exchange is positive rather than negative, i.e. that the former complements rather than substitutes the latter. Against this backdrop, we argue not only for an inclusive definition of the sharing economy, but also against a distinction between capitalism and sharing economy.

The rest of the paper is structured as follows: In part 2 we introduce a conceptual framework to formulate an inclusive definition of the sharing economy. In part 3 we present the method and data used to operationalise the definition, collect clickstream data and correlate it with the Economic Freedom Index. In part 4 we present empirical results and part 5 concludes.

2. Conceptual framework

In this section, we discuss previous attempts to define the sharing economy and propose a broad definition based on commonalities among other definitions. We operationalize our definition into a classification tool that can be used to identify sharing economy service

providers. Finally, the institutional setting surrounding sharing economy activities is discussed, leading up to the research question addressed in this paper.

2.1 Defining the sharing economy

There is no commonly accepted way of defining the sharing economy. Three common denominators, however, appear in all existing descriptions and definitions: excess capacity, large, decentralized networks and trust between strangers. Sundararajan (2016) provides an overview and a discussion of existing definitions and formulates his own in response to these. A summary of these definitions, divided into three categories corresponding to our three denominators is presented in table 1:

Table 1: Sharing economy definitions

	Sundararajan 2016	Botsman & Rogers 2010	Stephany 2015	Gansky 2010	Benkler 2004
Name of concept:	<i>Sharing economy/ crowd-based capitalism</i>	<i>Collaborative consumption</i>	<i>Sharing economy</i>	<i>The Mesh</i>	<i>Sharing as a modality of economic production</i>
Common factor: Excess capacity	High-impact capital	Idling capacity	Value	Shareability	Lumpy mid-grained goods
			Underutilized assets	Immediacy	
			Reduced ownership		
Common factor: Large decentralized networks		Critical mass	Online accessibility	Digital networks	Distributed computing
	Largely market-based			Global in scale and potential	Population-scale digital networks
Common factor: Trust between strangers	crowd-based networks	Belief in commons	Community	Advertising replaced by social promotions	Trust reduces transaction costs
		Trust in strangers			
Consequences:	Blurring personal/professional				
	Blurring fully employed/casual labor				

Sundararajan (2016) also mentions two consequences of the sharing economy (noted in the bottom row of Table 1): The blurring of borders between different forms of employment and between the personal and professional.

While the term sharing economy caught on around 2013, the underlying phenomena of cooperation and sharing resources (for instance development of open software, the use of distributed computation and file-sharing) over digital networks has been a subject of study

long before that (Benkler 2004, 2006; 2011). What Benkler (2004) defines as lumpy and mid-grained goods are goods with a maximal functional capacity and a maximal utilization over time that supersedes the needs of the owner. Benkler uses carseats and processor capacity as two examples of resources that are seldom maximally employed. This is clearly an example of what in the other definitions in Table 1 is referred to as idling/excess capacity, the value of underutilized assets and shareability.

An extension of this argument can be made for an individual's time and human capital beyond what is already being utilized by work and other activities. Sundararajan (2016, p. 29), based on Mansky's definition of the Mesh (a fully interconnected network in which any node can connect to any other node directly), argues that *"people's spare time as well as their spare capacity in assets and space are, in effect, being rendered detectable because of digital networks, and by virtue of this new transparency, increasingly shareable"*. In other words, by making untapped resources available for consumption with only small or no extra work, the economy is made more efficient.

With new means of mobilizing what used to be excess capacity or latent resources, the incentives both for owning and for renting instead of owning certain things will shift. While some people may refrain from owning a car because they can easily rent one on demand, others may be incentivised to buy a summer home because they can rent it out when they are not using it. This also implies that participants in a sharing economy may invest in resources with the explicit aim to share them. For example, an individual may buy one or several apartments and rent them out via Airbnb, rather than sharing his or her own apartment when it is not used. Such activities create more excess capacity with the aim of renting it out via sharing economy platforms. To some extent all commercial supply-side participation in the sharing economy is an expression of entrepreneurial effort and from that point of view the difference between renting out your own apartment and investing in an apartment to rent out are a matter of scale rather than of principle.

Thus, a consequence of the possibility to mobilize and monetize excess capacity is that more excess capacity may be created both intentionally and unintentionally. It would prove hard, or even impossible, to fully distinguish between already existing and created, intentionally or unintentionally, excess capacity with any accuracy. If sharing economy platforms prove to be more efficient than other means of finding customers, traditional suppliers may even shift

their priorities so that matching through these platforms becomes a primary sales channel. This blurs the line between sharing economy platforms and other types of multisided platform economies such as Amazon. Crucial for the definition presented here is 1) that the platform is not a supplier but only acts as a matchmaker, and 2) that suppliers on the platform are principally individuals.

The utilization of excess capacity means that supply is decentralized, and also that availability is conditional on individual suppliers being able to provide access to the excess capacity of their resources.⁴ For example, a car owner can only provide transportation when she is driving the car and can only lend the car to other drivers when she is not using it. This implies that the matching of supply and demand must be *ad hoc* and that, consequently, the size of the supply side in terms of individual suppliers will have to be at least large enough to satisfy to the demand side at any given point in time even though each supplier only supplies for a short period of time. Many sharing economy services are associated with on-demand access to goods and services, meaning it is not the total number of people potentially supplying that good or service, but the number who are supplying it at a certain point in time. Conversely, to attract suppliers, there has to be a critical mass of demand to merit the effort of making resources available. This level of what Botsman and Rogers (2010) refer to as critical mass is made possible through large decentralized digital networks, exemplified by social media, that make it possible to match available supply with demand with the immediacy emphasized by Gansky (2010).

In terms of economic activity, decentralized supply and peer-to-peer exchanges are not a new phenomenon but dates back to before the industrial revolution and the rise of large firms, mass production and distribution of goods (Sundararajan 2016; Schor and Fitzmaurice 2015). Neither is sharing of resources among peers unprecedented. What is new in the sharing economy context, however, is the nature of the networks on which these exchanges are made. Historically, sharing and to some extent also commercial exchanges relied on local communities and social relationships and reputations established among neighbors and acquaintances, i.e. small and mostly localized networks. With large digital networks - global in scale and potential (Mansky 2010) or population-scale (Benkler 2004) - the size and geographical reach of the network as well as the speed of communication is in fact

⁴ Note that although supply is decentralized, the sharing of it is often facilitated through highly centralized platforms.

unprecedented. Sundararajan (2016) refers to the extent of the network as largely market-based rather than community-based.

Consequently, digital connectivity not only extends the quantitative size but also the qualitative nature of the network of peers that can engage in interactions and exchanges. Apart from expanding activities that used to be limited to smaller and geographically local communities, digital networks also enable the exchange or sharing of goods and services that would not gather critical mass in smaller networks depending on slower means of communication.

Furthermore, digital networks allow people who do not share a social tie to match and share resources, so called stranger sharing. While this may increase the potential for matching in the network, it also presents considerable challenges to the individual incentives to trust and to engage with strangers.

There are two lines of argument when it comes to the incentives: the belief in and value of building community, and market-based economic exchanges. For example, Sundararajan's definition highlights crowd-based capitalism, while Botsman and Rogers emphasize collaborative consumption as opposed to hyperconsumption. Both social values and monetary exchanges contribute to motivating sharing between strangers, but in different ways, and they may also be combined to boost sharing exchanges within large digital networks. Sundararajan compares this to what Lessig (2008) describes as a hybrid economy that combines the interacting commercial exchange and non-commercial remix and sharing of creative content.

Because it is hard to determine and separate individual incentives for participating in sharing economy activities, and because these may interact with each other, any attempt at defining and demarcating the sharing economy based on specific incentives or values will only capture a partial image of the phenomenon. To study the sharing economy and its relationship to other economic activities, it must be defined in an inclusive way with respect to the type of activities it enables and not in an exclusive way with respect to the values that may or may not drive said activities.

The other challenge to sharing excess capacity on large digital networks with strangers is to create sufficient trust between participants, which is also the third common denominator between the definitions in table 1. Put differently, trust and social capital reduce transaction

costs associated with exchanges between people, whether they are market exchanges or social sharing (Benkler 2004). Even though large digital networks like the Internet will tend to form so called small-world characteristics (Barabasi 2003), it is straining to rely exclusively on social ties to match supply to demand since this would limit the potential matching considerably, especially in cases where both supply and demand are highly temporary and localized. In a network consisting only of social ties and relying on trust established through those ties to enable exchanges, matching could be expanded by relying on intermediaries, i.e. to match with friends of friends. However, unless social relationships are expanded with interactions so that the network becomes fully interconnected, this type of intermediation is limited and depends to some degree on the institutional means to confirm trust in distant ties and strangers. As a response to this, many sharing economy marketplaces offer some type of rating or recommender system between peers that have engaged in an exchange. In other words, they leverage the crowd to provide a measure of trust for the individual, what Sundararajan (2016) refers to as crowd-based networks. This results in a quantification of trust and reputation that can both leverage social ties, for instance through friend-based recommendations, and transcend them to build trust among strangers. Much like Mansky (2010) argues that excess capacity is made detectable through digital networks, so too are reputations and trust becoming quantifiable.

Mazella et al (2016) draw upon the historical records of Mediterranean traders who employed agents overseas in order not to have to travel with their goods to distribute them in new marketplaces. In order not to be scammed by their agents, it is suggested that the traders would pay them comparatively well, but also that traders would agree among themselves to banish any agent who abused the trust of a trader. Mazella and his co-authors draw a parallel between this type of reputation system and the recommendations and ratings employed in many sharing economy platforms. They argue that the current shift in trust infrastructure is turning trust from a scarce to an abundant resource in the economy. They substantiate their argument with a survey among blablacar users, showing that 88 percent of the respondents rated trust in a blablacar driver they have never met higher than trust in their co-workers or neighbors (but still lower than trust in family and friends).⁵ Trust infrastructure and

⁵ Note that Mazella is the founder and CEO of Blablacar. The study in question is conducted in cooperation with researchers from New York University. As noted by Hagiu & Rothman (2016), rating systems come with their own problems. For example, raters tend to be either very happy or very unhappy with the product/service they have rated.

matchmaking between supply and demand among strangers go hand in hand: To provide matchmaking between unacquainted peers there needs to be enough trust. While most such trust infrastructures are currently associated with a specific sharing economy service, the authors envision the potential of exporting trust from and exchanging quantified trust records between platforms or to use as a merit.

In summary, three common denominators - excess capacity in goods, time and/or human capital, large decentralized digital networks and trust between strangers - are consistent across several definitions of the sharing economy, notably also those that differentiate between for profit and nonprofit motivations or other types of values and incentives. Thus, these three factors make up our inclusive definition of the sharing economy which we employ in the rest of the paper.

2.2 Identifying sharing economy service providers.

Against this background we formulate an operational classification that can be used to identify and demarcate sharing economy service providers for the empirical investigation. Defining sharing economy service providers differs somewhat from defining the sharing economy as a phenomenon. More to the point, it is not feasible to measure the level of trust or the size of the network of peers in each potential sharing economy service provider. Instead, we focus on the three business model components that correspond to the sharing economy features: decentralized supply, ad hoc matchmaking between peers and microtransactions.

First, excess capacity implies that the supply is decentralized among the supplying peers. It is important to underscore that transfer of ownership is not included since the focus is on excess capacity. In other words, secondary markets for buying and selling goods are not defined as sharing economy. On the other hand, decentralized supply will include both pre-existing excess capacity and excess capacity that is created in direct response to the rise of sharing economy services. Consider an apartment bought with the intent of posting it on Airbnb. This is still excess capacity in the sense that its underutilized value is being put to use through sharing, but this excess did not exist prior to the opportunity to rent it out. While critics may argue that this created capacity is not part of the intention with the sharing economy, sharing as an economic activity increases the underlying options value of goods in a way that makes

it possible for more people to invest in those goods. Put differently, people who previously could not afford a summer house or a flat in the city, may be able to when they can rent it out and thus finance a smaller part of the excess lumpiness and granularity (Benkler 2001). In other words, although the sharing economy can be said to reduce the need for ownership, it may also enable some investments in expanded ownership. Furthermore, this also means that we exclude companies that provide their own supply, even if that supply is spatially distributed. For example, sunfleet who own all their cars, or for that matter Uber if they move to supplying autonomous vehicles that are centrally owned by the company.

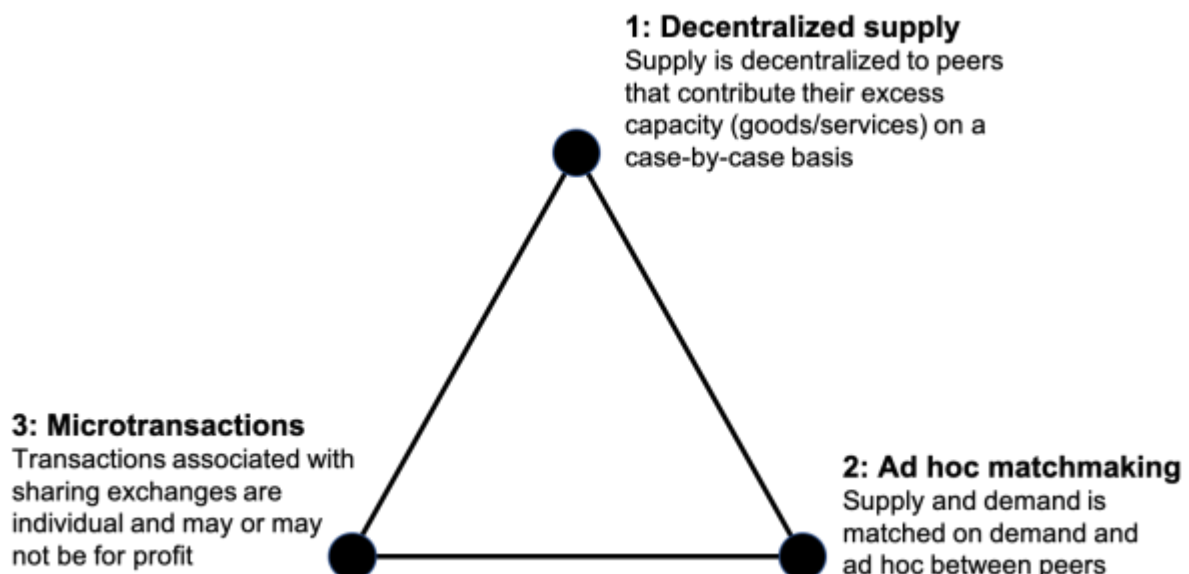
Second, there needs to be ad hoc on-demand matchmaking between peers. This implies a sufficient trust infrastructure, but also that supplying peers are free to choose on a case-by-case basis if they wish to be part of the decentralized supply. This type of matching will often be conducted on digital platforms and it could be argued that sharing economy service providers are a subset of digital platform companies. Yet, it is important to underscore that the platform in this case only matches supply and demand, it does not aggregate or refine that supply and the match is made between the peers directly. However, for our purposes it is enough to confirm that such matchmaking is present, regardless of how it is facilitated. This allows for a less technical definition.

Third, because matching of supply and demand should be on an ad hoc basis, transactions associated with exchanges should be microtransactions and not averaged compensation or extended contracts in any form. Also, because different sharing economy activities correspond both to nonprofit and for-profit motivations, these microtransactions are associated with micro-capitalism in such a way that microtransactions are mandatory but may or may not be monetary. This is in line with both Sundararajan's (2016) description of "crowd-based capitalism" and other descriptions of collaborative consumption as opposed to capitalism and consumerism (Botsman and Rogers 2010; Heinrichs 2013).

Putting these three business model components together results in the triangular sample space depicted in Figure 1. By this definition, a sharing economy service provider falls within this sample space, but two providers may differ considerably from each other for instance by having strong or no monetary incentives for engaging in exchanges. While this type of definition is admittedly wide in range, it also mirrors a significant variation in existing self-

identified sharing economy services that makes the field complicated to demarcate (Schor 2016).

Figure 1. Three characteristics of sharing economy providers.



With this definition, companies like eBay or Amazon are not part of the sharing economy, although both offer secondary markets for goods. Both Uber and Airbnb fall within the definition, although both have a strong component of commercial exchange. At the same time it also includes platforms for services like Taskrabbit since the definition covers the sharing of both goods and services, i.e. the combination of excess time and human capital that is not already being used for employed work. The definition will also cover financial services between peers, but only if the transactions are still conducted between peers and not aggregated together or refined into a financial product by the platform. In summary, the focus of this definition is on the decentralized sharing of goods and services facilitated through microtransactions between peers that are matched on demand, rather than on what is being exchanged, the nature of the exchange or the consequences of such exchanges.

2.3 Institutional room for sharing.

Sharing economy activities have been on the rise in economies all over the globe, but what is it that drives the emergence of this form of exchange as a means of accessing goods and

services? Sharing economy services can substitute access through renting or lending for ownership and thus reduce certain markets of consumption. On the other hand, some sharing economy services enter existing markets as complements and compete directly with incumbent actors – think of Uber and taxi companies or Airbnb and hotels. Given the definition of the sharing economy presented in this paper, it is a hybrid which encompasses both social values and economic incentives (Hamari et al 2015; Sundararajan 2016; Lessig 2008).

Hamari et al (2015) report that motivations for participating in sharing economy activities include both sustainability, personal enjoyment and economic savings or gains, although environmental concerns seem to be most important to individuals already engaged in ecological consumption elsewhere. Heinrichs (2013) argues that the sharing economy has a strong potential to counter unsustainable capitalism and consumerism towards a more sustainable economy. Schor (2016) highlights the potential for a “social movement centered on genuine practices of sharing and cooperation in the production and consumption of goods and services”, but also warns that for-profit sharing economy services may be acting against these values.

From another perspective, Fraiberger and Sundararajan (2015) find that peer-to-peer car renting service Getaround changes the consumption mix by substituting rental for ownership and reducing prices in secondary markets for cars while increasing consumer surplus. Zervas et al (2017) note that increasing Airbnb listings in Texas correlates with decreases in hotel revenues, indicating that sharing in this case competes with the traditional hospitality businesses. The observed effect is uneven and seems to impact lower-end hotels that do not cater to business travellers harder, indicating what market segment Airbnb is taking in Texas. Dillahunt and Malone (2015) investigate how participation in sharing economy services can contribute to generating income and temporary employment as well as enhancing social interactions and reciprocity within disadvantaged communities. Koopman et al (2015) argue that the sharing economy overcomes significant market imperfections, thus rendering some consumer protection regulation obsolete.

Previous research on the sharing economy carries with it expectations related to both social and economic values and while they are not mutually exclusive there appears to be a conceptual tension between them (Sundararajan 2016). One dimension of this tension cuts

between those who cast the sharing economy as a reaction against 20th century capitalism and consumerism, and those who see it as a natural development of capitalism and consumption. Some definitions of the sharing economy instead put limitations on the goods or services being shared (Frenken and Schor 2017).

Any ideological differences aside, any attempt to define the sharing economy by what is excluded from it effectively isolates it from the rest of the economy and treats it like a largely closed system. Yet, sharing economy activities can spur both reduced ownership in favor of renting and increased ownership because renting out idle capacity can cover expenses. Therefore, it should be central to researchers studying the sharing economy to investigate its relationship with the surrounding economy in full and not just through a partial view based on certain values or principles. This raises the question of what institutional environment the sharing economy thrives in. Does sharing economy usage mark a break with or an extension of market economies?

To address this issue, we test the relationship between sharing economy usage and institutions geared towards market economies, namely the Economic Freedom Index. If sharing economy activities are an extension of market economies (which could arguably still be called a change in capitalism, while still being a part of that capitalism), then they should correlate positively with the institutions associated with market economies. If, on the other hand, it is a break with the foundations of capitalism, then that correlation should be either absent or negative. The main hypothesis in this paper is that while social cues and community-building are vital parts of the sharing economy, sharing economy usage thrives in a market economy setting.

The Economic Freedom Index consists of five subcategories: Size of government, legal integrity, sound money, freedom of trade, and regulation. While these indicators promote market-driven economic exchange, they also correlate with economic development across countries. For that reason, we extend the analysis in a second stage to control specifically for access to highspeed ICT infrastructure, but also for a set of other controls including level of education and age. This way, the prevailing result will better reflect the relation between the institutions enabling and promoting market economies and sharing economy usage. The empirical setup is described in detail in the next section.

3. Method and data

In cross-country regressions, the economic freedom index has repeatedly been found to be highly correlated with growth (see Doucouliagos and Ulubasoglu 2006 for a survey, and Bergh and Bjornskov 2020 for a summary of more recent studies). A reasonable hypothesis based on previous findings is therefore that economic freedom is positively correlated with sharing economy usage, and that such a correlation is at least partially explained by countries with high economic freedom being richer, and richer countries having better ICT-infrastructure:

H1. Economic freedom correlates positively with growth and improved ICT infrastructure and therefore also correlates positively with sharing economy usage.

We also examine a second question: Do countries with higher economic freedom have higher sharing economy usage also when controlling for income, ICT-infrastructure and other factor factors that likely influence internet and sharing economy use? If this is the case, there is something about economic factors that matters also when controlling for other observable country level characteristics as captured by our control variables:

H2. Economic freedom associates positively with sharing economy usage also when controlling for GDP/capita, ICT-infrastructure, average education, globalization, and demography.

3.1 Sharing economy usage.

To measure sharing economy usage, we use country level clickstream data indicating unique visits to a set of sites classified as sharing economy services (SES) using the framework described above. Clickstream data are generated using self-recruited individuals that are unlikely to be representative for the entire population. For this reason, clickstream data should not be used to describe the absolute size, or the typical user, of the sharing economy in a given country. Assuming that the bias does not vary systematically with economic freedom, clickstream data still allows us to uncover patterns and differences across countries in how the sharing economy is associated with economic freedom and other country characteristics.

The procedure to identify sharing economy services was as follows: Using a computer at the University of Pennsylvania campus and a standard web browser in incognito mode we ran google searches to find local service directories. We searched in the local language using the title of the corresponding Wikipedia article in each language. To ensure relevance, only the first ten results from each search were used. A website was used only if it listed sharing economy companies with usable links to each listing's main web page.

Most of the work to classify the 4,651 SES candidates was done by a team recruited through a sharing economy service called Upwork. Each worker was interviewed, trained via video chats, and then tested to verify that they understood the classification criteria. The classifiers also indicated their certainty for each classification they made. Less certain classifications and conflicting ones were classified by more than two classifiers. We then used the majority classification to indicate whether a service was a sharing economy service. Our operationalized definition allowed the team of classifiers to follow the same procedure to determine whether a company is a sharing economy service, and if not, to indicate what factor they believed excludes it from this category.

The traffic data to the sites were collected from Sept 1, 2016 to Sept 1, 2017 and divided country population to create a comparable country level measure of traffic to sharing economy websites, which we interpret as a proxy for sharing economy usage. There are some omissions in the data (most notably, Uber is missing while the competitor Lyft is the sixth most visited site). Despite these drawbacks, differences across countries should remain meaningful, and will be more accurate when the bias is the same or similar across countries, which seems plausible. The use of clickstream data to measure web-browsing behavior is a commonly used approach that has been successfully employed to analyze a variety of topics, including browsing habits for online bookstores (Montgomery et al, 2004), browsing of scientific publications (Bollen et al, 2009) and digital music consumption (Aguiar & Martens, 2016). We interpret our data as a proxy of the propensity of a person in each country to visit sharing economy websites. Random variation in self-selection will bias coefficients towards 0, in which case our results will be a lower bound for the partial correlations with explanatory variables. In our specific case, self-selection will be problematic if individual propensity to self-select to clickstream registration varies positively with economic freedom, which seems unlikely.

It should be noted that our data do not allow us to separate intensive from extensive margins of usage. In other words, a given level of usage depends both on how many people use sharing economy services, as well as on the intensity of usage.

As indicated by the power-law graph in Figure 2, the sharing economy is characterized by a long tail of very small services, and a few services that account for most of the traffic. The distribution is much more skewed than the often-mentioned 80/20-rule: Two services (Amazon mechanical Turk and Airbnb) account for half of the traffic, and six percent of the services account for 90 percent of the traffic. Table 2 describes the 13 services that together account for 89.7 percent of the traffic. Since data were collected in 2016-2017, one of these has closed (the french electric car sharing service autolib).

Figure 2: Power-law graph for visits to sharing economy websites



Table 2: The largest sharing economy services in our data

Service	Description	Traffic share
Amazon Mechanical Turk	Crowdsourcing for individuals and businesses outsourcing tasks that can be performed virtually	28.0%
Airbnb	Lodging, primarily homestays, or tourism experiences	23.4%
Behance	Online platform to showcase & discover creative work	15.7%
Italki	Language learning marketplace that connects students with teachers	8.8 %
Homeaway	Vacation rentals	3.3%
Lyft	Ridesharing	2.3%
Lending club	Peer to peer lending	1.5%
Flipkey	Vacation rentals [a subsidiary of Tripadvisor since 2015]	1.4%
Autolib	Electric car sharing. [Closed in 2018]	1.4%
Crowdrise	Crowdfunding for charitable donations.	1.2%
Guru	Freelance marketplace	1.2%
Taskrabbit	Marketplace for freelance labor and everyday tasks	0.9%
Catarse	Crowdfunding	0.9%

3.2 Economic freedom

The Economic Freedom of the World (EFW) index was first published in 1996 (Gwartney, Block, and Lawson 1996) and has been updated annually since. We use data from 2014.

The economic freedom index consists of five dimensions that each quantify a certain aspect of economic freedom. Granted, economic freedom is not a well-defined concept, but the index has nevertheless often been used to quantify different aspects of institutional quality in a way that is relatively comparable both over time and between countries (see Hall and Lawson 2014 for a survey). Each dimension consists of several components that are weighed

together and assigned a score between 0 and 10. The aggregated economic freedom is the average of the score in the five dimensions (equally weighted). The five dimensions are:

1. Size of Government: Expenditures, Taxes, and Enterprise
2. Legal structure and security of property rights,
3. Access to sound money
4. Freedom to trade internationally, and
5. Regulation of credit, labour, and business.

For all dimensions, a higher number means more economic freedom. Thus the first dimension will henceforth be called limited government and the fifth will be called regulatory freedom.

3.3 Other control variables

Little is known about country level factors that facilitate sharing economy usage. In a related paper, Bergh & Funcke (2016) analyze the size of two home sharing services (flipkey and Airbnb) in cities around the world and show that the most important determinant of what they call sharing economy penetration is infrastructure for information and communication technology (ICT), measured using measured using the share of people with access to high speed internet according the World Bank.

Theoretically (and following Bergh & Funcke 2020), one might expect education, country level openness and a relatively young population to be positively associated with sharing economy usage. We will therefore also control for average years of schooling in the population, globalization as measured by KOF-index and the share of the population below 40 years of age.

Descriptive statistics for all variables are shown in table 3.

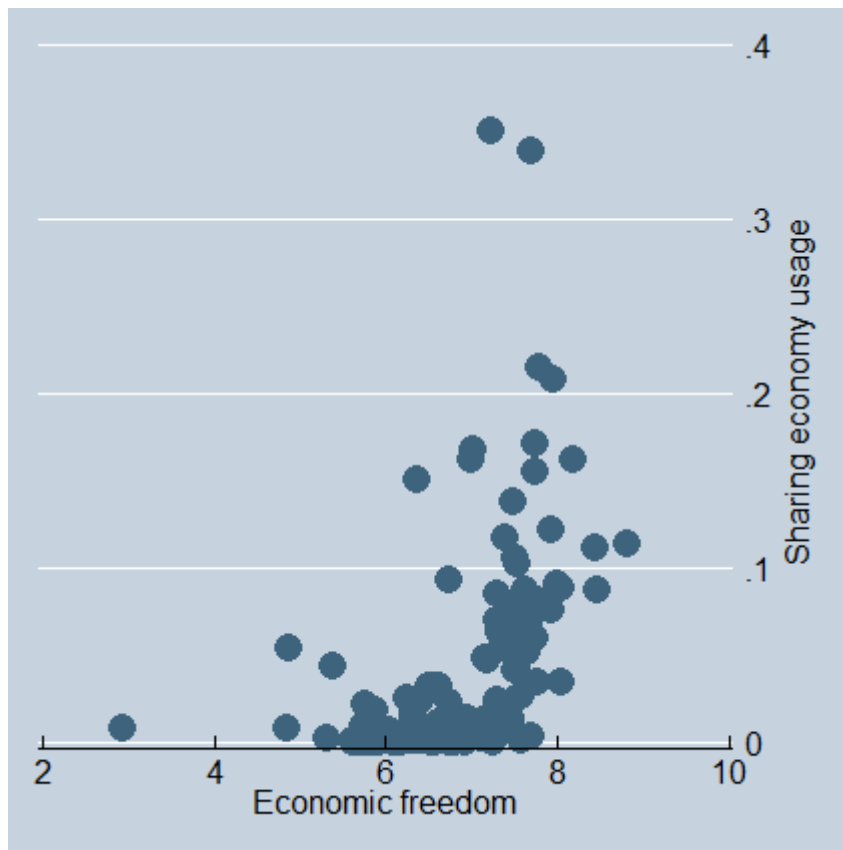
Table 3. Descriptive statistics

VARIABLES	N	mean	sd	min	max
Sharing economy usage	114	0.0480	0.0644	9.39e-06	0.351
Gdp per capita	114	20,150	21,559	806.0	163,294
Economic freedom	114	6.933	0.877	2.920	8.810
Limited government	114	6.426	1.323	3.420	9.490
Legal integrity	114	5.461	1.574	2.050	8.880
Sound money	114	8.524	1.346	1.940	9.840
Freedom to trade	114	7.218	1.109	3.320	9.250
Regulatory freedom	114	7.039	1.099	2.360	9.120
Average years of schooling	114	8.390	3.089	1.241	13.42
Globalization (KOF)	114	64.02	15.11	31.87	91.70
Share under 40 years	114	60.72	8.138	45.54	105.5
Share w broadband	113	0.143	0.135	0.000124	0.444

4. Results

Plotting the measure of sharing economy usage against aggregate economic freedom (Figure 3) illustrates clearly that sharing economy usage is higher in countries with more economic freedom, but suggests also that other factors matter: In the large group of countries with economic freedom between 7 and 8, there is substantial variation in sharing economy usage.

Figure 3. The relationship between economic freedom and sharing economy usage.



A standard OLS-regression of sharing economy usage on the aggregate economic freedom index confirms the positive association (Table 3, column 1). Countries with one standard deviation higher economic freedom have on average 0.44 standard deviations higher sharing economy usage. Half of this association is explained by countries with more economic freedom having higher GDP per capita (column 2), strongly supporting H1.

Interestingly, the effect of higher GDP per capita is driven entirely by the population share with access to high-speed internet (column 3). Education and demography do not seem to

matter much (column 4 and 5), but economic freedom is actually significant at the 10-percent level also with all control variables included (though the effect is very small).

Table 3. Explaining sharing economy usage.

	(1)	(2)	(3)	(4)	(5)
VARIABLES					
Economic freedom	0.0327*** (0.00633)	0.0170*** (0.00433)	0.00601* (0.00344)	0.00517 (0.00315)	0.00589* (0.00343)
Log GDP per capita		0.0241*** (0.00388)	-0.00192 (0.00421)	-0.00503 (0.00457)	-0.0137 (0.01000)
Share with broadband			0.332*** (0.0736)	0.313*** (0.0836)	0.405*** (0.150)
Average years of schooling				0.00243 (0.00196)	0.00258 (0.00190)
Share younger than 40					0.00124 (0.00111)
Observations	114	114	113	113	113
R-squared	0.198	0.341	0.511	0.514	0.524

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The partial correlations between sharing economy usage and the five different types of economic freedom is illustrated in Table 4. While usage is higher in countries with bigger government, all remaining types of economic freedom are positively associated with sharing economy usage.

Table 4. Correlations between sharing economy usage and five types of economic freedom.

Limited government	-0.0161*** (0.00368)
Legal Integrity	0.0237*** (0.00363)
Sound Money	0.0157*** (0.00452)
Freedom to Trade	0.0284*** (0.00502)
Regulatory freedom	0.0265*** (0.00523)

*** p<0.01, ** p<0.05, * p<0.1

As shown in Table 5, regulatory freedom and freedom to trade matter also when other variables are controlled for, providing some weak support for H2. The most robust partial correlation is found for share with broadband, where the coefficient indicates that a one standard deviation increase on broadband access correlates with 0.8 standard deviations higher sharing economy usage.

Table 5. Explaining sharing economy usage using five types of economic and control variables

VARIABLES	(1)	(2)	(3)	(4)	(5)
Log GDP per capita	-0.0127 (0.00980)	-0.0135 (0.00978)	-0.0128 (0.0101)	-0.0150 (0.00991)	-0.0128 (0.00976)
Share with broadband	0.425*** (0.161)	0.400** (0.156)	0.414*** (0.152)	0.403*** (0.149)	0.394*** (0.146)
Average years of schooling	0.00268 (0.00203)	0.00298 (0.00195)	0.00301 (0.00186)	0.00251 (0.00187)	0.00237 (0.00196)
Share younger than 40	0.00117 (0.00112)	0.00119 (0.00112)	0.00115 (0.00112)	0.00141 (0.00109)	0.00117 (0.00109)
Limited government	0.00202 (0.00337)				
Legal Integrity		0.00169 (0.00400)			
Sound Money			-0.00100 (0.00364)		
Freedom to Trade				0.00827** (0.00390)	
Regulatory freedom					0.00702** (0.00281)
Observations	113	113	113	113	113
R-squared	0.520	0.520	0.520	0.532	0.529
Robust standard errors in parentheses					
*** p<0.01, ** p<0.05, * p<0.1					

5. Conclusions

We have discussed how to define the sharing economy and provided an inclusive definition based on decentralized supply, ad hoc matching, and micro-transactions. We argue against sharing economy definitions that exclude profit motives and monetary transactions, and against definitions that require that total production be not affected. Such services most likely exist, but they are small and not representative of how the technologies upon which they rely are used. Most importantly, the true motive of people participating in a transaction cannot be observed, rendering a definition based on participants' motives less useful. The same technologies that enable a small, non-profit sector have similarly made possible large firms that operate for profit yet rely on decentralized supply and ad hoc matching.

With our more inclusive definition, the sharing economy is arguably something new and relatively different. It encompasses services of many different types and sizes, and where participants' motives vary. We have also shown that while the sharing economy as we define it is dominated by a few, large services, it also contains a long tail of smaller services.

Using clickstream data, we created a country level measure of sharing economy usage and demonstrated that it correlates positively with economic freedom. Even when controlling for GDP/capita, ICT-infrastructure, education, globalization, and demography, one standard deviation higher regulatory freedom is associated with 0.12 standard deviation higher sharing economy usage.

What do our findings imply for government and for entrepreneurs? First of all we note the following: Benefiting from economic freedom is a characteristic that the sharing economy shares (!) with the ordinary economy in general and entrepreneurial activity in particular (see e.g. Nyström 2008, Wiseman and Young 2013). As such, the sharing economy complements rather than substitutes capitalistic activities. In a way, that is good news for policymakers because it suggests that business friendly policies in general will also promote the sharing economy.

Our arguments for using an inclusive definition of the sharing economy that encompasses activities with varying degrees of commercialism and profit-motive also highlights wider policy questions on whether participants in the sharing economy should be regarded mainly as employed, entrepreneurs or something else. This principal issue has bearing on several policy areas.

When paired with the conclusion in Bergh and Funcke (2019), that the sharing economy facilitates trust-intensive economic activities also where social trust is low, another conclusion emerges: The potential for sharing economy services is likely to be large where economic freedom is relatively high and social trust is relatively low. Finally, it bears emphasizing that the most important correlate of sharing economy usage is to have a large population with access to high-speed internet.

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