

Digital Infrastructure: Does the ‘Coring’ of Digital Platforms make them part of Digital Infrastructure?

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April 22, 2020

Greenstein (2020) is a very useful summary of the existing literature on digital infrastructure. There are some key highlights to the piece. You learn a lot about the history and technology underlying the internet such as Root servers, fiber, broadband lines, networking switches and routers, content delivery networks, cloud facilities, and cellular towers. There are also intriguing pieces of data such as that in 2018, 2% of US households still use dialup. In general, Greenstein (2020) highlights two factors which have held up the literature - First the lack of convincing instruments which would allow an economist to measure the effects of digital infrastructure on outcomes. Second, that the literature has focused on broadband without much thought about additional technologies such as Content Distribution Networks, Cellular technologies and Cloud Computing. The cloud added approximately \$214 billion in value-added to U.S. GDP in 2017. The cloud added approximately 2.15 million jobs in 2017. In approximately 15 years since 2002, the cloud economy has nearly tripled in size. And yet it has been vastly understudied in economics. This useful summary helps frame and guide the forthcoming literature on this topic.

However, I wanted to focus my discussion on a passage in the chapter which reads as follows:

To close, consider this provocative question: Is Wikipedia digital infrastructure? Its ubiquity suggests it ought to be treated as such.... The Wikipedia example epitomizes the open questions of this topic: What is and is not infrastructure when public funding is absent? Where are the boundaries of public and private when the private infrastructure contains properties similar to public goods? Can something be called infrastructure merely if it is shared, inexpensive, and non-exclusive, and seemingly essential? Is the source – either public or private – relevant to the economics or virtually irrelevant?

This strikes me as a very useful framing of a potentially large and looming question.

Economists studying digital infrastructure have tended to focus on the wires, and physical manifestations of that infrastructure. However, a novel question which Greenstein (2020) highlights is perhaps platforms have actually become one of the most pressing digital infrastructure issues.

This is already being discussed in the popular press. For, example, the New York Times recently wrote:¹

All this is to say that a sufficiently successful social platform is experienced, much like Uber, as a piece of infrastructure. Except, instead of wrapping its marketplace around a city's roads, Facebook makes a new market around communication, media and civil society. This, from a founder's perspective, is an electrifying outcome. But this cultural metastasis has led to a swift and less-than-discriminate backlash. Already, calls for regulating the largest internet platforms are growing louder while remaining tellingly vague.

The 2020 pandemic has also led journalists to argue that Amazon fulfilled the role of a public utility and so should be treated like one.² However, it is notable that much of this discussion of infrastructure and public utilities with relationship to large technology platforms, is really a call for either more regulation or antitrust action. This is already a debate among law scholars. Rahman (2018) has argued that digital platforms such as Google, Facebook and Amazon are the core infrastructure of our 21st century economy and public sphere.

It strikes me that economists have much useful to say about this debate that we have not yet engaged with: In particular, our research can help answer key questions:

- Do platforms meet the definition of infrastructure as economists use the term?

¹<https://www.nytimes.com/2017/10/04/magazine/what-if-platforms-like-facebook-are-too-big-to-regulate.html>

²<https://www.theguardian.com/commentisfree/2020/apr/17/amazon-coronavirus-public-utility-workers>

- What does our experience with making various parts of infrastructure public, and then returning them to the private sector teach us about optimal conditions for public or private governance of digital infrastructure?

The first question is of course are economists definitions of infrastructure useful for this task? My impression is that the answer is no. Instead, most definitions have a ‘you know it when you see it’ flavor, and focus on the idea that it is self-evident that something as highlighted in the paper by Bennett et al. (2020) in this volume:

We begin with the challenging question of the definition of infrastructure. Defining the economic boundaries of ‘infrastructure’ is imprecise and somewhat subjective. We consider three broad categories of infrastructure that can gauge different aspects of infrastructure from a national accounts standpoint. ‘Basic’ infrastructure (e.g. transportation and utilities) reflects a traditional definition of ‘infrastructure.’ From there, we expand that core to include additional economic activity that would potentially be included in ‘infrastructure,’ including social and digital infrastructure.

Therefore it is not clear to me that economists are going to be helpful for determining a precise definition and whether something like the Amazon or Uber platform would qualify. I think where economics is helpful though is in understanding the underlying characteristics that digital platforms share with entities that are commonly thought of infrastructure, and understanding them through an economics lens.

Initially in the language of network effects or two-sided platforms, economists viewed the key challenges for businesses as being able to attract sufficient numbers of users. This is the focus of the early literature on digital platforms, and allowed us to understand that essentially the key property of what may or may not be a digital platform is whether or not there are significant network effects. Given this it might be simple to dismiss the argument that

platforms resemble infrastructure such as utilities or railroads as being related to arguments surrounding natural economies of scope or scale which suggest that there will be only one platform that succeeds at any one point in the market.

However, I would argue that this analogy is not particularly accurate. Increasingly digital markets are not characterized by there being only one platform or means of achieving a certain goal. If I am an advertiser I have multiple platforms to choose to use, for example, to reach a potential consumer. I am a ride sharing user, I have multiple platforms to choose between. Instead, in this essay I am going to argue that the temptation to argue that digital platforms reflect digital infrastructure instead reflects the degree of governance platforms themselves impose on their users.

To initiate some of this debate, I want to introduce a term from the classroom that we use to describe one of the key challenges of building a platform and relate it back to the infrastructure debate. In the classroom, I introduce students to the idea of ‘coring’ of platforms. ‘Coring’ was initially introduced as a term to describe the idea that platforms need to ensure that their technology is at the ‘core’ of interactions. The idea was, that if a platform controlled technology was not at the ‘core’ of the interaction within the platform then the platform risked losing control of that transaction. For example, if a real estate platform could not ensure that buyers and sellers used its technologies to execute real estate transactions, then it would risk losing control of the market (Gawer and Cusumano, 2008).

However, since the early 2000s when this concept was introduced the nature of digital platforms has changed. Due to all the shifts documented by Greenstein (2020) hardware and its technological manifestations have become less important. As a result if platforms are to ensure that transactions or interactions take place on the platform, they have to erect steps around governance which provide incentives for transactions to stay on the platform. The way I describe this in the classroom is that ultimately as a platform your major job is to make sure interactions on your platform don’t just happen, but they go well. This requires

relinquishing a technical mindset and adopting the mindset of a government or policemen to put into place the right incentives that interactions are successful. And it is that these platforms have to take on governance tasks, which I think has led commentators to argue that they are infrastructure.

Examples of ‘coring’ are the erection of huge and complex rating systems that give insight into the likely unobserved quality of platform participants. These have been a key part of the literature on the underlying infrastructure of digital platforms, in digital economics. Notable examples include Nosko and Tadelis (2015); Tadelis (2016); Fradkin et al. (2015). As well as being notable in general, these examples are notable in particular for the fact that they reflect the work of economists at large technology platforms trying to set up optimal incentives systems for reputation systems using the classic tools of economics.

Other examples of coring are constraints on who can use the platform, and attempts to make sure that antisocial behavior by one user of the platform does not have negative spillovers for other users.

It is useful to recognize that just because something is ‘infrastructure’ does not argue that governments should control that infrastructure or regulate access to this infrastructure. There are parallels here too with the early development of internet infrastructure that Greenstein (2020) highlights. That digital infrastructure has ‘happened’ swiftly, with very little government intervention. Furthermore, the US pathway for decentralized digital infrastructure has dominated worldwide. This has led to cries from non-US governments to have more control over underlying internet protocols. Similar, the recent increase in the importance of platforms have led non-US governments to seek to potentially intervene and gain more control.³ In other words, Greenstein (2020) when asking whether digital platforms are infrastructure, sets up one of the most crucial technology policy debates of our time.

³See for example the Australia Competition Commission and its Digital Platforms Inquiry <https://www.accc.gov.au/publications/digital-platforms-inquiry-final-report>

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