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Geographic Implications of Platforms for Labor and Work: Cases and Questions

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Abstract

As the platform economy has risen and matured, it has had geographic consequences. Today, platforms can be understood as gigantic machines for organizationally and spatially centralizing value and thus power. This article proceeds in two steps. First, we discuss the concentration of platform giants in terms of location on the US West Coast and market share in various services, such as search, maps and online sales. This has troubling implications: the fact that platforms are simultaneously intermediaries, two-sided markets, and data aggregators, creates synergies for platform owners and contradictions for those using the platform. Second, we use the cases of Amazon and Google Maps (GM) to demonstrate this, examining the extensive reach of these platforms in terms of the markets that they serve and shape, and their spatial consequences. We conclude by identifying areas for future research and by calling upon social scientists to consider the implications of the platform economy in reshaping the space of economic activity.

Introduction

Digital online platform firms are reorganizing the geography of capitalist accumulation. This essay explores some instances of the impact of platforms on space from three perspectives. At the *macro-level*, key platform firms are shifting the locus of economic activity to specific regions (e.g., US West Coast). We will show this in detail at the *meso-level*, where Amazon is reorganizing the logistics industry. Next, we demonstrate this at the *micro-level*, where GM is changing the ways by which people discover and decide upon local service providers. At each level, the intermediation of a platform changes the geography of value creation and capture. In sum, the impact of these global platforms is that they extract value across geographies but centralize it in a very few locations. The implications of this observation are profound as these platforms can be understood as gigantic machines for organizationally and spatially centralizing value and thus power (Kenney and Zysman 2020).

Online digital platforms can be considered a new organizational form that consists of a relationship between the platform and its ecosystem of complementors and users (Thomas et al. 2014; Tiwana 2013; Stark and Pais 2020). The organization and geography of the economy is being reorganized by this organizational form in the same way as almost a century earlier the Chandlerian firm became the dominant organizational form (Chandler 1993). Indeed, the migration of increasingly large sectors of economic activity onto digital platforms is propelling an economic shift that is as transformative as was the rise of Fordism in the early to mid-20th Century (on Fordism, see, e.g., Aglietta 1979; Lipietz 1982; on platforms, see Kenney and Zysman 2016; Srnicek 2017). The rise and maturation of the “platform economy” is already having profound effects on labor and competition (Bearson et al. 2020; Kenney et al. 2021; Kenney and Zysman 2016; Thelen 2018). Importantly, for this essay, and by historic analogy, the Fordist mass production paradigm had a powerful impact

on the geography of economic activity – not simply on the rise of the Industrial Midwest but also on the design of the US city. Fordism reshaped the spatial relations of capitalism, thereby creating, for its era, a “spatial fix” (Harvey 1982).

Similarly, the platform economy is recasting spatial relationships that will certainly generate and, perhaps, already has generated a new spatial fix. One overt indicator is the recognition and discussion around the powerful effects that digitization will have on “smart cities,” which conceive of urban dwellers as being embedded in a digitally defined landscape (e.g., Kitchin 2015; Richardson 2020). Even more concretely, perhaps echoing the efforts by the automobile firms in the postwar to shutter streetcar systems, is Google City Lab’s effort to build a new data-intensive, Google-compatible, neighborhood on the Toronto Waterfront. More to the point, consider how Uber and Lyft are reconfiguring transportation patterns (Gehrke 2020) and Airbnb is reconfiguring the nature and use of housing (see, for example, Wachsmuth and Weisler 2018). Platform firms are creating new spatial arrangements and relationships, from housing hotspots to city arrangements, which further their value creation and accumulation goals (Kenney and Zysman 2020; McNeill 2021).

The geographic implications of the emergence of the digital platform are significant because digital platforms have become the intermediary for an increasing proportion of all economic activity (Kenney et al. 2021). We, therefore, emphasize the power that digital platforms have accumulated over the last approximately fifteen years as they have intermediate ever-increasing segments of social and economic life. We next explore these questions further in case studies of Amazon and GM – effectively, these platforms exemplify many of the critical issues raised by the emergence of a platform economy and their consequences for spatial organization.

Digital Platforms and Economic Geography

Before turning to our core argument, we situate the current understanding in economic geography of the impact of digital technology on place. Until very recently, the majority of research by economic geographers on the impacts of digital technologies was undertaken during or in the aftermath of the 1990s Internet Bubble (Castells 2000; Malecki 2002; Zook 2000).¹ With the collapse of the Internet Bubble, interest in the geographic consequences of digital technologies waned and only has been reborn recently as geographers became interested in the impacts of digital platforms (one early contribution was Langley and Leyshon 2017). In 2005, Martin Dodge and Rob Kitchin revived the discussion when they argued that software, through its ubiquity and indispensability in an increasing number of activities, was blurring or even determining the use of space. Moriset and Malecki (2009: 271) concluded that the “main effect of IT-enabled informational ubiquity is to provide individuals, enterprises, and communities, wherever on Earth, with a greater choice for shaping an enterprising future.” This conclusion was prescient and suggested that the digital technologies allowed a greater dispersion of economic activity and increased the ability of producers to reach ever more distant consumers. The prevailing view regarding the constitutive powers of the software and code was that, while important, the changes driven by the internet reinforced the existing business structures and arrangements (see Lessig 2009).² As with many scholars, they did not see the rise to a monopoly position of the online platform firms.

Some labor researchers also shared the view that the changes the internet has caused are incremental. For example, in 2018, the International Labour Organization concluded “work on these platforms resembles many long-standing work arrangements, merely with a digital tool serving as an intermediary” (Berg, Furrer, Harmon, Rani, & Silberman, 2018).

¹ For recent important exceptions, see Fields (2019)

² In contrast, to this formulation their earlier paper on GM and Earth suggested that the power of these digital platforms was far greater in being able to frame action (Zook and Graham 2007).

This conclusion understands platforms as being merely an “intermediary,” rather than gatekeepers, data aggregators, and, in fact, untrammelled powers in their particular markets (see Cutolo and Kenney 2020, for a more realistic evaluation). Their conclusion is true, in the same way that the introduction of the moving assembly line did not change the fact that workers in factories were employed in producing and received payment for the work. Such a conclusion would not understand that context for work had changed profoundly, as the assembly line allowed the reorganization of production, created entirely new work categories, and led to a new geography of capitalist accumulation and competition while transforming consumption patterns.

The debate only recently has begun to comprehend the geographical consequences of the rise of the platform economy. While economic geographers have made progress analyzing the relationship between space, digitalization and the role of networks, they have focused far less attention to the fact that certain key Internet firms are not just websites or even massive multinationals, but rather they are online platforms, serving as intermediaries and gatekeepers connecting enormous numbers of users and customers with service providers, advertisers and others. In other words, they have been less concerned with the power that these platforms wield and, consequently have missed the impacts of this power on the spatial organization of this new way of organizing the economy (for an important exception, see Grabher and van Tuijl 2020).

More recently, scholars have advanced the proposition that platforms are a new institutional form that conforms neither to a market or hierarchical logic (Frenken et al. 2018; Stark and Pais 2020; van Dijck et al. 2018). Whether the form should be understood as new institutional logic or the economic-technical base of a new regime of accumulation, there is increasing evidence that the platform economy is reshaping the geography of economic activity (Grabher and Konig 2020; Kenney and Zysman 2016).

Before we turn to the spatial implications, let us reemphasize the emerging centrality of these digital platforms, as this is fundamental in grasping their spatial implications. The apex online platform giants such as Amazon, Apple, Facebook, Google, and Microsoft³ are now central firms in capitalist economies. In August 2021, these five platform firms were the most valuable firms in the world. The two Chinese platform giants, Tencent and Alibaba had tumbled because the Chinese government launched a far-reaching crackdown on them (McKnight et al. 2021).⁴ Along with a number of sectoral platform firms, such as, Airbnb, Expedia, Priceline, Salesforce.com, Shopify, Uber, etc., these have become the intermediaries organizing, reorganizing or even transforming a host of industries (Parker et al. 2016; van Dijck, 2013). Not only are platforms organizing markets by disintermediating incumbents and providing opportunities for new entrants, in many respects, they are private regulators of commerce.

Space and Power in the Platform Economy

The implications of platforms on geography has been underestimated despite that, as online intermediaries and connective agents, the geographic reach of these platform firms is staggering. It is perhaps only rivaled by the petrochemical giants such as Standard Oil, Royal Dutch Shell, and British Petroleum at the peak of their power. This reach is illustrated by the fact that Amazon; Facebook, Messenger, and WhatsApp; Google Chrome, Drive, Gmail, Maps, and Search have a billion or more monthly active users. Consequently, the implications of these platforms as a space for social and economic activity is enormous.

³ Microsoft was, of course, the platform owner during the personal computer era, but its dominance never reached beyond the personal computer itself. Of course, more recently, its cloud computing platform, Azure, has become increasingly significant. Its increased importance in the platform economy comes through its purchase of platforms such as Skype, LinkedIn, and, most recently, GitHub.

⁴ In the case of China, the crackdown by the Chinese government, which is trying to control their power, has dramatically decreased their value (McKnight 2021).

Online digital markets are characterized by network dynamics and would be winner-take-all aspects, as argued by Shapiro and Varian (1998), where the overarching goal of these firms is to “tip the market.”⁵ This concentration provides an opportunity for the dominant platform to extract value from the other actors in the ecosystem. Certainly, there is an ideological aspect to this, as Silicon Valley firms, in particular, nurtured a culture, as articulated by Mark Zuckerberg, of “moving fast and breaking things,” while venture capitalists suggested that entrepreneurs should “not ask permission, but rather forgiveness.”

The winner-take-all nature of online platform competition means that they are not simply intermediaries, rather, they are monopolistic or oligopolistic intermediaries. That is, platforms become the sole or one of a limited number of digital intermediaries between users and sellers, granting them immense power to channel transactions and extract value from them. To illustrate, if advertisers wish to connect with potential customers, there are only a few paths – predominantly advertising goes through the Google, Facebook, or Amazon networks. In 2020, the U.S. advertising market was dominated by Google with 28.9%, Facebook with 25.2%, and Amazon with 10.3% of the total revenues (Bruell 2021). Because the global telecommunications infrastructure already exists and, in particular, the availability of smartphones, the rapidity with which online platforms can add users is astonishing. For example, Google Drive was launched in 2012 and by 2018 had one billion users.

When compared to the titans of the past, the markets that digital platform firms operate in are, by contrast, even more concentrated. To provide a few comparisons, despite enormous consolidation there are still 14 significant sized auto makers (ex-China), at least 6 large private petroleum industry firms (and many more if one considers the national oil

⁵ There is an ideological aspect to this movement as Silicon Valley firms, in particular, nurtured a culture of “moving fast and breaking things” as articulated by Mark Zuckerberg who advocated “moving fast and breaking things”, while venture capitalists suggested that entrepreneurs should “not ask permission, but rather forgiveness.” This was motivated by the belief that online digital markets were characterized by network dynamics.

firms), and an even larger number of steelmakers. Outside China, there is only one search engine, one or two social media sites, one e-book seller, one or, perhaps, two online merchants, one mapping program, two smart phone operating systems, and two online travel sites (though Google Travel is threatening the current market leaders, Expedia and Booking.com). The levels of concentration in platform-organized markets is remarkable.

If the sectoral concentration is remarkable, the geographic concentration of the mega platforms is even greater as the headquarters for these firms is almost entirely concentrated on the West Coast of the United States. As noted, the single most important exception, the largest single market in the world, China, is closed to these firms. The few platform markets within which non-West Coast firms are significant are vertical markets, such as travel and music. Yet even the travel and music sectors are experiencing encroachment from Apple, Google, and Amazon. For example, Google Travel has become the largest online travel agency (McBride 2019).

Crucial to an examination of the spatial content of platforms, is that often these digital platforms have replaced activities that were previously local and centralized them onto a platform in the “cloud.” Consider, for example, one of the earliest platforms, Craigslist, which absorbed classified advertisements from newspapers. While it only charged for employment advertisements, it destroyed classified advertising – one of the mainstay income sources for local newspapers (Seamans and Zhu 2014). Similarly, the rise of online travel agencies such as Expedia and Booking.com control approximately 39% of all online bookings (Kelly 2017), thereby replacing local travel agents. Amazon, which we discuss later in more detail, is directly leading to an ongoing shake-out in bricks-and-mortar retail globally (LaVecchia and Mitchell 2016). Finally, Google, the global giant, is increasingly important in finding merchants locally, forcing merchants to advertise on its search platform and thereby extracting value from the local market and centralizing it.

The geography of value creation and capture are in a fundamental flux, as the integration of ever more businesses into the various platform's ecosystems continues. At the local level, to be discovered ever more firms are dependent upon Google Search and Maps, Yelp, and Facebook to entice customers and for this must buy advertisements, thereby transferring value from the local economy to the platform.⁶ Built upon the ubiquitous networks that Castells (2000) documents, the scale, pervasiveness, and reach of the platforms is paradoxically wedded by a remarkably granular localness created by user-generated local content. The value transfer produces ever-greater spatial inequality, as the platform accumulates ever more users and data.

The next two sections examine some features of two mega platforms, Amazon and GM, to indicate tendencies and developments of the platform economy more generally.

Amazon – The Economic Geography of a Platform Giant

The Amazon case has been examined in depth by many, most famously by Lina Khan, but also by ourselves (Khan 2017; Kenney et al. 2021). In this essay our concern is the geographic implications of the case, which have not been a focus in most other essays. We utilize the Amazon case as a dramatic example that heightens our understanding of how, in general, platforms reshape geography. While Amazon's expansion methods are not intrinsically different from brick-and-mortar institutions practicing e-commerce, Amazon's importance is dramatically greater due to the unique logic of platforms. Through this case, we demonstrate several geographical development implications:

- First, the transformation of the physical shop-based retail sales model;
- Second, the borderless nature of Amazon vendors;
- Third, the increased reliance on geographically dispersed contractors for fulfillment processes, which ensures lower labor costs than existing firms; and

⁶ In addition to buying advertisements, "purchasing reviews" is a common practice among merchants. Restaurants may offer a discount to patrons for leaving a Yelp review or Amazon sellers (although, according to the Terms and Conditions, not allowed) may offer free or discounted products in exchange for a positive review. There are obviously implications on inequality, as platform familiarity and the ability to forgo income for self-promotion become necessary for marketplace participation.

- Fourth, the pioneering of a logistics system, that is a digital Taylorist work process. Each of these contributes to putting pressure on wages and working conditions at traditional retailers, logistics firms, and the entire economy.

Amazon is reshaping geography to suit its business model. Importantly, it also finds advantage operating across geographically situated regulatory regimes, creating a form of regulatory arbitrage -- this was particularly true during its early growth. In one sense, but only in a limited sense, Amazon confirms Cairncross' (1997) claim that the internet results in the death of distance, as an increasing number of people order online, and have items delivered rapidly. But Amazon is also building a logistics infrastructure in ways that have significant implications for the spatial economy of cities (on code/space, Kitchin and Dodge 2011).

Before turning to the geography of fulfillment, let us remind ourselves of the basics. Amazon was established in Seattle in 1994 as an e-commerce online bookseller, and has since become the largest online retailer. After 2000, when Amazon opened its website to third-party vendors it became possible for any merchant anywhere to sell through Amazon. This enabled anyone to become a retailer – there was no need for a store or even normal place of business – a spare bedroom in any city in the US or anywhere else could become a “shop.” By 2021, Amazon overtook Walmart as the largest US retailer in terms of gross merchandise value, responsible for approximately 40% of all online retail sales (Deagon 2021).

The movement of sales online reorganized the process and locations for fulfilling customers' orders. This, in turn, is changing the location of employment and types of employees needed. Instead of customers coming to physical stores, for most goods, purchases can be made online and delivered from a warehouse normally located outside of town. This brings us to the geography of fulfillment and its implications.

The Geography of Fulfillment

The Amazon website was established as a virtual bookstore accessible to anyone with an internet connection. Initially, Amazon used Ingram Books, a book distributor, to handle all logistics. Four years after it was founded, Amazon began selling compact disks and video cassettes, as they had similar physical characteristics to books that made expanding logistics simple. In 1999, toys and electronics were added to the firm's inventory. The company continued its rapid expansion into selling other products and gradually out-growing its relationship with distributors. For Amazon, adding and extending product lines was relatively easy as it simply entailed building a new catalog and placing a new tab on its home page. This constant expansion of product offerings meant that the fulfillment system was obliged to grow and indeed innovate. Amazon's computer system, warehouses and later in-house logistics system, and management team not only grew in number and size, but as importantly, in capability to handle an ever-greater variety of products of varying sizes and shapes.

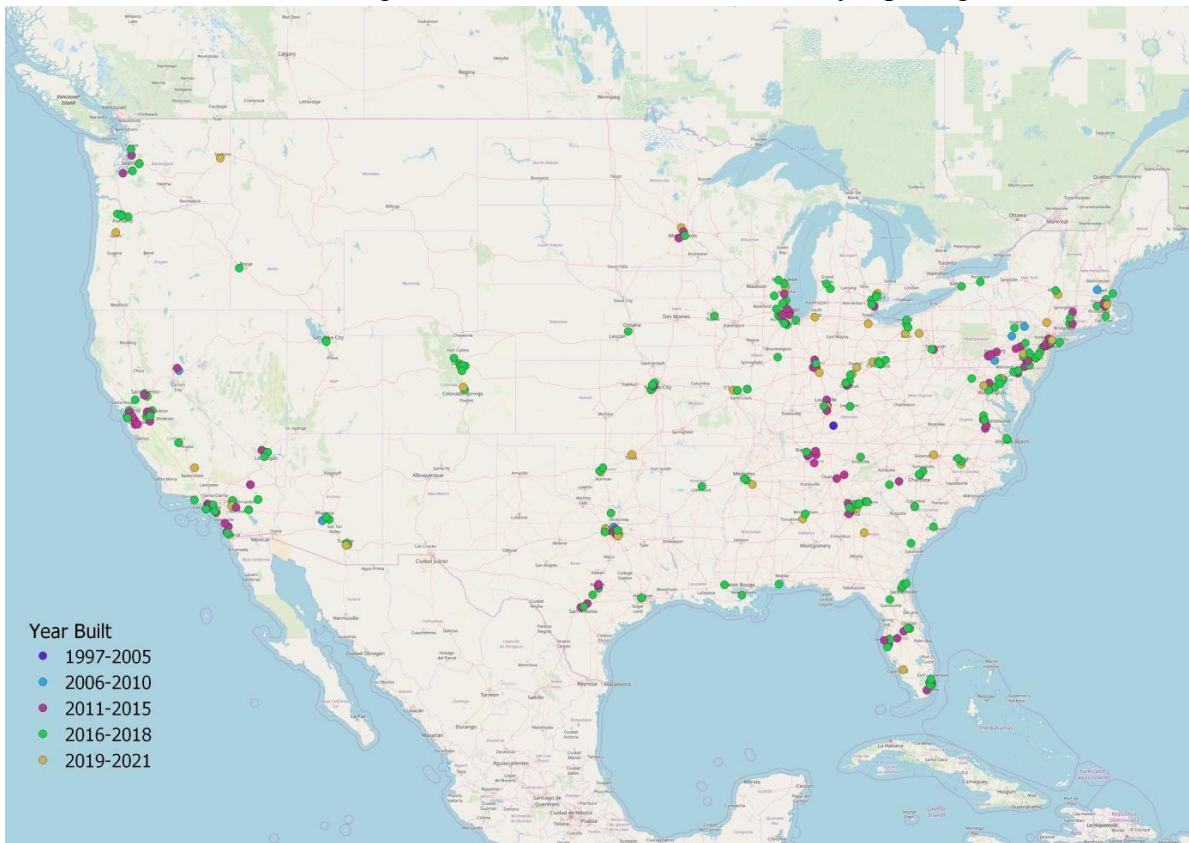
In 1997, Amazon opened its first warehouses, one in Seattle to serve the West Coast and one in Delaware to serve the East Coast. In 1999, it opened warehouses in a number of other states including Fernley, Nevada largely to serve the rapidly growing California market (MWPVL International 2019). In order to avoid paying taxes, Amazon exploited differences in state regulation in its location decisions. Taking advantage of a feature of the US federal system, namely that the shipping firm is not required to collect state sales taxes on goods shipped interstate due to the interstate commerce clause in the constitution. This regulatory arbitrage was a powerful subsidy to the online retailer as the unpaid taxes largely covered the shipment costs (Einav et al. 2014). Effectively, federal law provided a subsidy and also shaped the initial location of Amazon's warehouses, as having a point of presence within a state meant that the firm would then have to collect taxes on all products shipped into that state. As Amazon grew and was shipping ever more merchandise, more distribution centers

were needed. Amazon faced a conundrum, namely it could expand in the states where it already had distribution centers (Washington, Delaware, Georgia, Kansas, Kentucky, and Nevada) or it could expand into another new state. However, expansion into another state meant that it would have to begin charging sales tax for all sales that went to that state. Eventually, in response to regulatory pressure from states and local vendors as well as ever-increasing volumes, the decision was made to no longer avoid sales taxes.

The strategic decision to establish dispersed facilities rather than focus on a few, major centers came in 2005, when Amazon launched Amazon Prime. Amazon Prime, which promised free two-day delivery anywhere in the US, locked-in customers and drove even higher volumes. However, it meant that Amazon faced a new logistics challenge. Fulfillment now became the key cost for Amazon's business. No longer constrained by local tax evasion, the location of Amazon's distribution centers changed dramatically. As the green and purple dots in **Figure One** indicate, facilities were soon established outside all major population. Rapid, free delivery replaced tax savings and Amazon shifted its concentration to lowering the cost of logistics. The significance of this logistics shift, which dramatically accelerated in the 2010s, was that with the enormous success of Amazon Prime, Amazon needed to deliver products more rapidly, while containing the resulting cost

Figure One:

U.S. Location of Amazon Logistics Facilities and Data Centers by Opening, 1997-2021



In order to meet the demands of Amazon Prime, Amazon created an entirely new logistics system that included warehousing, fulfillment, long-haul trucks, and even an air freight fleet. Amazon rapidly built out its warehousing footprint, nationally and globally, but last-mile delivery was contracted to the US Postal Service, UPS, and FedEx in the US (and their equivalents abroad). As volume grew, Amazon was able to extract ever better rates from these firms. Due to its scale, the shipping rates Amazon negotiated were lower than the rates Amazon Marketplace sellers could get independently from shippers, allowing Amazon to eventually launch “Fulfillment by Amazon.”⁷

⁷ Fulfillment by Amazon (FBA) enabled Amazon sellers to send their products directly to Amazon fulfillment centers where the firm would handle “pick[ing], pack[ing], ship[ing], and provid[ing] customer service” for orders.

Second, fulfillment remained one of Amazon's greatest costs. In 2015, Amazon introduced Amazon Flex, which engaged "independent contractors" that used their own automobiles to deliver packages from Amazon or Amazon-contracted warehouses. This allowed it to put further pressure upon its logistics suppliers and force them to take Amazon's expensive peak load deliveries. To further extend this contractor-based delivery system, in 2018, Amazon signed a contract to purchase 20,000 Mercedes Benz delivery vans that it "sold" to local "entrepreneurs" that wished to start local delivery businesses (Stevens 2018). These contractors then "hired" or contracted subcontractors to staff the delivery vans, thereby removing the "contracting" responsibility from Amazon. Despite this contractual separation, all of these contractors were monitored by Amazon in real time (Hempstead 2019).

Amazon's effort to build a supply chain expanded to, *third*, include directly contracting long-haul trucks to move goods. It also leased planes and established a delivery hub in Hebron, Kentucky. The Amazon pilots are employed by a contractor that pays less than other airlines. Finally, in 2016, Amazon received a license from maritime authorities to become an importer-shipper from China (Chamlou 2018). Coordinating this ever-expanding network of "captive" contracted logistics operations and its own warehouses was accomplished through the application of enormous computational power and software design.

Once in place, *fourth*, the logistics system with two-day and often same-day delivery was wielded as a competitive advantage against competitors such as Walmart, eBay, and others. And yet, even though Amazon has built its own logistics system it continues to contract with FedEx, UPS, and USPS for delivery, taking advantage of other organizations' geographical strengths or relative costs. Similarly, even as it contracts with warehouse logistics providers like Dynamex, it also competes with them and resells their services to

Marketplace sellers. But the key to its expansion, is that Amazon has a structural advantage because it has more supply chain data than any other retailer. This provides it with a god-like view into the physical and virtual dimensions of its logistics chain.

Finally, *fifth*, the final important geographical impact was that Amazon began offering fulfillment to its Marketplace vendors – it labels these offerings as having “Fulfillment by Amazon”. By providing the fulfillment service to its vendors, it further increased its warehouse and delivery volume, thereby decreasing logistics costs per item. This offering had another important effect as the growth of Chinese sellers was facilitated by FBA, as it allowed their products to have the same two-day Prime shipping from an Amazon warehouse as domestic sellers. The Chinese sellers would ship their products to the Amazon warehouse in the US or Europe from where customer orders were fulfilled, thus concealing the fact that the seller’s business location was in China. According to Marketplace Pulse (2019), “almost all top Chinese sellers use FBA, while only 75% of top US-based sellers do.” In addition, firms that used FBA had higher rankings than those that did not.⁸ As Amazon increases the throughput through its logistics system, it will increase its economies of scale and scope, magnifying its considerable advantages, enabling it to enter yet other markets further squeezing competitors.

The local and regional development implications of the movement of sales online are difficult to capture because there has been little study of the local employment effects. *One* obvious result of the movement of sales on-line, a tendency that was reinforced by the Covid-19 pandemics, is the transformation of the physical shop-based retail sales model that is leading to the “hollowing-out” of many shopping centers and main street shops (Semeuls

⁸ As Cutolo and Kenney (2020) point out, using FBA separates the third-party vendor from its customers and thus strengthens Amazon’s control of the customer and prevents disintermediation. For the Chinese vendor, this is not important. For US vendors wishing to decrease Amazon’s power as an intermediary, FBA is a double-edged sword (see also Cutolo et al. 2021).

2018). The jobs in these shops are being partially replaced with warehousing and delivery workers, many of whom are contractors, whose place of employment is on the urban periphery. Here again, the Covid-19 pandemic appears to have accelerated this trend. In some cases, the geographical implications are even greater, as seasonal workers may travel to temporarily reside in the towns with Amazon warehouses. A *second* result is that vendors can operate from anywhere in the world or from their homes to sell online through Amazon, as was shown clearly in the case of Amazon and Chinese exporters. *Third*, the Amazon-owned logistics system utilizes large numbers of contractors that ensure that it has lower labor costs than the established firms such as UPS or FedEx that are being replaced. As part of this, the Amazon logistics system has pioneered an all-encompassing digital Taylorist work process. *Finally*, this combination of “innovations” puts pressure on wages and working conditions at retailers and logistics firms. In regional development terms, Amazon is likely to decrease local employment and, not only, contribute to a further hollowing out not only of downtown retail, but also suburban shopping centers as their retail anchor tenants collapse into bankruptcy.

Summation

Amazon is changing the geography of retailing, logistics, and also production as it replaces stores with home delivery and the Amazon Marketplace allows vendors from anywhere in the world easy access to customers. As it has expanded, Amazon or vendors on its Marketplace now competes with nearly every retailer, online and offline. The continual entry into new markets, drive to automate, and lower costs results in constant pressure on prices and thus wages in ever more industries and geographies. It has exploited the fact that as it increasingly became the website upon which consumers searched for products, it could sell advertising, forcing vendors to bid for the all-important “buy box”, even as it demoted

and hid vendors with the lowest prices -- something understandable as it gets a commission for every sale and the advertising was a remarkably lucrative source of greater profits.

Amazon offers remarkable convenience, competitive low prices, and the ability for consumers to purchase from vendors anywhere in the world; however, while not yet demonstrated empirically, the business model appears to be a powerful engine for increasing spatial inequality. The effects of this spatial inequality on labor are multi-faceted. First, clerks in shopping malls are being displaced by workers augmented by robots in warehouses and drivers for last-mile delivery. In the logistics system, UPS and FedEx drivers are being replaced by poorly paid contractors. As local businesses are displaced, as was the case with Walmart in an earlier retail revolution, consumer spending and control is transferred from the community to the headquarters and centers of control to an even greater degree. Second, at the global level, the powerful national and, even, international retailers now have a global competitor that benefits from winner-take-most economics contributing to greater global concentration in all of the countries within which it operates.

In summation, the spatial inequality prompted by Amazon's business model occurs through the destruction of local retailing, the inherent structure of its Marketplace to put downward pricing pressure on its third-party vendors, its logistics chain using third-party vendors that are paid far less than incumbents, and the relentless warehouse and logistics automation ensuring ever fewer jobs per dollar of retail sales. Be that as it may, we are only now beginning to understand the social, labor and geographic implications of Amazon's success.

Google Maps

While Amazon has reshaped the physical geography of work, GM has reshaped our mental models of place and space. Google's mapping tools shift the ways in which we locate ourselves, activities, and places in the physical world. GM is transforming the lived

experience of geographic space as well as the competitive dynamics in a wide variety of industries. As a result, GM has become a powerful platform for reorganizing social and economic activity to capture value. However, before diving into the spatial consequences of GM, we begin by exploring the business of GM as an owned digital platform.

Maps, while important in the desktop era, have become a vital service in the mobile era – for both users and service providers. Maps are a representation of geography and as Craig Dalton (2013) observes “maps have a long-running association with sovereign power in the exercise of state programs such as empires, defense, land tenure, and administration” (Dalton 2013). With 80% of the US market, GM has become both a platform and a reference. To paraphrase Dalton, in spatial terms, the map denotes existence, and to be “on the map” is mandatory for any entity wishing to be found — overstated perhaps, but today, GM is the manifestation of this.

Google Maps Starts and Spreads

The key to GM's success as a business was that almost immediately upon introduction, users began creating applications that rested on top of the GM platform. Google managers quickly realized that the user-generated content from these spontaneous customizations of GM created enormous value. As a result, in June 2005 Google began allowing users to integrate the GM API into their websites and applications. With the move to the mobile era, the ability of firms and individuals to integrate GMs into their own platforms made businesses such as making Uber, Doordash, Instacart, and many other location-based services possible. For the gig-based firms, it was vital because now any person with a car could find places without having special knowledge or passing a test (Edwards 2015), thereby allowing them to use less knowledgeable workers.

Initially, GM was free, thereby helping it gain market share against other map applications. However, in June 2018, it was announced that all users of the Map API would

have to have a Google billing account to continue to use it, though small-scale users would get a \$200 per month credit — a clever strategy as it allowed entrepreneurs and users to experiment. If they created a commercially successful entity, they would have to begin paying Google for its use. The initially generous terms meant GM was quickly adopted. By 2013, the GM API was the most used API in the world with over one million websites using it (Google 2013). Effectively, every website with a Google Map embedded in it was transformed into a potential Google customer. These design and deployment decisions were critical; as users began to innovate on GM and integrate it into their websites. This user involvement was vital for its transition to being a powerful platform. Consequently, the degree to which our sense of place and space hinged on these maps expanded.

As is typical for a platform, GM has constantly evolved by adding more features and often learning from innovations made by the users in its ecosystem. For example, GM has added features such as Street View, aerial maps, public transport schedules, pedestrian information, hiking trails, the ability to hail an Uber or follow a package, etc. even as it increased its knowledge of locales. Today, GM is what Gawer (2020) would denote as a hybrid platform. A combination of a transaction platform (serving as an intermediary between businesses looking to be found and searching customers) and an innovation platform (upon which others have developed complementary innovations by integrated GM to serve as a locational function, GM has reorganized markets and societal behaviors around spatial relationships.

Thus, began the shift from the professional to anyone being able to contribute to and “create” maps. Originally, the ability of users to interact directly with online mapping tools such as GM led some geographers to argue that a “neogeography,” synonymous with a “bottom-up” democratization of mapping was emerging (Eisnor 2006; Turner 2006).⁹ In

⁹ For a more skeptical view of neogeography, see Haklay 2013.

some respects, traditional map-making has been overwhelmed by online user-generated content in roughly the same way encyclopedias were overwhelmed by Wikipedia. Mapping, with GM being the frontrunner, has become a platform that has winner-take-most dynamics, multi-sided characteristics, lock-ins, user-generated data, and the formation of powerful ecosystems. We suggest that the lack of recognition that maps are now platforms leads to an underestimation of the power of GM – and, most remarkably, a power that is only increasing as lock-in becomes greater and AI is applied to extract more value from the resultant user-generated geographical data.

The Ubiquity of GM

GM, with its winner-take-most dynamics, multi-sided characteristics, and lock-ins has formed powerful ecosystems that have fueled its ubiquitous spread making it an essential feature of daily life. The reach of GM can be measured in terms of volume, where the greatest reach and largest amount of information, almost certainly, is all of the Android users (and iPhone users that use GM) and basically all desktop users. Complementary to mobile mapping, by being embedded in so many websites, Google receives information every time someone goes to a website and accesses their map – be that an Uber customer or driver, someone searching Booking.com for hotels, or someone using Yelp to search for a nearby restaurant. This provides data regarding potential consumer interest that grants Google two revenue streams – the merchant pays for the click on the map and because of the evidence of consumer interest, advertisements can be served to that consumer. The behavioral change GM has catalyzed — the widespread habitual practice of referencing GM for directions, restaurant recommendations, and even activities — is even more extraordinary than the pervasiveness of GM across devices, as remarkable as that is.

In economic and competitive power terms, GM' embeddedness in the applications and operations of other firms may be a greater indicator of its ubiquity and power. Consider that

Google's competitors (as Google now has direct travel booking and local business rating systems), Yelp, Booking.com, Expedia, and others all use GM, thereby providing data on map searches directly to Google, while paying Google for usage – effectively Google can see directly into the core of their businesses. What is significant is that GM is a vital module in the business models of these firms and Google is able to extract value and data – and, should it wish to, can enter their markets, such as lodging or travel, armed with significant prior understanding.

Maps are also becoming an important input for incumbents in other industries. For example, today's automobiles are sensor-laden connected vehicles with cameras, mechanical, temperature, and numerous other sensors. Initially, most automakers resisted the integration of GM as their default in-automobile navigation systems. And yet, GM is being used by Fiat-Chrysler, General Motors, Renault-Nissan-Mitsubishi Alliance, Ford, and other automakers as bow to consumer wishes and sync their phones with GM (Narayanan 2020). The German automakers, BMW, Mercedes, and Volkswagen as a consortium, purchased Nokia Maps in 2015 for \$3 billion in an effort to preserve an alternative to GM (Kiley 2015). As an increasing number of automakers adopt GM, it could become the de facto standard for auto mapping with a lock-in providing Google yet another opportunity to generate revenue.¹⁰

The generativity of Internet platforms, their ability to be repurposed and integrated into new uses, is what allows the innovative use of the platform resources, while integrating new actors into the ecosystem (Zittrain 2008). This is very evident in the case of GM. To illustrate, insurance claims adjusters use Google Street View to reconstruct an automobile accident scene without visiting the location, thereby shifting locational details digitally and saving time. GM and Street View are integral to Pokemon Go and other real-world, place-based games and thus give rise to greater innovation which straddles our mental and physical

¹⁰ Most cars permit Apple Play as an alternate mapping system to show up on the primary navigation screen, even though it is not integrated into the additional services such as the heads-up display.

interactions with geography (Holly 2018).¹¹ Yet another application on GM is “Plane Finder” which maps planes in the US skies in real-time. Each of these uncompensated innovators make GM more ubiquitous and more valuable and, if the innovations become monetizable, they pay for the use of maps.

GM’ revenue streams are as diverse as its use cases. *First*, and fundamentally, GM profits from the data it collects from users, both end-users and business-users. For instance, when a potential customer interacts with a Google Map that is embedded in a website or application, Google receives two revenue streams – the merchant pays for the click on the map and because of the evidence of consumer interest, advertisements can be served to that consumer. *Second*, GM monetizes large scale partnerships with other firms wanting to integrate GM with their own products or services. Between January 2016 and December 2018 alone, Uber paid GM approximately \$58 million for use by its drivers and for route visualization for customers (Lyft also uses GM). Here again, the data collected while the car is driving is shared with Google. This approach to monetization expands beyond the tech industry as automakers enable their vehicles to sync with GM, per the demand of customers. *Third*, as GM has become the intermediary connecting customers in their search for local service providers, it has developed a digital advertising model in which local service providers pay Google for advertisements to generate customers. Finally, *fourth*, the generativity of GM has enabled ever-expanding revenue streams for Google, grounded significantly, in unpaid innovations and content, as discussed above. Still, the implications of GM go beyond the monetization of unpaid contributions; GM’s power in determining digital geography and spatial relationships has real world effects across social and economic activities.

¹¹ More recently, Niantic Pokemon Go to Open Source Maps (OSM) to weaken Google’s hold over its games.

Implications for Geography

The ubiquity of GM has had profound spatial consequences. As previously noted, GM, like traditional maps and, in fact, as is the case with Google Search for virtual places, the ability to find something, denotes existence. Similarly, but with greater reach than traditional mapping, the platform dynamics of GM has nurtured an uneven playing field when it comes to firms being mapped. For local businesses appearing on the map, in particular, Google's Map, is becoming critical to social and economic participation. This proof of existence also necessarily means that a business must provide unpaid content, such as pictures and information about the business establishment, to GM. As a restaurant, for example, this increasingly also includes a menu with prices, but as Google also provides customers the ability to review the local business, it also includes user-generated content from customers as well.

More recently, Google introduced the Google Guaranteed program, by Google guarantees the local repair services and features these services, thereby directing customers to them for a referral fee. While GM may enable new businesses to easily be found, it can also reinforce existing inequalities. For instance, a larger coffee chain is likely to have greater resources that allow it to correctly set up and market a GM listing, while a mom and pop shop may not. As consumers utilize maps to find businesses, they are more likely to find organizations that can utilize the platform well, as opposed to one that cannot, regardless of consumer preference.

On GM, existence can also be guaranteed in the form of advertising. GM has become part of the hegemonic local information package that allows Google to, more tightly, integrate local firms into its advertising machine. Because increasingly searching for local service providers such as plumbers, electricians, locksmiths, etc. is through Google, it has become the intermediary for service provision replacing newspapers, television, radio, Yellow Pages, etc. The result is that local service providers must pay Google for advertisements to generate

customers and this revenue is extracted from the community and community news media. Effectively, this serves as a counterpart to Amazon removing retail sales from community stores, as Google Local Services displaces local advertisers and extracts that revenue from local vendors and service providers.

As important is that when a potential customer searches for a specific establishment online, if that establishment does not advertise against that search, Google will sell the advertisement to the establishment's competitor. This is done in two ways. Google runs "keyword" ads as well as "competitor" ads. The keyword ad allows a business to place an ad based on a keyword search (e.g., "flat white coffee"), while competitor ads allow firms to directly target people searching for a competing business (i.e., with two Thai restaurants in the same area, Thai A and Thai B, Thai A can pay to come up on the search when people look for Thai B) – essentially “hijacking” the restaurant's potential customers. Furthermore, restaurants may feel that they have to “purchase” reviews, by providing customers with free or discounted products, while putatively illegal from Google's perspective, it is a common practice among merchants as a way to increase “organic” advertising. In each of these examples, existing inequalities can be reinforced as those who can afford advertising on GM, either directly or through reviews, direct more customers to their businesses, often, regardless of location or preference. Of course, a new entrant could invest in Google advertising to build their business. Regardless, as the intermediary, Google always wins.

The geographical implications of GM extend beyond the extent to which individuals or firms can participate in mapping, to whether or not individuals, firms, and even places are granted the choice to participate. Spatial knowledge, as Harvey et al. (2005) noted, is influenced by identity, power, and socioeconomic status. It is unsurprising, therefore, that the global development of GM has reflected the perspectives and priorities of the Silicon Valley elite. In 2014, for instance, a year after becoming the most used smartphone app in the world

(Richter 2013), entire townships in South Africa were still unmapped, left as blank open spaces despite the communities that existed within them (Wan 2014).

This brief discussion of the increasing hegemony of GM over “location” itself suggests that mapping is becoming a powerful platform in its own right and being integrated into other products and services. While GM provides a remarkable service to users, for place-based establishments it effectively operates as a tax upon them. Moreover, GM continues to amplify existing inequalities as a discerner of existence. The dominance of GM has effectively subsumed the function of finding things and being found into a dual monetization model that continues to reshape spatial relationships, online and offline. As an affordance, Maps is built into a myriad of other applications, thereby extending Google’s access to information and data. Finally, it has had extraordinary importance as a social phenomenon that affects how we understand and experience space.

Concluding Remarks

It is now widely accepted that online platforms are transforming economic and social life. In this essay, we have used two case studies to explore the ways within which online platforms are reorganizing the geography of economic activity. First, the reach and power of the online platform giants is such that, at the global-scale, value is created by firms and individuals scattered around the world. However, the capture of that value is remarkably concentrated in a few firms located on the U.S. West Coast. In the previous era, nations had national champions in the key sectors such as steel, automobiles, chemicals, etc. In the platform economy ex-China, this is not the case; most other nations are relevant only as consumers or content providers to be intermediated by the platform. Synchronically, their sectors such as retail, logistics, publishing, advertising, entertainment, and others are being challenged directly by the platform giants, even while their local firms can reach global markets through the platforms.

At the meso-level, the increasing share of online sales, which has only been accelerated by the Covid-19 pandemic, and, in particular, by Amazon is resulting in a new geography of retail. This geographical shift has replaced sales clerks in stores with non-unionized workers in warehouses and delivery which are constantly monitored in real time by algorithms and, as a result of Amazon's digital Taylorism, face the omnipresent threat of replacement by robots. One result is the demise of the shopping center emblematic of the mass consumption society to be replaced by warehouses on the outskirts of cities.

The political economic significance of online maps and its effect on local business and communities has received little sustained attention. Our brief discussion suggested that GM, because it is able to locate things and people in space, is remarkably important for all manner of services. We showed that Maps' ability to act as an intermediary between those looking for something and those having it, allows it to extract value, frequently amplifying inequalities. It is already altering the use of economic space as GM enabled untrained drivers to replace professional taxi cab drivers through the Uber/Lyft apps. Home buyers can use Street View to look at neighborhoods and individual homes without using real estate agents or having to drive through a neighborhood. Loan officers can "tour" a neighborhood through StreetView and decide its "quality" by observing the conditions of homes and even the infrastructure such as the streets. GM increasingly is treated not as a depiction of a place, but actually as an unbiased view of the place, with little consideration given to its political economic implications.

Online platforms and society's reaction to them and their impacts will be one of the most contentious struggles in the next few decades (Cioffi et al. 2021; McKnight et al. 2021). This will include how online platforms such as Uber, Airbnb, Instacart, and many others use public space for private purposes. Amazon and online sales are reconfiguring work and the location of work. And, finally, online maps are proving a powerful tool for extracting value

from local businesses. The articulation of the local and its integration into the global have received far too little attention from geographers and political economists.

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