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Work and Value Creation in the Platform Economy

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ABSTRACT

The emergence of the platform economy is reorganizing work, employment and value creation. We argue that the digital platforms are fracturing work itself as the places and types of work are being reorganized into a myriad of platform organized work arrangements with workplaces being potentially anywhere with Internet connectivity. We differ from most traditional narratives that focus solely upon either work displacement, a single type of platform-organized value-creating activity, or David Weil's concentration solely upon the workplace. We recognize that even as some work is replaced, other work is being transformed; new work and old work in new arrangements is being created and recreated. Our taxonomy begins with the workers employed directly by the platform and its contractors. We then introduce the category, platform-mediated work, which we divide into three groups: marketplaces such as Amazon; in-person service provision such as Uber and Airbnb; and remote service provision such as Upwork. The next category, "platform-mediated content creation," is complex. We identify three groups of activities: consignment content creators that include services such as the app stores, YouTube, and Amazon Self-Publishing; non-platform organization content producers, which refers to the enormous number of workers occupied with creating and maintaining websites; user-generated content is the non-compensated value creation that ranges from content uploaded to Facebook, Instagram etc. to reviews on sites such as Yelp! It is only when work and value creation is considered in all of these platform-based manifestations that we can understand the ultimate dimensions of the platform economy and comprehensively understand its implications for work.

Keywords: platform economy, user-generated content, venture labor, internet, work force, contractors

This essay sorts out the different kinds of work being created in what we have termed the “platform economy.” Here, we differ from most of the traditional narratives that focus either on the displacement of work or on one type of work, providing digitally organized, in-person services, such as providing transportation, room rental, or remote service work. The development of the platform economy and the diffusion of intelligent tools and systems more generally are transforming how goods and services are created, produced, and distributed throughout the economy (Kenney and Zysman, 2016; Zysman and Kenney, 2018). Our focus here is the impact of platforms and intelligent tools on work, labor, and value creation. Digital platforms, which are virtual locations through which various users communicate and transact, have become intermediaries for organizing social and economic life at both the micro-level in terms of how work is performed (Scott and Orlikowski, 2012; Barley 2015; Orlikowski and Scott, 2016; Van Dijck, 2013) and the economic structural level (Kenney and Zysman, 2016; Srnicek, 2017). Effectively, platforms are mechanisms mediating greater portions of social life (Perrin and Jiang, 2018).

The reality is that we know much less than is often claimed about the transformations underway. We know that some jobs/tasks will be eliminated, new work created, and much work transformed. There is the hype of “the robots are coming,” which will eliminate jobs, and the fear that everyone will be relegated to being a transiently employed Uber driver. For some, “the singularity is nigh,” accompanied by an employment apocalypse. With the increasing application of digitization to work and other aspects of social life, a powerful narrative has emerged that massive numbers of jobs will disappear as a new machine age inexorably results in massive unemployment (Brynjolfsson and MacAfee, 2014; Frey and Osborne, 2017). Others,

such as Manyika et al. (2017), suggest that a more prevalent tendency will be for certain tasks to be automated (or, as Zuboff [1988] evocatively termed it, “informed”).

By contrast, other arguments claim that we face another epic industrial transformation, in line with historical experience, creating real opportunity but also initiating dramatic economic and social restructuring (Janeway, 2012; Perez, 2010). And, of course, there are the arguments that the entire digital transformation is overblown to start with and, in any case, is more or less over (Gordon, 2017).

What we do *not* know is what, when, how, and how much. Existing work and the context in which it is performed are being transformed and reorganized. Many routine tasks will be displaced or altered, but how many jobs will be eliminated is less certain. Consider the transformation of the work of a restaurant server in an environment in which a customer’s Yelp evaluation of service is monitored by supervisors. Here, the platform has changed the work conditions and the supervisory system. Note that this occurs without the intrusive use of digital tracking technology. Of course, it is also possible that many of the servers’ positions could be replaced by robots (Semeuls, 2018). Indeed, one could speculate that applying digital tools to many routine tasks may just change the character of work but not the categories or levels of employment.

The increased centrality of digital platforms motivates this essay as we focus on the creation aspect, asking, “What sorts of jobs or work are being created?” The past history of technological change suggests that new work will be created. As we explore this question in this paper, we recognize that whether digital platforms, such as Uber, create a flood of gig work or create new transportation firms with imaginative new work arrangements will depend as much on labor market law, policy and rules, and the politics of labor as on the technology itself.

Reflecting upon the ongoing dismantling of the Chandlerian firm through outsourcing and spinning off various corporate functions, David Weil (2014) has termed this process a “fissuring of the work place,” in which increasing numbers of workers in a physical workplace are employed under different contracts or by different employers. Louis Hyman (2018) sketches how work became temporary and how the dream of the fully vested job with benefits was in any case the domain of some white workers. Although we agree with Weil and Hyman that this fissuring was already underway, we find that the emerging platform economy is creating a kaleidoscopic set of new forms of employment and value creation opportunities – it is in fact fissuring the work force and the arrangements through which “work,” in the sense of value creation, is organized and carried out. The implications of the platform economy are far broader and more encompassing than simply Uber and TaskRabbit and include the millions of vendors on Amazon and eBay, app creators for smartphones, YouTube video creators, and many more. In fact, they include the enormous ecosystems that these platforms support. Finally, as these platforms reach further into traditional industries and firms, they will begin reorganizing them as well.

An Analytic Framework/Taxonomy

We propose here a taxonomy to consider the influence of work on platforms: new work generated, work transformed, and new methods for creating value that influences compensation and employment (see *Table 1*). We return to that taxonomy below. Not surprisingly, given their increasing salience, efforts have been made to categorize platform firms. For example, Fumagalli et al. (2018) posit six categories of platform firms based upon the way in which they generate income:

1. Advertising platforms that offer a service and serve ads to users,
2. Cloud platforms, such as Amazon Web Services or Microsoft Azure, that sell data center use,
3. Industrial platforms that control production or distribution activities,
4. Product platforms, such as Netflix, Spotify, and YouTube, or possibly app stores that deliver presumably virtual products for a fee or subscription,
5. Work platforms that are intermediaries for in-person service provision; they are often subsumed under the terms “on demand” or the “sharing” economy.¹
6. Logistics platforms, such as Amazon, eBay, and Etsy, that organize online commerce and, in most cases, provide a virtual market for third-party vendors. In contrast to Amazon, most of these firms are not also becoming logistics firms.

Although this formulation is based on a monetization scheme for particular platforms, it does not directly address labor monetization by ecosystem participants.

From a different perspective, Forde et al. (2017: 11) finds that, in terms of dependence upon platforms for income, three categories of workers exist: moderate beneficiaries, random surfers, and platform-dependent workers. The importance of this categorization is that it recognizes that the degree of income dependence by those who obtain work generated by platforms ranges from absolute to merely supplemental. These differing levels of engagement by those who earn income on these platforms illustrates the ease of labor-market entry and exit on a number of the labor platforms—an attribute that contributes to low income levels.

¹ The term “sharing economy” is not useful as the business model for these firms as their business model is to broker renting rooms (Airbnb) or providing a service in return for compensation (Uber, Lyft, GrubHub). This does not comport with the normal meaning of “sharing” (Kenney and Zysman, 2016; Schor and Attwood-Charles, 2017).

The previous taxonomies provide useful insights into labor and value creation in platform-organized activities. In this paper, we propose a more encompassing analytical framework with which to consider how platforms generate new work, transform other work, and develop new methods for creating value (see *Table 1*). We distinguish between work within and generated by the platform companies, on the one hand, and work on the platform ecosystem, on the other. The *first* set comprises workers for the platforms, creating and maintaining the platforms. We consider them in the first section. But an even larger workforce is being organized into the labor markets created by these platforms. Often, these platforms are not only reorganizing but also transforming other parts of the economy. Thus, the *second* set consists of workers in the platform ecosystems, whom we divide into two groups: first, those undertaking platform-mediated work, and, second, those undertaking platform-mediated content creation. In terms of content creation, we also include non-compensated user-generated content (Terranova, 2000). We contend that a wide variety of new value-creating activities are based upon these platform-created ecosystems, even as work at traditional firms is being altered, as their activities are being integrated and often subsumed by the platform firms. Thus in examining and categorizing work, we also consider how value is created in these forms of work.

In the following two sections, we consider these distinct types of work and compensation.

Table 1: Labor Force Distinctions in the Platform Economy

Platform type	Employment type	Typical examples*	Compensation type	Labor conditions	Value creation process
Platform firm					
Venture labor	Full time	Google, Amazon, Facebook, Snap, Airbnb	Salary and stock options	Excellent	Creating and maintaining platform
Contractors (provide service to platform firm but not employees)	Full or part time	Dynamex, LeapForce	Salary or by job	Precarious, mostly low wage	Routinized

Platform-mediated work					
Platform-mediated marketplaces	Independent or contractors	Amazon, Craigslist, eBay, Etsy	Salary or by job	Low wage or precarious	Direct work including logistics
Platform-mediated in-person service provision	Contracted service through platform (contested)	Uber, Airbnb, Lyft, PostMates, GrubHub	Normally, but not always, set by platform	Gig, low income	Provide service, sometimes monetize asset
Platform-mediated remote service provision	One-time project contract	Upwork, Fiverr, InnoCentives, Amazon Mechanical Turk	Agreed upon by job	Gig, low income	Project work
Platform-mediated content creation					
Consignment content creators	Not employed	YouTube, Apple App Store, Google Play	Income from sales or share of advertising	Skewed, with few having large returns	Content creation
Non-platform organization content producers (e.g., websites)	Employed or contractors	All organizations with a web presence	Salary or by the job	Varies widely	Build websites, etc., for their firms
User-generated content	Not employed	Google, Facebook, Yelp!, Snapchat	Use of the platform	N/A	Produce data from which value is extracted

This paper provides an analytical categorization; it does not calculate the number of workers in each category. However, in principle, it should be possible to estimate the number of people in each category. Classification can be difficult. For example, as [Cohen and Zysman \(1987\)](#) note, a window washer working for General Motors is counted as a manufacturing employee. In contrast, if GM contracts directly with window washers, they are direct contractors. If it hires ISS World, a Danish firm specializing in facilities management, then those window washers are service employees.

Examining the platform economy entails significant measurement problems. The first is measuring the number of individuals who rely on platforms for income. For example, many

YouTube videos are uploaded with no intention of monetization, while for other uploaders, income is their prime goal. Some attempts have been made to measure platform-based income. In 2015, by examining three years of bank records of a sample of JPMorgan Chase customer payments from 30 different online platforms, [Diana Farrell and Fiona Grieg \(2016\)](#) find that 1 percent of US adults earned income from these platforms in a given month, and more than 4 percent had participated during their three-year study period.

In 2016, the [McKinsey Global Institute \(2016\)](#) found that between 20 percent and 30 percent of the US population engaged in some kind of independent or gig work, though much of it was not connected with an online platform. This is an important distinction; identifying independent work is one thing; establishing that the total amount of independent work has grown because of digitization is another. More recently, [Abraham et al. \(2017\)](#) explore the problems that governments confront when trying to measure the “gig” economy. Reinforcing the McKinsey Global Institute’s findings, they discover that traditional job surveys, because of their wording, which focuses on traditional employment relationships, may not elicit information from respondents who receive income from non-traditional income-generating activities, such as someone who is a full-time YouTuber or other social media influencer, or someone with a small but profitable eBay sales operation. They illustrate this by noting that tax filings show an increase in non-traditional income whereas household surveys do not ([Abraham et al. 2017: 3](#)). These studies might lead to the conclusion that much of the income generated from platform-related activities is supplemental, however, ample evidence indicates that in the

labor markets organized by the larger platforms, many individuals are dependent upon platform-derived income.²

The second measurement problem is that the numbers are not straightforward in terms of analysis. Understanding the meaning and measuring the number of jobs (opportunities for earning income) created by the platforms outside direct full-time employment are difficult. It is not simply a matter of counting the number but of whether the new jobs are of higher quality or better paying than the previous jobs. How can we decide whether working on these platforms is good or bad? A great deal of research suggests that a portion of the gig economy workforce affirmatively enjoys and seeks out such employment (Barley and Kunda, 2006; McKinsey Global Institute, 2016; Schor, 2017); but, for many others, working on digital platforms is simply the condition for securing employment. Either way, it is certain is that an increasing percentage of the labor force derives at least some income on digital platforms.

The ultimate extent of platform firm power is currently uncertain. However, by definition, successful platforms generate ecosystems of firms and providers that are dependent upon the platform. In the larger ecosystems, the number of individuals employed or generating income for themselves in the ecosystem is larger than the platform's direct employees. For example, work in the ecosystems is hard to characterize, let alone count, but analytically separating them enables us to understand the different types of work that are emerging in their ecosystems. The objective is not to analyze business model dynamics but only to bring some analytical clarity to the nature of the work spawned by different types of platforms. Moreover, a powerful platform firm, such as Google or Amazon, may sprout a number of ecosystems with different types of

² One strategy of ameliorating this dependence is for service providers to multi-home. The iconic case is, of course, Uber and Lyft drivers, that drive for both firms and app developers that develop their apps for both Apple and the Google Android (Cusumano, 2017).

work organization and value creation in each one. In the following sections, we turn to our schema for understanding work in the platform economy, beginning with the platform firms.

Work at the Platform Firms

Before we discuss the work organized by digital platforms, we need to reiterate how the activities in these platform firms, the central axis of the platform economy, are organized. This part of the platform economy is often ignored. As *Table 1* indicates, the platform firm's workforce is divided into roughly two groups: first, core employees and, second, large numbers of contractors and temporary workers whose employment conditions are characterized by low pay and few benefits. In the next section, we briefly describe these two workforces, as they are necessary for platform operations.

Platform Firm Employees: Venture Labor

At the apex of the platform economy are those who work for platform firms. Although the number of direct employees is a small portion of those in the entire ecosystem,³ they are vital to the firm's success and are among the most highly paid and well treated in society. We have adopted the term “venture labor” for these workers (Neff, 2013), who comprise the platform firm's founders and employees. The distinction between workers in myriad new startups trying to become sufficiently large to become a platform and those in established platform firms, such as Amazon, Apple, Facebook, Google, Lyft, Spotify, Snap, Uber, and Yelp!, is important in

³ For example, in 2018 Google employed 85,050. Facebook had 25,105 employees in 2017. Apple had 123,000 and Microsoft had 124,000 employees. With the exception of Amazon, which has large fulfillment activities, these are remarkably small firms. Amazon was by far the largest, with 566,000 employees in 2018. It is important to recognize that Amazon has a strictly separate dual-labor market with its logistics operations being described as brutal twenty-first-century sweatshops with much of the management coming from handheld computers carried by all workers—the digital panopticon (e.g., Bloodworth, 2018; Rittenhouse, 2017).

terms of job security, but we do not explore it here, though being in one of the established platform firms confers greater security.

In return for complete dedication to the goals of the firms and extremely long hours, venture workers experience outstanding environments in terms of pay, benefits, and working conditions. Initially, while the platform firm is being created, this environment is dependent upon funds provided by venture capitalists who are investing in the young firm, with the ultimate goal of a successful exit by selling the firm either in the stock market or to another firm. In addition to generous salaries, the greatest benefit from employment at these firms is receiving stock options that result in capital gains if and when the firm is sold. The capital gains associated with success can be substantial. For example, in 2012, when Facebook offered its stock to the public, it is estimated that perhaps 1,000 employees had equity worth more than \$1 million (Frank, 2012). In another illustration, the initial public offering (IPO) of Twitter in 2013 created 1,600 millionaires among its employees (Delevett, 2013). And when WhatsApp was purchased by Facebook for \$19 billion, it was rumored at the time that all the early employees (of a total headcount of 55) had at least 1 percent each of the stock, which would have made them worth \$160 million at the purchase price (Ratho, 2014). Moreover, the returns are often highly skewed, with the founders receiving the largest capital gains.

Venture laborers at startups work with the ever-present possibility that the firm will fail and they will lose their jobs, often without any severance pay. Although the risk of failure is always high, in downturns, it can be enormous. In many respects, the labor market and compensation for venture labor resembles that of a long tail, in which many receive only their wages (and then lose their jobs in downturns), and the few in the successful firms reap outside capital gains. Because many of the markets in which these firms compete have winner-take-all characteristics

because of network effects and positive feedback loops,⁴ success is often determined by which firm enters the market first and successfully captures market share—a market-competition process fueled by venture capital and predicated upon early losses in the hopes of establishing market dominance (Kenney and Zysman, 2018).

The startup work environment is designed to conform to the rhythms and goals of venture capitalists. For these startups, capital must be raised, web sites built, business models and customers identified—all as rapidly as possible because path-dependent network effects and market-tipping dynamics ensure that in each market segment only a few entrants or, in many cases, only one will survive. From the venture capitalist’s perspective, the workers’ sole purpose is to help achieve these outsize capital gains, which, of course, then are aligned with the full-time platform employees’ interests.

In these competitive conditions, normal working hours are not feasible. The twin pressures of the startup “burning” its capital and the prospect that other competitors will reach the market tipping point earlier places tremendous pressure upon all employees to work long hours: 80, 90, and even 100 hours per week. Employees are selected for their willingness to make such time commitments, managers are hired who can elicit these commitments, and the potential for capital gains and the intense team interactions motivate employees.

The environment for these venture laborers, particularly during the bubble periods, is extremely generous, so as to inspire employees to work as hard and as long as humanly possible. Although the perks at leading firms such as Google and Facebook are well known, they have become generalized. For example, according to employees, the internet game firm

⁴ On winner-take-all characteristics in markets characterized by network effects, see Eisenmann et al. (2006) and Gawer and Cusumano (2008).

Zynga provided free meals every day. As one former employee described it, “They really tried hard to be a good place to work and a socially conscious company” (Greenfield, 2013). Benefits also include on-site gyms, massages, haircuts, “nap pods,” arcade machines, t-shirts at every game launch, and weekly happy hours with free drinks. Free gourmet meals, on-site dry cleaning, parties, buses with wi-fi for workers (so that they can continue to work remotely), snacks, and drinks are common. In addition, quarterly company-wide celebrations are often held. Of course, if the firm experiences difficulties, the perks are scaled back or eliminated, as the firm conserves cash. Such economies, while necessary, are also a sign to employees to begin searching for a new employer. Venture laborers are the elite in the platform economy, so in general their employment conditions are excellent, the pay is very good, and those in privileged positions have the potential to accrue large capital gains from stock options. Yet, while the pressure on Amazon’s professional workforce may be the exception (Kantor and Streitfeld, 2015), even after a venture capital–funded firm is successful, powerful pressure to continue to work extreme hours still exists, in exchange for the lavish perks, stock options, and excellent salaries.

This elite labor force (with the exception of Amazon’s fulfillment labor force) of 980,000 employed globally in 2017 by the platform firms is less than 1 percent of the US workforce (160 million) even after the two legacy platform giants, Microsoft and Apple, are included (see *Table 2*).⁵ More interesting is that, if Amazon is included, in 2017 average revenue per employee across all the firms was \$720,645, but, when it and its large number of warehouse workers is excluded, revenue per employee was \$1,203,814. If their global sales are included as a portion of US gross domestic product (GDP), these platform firms are more significant,

⁵ For a more general discussion of this phenomenon of fewer employees at the core firms in the US economy, see Davis (2016).

accounting for 3 percent, and if only US sales are included, these firms still account for approximately 2 percent. These employees are at the core of the entire ecosystem.

Table 2: Employment, Revenue, and Revenue per Employee at the Largest US Internet Platform Firms, 2017

Firm	Employment	2017 Revenues in \$ billions	Revenue per Employee (US\$)
Amazon	542,000	177.87	328,170
Microsoft	124,000	89.50	721,770
Apple	123,000	229.34	1,864,550
Google	80,100	109.65	1,368,910
Facebook	25,100	40.65	1,619,640
Expedia	22,615	10.06	444,790
Booking.com	18,500	12.68	685,410
eBay	14,100	9.57	678,510
Uber	12,000	7.50	625,000
Groupon	6,672	2.84	426,110
Netflix	5,500	11.69	2,125,820
Twitter	3,372	2.44	723,610
Airbnb	3,100	2.60	838,710
Pandora	2,200	1.47	666,360
Total, Total, Average	982,259	707.86	720,645
Total, Total, Average (ex-Amazon)	440,259	529.99	1,203,814

Source: Various annual reports.

Platform Firm Contractors

The platform firms not only have regular employees but, in keeping with Silicon Valley firm practice, they depend upon large numbers of contractors and temporary employees that they secure through a variety of channels, including directly, through temporary agencies, and through contractors who perform services on their own premises (Barley and Kunda, 2006).

Effectively, the elite venture laborers are surrounded by masses of workers who normally

receive less pay, fewer benefits, and less job security (for a general discussion of precarious work, see Kalleberg and Vallas, 2018).

The sheer breadth of the activities that the contractors undertake is surprising. Little is known about how many of these “invisible” contractors work for the platform firms. These workers, whom Lilly Irani (2015) terms “data janitors,” are often employed through temporary employment firms to ensure that they cannot claim to be full-time employees.⁶ Working both on- and off-site, they perform a variety of tasks, not only coding but also search engine result monitoring, data cleaning and organization, vetting uploaded material for prohibited content, and many other necessary but routine tasks (Gillespie, 2018). For example, in 2012 it was reported that Google Maps employed 7,100 people, of whom 1,100 were full-time employees and 6,000 were contractors (Carlson, 2012). To understand the dimensions, consider that in 2017, Google claimed that it had “hired” 10,000 moderators (almost certainly, contractors) to ensure that the YouTube search engine was generating appropriate results for the hundreds of hours of video uploaded every minute (Brown, 2017; Levine, 2017). A recent Bloomberg news article estimated that Google has as many contractors (which it calls the “invisible workforce”) as regular employees (Bergen and Eidelson, 2018). In part, the ability to utilize so many contractors may be due to digitization, as it has improved the ability to define tasks and monitor the results sufficiently so as to be able to outsource the work to a labor contractor.

For example, let us consider content moderators for digital platforms. Although no concrete numbers are available, one estimate finds it likely that 100,000, or even several times that amount, may exist (Buni and Chemaly, 2016), and they are located both in the US and abroad. The number and scale of these digital platform-related tasks is immense and includes screening

⁶ In government statistics, these employees appear as the employees of the temp firm and thus are counted as employees, when, in fact, they are temporaries.

images for Instagram, Facebook, and so forth, YouTube videos, blog posts on Reddit or Blogger, products on eBay and Amazon for acceptable content, and even “news” (Harmanci, 2012). Google also contracts with a number of firms to obtain a workforce of thousands of “raters” to check the usefulness of Google’s search results. Their work was described in the following way:

They're carefully trained and tested staff who can spend 40 hours per week logged into a system called Raterhub, which is owned and operated by Google. Every day, the raters complete dozens of short but exacting tasks that produce invaluable data about the usefulness of Google's ever-changing algorithms. (Newitz, 2017)

Little has been written about this huge labor force that works either directly or, more likely, because of labor law, through labor-contracting firms doing less-high-value, data-related work for these platform firms. These workers enjoy few if any of the on-site perks and have far lower salaries and fewer benefits than regular platform-firm employees. It is impossible to know how many contract employees work for these firms, but it is possible that their number exceeds that of the regular employees.

Platform-Mediated Work

Several analytically separate platform-mediated work types and associated value creation exist (see *Table 1*). *First*, platform-mediated marketplaces facilitate the sale of goods and services, usually to consumers, though, recently, Amazon has extended its platform in an effort to become a business-to-business sales intermediary. This category includes platforms with their own inventory, e.g., Amazon, or pure market intermediaries, such as eBay and Etsy. A

marketplace that sells physical goods must also have a logistical system to employ workers in place.⁷ *Second*, what we loosely call platform-mediated labor markets have emerged that organize and facilitate work of various types, which we separate into two categories: in-person and remote service provision. Our classification sidesteps the debate over whether platform workers are or should be considered employees (De Stefano, 2015; Forde et al., 2017). These debates hinge upon the relative level of control held by the platform and the workers' ability to make decisions: the less autonomy workers have, the more that they are likely to be considered employees from the legal perspective. Clearly, classifying these workers as employees legally entitles them to greater access to various benefits that employees normally receive.⁸

Platform-Mediated Marketplaces

Platform-mediated marketplaces are profoundly changing work, as they move transactions from physical retail outlets to online platforms. This change affects who does what where and how and how much compensation they receive. Whether that means less or more work and what the consequences are for income distribution will unfold and be shaped in some cases by government policy and in other cases almost solely by marketplace dynamics, corporate strategy, and technology.

Online marketplaces, such as Amazon, Craigslist, eBay, Priceline, and Expedia, are the most prominent survivors of the high number of market entrants from 1995 to approximately 2000, when the dot.com bubble burst. Of all these firms, Amazon is by far the most powerful, as it has

⁷ Most of these sales platforms use existing logistics systems for delivery and thus cannot said to be creating new types of jobs. Amazon is, of course, the critical exception

⁸ If service providers at firms such as Uber were recognized as employees, it is almost certain that Uber would organize the employment relationship through subcontractors, as Amazon is currently doing by contracting out to smaller local firms that are completely dependent upon Amazon, but independent (McCracken, 2018). This effectively shifts risk and low-wage administration to these "independent entrepreneurs." Moreover, this network is a direct threat to the far better paid Fedex and UPS workers.

higher revenue than all of them combined. It not only sells its own products but also allows independent vendors (“shops”) to use its marketplace and logistics network for a fee. The sheer scale of the impact of these platform marketplaces can be seen in the increasing percentage of all US retail transactions: about 9.5 percent of all US retail sales in 2018 are online, and this is steadily increasing. In the first quarter of 2018, online sales totaled \$124 billion and grew at over 10 percent on an annualized basis. Just as important, Amazon accounted for approximately 43 percent of all online sales (US Census Bureau, 2018). The implications of this seemingly inexorable movement of transactions online are significant for employment in terms of both structure and location.

One labor implication of the rise of these online market platforms is that the work of distributing products to consumers is relocating from shopping centers to warehouses and thus changed in a variety of ways. For example, the rise of the department store during its golden era in the 1920s transformed retail. This was followed by the shopping mall located on the urban fringe, with its department stores and numerous smaller specialty retailers (Longstreth, 2010). The department store and small-town Main Street were destroyed by Walmart and the big box stores, which transformed retailing once again. Of course, the geography of retail has changed a number of times in the past, and each locational change affects the workforce and supply chains.

The emergence of online retailing has a similar effect. For example, online retailing employs far less labor per \$1 million in sales than even highly efficient competitors such as Walmart (Wigglesworth, 2017). However, not only is the labor intensity lower but the location of work changes in two ways. *First*, consumer purchasing behavior has shifted away from physical retail, which can be seen in the dramatic number of bankruptcies in the retail sector (Townsend et al., 2018). The ultimate result is that many retail employees are likely to lose their

jobs. As [Townsend et al. \(2018\)](#) observe, the movement of retail to online channels could have the side effect of changing the characteristics of employees from middle-class retail clerks to male warehouse and delivery workers; at the same time, warehousing firms such as Amazon are investing considerable resources in automation.⁹ The ultimate result of these changes is difficult to ascertain in terms of types of employment, compensation, gender, and ethnicity. Adding further to this complicated process is that automation in warehouses is proceeding very rapidly with Amazon as a leader. In previous generations, these male workers distribution workers were relatively better paid than female retail clerks. However, given the changes, these differences may no longer be significant – a case where automation may create greater equality by reducing men's wages to those of women. It also should be remarked that anecdotal evidence in various media accounts suggest that there are very difficult working conditions in Amazon's warehouses, though recently Amazon introduced a \$15 per hour minimum wage in its warehouses to its employees – not necessarily for contractors employed in the warehouses ([Bloodworth, 2016; Jamieson, 2015](#)).

Second, another, related but different relocation is also underway. With increasing online sales, through eBay, Amazon Marketplace sellers, Etsy, and other sales platforms, a transformation has taken place among sellers, from physical shops to people's homes and garages. These home businesses may not even have business licenses, but they compete with physical retailers that operate as formal businesses, pay local taxes and rent, and employ local workers.

⁹ For example, in 2012 Amazon purchased Kiva Systems, a warehousing robotics manufacturer, for \$775 million. In 2017, Amazon was reported to have 45,000 robots in its warehouses, a 50 percent increase from 2016 ([Shead, 2017](#)). In June 2018, a report suggested that Amazon might be using 100,000 robots in its logistics operations ([Engel, 2018](#)).

The character of work and its conditions are changing. Firms with back-end fulfillment such as in Amazon’s warehouses or at outsourced fulfillment firms, such as Dynamex, often have difficult working conditions that are entirely different from those experienced by venture labor in white-collar operations.¹⁰ Workers at these fulfillment operations are constantly monitored, with their pace set by algorithms and robots. In terms of income, although retail does not pay wages sufficient to support a reasonable standard of living, neither do logistics operations.

Platform-Mediated In-Person Service Provision

Platforms change labor markets—how workers interact with employers or clients. A great deal of confusion has arisen in discussions of this category, in particular. Core questions include whether more work is now “contingent”—that is, do platforms facilitate gig work and contract work, rather than employment—and whether the terms of “work” are improved or undermined by platforms. Two examples show how easily issues become conflated and confusing. First, consider Uber in New York City: Taxi drivers, individual and corporate, who purchased medallion licenses to operate are clearly affected by the flood of new drivers through Uber and other such firms, though the actual drivers often are renting the medallion from its owner.¹¹ The entry of Uber and Lyft has pressured existing taxi drivers to work more hours and earn less, and it has devalued their monopoly, expressed in the taxi medallion, on individual for-hire transportation. Conversely, it allows other drivers to enter the market, thereby giving them an opportunity to earn income, so it is unclear how to calculate the net social value. Second, plumbers and electricians have long worked as independent contractors. The fact that many skilled tradespeople operate as independent contractors is not an outcome of a move to

¹⁰ For a journalistic description of the experiences of Amazon’s contracted out delivery service workers, see [Peterson \(2018\)](#).

¹¹ A recent vote by the New York City Council to cap the number of Uber and Lyft cars in the city and to guarantee their drivers a minimum wage will likely affect their business models (see, e.g., [Bliss, 2018](#)).

platforms. However, as is the case with cab drivers, plumbers and electricians have to be certified and have the option of joining a union or some sort of organization to represent their interests. Although it is clear that digital platforms, such as Uber, Lyft, and PostMates, offer people the opportunity to earn income, they are unlikely to earn more than near-poverty levels. Some blame the digital platforms for these conditions, but they are simply taking advantage of the societal forces that have increased the amount of gig work before the widespread adoption of platforms for organizing work (Friedman, 2014). Nonetheless, the increased use of platforms has increased the amount and the intensity of gig work.

Uber has broadly two types of drivers. The first type is casual drivers who might regularly drive part time for extra income or others who drive for short periods when they need income (Hall and Krueger, 2018). The second type is drivers who use Uber for full-time employment, which requires working grueling hours and might be unsustainable (Dubal, 2017; Hua and Ray, 2018). This distinction between those who enter the market idiosyncratically for a variety of reasons, but not full time or as a career, and those who plan to use the platform for a full-time, permanent source of income is critical (Hua and Ray, 2018). By dissolving previous barriers to entry, these platforms thus create competition not only between the full-timers using the platform, but also the part-timers now compete with full-timers particularly during peak hours when the earnings are the highest, thereby depressing income for all the drivers.

In-person gig work appears to be increasing, and where network effects operate strongly, such as apparently is the case with ride provision, these firms are likely to reorganize such service functions. For example, Uber and Lyft may affect the taxi industry in the same way as Amazon is subverting traditional in-store retail. A recent study of the New York City individual transportation industry showed that the entrance of Uber and Lyft to the market from 2015 to

2018 decreased monthly taxi trips from 12.5 million in 2015 to roughly 8.1 million in 2018. During the same period, Uber/Lyft rides increased from approximately 2 million in 2015 to 17 million in 2018. These statistics lead to two important observations. First, the taxi industry is being severely affected. Second, and perhaps more interesting, more rides than ever are taking place and some believe that these are being shifted from mass transit (Parrott and Reich, 2018: 8). These results in New York City, which are likely indicative of the rest of the country, suggest that the total number of rides is increasing, which therefore creates more work. Of course, as Parrott and Reich (2018) find, per driver earnings have decreased.

It seems almost certain as well that more work is being created by Airbnb, though hotel workers may be negatively affected. Although transportation, package delivery, and lodgings (Airbnb) appear to have made successful transformations, service provision firms, such as TaskRabbit, seem to be less successful.¹² A limit may exist in the ability of platform entrants to “cyber-organize” in-person labor provision in other in-person service work, such as babysitting. Uber, Lyft, and Airbnb may be the most powerful exceptions, rather than the rule, in in-person work, as firms such as GrubHub and PostMates do not appear to be growing rapidly outside a few of the largest cities.

Platform-Mediated Remote Contracting

Outsourcing and offshoring were enabled by digitization and inexpensive telecommunications (Dossani and Kenney, 2007). This earlier wave of offshoring occurred either within organizations (offshoring) or between organization (outsourcing), in which a firm spins off activities that were formerly performed in-house and contracts with another organization to undertake them (Sako, 2006). The functions addressed by these corporate

¹² For example, TaskRabbit was recently purchased by IKEA (Swisher and Schleifer, 2017) and has been renamed IKEA Services.

strategies have tended to be larger processes that require significant coordination. However, a rising tide has taken place in which contracting firms hire individual contractors, either through an employment agency or directly. Although some of this work requires in-person presence, many of the tasks can be undertaken remotely, and the contracting can be organized through a platform.¹³

The work contracted and delivered through a platform has a wide scope, and such firms have proliferated. The simplest work, micro-tasks, can be contracted through Amazon Mechanical Turk (Ross et al., 2010). Upwork and Freelancer.com can accommodate larger more complicated tasks that are still performed by individuals (Graham et al., 2017). The tasks range from software development and search engine optimization to web-scraping and copy-editing. In 2018, Mary Meeker (2018) claimed that Upwork had 18 million contractors, and it is reported that it billed approximately \$1 billion annually. The percentage of the earnings that the platform takes from the producers can be 20 percent or more. In addition to the general freelancing platforms, specialized contracting platforms are available, such as Design.net and 99Design for design and Cadcrowd for engineering. Finally, sophisticated problem solving is offered on sites such as InnoCentives and Kaggle, where customers can offer a reward for solutions to their difficult-to-solve problems (Lewin and Zhong, 2013).

Although these kinds of gig firms certainly affect traditional employment and even traditional outsourcing, this type of contracting appears to be amenable only to certain types of work; they are most effective when the task can be clearly specified and described. Another limitation is that, with the exception of the sophisticated problems that need to be solved, projects that require teams and a division of labor do not appear to be as amenable to such

¹³ For an early and remarkably prescient statement of this form of global online labor organization, see Huws (2001).

online gig types of outsourcing.¹⁴ Finally, the network and winner-take-most effects seen on other platforms do not appear to be strong in these online work platforms many competitors and freelancers multi-home in their search for opportunities. Effectively, most of these platforms operate as race to the bottom for workers. Because the freelancer market is global, although the numbers are high, it is difficult to ascertain the total employment of online contractors (for various estimates, see, e.g., De Stefano, 2015; Graham et al., 2017). Remote labor-sourcing clearly creates downward wage pressure in developed country labor markets, but how much pressure is uncertain. As with all these new labor markets, calculating how much work is displaced and to where, how much, and the quality of the new work that is being created is difficult to measure.

Platform-Mediated Content Creation

From the inception of the worldwide web, users have been attracted by the ability to access content. Without content, no engagement, no users, no data, and no value creation are created. For heuristic purposes, we divide platform-mediated content creation into three categories. The first category is user-generated content uploaded to platforms, where their producers can monetize the content directly. The second category is content generated by existing organizations that is posted on the web or existing platforms as part of the organization's web strategy. This is an enormous, but largely ignored source of employment: both direct employees and a wide number and variety of contractors and consultants. The third category is the largest and the one for which value and its size are the most difficult to measure: the great quantity of

¹⁴ It is clear that various platforms, such as Slack, allow cross-national teams made up of firm employees or even teams of contractors who have coalesced for a project to liaise and work more effectively in real time (Manjoo, 2015).

uncompensated UGC and data generated as people surf the internet, interact on platforms such as Facebook and Instagram, and upload their information onto LinkedIn.

Consignment Content Producers

Digital platforms, such as the app stores, YouTube, Twitch gaming network, and Amazon Publisher Services, are become massive marketplaces for virtual goods or content. These consignment markets are not gig markets, in the sense of selling services to a temporary employer through a contract. Rather, they are owned markets within which creators offer their virtual product to the platform users. These creators are vital to the platform's success. However, after the platform becomes dominant, much of the power shifts to the platform owner. For complementors, income is unevenly distributed, with a few winners and a long tail that receives little, if anything (Brynjolfsson et al., 2011). Firms with the greatest success, such as Angry Birds or Supercell, can often be sold to outside investors, thereby capitalizing on the audience.

This category encompasses diverse activities in which content is produced and provided to the platform in the hope of attracting an audience or consumers so that the content can be monetized. The key to this type of work is that the content creator who uploads material to the digital platform bears all the risks. The digital platform monetizes the content through a variety of mechanisms depending upon the genre and types of users. The market for these products is extremely skewed, with a few huge successes and an extremely long tail of content that has little engagement.

The platform that generates the highest income is the Apple App Store, which paid app developers \$26.5 billion in 2017; in contrast, the Google Play site, which has more users, earns less income. Digital consignment is so powerful because of the size of the audiences of the

largest platforms.¹⁵ For example, according to one estimate, in 2018 YouTube is expected to have income of approximately \$15 billion (Gutelle, 2018). The “content” creators are individuals or firms that use internet platforms, on which they consign their digital creations in the hope of monetizing them.¹⁶ This is a fascinating form of labor, as the products are virtual and take the form of usable software (apps, games, etc.) or cultural products, such as video, online classes, and music. The producer receives direct compensation through the platform, though monetization can take many forms: direct purchase, a share of advertising income, in-game purchase of virtual goods. Because the content producer is dependent upon the platform, a significant percentage of the revenue is retained by the platform firm. Moreover, the platform owner has no costs beyond maintaining the platform; all other costs and risks are borne by the consigner.

Although YouTube is a salient example, the Apple App Store and Google Play are the premier platforms. From June 2017 to June 2018, Apple claims to have paid \$30 billion to its developers (Protalinski, 2018). Google does not share the total from Google Play sales or the funds paid to creators of apps sold on it, however, revenues are certainly in the billions. Different permutations exist, but basically these platforms provide a marketplace for virtual goods.

In the consignment model, the content is consigned to the platform owner in return for a share of any income generated. The consigner is effectively a freelance content producer. This business model can be considered from a historical perspective, as consignment has long existed in the art world. However, the emergence of various internet platforms has dramatically increased opportunities for such monetization. Prior to the existence of the internet and

¹⁵ It has been estimated that in 2018 YouTube had 1.57 billion monthly active users.

¹⁶ On platforms, the standard reference is Cusumano and Gawer (2002).

independent publishing, authors wrote novels, and some of them convinced publishers to publish them. In the old publishing world, publishers acted as gatekeepers who selected only a small number of would-be authors' works for publication. The remaining novels were never published and thus had no market value. Internet-based independent publishing allowed written materials that were rejected by traditional publishers or shelved without any consideration to be marketed. Effectively, these new content delivery platforms have lowered entry barriers, permitting previously excluded creators to enter, thereby enlarging the market but also possibly threatening the brick-and-mortar publishers. Of course, existing publishers and successful offline authors might be threatened with a loss of market share, pricing control, and, eventually, displacement. The ultimate result of this new delivery method is unclear. For example, the London-based *Guardian* suggested that mid-ranking authors who remain with their long-standing publishers are experiencing a significant loss of income (McCrum, 2014). Alternatively, there is the success of the Flappy Birds game in the Apple App Store, one that no software publisher would have backed because it was so simple and crude. This suggests that new monetization opportunities have been created.¹⁷

After Amazon released the Kindle, it created Amazon Publisher Services to act as a purveyor of digital works where it offers mystery, thriller, romance, and Christian genres; it publishes translations and reprints; it has a self-service fan-fiction platform; and even offers an extremely popular self-publishing platform. Authors become Amazon partners, earning up to 70 percent of the total income in royalties, as opposed to the 15 percent typical with commercially published hardcovers. Bezos touts the biggest successes, such as Theresa Ragan, whose self-published thrillers and romances have been downloaded hundreds of thousands of times. And

¹⁷ At the height of its popularity, the very simple and even crude Flappy Birds game was estimated to be bringing in \$50,000 per day through in-app purchases, before the game creator removed it from the Apple App Store.

yet one survey found that half the self-published authors make less than \$500 a year (Packer, 2014). Note that this model replaces publishers, allowing greater market entry than ever before, but editing, page composition, publicity, distribution, and inventory are the responsibility of the authors – however, undertaking all of these personally erodes the authors’ ultimate income.

YouTube, which began as a website on which people could upload video, soon began to monetize the videos by accompanying them with advertisements and sharing the income with their producers. Star creators earned significant amounts of income from their videos (Hamilton, 2013), but this income is highly skewed toward only the most successful. For example, as of January 2013 the K-Pop star PSY reportedly received approximately \$4 million from YouTube for the 1.23 billion views (or about \$.00325 per view) of his hit song “Gangnam Style,” with Google retaining 45 percent of the advertising revenue (Van Buskirk, 2013).¹⁸ According to one estimate, of the \$1 billion paid in 2013, approximately 4 percent was for the one video by PSY. In addition, PSY had another video, “Gentleman,” that had 744 million views as of October 2014, which suggests that he earned more than .5 percent of all the money paid out in 2014. He also became a celebrity and used this status to obtain other income opportunities, such as public appearances and other sorts of publicity. For YouTube, it generated hundreds of covers and spoofs, some of which also received millions of hits, though these likely created very little income. For example, the MIT cover of “Gangnam Style” had over 7 million hits. Despite these highly skewed returns, the number of individuals attempting to build YouTube businesses has grown. To illustrate, the VidCon conference in Santa Ana, CA, targeted at online video creators has grown from 1,400 attendees in 2010 to over 35,000 in 2017 (Feinblatt, 2018).¹⁹

¹⁸ By August 2018, the video had garnered 3.1 billion views and likely will continue to have residual viewership, which will continue to generate income.

¹⁹ The Vidcon franchise, which includes Vidcon Europe, was purchased by Viacom in 2018.

The spectacular growth in smartphones and the success of the iPhone were predicated upon the content uploaded to the Apple App Store and resulted in the development of what some have the “app economy.” One study claimed that 466,000 jobs were created by the US app economy (Mandel, 2012). It is easy to debunk the methodology in such employment creation estimation exercises, as they are based on many assumptions and often are funded by interested parties; nonetheless, it is valuable to consider the types of work that have been created. First are the formal jobs created through the formation of new firms and the addition of employment at existing firms that create apps. One study of Facebook apps found that in 2011 approximately 53,000 direct jobs were created in the Facebook ecosystem (Han et al., 2011).²⁰ The formal employment at platform firms is only the tip of the iceberg. As recounted in the *New York Times* (Streitfield, 2012), the contributions of app developers make the smartphone more functional and thus contribute to the app store’s value. In addition to the app writers are a universe of consultants, data collection firms such as AppAnnie and TubeMogul, and advertising strategists, which all earn income in these massive multibillion-dollar ecosystems.

In some cases, if successful YouTube creators or online gaming firms can create a fan base, then they might be able to create offline businesses: for example, Bethany Mota started a YouTube fashion channel in 2009 and by 2013 was estimated to be earning \$40,000 per month from YouTube alone (Halperin, 2014). Then, her fame also translated into other income, as in 2017 a skincare company paid her \$325,000 to fly to Hawaii and film and upload videos of her applying its products (Cullins, 2017).

²⁰ One of the difficulties with this study is that they found that 8,273 firms had between 1 and 1 million monthly users. The study did not provide its estimation methodology for these smaller firms, so it is difficult to be certain whether individuals working part time creating apps were counted as full-time employees. It is hard to believe that those writing apps with very few users could be working full time at the task. Also, given the viral nature of the app business, it is possible, at least initially, that even the apps used more often were created by part-time software writers.

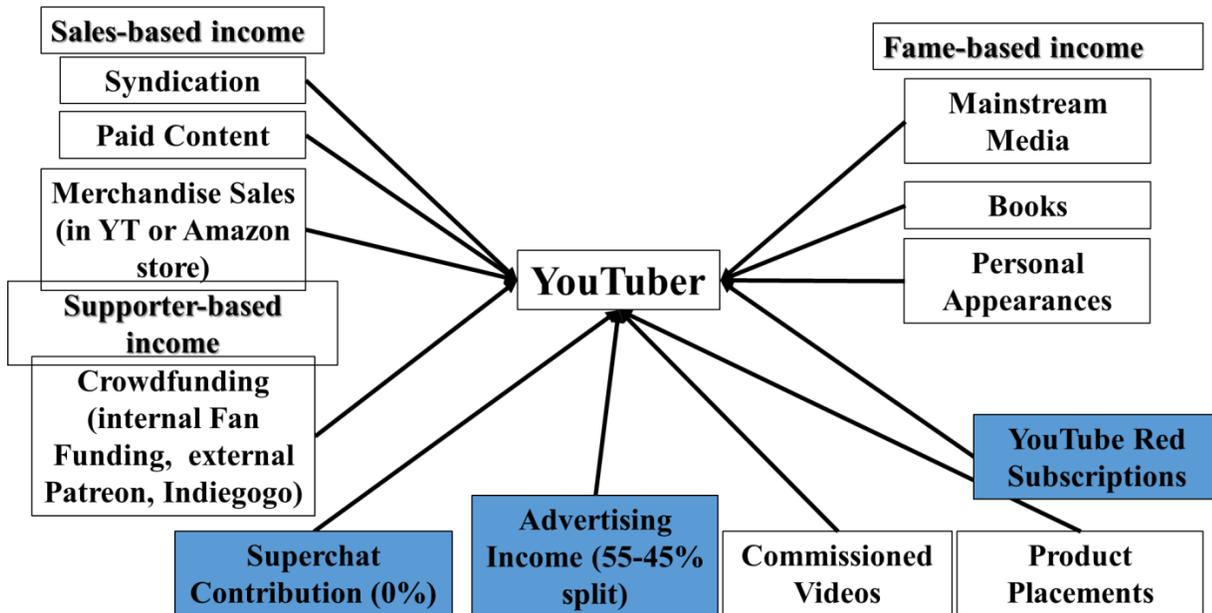
Figure 1 shows that YouTube creators can develop many different income streams, only two of which—advertising and Superchat—are owned by YouTube. The precise mix of income sources certainly differs for particular creators. To illustrate, Patreon, a crowd-funding website, has already raised \$250 million, most of which supports YouTube creators (some funds also go to bloggers and musicians). In a detailed study of social media workers, Duffy (2017: 192-197) describes both the precariousness and the all-encompassing nature of the work, as creators, unless they are sufficiently successful to be able to hire assistants, are responsible for creating content, uploading it, responding to their fans, and managing the administrative tasks that accompany such operations.²¹ Moreover, the nature of many of these “follower-based” real-time enterprises creates an incessant demand for engagement that can lead to burn-out, because creators cannot maintain the initial frenetic pace. Among individual creators, burn-out may be endemic and traumatic, though for the system this is not necessarily a problem. New market entrants are constant, and in aggregate they maintain the income stream of the platform owner.

These platforms that allow creators to monetize their digital work include blogs, Amazon Publisher Services, Facebook videos, Pinterest postings, and, of course, YouTube. The monetization methods differ significantly. Some, such as YouTube and Facebook, are based on advertising, while Amazon Publisher Services pay based on downloaded purchases. Others use the attention generated through their online content creation to monetize through web shops (such as self-help YouTube channels) or a model where basic content is free, but where premium content must be purchased. More likely, as *Figure 1* suggests, the creators maintain

²¹ It is important to note that more successful content creators hire or contract with specialists of all sorts, creating more employment. In fact, an ecosystem of skills suppliers to these creators has emerged that should be included in any assessment of the employment impacts of any of these large virtual content consignment platforms. For a discussion of this “team” building, see [Brown \(2017\)](#).

multiple income streams, often through the use of multiple platforms (Twitter, YouTube, Instagram, etc.).

Figure 1: Various Sources of Income for YouTubers



Legend: Blue is income sources directly through YouTube.

Source: Anable and Kenney, 2017.

Yet another genre of consignment is online gaming platforms, such as Twitch,²² which was bought by Amazon for \$970 million in 2014. Successful gamers can make up to \$2 million per year from subscriptions, tips, and promotions, which can sell up to \$3 million in sponsor's products (Clark, 2017). The Twitch ecosystem has developed a complicated division of labor, including not only gamers but also announcers and other contractors such as artists, coders, and sound technicians.

The amount of work created in these ecosystems is difficult to measure, as an enormous number of people work in the ancillary services. As more money flows through one of these

²² Twitch has only 1,200 employees, but an entire ecosystem has formed around it (Clark, 2017).

platform ecosystems, numerous specialists emerge, offering a various expert services. In Los Angeles, which is the global center for YouTube creators, there are photographers, public relations specialists, talent management agencies, accountants, and even lawyers who specialize in handling YouTubers—all of these specialists are employed because of YouTube, and thus new work is created by the platform, but its magnitude cannot be calculated by counting those who are directly compensated by YouTube or any other platform. Our point is not to claim that such jobs can replace the jobs lost but, rather, to suggest that new work is being created.

Non-Platform Organization Content Producers

User-generated firms and organizations, large and small, create content, and, most obviously, are the websites through which they communicate with their customers, clients, communities, and constituencies. Content is generated by operating on platforms—the largest of which is the internet itself—through their websites. Most of the sites that Google classifies are the product of employees or contractors who build websites for organizations and populate them with content. To illustrate, Nike’s website provides a plethora of online materials, including public relations, advertising, sales, and investor information. It is a virtual location constructed by paid employees (though portions of the site may allow users to post comments, photos, etc.). A search for Nike on Google may trigger an advertisement by either Nike or another firm—the appearance of this advertisement triggers a micropayment to Google. In an economic sense, Nike’s work became free labor for Google, but is a cost of doing business for Nike.

The number of paid employees and contractors working on digital and internet strategies for existing organizations is difficult to calculate. A recent report by the McKinsey Global Institute concluded that digital technologies, rather than entirely displacing jobs, eliminates particular

tasks from the overall bundle that constitutes a “job.” This conclusion is almost certainly correct, but it is also likely that digital technologies create new tasks to add to that job bundle. So, the overall net gain in employment from digitization can be calculated only by subtracting the number of new jobs from the old jobs that may have been replaced. The point of singling out this work is that it is probably large and certainly is growing rapidly.

User-Generated Content

User-generated content (UGC) is at the heart of many of the most valuable platform firms and operations, including Facebook and Google, as well as GitHub, LinkedIn, Snapchat, Twitter, Yelp, and Instagram (Terranova, 2000; Lanier, 2014). These platforms allow users access in exchange for uploading content and permitting the platform to track them (Terranova, 2000). After the content is created, the platforms incur significant costs and add value by categorizing, storing, making the content discoverable, and serving it to consumers. Although the content is given to platforms free of cost, they find ways to monetize it. In many respects, Google is the most powerful of these firms, as it is the “librarian” of the internet; websites that are not indexed by Google for all intents and purposes do not exist.

A salient characteristic about online value creation is the sheer volume of what has been termed free labor or, very often, activity whose compensation is in the form of use of the service, whereas monetization comes through sale of the analysis of the data captured. The internet and traditional media differ in that internet users provide significantly more information inadvertently through their electronic trails (Huberty, 2015) than do television or radio users, who are passive and largely opaque to the networks. But the internet is bidirectional, as users

can upload information and digital objects, including sound, data, text, and visual content and react to that content online, and every online activity is recorded.

Some user content is casually created, the exhaust from the internet operation: As we shop or search, we leave behind data and information that can be packaged, analyzed, and sold. When information is posted on Facebook for friends or a video is uploaded to YouTube, not only are data and information generated that can be packaged, analyzed, and sold, but also the reactions to that content can be monetized. Such value-creating activity is compensated by the services, in the form of search or providing video to our friends, but the data are then used by the platform or app for their own purposes. This labor does not generate income for the platform user, and hence it can be seen as either uncompensated labor or the creation of raw material to be transformed by the platform owner into something that does create value. The internet allows, even entices, users to generate content. For example, Facebook claims to have 2.2 billion users, while Google Search has 2 billion unique monthly users—all of whom produce data through their use of the service.

Value can be captured in subtle ways that may not be evident to users. The CAPTCHA method of testing whether the user is a human being or bot is an excellent example. In 2009, Google purchased the firm reCAPTCHA for an undisclosed amount. Google offers its CAPTCHA security service to a wide variety of websites. Initially, the CAPTCHA service was based on recognition of characters taken from the Google Books project. Effectively, to use a CAPTCHA-protected website, users had to train Google's character recognition artificial intelligence (AI). Because this has largely been completed, users are now asked to identify images (initially, cats)—an important training set for AI. More recently, users are asked to

identify which pictures from Google Streetview have street signs in them. Thus, in all these cases, users are performing training for Google's AI and future products.

The ability to monetize user web activity has led some to assert that we are in a “participation economy” (Karaganis, 2008), in which activities such as surfing the internet generate value. Terranova (2000) suggests that this is a more profound type of unpaid labor in which normal activities on the internet, such as uploading content to Facebook, proving one is not a bot, or surfing the internet, transforms free time into data generation, which is created by uncompensated labor. In the social space organized by Facebook, for example, the leisure activity of creating content is “mined” for information to sell for targeted advertising viewers. UGC firms, such as Facebook, GitHub, LinkedIn, and Snapchat, are predicated upon users generating content for one another that can be monetized on the platform. An analogy might help clarify the relationship between the platform-firm employees and the UGC providers. Some argue that UGC resembles petroleum, which has no value underground and needs to be drilled, pumped, refined, and delivered. UGC and, in fact, all data have no value until they are recorded, curated, analyzed, and delivered—a process that is dependent upon software algorithms.

Discussion and Conclusion

We have outlined a framework for examining work and value creation in the platform economy. The fissuring of the workplace that David Weil describes does not capture the profound rewiring of the macro-economy underway because of platformization. Even with the preliminary framework that we have provided, the employment impact of the wide variety of platforms emerging and organizing economic activity will be difficult to assess or measure.

Although many have cautioned that one should not project societal or workplace relations from the “supposed” inherent tendencies of new technologies, it is reasonable to consider how new technologies enable new methods of organizing labor and creating value. Assessing value creation and employment in the platform economy is particularly difficult. This is because, as we have seen, value-creating activities range from data or, in the case of GitHub, software code provision in exchange for use of a service and monetization of an asset as a service, as in the case of Uber and Airbnb, to the production of content with no guarantee that it will be valued, as in the case of YouTube and the App Store.

The ability of these digital platforms to connect persons more easily and inexpensively allows the integration of extremely small value creation opportunities, as is illustrated by the ability to monetize microwork, as in the case of Amazon’s Mechanical Turk or Airbnb monetizing an empty room. For completely digital work, it facilitates transactions from anywhere with a computer and connectivity. Thus retail shops can be located in bedrooms or garages and digital work or products can come from anywhere in the world, at any time of the day. Concomitant with this is both a filling up of the pores of day, as, for example, some Amazon Mechanical Turkers work only during short bursts of spare time, and Uber drivers can choose which hours to work.

Yet, all these platforms share one commonality: the power of the platform owners. The owners are in a privileged position to absorb ecosystem innovations into the platform itself. In software, this can occur as the operating system owner absorbs particularly important or valuable functionality into the operating system. Amazon, because of its ownership of the data, can introduce a competitive product to the independent retailers on its site, thereby creating competition for a retailer that introduces a new and successful product. Platform owners rarely

tell users how their algorithms work and can change their algorithms unilaterally, to the detriment of users. This creates enormous anxiety and dread in the user population that is dependent upon the platform for income, as they have limited or, as [Scolere et al. \(2018\)](#) terms it, only an “imagined” understanding of the platform’s algorithms. Because the algorithms establish the rules of interaction ([Lessig, 1999](#)), any change in them is an expression of power.

Measuring the number of workers in the platform economy is difficult. First, as we have shown, these platform ecosystems can be huge but also amorphous. To illustrate, how should we classify someone who drives part time for Uber and part time as a barista and is a budding but not yet successful YouTuber? Or, even more problematic, YouTuber who use their videos to drive an off-line business. How do we account for the jobs lost, such as when Craigslist destroyed the classified advertising market for newspapers, removing a major source of revenue, and had a significant impact on the decline of the newspaper industry ([Seamans and Zhu, 2013](#)). In a study of the impact of Airbnb on the Texas hotel market, [Zervas et al. \(2014\)](#) find that a 1 percent increase in Airbnb listings led to a decrease in quarterly hotel revenues. Further, they conclude that Airbnb had ample opportunity for growth in the market, suggesting that its impact might grow over time. They also find that the decrease was concentrated in the lower-end budget accommodations category. Even if the employment of an existing category of workers declines, as the New York City taxi case showed, the entry of Uber and Lyft into the market decreases the share of rides provided by taxi drivers, but dramatically increases the total number of rides given, thus likely employing more people than ever, albeit at a lower overall wage for each driver.

When evaluating the employment impact, we should consider whether more work is created than destroyed. For example, almost certainly Amazon self-publishing increased the total

number of books published and the number of authors earning some income from publishing. Given the current trajectory, it is possible that platforms will create more income-generation opportunities than ever. However, the greatest beneficiaries will be the platform owners, their direct employees, and the big winners in the consignment marketplaces.

In sum, when seen from the perspective of the future of work, the platform economy is not merely fissuring the workplace but creating and reorganizing value-creating activities in a complex set of arrangements for income generation. It allows supervision to extend beyond the firm boundaries by integrating and controlling work processes by non-employees, whether Uber drivers, YouTubers, or Twitter bloggers. This fissuring appears in terms of location, organizational affiliation, and income generation. Individuals may work for Uber, rent out one of their apartment's rooms on Airbnb, raise money for an arts project on Kickstarter, and attempting to build a YouTube channel—fissuring the sources of income at the level of the individual. In these respects, Weil's discussion of the fissured workplace was only prolegomenon to the current phase where the workplace is potentially everywhere and individuals have multiple virtual work forces.

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