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New Work and Value Creation in the Platform Economy:

A Taxonomy and Preliminary Evidence

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Abstract

Take a software engineer and an Uber driver, a data scientist and an author self-published on Amazon, a marketing specialist and an Etsy seller – what do all they have in common? Their work is enabled by digital platforms. This paper proposes a taxonomy based upon the types of work undertaken to understand and systematically measure work, employment, and value creation in the platform economy. Platforms enable a greater and more dispersed division of labor than possible before. While there are practical complexities to identify and measure the distinct categories of labor and value creation in the platform economy, it is a critical first step to consider the consequences of platform-enabled economic activity on a growing share of workers. This paper provides suggestive evidence for the utility of the framework using case studies of Etsy's marketplace and Amazon's self-publishing service.

Keywords: Platform Economy, Technology, Work, Employment, Digitization
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1 Introduction

As digital tools diffuse through the economy, some jobs are being displaced, new tasks are being created, and above all work, workplace arrangements and labor markets are being reconfigured and transformed. Some of that reconfiguration is facilitated and even, perhaps, determined by the technologies themselves, and part is the product of choices about business strategy and policy. Our intent here is to consider how deep the transformation will be with the rise of the platform economy, a central aspect of the digital revolution (Zysman and Newman, 2006; Kenney and Zysman, 2016).

The factory was the emblem and embodiment of the industrial revolution. Its consolidation of workers and work made them easier to observe and manage, while making it simpler to reorganize and increase the efficiency and effectiveness of the work process (Thompson, 1966). Indeed, even the very inputs to production and the resulting products that were then sold also changed and could be tracked. Similarly, the assembly-line version of the factory became encapsulated in discourse such as Fordism (Gramsci, 1971; Boyer, 1990). In the past years, outsourcing and temp work, supply chain and supply networks, have already fractured and fissured work, making it harder to observe and count (Huws, 2001; Hyman, 2018; Weil, 2014). The work, for example, on the Apple iPhone (Kraemer et al., 2011) and Nokia phones (Ali-Yrkkö et al., 2011) show how difficult it is to understand where the value was created in the supply networks, though it has been easier to see how a firm controlling a choke point is able to capture a disproportionate share of value as measured by profits compared to other firms (Jacobides and Tae, 2015).

Platforms, which are quickly becoming an emblem of markets and work in this era, continue those trends (Kenney and Zysman, 2016; Srnicek, 2017). Platforms profoundly alter market logic and dynamics. The technical language of multi-sided markets often hides the reality that a platform shapes the ecosystem providing crucial control over data and market connections. In this digital transformation, platforms are an agent of and coalescing point for reorganizing old work and creating conditions for

new work. The current discussions so often turn on the study of work on a single platform, be it the so-called "sharing economy" firms such as Uber and Lyft (Cramer and Krueger, 2016), AirBnb (Zervas et al., 2017), or remote gig work firms such as Upwork (Popiel, 2017) or Amazon Mechanical Turk (Ross et al., 2010). Each of these studies claims to discover an essential learning about the emerging economy and its impact upon work and the particular features that digital transactions permit – mistaking the specific for the general. This paper proposes a general framework for understanding and measuring work, employment, and value creation in the platform economy. We provide suggestive evidence for the utility of our framework and case studies illuminate the framework's categories and analysis.

To address the unique challenges and capture the opportunities that platforms create, we must first systematically identify the distinct categories of work that platforms enable and the way that they are reorganizing economic activity. Any number of vignettes – whether musicians on Spotify, YouTube video creators, Lyft or Uber drivers, AirBnb landlords, Amazon sellers, or any other person doing platform-mediated work – could demonstrate the practical complexities of labor and value creation in the platform ecosystem. Entire ecosystems of activity are enabled by a single successful platform. All of the activity can be seen as work, some of which is employment and some is uncompensated value creation. In this paper, we define work as compensated or uncompensated labor, employment as compensated labor and value creation as anything consumers or businesses are willing to purchase (Bureau of Labor Statistics (BLS), 2016).

This paper continues as follows. Section 2 describes the current literature on platforms and platform-enabled work. Section 3 builds upon a taxonomy of platform work developed by Kenney and Zysman (2019a) and provides descriptive statistics. Section 4 uses case studies of two distinct platform firms – the Etsy marketplace and Amazon Self-Publishing services – to which the taxonomy can be applied. Section 5 describes and analyzes emerging trends in the platform economy. In the final section, we consider how taxonomizing platform-enabled work allows a more comprehensive perspective on

where work may emerge in the future.

2 Literature Review

Literature on technology and work is increasingly turning to the emergence of the digital platform economy. Certainly, studies on the relationship between technological advances and employment, as well as the organization of labor are by no means new. It was a fundamental premise in Marx's *Capital* and had been remarked upon earlier by Adam Smith and Charles Babbage. In 1933, Keynes forecast a future of "technological unemployment", and debates on the scale and scope of technological change and resulting economic transformation have, once again, resurfaced in the twenty-first century as industrial robotics, artificial intelligence and machine learning, and other digital technologies increasingly have become standard factors of production (Frey and Osborne, 2013; Arntz et al., 2016; Bessen, 2016; Autor and Salomons, 2017; Manyika et al., 2017; Frey, 2019; Herzenberg and Alic, 2019). In the manufacturing industry, new digital technologies are being applied to industrial production (Lütkenhorst, 2018). But the influence of digital technologies extends far beyond manufacturing as they lower a variety of costs and increasingly penetrate and reorganize the service sector, which employs the largest share of workers in most advanced economies (Baldwin, 2019; Goldfarb and Tucker, 2019). Thus, more recently, attention has shifted to the emergence of the digital "platform economy" and the diffusion of intelligent tools and systems *throughout* the economy (Kenney and Zysman, 2016; Kenney and Zysman, 2019a).

Digital platforms are intermediating a growing share of economic activity, both in terms of how work is done and at the economic structural level (Scott and Orlikowski, 2012; Van Dijck, 2013; Barley, 2015), as well as social interactions (Perrin and Jiang, 2018). IRS tax returns provide suggestive evidence of an increase in nonstandard work arrangements, including platform-mediated "gig" or "on-demand" work, that is contingent and coordinated through online platforms (Jackson et al., 2017; Abraham et

al., 2018; Collins et al., 2019). A number of studies estimate demand- and supply-side factors that are driving the growth of platform-mediated jobs, including lower costs to coordinating and supervising dispersed labor, greater access to online labor markets, worker preferences, and income smoothing (Kalleberg, 2009; Manyika et al., 2016; Oyer, 2016; Mas, 2016; Schor, 2017; Koustas, 2019). Other studies have focused on the ways that specific digital technologies integrate with workers, in some cases augmenting labor, while in other cases substituting for workers or requiring upskilling (Goldberg and Kumar, 2018; Herzenberg and Alic, 2019; Mateescu and Elish, 2019). Additional literature investigate the way that greater connectivity through digital technologies has enabled fragmentation of industrial production processes (Fort, 2017; Lund et al., 2019) and changes in the composition and compensation of occupations within industries at the macroeconomic level (Acemoglu and Autor, 2011; Autor and Dorn 2013; Goos et al., 2014; Srnicek, 2017).

In all studies of the implications of platforms for work, measurement challenges are pervasive (Abraham et al., 2018; Abraham and Amaya, 2018; Allard and Polivka, 2018; Bracha and Burke, 2018). Given this, a number of attempts have been made to classify platform firms and platform-enabled employment. Fumagalli et al. (2018) identify six main types of platform firms based on the ways that firms generate income, for instance, advertising-based in the case of Google, work-based in the case of Uber, or product-based in the case of Spotify. Kalleberg and Dunn (2016) propose four categories of platform work that they argue encapsulate the majority of "gig" companies: crowdwork, transportation, delivery and home task, and online freelance platforms. Both Forde et al. (2017) and Manyika et al. (2016) classify platform workers with respect to their degree of dependence on platform-generated income. Eurofound (2018) identifies ten types of platform work based on whether the jobs is 1) remote versus local, 2) routine versus specialized, and 3) who determines the work (e.g., worker or platform), and subsequently estimates the share of EU workers per category. The absence of consensus on definitions of platform firms and platform workers has made it challenging to accurately estimate the effects of increasing platform-generated economic

activity on labor outcomes.

Studies forecast vastly different futures for platform-generated labor. One study found that independent contracting work is growing up to three times the pace of the overall US workforce (Upwork, 2017), particularly driven by gains in the transportation services sector (Abraham et al., 2018; Farrell et al., 2018). Since 2012, Uber drivers in the US increased from near zero to upwards of 460,000 in 2015 (Hall and Krueger, 2018). In 2018, Upwork claimed to have 18 million contractors (Meeker, 2018). But the most recent studies estimate that electronically-mediated work represents approximately 1 percent of total US employment (BLS, 2018; Farrell et al., 2018; Katz and Krueger, 2019). These studies might lead to the conclusion that platform-dependent income is trivial, however, with a broader perspective on the ecosystem of platform-enabled economic activity, it is clear that platforms are creating and changing a much larger share of work, employment, and value creation.

3 A New Taxonomy of Platform Work, Employment, and Value Creation

In this section, a taxonomy of platform work is proposed that allows us to parse a range of cases and data. Previous research on work done through platforms has focused on particular platforms with a narrow definition of platform work that does not provide a comprehensive perspective regarding the myriad but subtle ways that platforms are reorganizing work. The canonical literature characterizes platforms as "multi-sided markets" between providers of goods and services and consumers (Parker et al., 2016). In reality, platform induced creation and reorganization of work, employment, and value creation extends far beyond direct relationships between producers, consumers, and even third parties such as advertisers to encompass many other intermediaries and suppliers. In the case of all successful platforms, an ecosystem of activity emerges around the platform – these include not only direct providers, but also a variety of

other parties (Tiwana, 2013). The structure of each of these ecosystems has vastly different implications for various workers.

Within platform-enabled ecosystems, participants have various strategies for generating income, thus, a key question arises: how should we categorize and measure work *within* and *generated by* platforms? This is far more complex than it first appears, but it is vital for accurately collecting employment statistics that capture all forms of work. For example, how do we categorize an individual using a platform such as Instagram or YouTube to direct traffic to yet another platform such as an Amazon Marketplace where they sell merchandise? In this section, we propose a new taxonomy, as shown in **Table 1**, for platform-enabled work, employment, and value creation. It is composed of four categories and ten sub-categories. The four core categories are

- Direct employees of a platform firm and its contractors
- Platform-mediated workers
- Platform-mediated content creators (Kenney and Zysman, 2019a)
- Platform-mediated funders

For each of the sub-categories, we consider: a) the employment type, b) typical firms, c) compensation type, d) labor conditions, and e) their value creation process. **Table 1** displays the variety of labor in the platform economy. It is important to distinguish between economic activity that occurs *within* the platform firm, including direct employees and contractors, versus the economic activity that is *generated by* the platform ecosystem, which is composed of the remaining categories.

The *first*, and simplest, category of workers is the direct platform employees, termed "venture labor" by Neff (2012). These employees are most similar to what we consider traditional employment, however, particularly in the early stages of the firm's growth their jobs are susceptible to termination due to exhaustion of capital by the firm. These are typically full-time workers who are compensated with salaries and stock options, as well as in-kind remuneration. These employees receive worker protections, health coverage, and many other benefits. This employment arrangement is typically secure, with predictable scheduling and opportunity for career advancement. In return, they

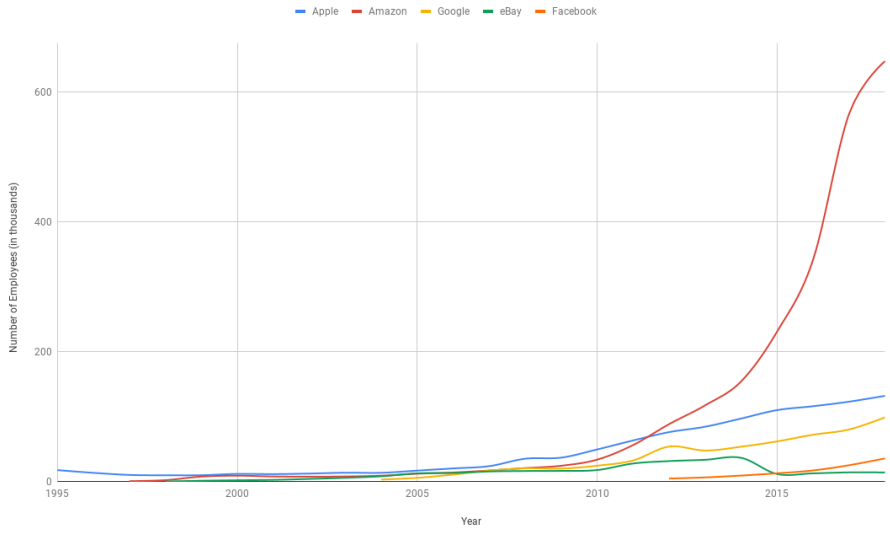
Table 1: Labor Force Distinctions in the Platform Economy

Platform Type	**Employment Type**	**Typical Firms**	**Compensation Type**	**Labor Conditions**	**Value-Creation Process**
Platform Firm					
Direct Employees	Full-time	Google, Amazon, Facebook, Snap, AirBnB, Uber	Salary, stock option, and in-kind remuneration (e.g., access to gym, travel credits)	Excellent	Creating and maintaining platform
Contractors	Full- or part-time	Dynamex, LeapForce	Salary or by job	Precarious, low-wage or high-wage	Routinized or specialized
Platform-Mediated Work					
Platform-mediated marketplace	Independent vendors	Amazon, Craigslist, eBay, Etsy	Difference between purchase and sales price	Low-wage or precarious	Sales but can include logistics
Platform-mediated in-person service	Contracted service through platform (contested)	Uber, Lyft, Postmates, Eldercare.com	Wages normally set by platform	Gig, low-income	Provide service, sometimes monetize asset
Platform-mediated remote service provision	One-time project contract	Upowork, Fiverr	Agreed upon by job	Gig, low-income	Project work
Platform-Mediated Content Creation					
Consignment content creator	Not employed	YouTube, Spotify, App Store, Google Play	Income from sales or share of advertising	Skewed, with few having large returns	Content creation
Non-platform organization content producers	Employees or contractors	All organizations with a web presence	Salary or by job	Varies widely	Build websites for firms
User-generated content	Not employed	Google, Yelp!, Waze, Facebook	Use of platform	N/A	Produce data from which value is extracted
Platform-Mediated Funding					
Seed fund recipients	Not employed	GoFundMe, Kickstarter, Patreon	Share of amount fundraised	Varies widely	Project work
Solvers	One-time contract	InnoCentives	Agreed by project	Varies widely	Project work

Source: Adapted from Kenney and Zysman (2019a)

are expected to work long hours as the firm rushes to be first to the market. While a relatively small group, in secular terms, the number of persons directly employed by platform firms has been increasing since the early 2000s, and, particularly recently as there has been a Gold Rush of investment (Kenney and Zysman, 2019b).

Figure 1: Platform Firm Direct Employment, 1995-2018

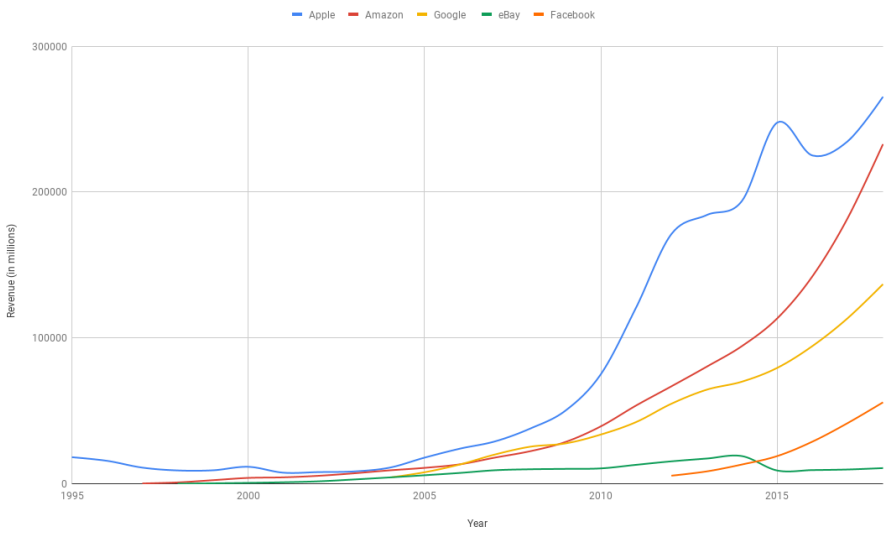


Source: Authors' calculation based on Compustat data from January 1995 to December 2018.

A subset of individuals employed by platform firms are contract workers. A firm – platform or otherwise – may contract out services as a way to cut costs, concentrate profits, adjust to fluctuation in demand, or access short-term expertise (Kalleberg, 2009; Hyman, 2018). Part of the reason that platform firms flourish with relatively few employees is not only because of highly productive digital technologies that substitute for labor, but also because much of the non-core work that was historically done in-house is contracted out (Irwin, 2017). Recent government surveys have not found an increase in the number of contract workers and temporary personnel as a share of total employment from 1995 to 2017 (CPS, 2005; CPS, 2018) and the platform firms we study do not release the number of these workers hired, however, there exists anecdotal evidence that firms are increasingly dependent on contingent workers.

Since the early 2000s, the revenue of a sample of major platform firms has in-

Figure 2: Platform Firm Revenue in Millions of 2018 Dollars, 1995-2018



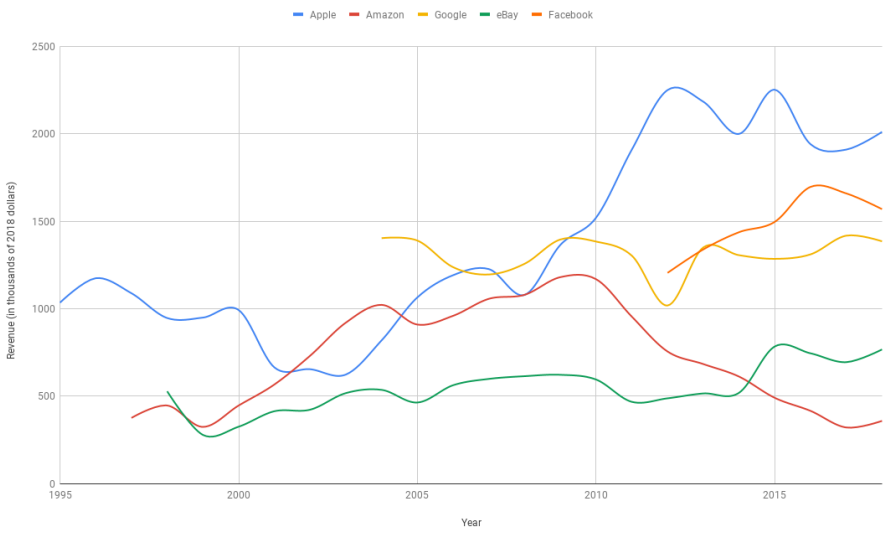
Source: Authors' calculation based on Compustat data from January 1995 to December 2018. Real dollar conversions made using Consumer Price Index.

creased substantially (**Figure 2**). As the sample in **Figure 3** demonstrates, revenue per employee has been generally trending upward, except in the case of Amazon, which has hired enormous numbers of warehouse and logistics workers. Taken together, these figures suggest that revenue is increasing at a faster pace than employment, perhaps because these firms are experiencing the positive feedback loops that successful platform firms enjoy as they scale, or perhaps because these firms are increasingly dependent on contractors who are not included in employee counts.

Contract workers are compensated by a variety of mechanisms – hours worked, salary, or by the job – but they rarely have the same worker protections, benefits and perks that full-time employees have. These workers are diverse with respect to skill requirements, ranging from a janitor without a high school diploma to a consultant with a PhD, both employed on a contract basis, often through an employment agency that might provide W-2s. Regardless of compensation, nearly all contract work is limited-term and precarious.

The *second category* is platform-mediated work. In recent literature, this category has captured the most attention. However, the distinct types of platform-mediated

Figure 3: Revenue per Employee by Year in Thousands of 2018 Dollars, 1995-2018



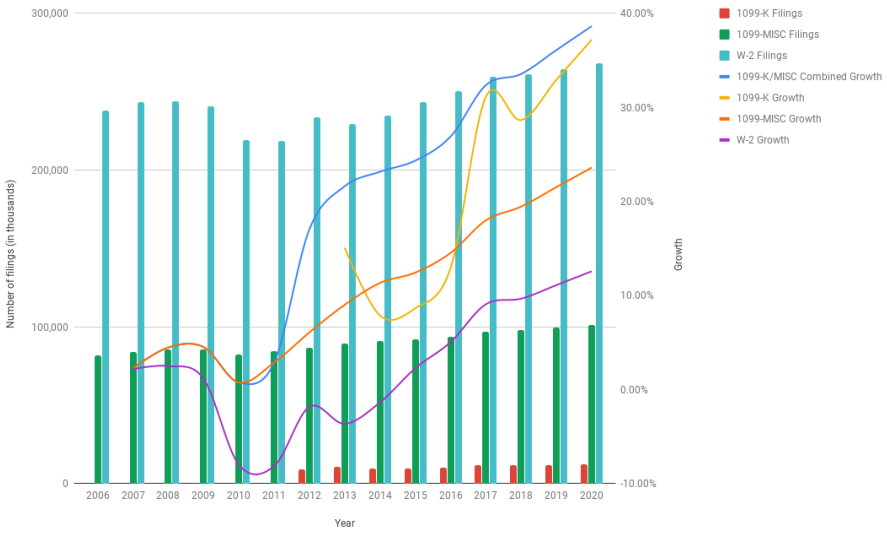
Source: Authors' calculation based on Compustat data from January 1996 to December 2018.

work have been underexplored, thereby leading to confusion. First, there are platform-mediated in-person service providers. These include the independent contractors who are drivers for Uber or Lyft (Cramer and Krueger, 2016), couriers on PostMates and GrubHub, caregivers on Eldercare.com, among many other examples (De Stefano, 2015). These "gig" jobs are typically low-income with price of service and, therefore, income for providers determined by the platform, unpredictable working hours, and may require capital like a car or a bicycle.[1] The second category is platform-mediated remote service providers that usually provide one-time project work contracted through the platform. The iconic examples are freelancers on Upwork and Fiverr. Third, there are platform-mediated marketplaces, which include sellers on Amazon, Craigslist, eBay, or Etsy. For tax purposes, individuals engaged in platform-mediated work are generally considered independent contractors. However, in some cases, such marketplace operators are or can become substantial firms in their own right. Such firms include Colourpop, Warby Parker, Zalando, Asos, and a myriad of other brands that began entirely online and have grown to have robust workforces.

[1]Some have termed these types of services as "sharing" (e.g., Schor, 2016).

The 1099-K is a tax form for individuals whose work is intermediated through online platforms, which may serve as a proxy for quantifying platform-mediated workers.[2] **Figure 4** shows that since 2012 when the 1099-K was first made available, 1099-K filings have grown faster than 1099-MISC and W-2 filings by a substantial margin. By 2017, only 5 years since the 1099-K began, 1099-K filings increased by over 30%. In comparison, in over a decade since 2006, 1099-MISCs and W-2s increased by 18% and 9%, respectively. While the total number of filings of the 1099-Ks remains below 1099-MISCs and W-2s, the projected growth rates suggest that platform-mediated work will continue to be a driving force for reorganization of economic activity. Platform-mediated workers who do not meet the requirements for the 1099-K file 1099-MISCs, however, it is important to note that not all platform-mediated workers file a 1099-K or 1099-MISC, and not all worker that file these forms are platform-mediated workers (Jackson et al., 2017; Abraham et al., 2018).

Figure 4: 1099-MISC/K versus W-2 Filings, 2006-2020



Source: Authors' calculations based on Internal Revenue Service data, Statistics of Income, annual Publication 6961. Numbers for 2018, 2019 and 2020 are projections.

The *third category* is platform-mediated content creation. Within this category, there are three unique types of work: a) consignment content creators, b) non-platform

[2]The 1099-K is required from those with more than 200 transactions or $20,000 in gross earnings.

organization content producers, and c) user-generated content. Consignment content creators produce videos for YouTube, music for Spotify, applications and games for the App Store, Twitch, and Google Play, etc. Typically, they are not paid for the production of their content, but their work is monetized when it is streamed, downloaded, sold, or attracts advertising. In some cases, these products may result in fame or notoriety that can be monetized through other venues. The returns nearly always have a long-tail distribution, whereby most producers receive little or no income, while a few reap large returns, thus creating a skewed distribution (Brynjolfsson et al., 2011). Non-platform organization content producers are the employees or contractors that any firm might use to create and maintain an online presence. A typical example would be a web developer. User-generated content creation is the data that is derived from individuals as they search on Google, write a review on Yelp!, report an accident on Waze, like a post on Facebook, etc., in exchange for use of the "free" platform service. While they are uncompensated for passive data generation, these actions produce value that is extracted and monetized by platform firms (Terranova, 2000). While the actual monetization of collective data is beyond calculation, one measure of the value is Google advertising income, which was $116 billion, while Facebook had revenues of approximately $55 billion. Both of these were in large due to monetization of user-generated content.

The *fourth and final category* is platform-mediated funding, or "crowdfunding." Typically, people use crowdfunding platforms to receive small amounts of funding from many donors in order to finance a project that involves significant investment or to cover an expense. In this section, we will consider the former, also known as "seed-funding." On platforms such as GoFundMe, Kickstarter or Patreon, individuals post a description of their project, the amount they hope to raise, and the platform connects them to individuals interested in providing funds (Economist, 2018). Kickstarter alone has financed over 158,000 projects with more than 51 million pledges (Kickstarter, 2019). A similar kind of platform-mediated funding involves crowdsourcing ideas from online communities. For example, on InnoCentives, individuals or organizations post

challenges for people, known as "solvers," to compete on solutions for a monetary reward. These challenges often involve highly specialized skills or domain expertise, for instance, "instant inflation systems for stand-up paddle board" for $25,000. Platform-mediated funding pays for work on selected projects and creates value for those people or organizations willing to pay to use them.

In sum, we can generalize the diverse types of platform firm- and platform ecosystem-generated economic activity into four core categories with ten subcategories that are different with respect to their employment and compensation type, labor quality, and value creation process.

4 Case Studies: Etsy and Amazon Self-Publishing

In this section, Etsy and Amazon self-publishing – two platform firms – are examined with respect to the ways that they generate, transform or develop new forms of work, employment and value creation. For both cases, the taxonomy illuminates the organization of work and value creation and helps us better understand growth and development strategies of the platforms. While Etsy is a retailer and Amazon self-publishing is a part of the publishing industry, the case studies are useful for extracting the various types of work at a particular platform firm and within its ecosystem. Further, for each case study, we endeavor to provide tentative estimates of the amount of workers per category. Additional research will be required to systematically measure these categories across the economy.

4.1 Retail

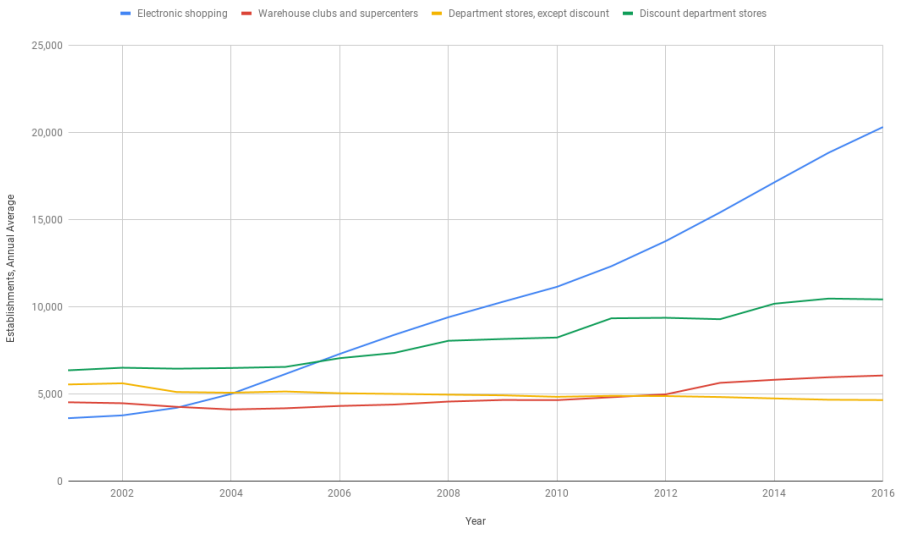
To better understand how platforms are reorganizing labor, we first look the trends in the evolving retail industry. We subsequently turn to Etsy, a major online retailer, to explore the variety of labor utilized by Etsy and the Etsy ecosystem, as well as how Etsy might contribute to the general reorganization of the retail industry.

In 2018, there were 5,468 US retail store closures (Coresight, 2018) and in 2019 the

pace appears to be increasing. However, aggregate employment data do not confirm the notion that retail is experiencing difficulty, as retail employment as a percent of total nonfarm employment has remained relatively stable since 1954 (Hortaçsu and Syverson, 2015). Almost 16 million people are employed in retail, representing approximately 1 in every 10 workers, and output has remained on an upward trajectory over time.[3]

The decline in established retail businesses without a corresponding decline in retail employment is in part explained by the rise of e-commerce, as shown in **Figure 5**.[4] Since 2001, the number of online shopping establishments increased from 3,625 to more than 20,000 – an increase of 460 percent – while the number of department stores declined by 16 percent (BLS, 2017a).

Figure 5: Number of Establishments in Selected Retail Industries, 2000-2016



Source: Recreated from Bureau of Labor Statistics data.

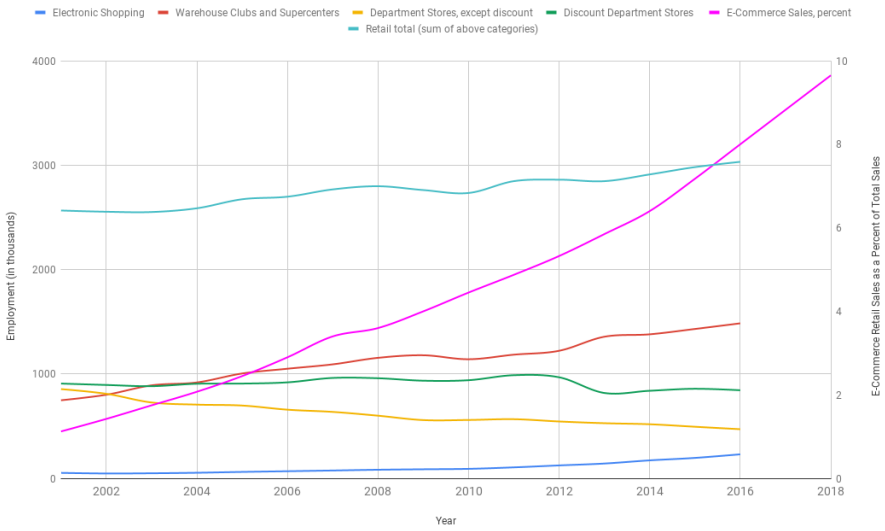
According to one study, the combination of warehousing and electronic shopping industries added 405,000 jobs from 2007 to 2017. And yet, while net employment in retail trade rose, the hours worked in "brick-and-mortar" retail declined such that

[3]Statistics are from FRED database on all US employees in retail trade (accessed on 3/4/19), as well as the US Census database.

[4]It cannot explain much of the decline, since e-commerce employment (as it is counted by the BLS) is still fairly small. An increase in employment in warehouse clubs and supercenters has played a larger part in offsetting the decline in employment in department stores.

the equivalent of 140,000 full-time jobs were lost (Mandel, 2017). While e-commerce employment accounts for a relatively small proportion of total retail employment, as almost three-fourths of e-commerce establishments employments have 1 to 4 employees, it is an increasingly important avenue for sales (**Figure 6**).

Figure 6: Share of E-Commerce Sales versus Employment in Selected Retail Industries, 2006-2016



Source: Data on employment adapted from the Bureau of Labor Statistics TED: Economics Daily on electronic shopping (2017). Data on e-commerce sales as a percent of total retail sales from FRED.

4.1.1 Etsy

To investigate the variety of labor relations in the platform economy, we begin with a case study of Etsy. Etsy was founded in 2005 as an online marketplace for handcrafted and vintage goods. From its launch, merchandise sales have increased from $0.17 million to $3.25 billion in 2017 (Etsy, 2018). In 2017, Etsy had 1.9 million sellers and 33.4 million customers worldwide and listed over 50 millions items for sale (Etsy, 2018). In aggregate, Etsy demonstrates the way that retail is being reorganized by platforms; some of the employment is simple to account for, for example, the direct employees creating and maintaining the platform marketplace, while other work and value creation is more difficult to quantify, for instance, the sellers who generate income

Table 2: Labor Force Distinctions in Etsy

Employment Classification	Employment Type	Compensation Type	Labor Conditions	Value Creation Process	Estimate of Labor
Etsy					
Direct Employees: managers, software engineers, IT, HR	Full-time	Salary, stock options, in-kind remuneration; large share upwards of $100,000 annually	Excellent	Creating, maintaing, marketing platform	874
Contractors: programmers, content evaluators	Full- or part-time	Hourly or by job	Precarious, enormous variability	Enormous variety of roles	Unavailable, given data constraints
Contractors: security, custodians	Flexible schedule	Hourly or by job	Precarious, mostly low-wage	Routinized	Unavailable, given data constraints
Etsy Ecosystem					
Platform-mediated marketplace	Independent contractors	Income by sale; average of $18.05 per sale after fees	Low-wage, precarious	Direct work, including logistics	1.9 million
Economic activity in supply-chain of sellers	Variable	Variable	Variable	Variable	14,000+
Platform-mediated user-generated content: data, user reviews	Not employed	Free use of platform	N/A	Evaluation of sellers, provide data on viewing, credit cards, etc.	33.4 million
Aggregate value-contributing labor force from Etsy and Etsy Ecosystem					35,000,000+

Source: Adapted from Kenney and Zysman (2019a)

only upon sales or the users whose data can be monetized by Etsy. **Table 2** decomposes the types of work enabled by Etsy and its ecosystem.

4.1.2 Etsy: Direct Employees and Contractors

While the Etsy platform offers a virtual storefront to millions of Internet-based entrepreneurs, as of December 2018, Etsy only had 874 employees. Postings on the jobsite Glassdoor indicate that a substantial share of these positions have compensation in excess of $100,000 annually. Etsy also offers its employees generous benefits, including comprehensive health insurance without premiums, 26-week parental leave, paid sabbaticals and family leave, back-up childcare services, and access to gym and other fitness programs (Moskowitz, 2018).

Etsy's direct employees are tasked with creating, maintaining, and marketing the platform, as well as mediating the seller-to-client interactions. These occupations include titles such as "Engineering Manager, Machine Learning Infrastructure" or "Product Design Manager." Direct Etsy employees are likely to have college degrees, and often, years of expertise, and niche skills. In the current job market, these skills are

in short supply, therefore, for such workers compensation is high and the working environment is attractive.

On Etsy's career portal, the company does not list hirings for typically low-wage, physically-intensive service jobs as these are outsourced. Almost certainly, these tasks are performed by workers employed by a temp agency or cleaning or security firm. There is also a large numbers of contract workers that Etsy uses to vet products offered for sale, curate the website, and undertake a large variety of other tasks.[5] While contract work is part of Etsy's employment effects, it is difficult to quantify their numbers with the available data.

4.1.3 Etsy: Platform-Mediated Marketplace

When an individual – a t-shirt designer, for instance – becomes an Etsy seller, they curate a "free" profile as an uncompensated upfront time investment. For each t-shirt listed on the virtual marketplace, the vendor pays Etsy base, transaction, and processing fees (Etsy, 2019f).[6] The average item on Etsy sells for approximately $20.10 (Traub, 2013), which, after fees, implies that the average seller earns $18.05 per sale.[7] To earn the equivalent of the national median pay of $49,160 for craft and fine arts workers (BLS, 2018), the average seller would need to sell 227 items a month and 2,724 items a year, before taxes. While Etsy has not released data on the items sold since 2014, it is likely that there is a long-tail distribution among its sellers with a small number responsible for the majority of the items sold, while the remaining vendors have fewer sales and highly volatile income (Etsy, 2016; Reddit, 2015). Because sellers are classified as business-owners by Etsy, they do not receive benefits or other entitlements.

Along the way to the final sale, the Etsy t-shirt seller engages in value creation that ranges from brainstorming, buying tools and supplies, utilizing web-based design

[5]To illustrate, it is estimated that Google employs as many contractors and temps as it does regular employees (Bergen & Eidelson, 2018).

[6]The fees we described are for the most basic Etsy listing, there are other fees that apply should additional features be added.

[7]In May 2014, Etsy sold $102.9 million of goods, representing 5,118,562 items sold, which amounts to an average sales price of $20.10. This is the most recently available data on items sold by Etsy. (Traub, 2013).

software, partnering with on-demand t-shirt printers, marketing, purchased advertisements, customer relations, etc., which impacts other businesses generating economic activity. According to Etsy (2019c), in 2018, the 1.9 million sellers generated more than $1 billion in revenue, and over $850 million in wages and income for US workers, which is equivalent to median annual income for approximately 14,000 individuals (Fontenot et al., 2018). In aggregate, using a multiplier approach, Etsy estimates that in 2018 its sellers and all other businesses impacted by them was worth $5.37 billion (Etsy, 2019d). These numbers are particularly large, considering that 79 percent of Etsy sellers are businesses with a single employee, 97 percent operate from their homes, and 87 percent are female compared to the national average of 36 percent (McManus, 2017; Etsy, 2019b).

4.1.4 Etsy: Platform-Mediated User-Generated Content

When any of the 33.4 million potential buyers use the Etsy platform, their activities are monitored and analyzed. This data is provided by the customer, in exchange for use of the Etsy marketplace. All data generating activity – a click, page view, a pop-up – is collected by Etsy (Bednarz, 2013) and sent to data analytics teams that constantly sift through data to come up with changes in small, quick tweaks to the web design, selling process, user-experience, etc., in a process of continuous deployment (Snyder, 2013). This provides sellers with insight that allows them to better target potential buyers and provides buyers with a more customized user experience.

Once the-buyer purchases and receives an item, they are prompted to rank and review the seller. These rankings are a form of user-generated content that provides information to the seller, potential future buyers, and, of course, the platform. These rankings are used to curate the platform, identify problems, and when combined with more data such as credit card information and user profiles, can be used for a remarkable variety of other purposes including A/B testing and sales targeting.

In current estimates of labor within the Etsy ecosystem, the most clear cut categories of work are the 874 full-time employees and the 1.9 million platform-mediated

marketplace sellers. The precise income of the 1.9 million platform-mediated sellers would only be captured through 1099 filings, which is gross income and does not account for expenses. It is more challenging to estimate the additional economic activity generated by the sellers' supply chain, the work of contractors that is undisclosed and might be attributed to another firm, and the uncompensated value of data created by sellers and users. In this respect, most naive measures of the people "employed" by Etsy neglects much of the work and value creation related to Etsy, which in aggregate is likely upwards of 35 million individuals. By systematically identifying the distinct types of labor at Etsy and its ecosystem using the taxonomy, we can begin to dissect the various quantities and consequences of new, platform-based work in terms of workers compensation, benefits and protections, and job security. Next, we look at the impact of platforms on labor creation and organization in the publishing industry, which, unlike retail and e-commerce, has seen a dramatic decline in publishing employment corresponding with the rise of digital platforms.

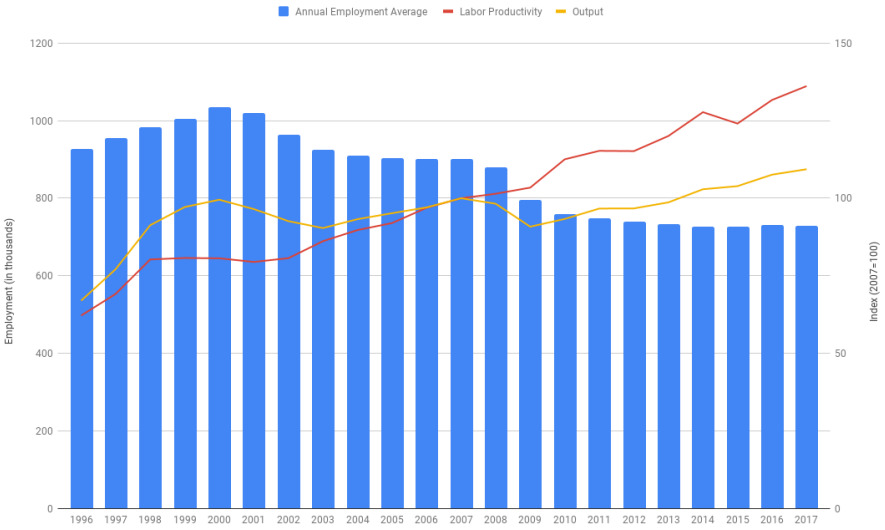
4.2 Publishing

Digitization has dramatically reorganized the publishing industry and platforms have been a major part of that. This section focuses on book publishers, which have experienced substantial decline in recorded employment during the past 20 years. As platforms have become an increasingly dominant tool used to create, market, and distribute books, they have absorbed many of the tasks previously done by traditional publishers and shifted the remaining tasks onto authors and other individuals with niche skills; for example, cover design, manuscript layout, Kindle content producers, and audiobook narrators.

As **Figure 7** illustrates, aggregate employment in publishing industries began to decrease in 2001 and intensified during the Great Recession in 2008. Since 2013, employment has stagnated at approximately 725,000 – a 30 percent decline since 2000. Publishing is now one of the most rapidly declining industries in the US (BLS, 2017b). Yet the dramatic decline in traditional publishing employment has not been accom-

panied by an equivalent decline in the quantity of annual publications. In fact, since 2000, publishing industry output and labor productivity has increased.

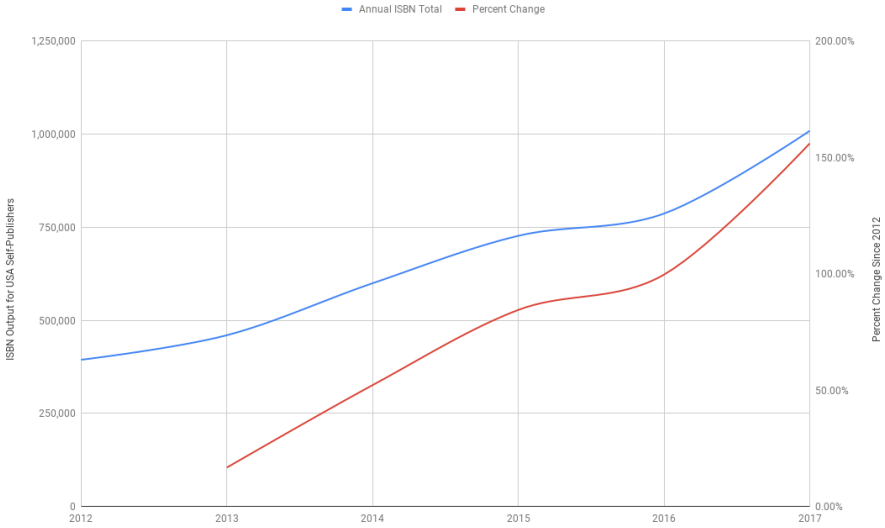
Figure 7: Publishing Industries Employment (except Internet) versus Labor Productivity and Output, 1996-2017



Source: Data from Bureau of Labor Statistics.

Publishing employment statistics reported in **Figure 7** do not include electronically-mediated self-publishing and the many ancillary industries such as editing, illustrating, etc., that are monetized through platforms. The difficulty of counting employment in Internet-based publishing is that it is mixed within, "other information services" – a category that has been steadily increasing since the early 2000s (BLS, 2019a). In 2017, self-published titles peaked at over 1 million (Bowker, 2018), representing 156 percent growth in the number of self-published titles published since 2012 (**Figure 8**). Of all self-published print and eBooks in 2017, 88 percent were published by three platforms: CreateSpace (an Amazon subsidiary), Smashwords, and Lulu. Not surprisingly, people are still writing and publishing, but fewer authors use traditional publishers; many more self-publish through platforms.

Figure 8: Online Self-Published Titles, 2012-2017



Source: Bowker Self-Publishing report 2012-2017.

4.2.1 Amazon Self-Publishing

Since Amazon is the dominant firm in online publishing, we explore the types of work and methods of compensation that have emerged from the platforms that compose Amazon self-publishing: 1) CreateSpace and Kindle Direct Publishing (KDP) for print books and eBooks, and 2) Audiobook Creation Exchange (ACX) for audiobooks. In addition to self-publishing, Amazon has 16 imprints that are structured like traditional publishing companies. **Table 3** presents labor force distinctions within Amazon self-publishing and its ecosystem. Of course, self-publishing is just one part of the Amazon empire.

4.2.2 Amazon Self-Publishing: Direct Employees and Contractors

In 2018, Amazon employment reached an all time high of 647,500 people, representing a 420 percent increase since 2014. Although the number of employees working directly for CreateSpace, KDP, and ACX are unavailable, as one indicator of employment, we found that in February 2019, there were 506 positions being recruited in departments related to Amazon self-publishing: 323 open jobs in "Kindle Content,"

Table 3: Labor Force Distinctions in Amazon Self-Publishing

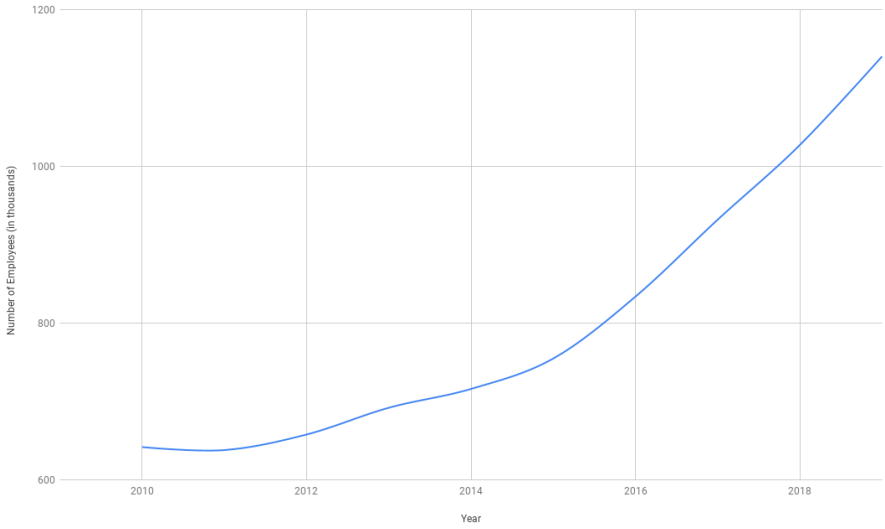
Employment Classification	**Employment Type**	**Compensation Type**	**Labor Conditions**	**Value Creation Process**	**Estimate of Labor**
Amazon Self-Publishing					
Direct Employees: Kindle Content Managers, Software Developers	Full-time	Salary and stock options; $54,000-160,000	Excellent	Creating, maintaining, marketing platform	5,060
Contractors: Professionals, Consultants	Full- or part-time	Hourly or by job; $15 minimum an hour	Precarious, enormous variability	Enormous variety of roles	Unavailable, given data constraints
Contractors: Warehousing, on-demand printers, narration services	Flexible schedule	Hourly; $15 minimum an hour	Precarious, mostly low-wage	Routinized good or service	200,000+
Amazon Self-Publishing Ecosystem					
Consignment content creators: Authors	Not employed	Income from sales; varies widely, but median pay is $29.71 an hour	Skewed, with few having large returns	Wiriting books, but also take on publishing tasks	187,983
Platform-mediated remote service provision: Amazon Mechanical Turk, Upwork	One-time project contract through author	Agreed upon by job or hourly	Gig, low-income	Project-based work	751,929
Platform-mediated in-person service provision: Amazon Flex, Amazon Delivery Partners	Contracted service through platform	Set by platform or employer who uses platform; $18-25 an hour	Gig, low-income	Provide service, sometimes monetize asset	Unavailable, given data constraints
Aggregate value-contributing labor force from Amazon Self-Publishing and Amazon Self-Publishing Ecosystem					101,144,972+

Source: Adapted from Kenney and Zysman (2019a)

125 open jobs in "Audible," and 58 open jobs in "Author & Publisher Experience." If we assume that the available positions represent 10 percent of the total staff in Amazon self-publishing, then this suggests that Amazon self-publishing alone directly employs approximately 5,060 persons. Amazon self-publishing positions, such as Software Development Engineer, Senior Product Manager, Human Resources and Compensation Data Analyst, Video Content Producer, Customer Engagement and Retention Manager, are typically IT-intensive and appear to require specialized skills or higher education. On average, direct employees are well-compensated with salaries that range from $54,000 to $160,000 in addition to employee benefits.

Within self-publishing, many of the contract and temporary jobs are in logistics, packing and shipping books, on-demand printing, audiobook narration, etc. While the precise number of contractors and temporary personnel is difficult to estimate with available data, Amazon reported that it hired 200,000 seasonal employees for the holiday season in 2018, which provides a lower bound estimate of the number of contractors used by the firm annually. **Figure 9** shows that work in warehousing and storage has been increasing rapidly across the US economy.

Figure 9: Employment in Warehousing and Storage, 2009-2018



Source: Author's calculation of annual averages based on Bureau of Labor Statistics data.

The minimum wage for Amazon employees recently increased to $15 an hour, including part-time, temp, and seasonal workers (Business Wire, 2018). The other category of contract work that is difficult to measure are the professional contractors, consultants, etc., that receive higher pay for providing a specialized service. The difference in compensation between Amazon self-publishing direct employees and both types of contract workers is substantial, despite all being workers who are complementary to the platform.

4.2.3 Amazon Self-Publishing: Platform-Mediated Content Creation

Amazon self-publishing authors are platform-mediated consignment content creators. An author with a complete, formatted manuscript uploads it to the KDP portal and their book is subsequently available through Amazon publishing distribution channels. The author's work, which is created at their expense and published for "free" through Amazon self-publishing, is added to Amazon's book collection – an act of uncompensated, platform-mediated consignment content creation.

Authors using Amazon self-publishing have increased substantially over time. From 2012 to 2017, the number of print and eBooks published through KDP grew from 131,460 to 751,929 (Bowker, 2018). While the precise number of self-published KDP authors is undisclosed, if we assume that each author publishes four books per year, then 187,983 authors self-published on Amazon in 2017. The increase in self-published titles is likely driven by: 1) authors who previously worked with traditional publishers switching to KDP, 2) authors who previously worked with online competitors switching to KDP, and, almost certainly the largest category, 3) new authors entering the industry and choosing to self-publish with KDP. By providing "free" tools to build and publish books, royalties of up to 70 to 80 percent of the sales price, and access to top distributors including Amazon itself, Kindle, and Audible.com, Amazon publishing has become a dominant way for authors distribute their work, thereby disrupting the traditional publishing industry.[8]

[8]If an author earns royalties from Amazon, this income will be considered self-employment income in

Once a book has been published on Amazon's marketplace, customers generate content in exchange for use of the platform, an act of platform-mediated user-generated content creation. In 2017, there were 100 million Amazon prime members, many of whom have likely used Amazon to purchase at least one book (Bezos, 2018). Amazon collects data on users' past purchases, wish lists, shopping cart, reviews, and ratings that is used to make recommendations for future purchases and is monetized by the company when the targeted suggestions lead to a purchase. For Kindle books, users may highlight words and take notes; their annotations are analyzed by Amazon to determine what topics are of interest to users and to make purchase suggestions (Wills, 2018). While users are not compensated for their data generation, it creates value for Amazon.

4.2.4 Amazon Self-Publishing: Platform-Mediated Work

There are two types of platform-mediated work that arise alongside the Amazon self-publishing platform. First, platform-mediated remote service provider jobs. As authors self-publish through Amazon, they independently find editorial services, cover designers, eBook conversion, translation services, etc., for the tasks that authors cannot or do not wish to complete themselves. They secure outside assistance through word of mouth or platforms like Amazon Mechanical Turk or Upwork. Based on a search on Upwork in February 2019, more than 4,000 freelancers in the US appeared in each search for "book editor," "book translator," and "graphic designer." If each title published requires the assistance of only one additional person, then in 2017, 751,929 additional people would have work as a result of Amazon self-publishing. In reality, the number is likely much higher.

The second category is platform-mediated in-person service providers composed of the couriers that deliver Amazon print books – of course, these are general delivery workers and books are only a small subset of what they deliver. These independent contractors work with Amazon Flex and earn $18 to $25 an hour. On the Amazon

national accounts (Abraham and Amaya, 2018; Allard and Polivka, 2018).

Flex app, workers designate times that they are available to pick up and deliver packages, and are directed and monitored during the delivery process. In September 2018, Amazon announced a pilot program called Delivery Service Partner, where individuals establish their own delivery businesses for as little as $10,000 (Amazon, 2018); in return, Amazon provides an Amazon truck, training and on-demand support. Both delivery services depend on Amazon apps in a manner roughly comparable to that of Uber.

Amazon self-publishing demonstrates the profound ways that platforms have disrupted the publishing industry and fragmented traditional publishing occupations into tasks that platforms absorb, and remaining tasks that authors or others with niche skills complete. This shift may partially explain the steep reduction in traditional publishing employment, even as the number of publications has increased. We estimate that over 101 million individuals are engaged in distinct types of economic activity enabled by Amazon's self-publishing platform – all of whom can be categorized within the taxonomy. Next, we turn to the conclusions that we might draw from the taxonomy and the case studies.

5 Discussion

This paper introduces a taxonomy of the complex ways work in the platform economy is organized and provides case studies as well as suggestive macro-level data on employment impacts. The case studies of Etsy and Amazon self-publishing suggest that there are consistent patterns of work, employment, and value creation across online platforms that can be systematically classified into the proposed taxonomy, and are, arguably, measureable.

From this, we may draw some conclusions.

First, platform ecosystems are a significant driver of labor reorganization and economic transformation. As platforms create new tasks and subsume other tasks, work in traditional firms is being reconfigured and a wide variety of value-creating activities

emerge. In fact, the 1.9 million platform-mediated sellers claimed by Etsy suggests that the most representative estimate of 1.6 million electronically-mediated workers in the whole US economy is a vast underestimation (CPS, 2018). In their current configurations, although much new work and value is being created, only the "venture laborers" and some of the most successful content creators appear to capture bulk of the benefits.

Second, platform firms *employ* an elite group of workers that create and maintain platforms. As our data showed, for the successful firms the revenues per employee are enormous. These direct employees of successful platforms (with the exception of Amazon), the venture labor, receive excellent compensation and workplaces. The platforms also hire temporary and contingent workers, a faction difficult to enumerate, most often for non-core tasks and lower-wages.

Third, our taxonomy suggests that platforms are enabling an ever greater division of labor. For example, platform-enabled fissuring of labor has resulted in the emergence of workers engaged in platform-mediated work, undertaking platform-mediated content creation, and receiving platform-mediated funding. In the case of book publishing, the occupation has fragmented into tasks that the Amazon self-publishing platform absorbs and remaining tasks that are dispersed to authors and other sets of workers. The consequences of greater division of labor on workers' wages and incomes, benefits and worker protections, bargaining power, economic mobility, etc., has in many particular cases been quite severe. Making definitive general statements will be difficult until we more systematically categorize and measure the entire ecosystems that platforms enable.

Fourth, we question the notion that digital technological innovation is, necessarily, labor-reducing. In fact, our data and case studies confirm that there is significant ambiguity surrounding the consequences of digital technologies for the net number of jobs, or better perhaps, income generating activities. While most surveys to-date find that electronically-mediated ("platform") work represents 1 percent of total US employment – a share so small that it is unlikely to offset any substantial platform-

induced task elimination or job displacement (CPS, 2018), we believe that the quantity of people dependent upon platforms for their employment or business activities is far greater. For example, these surveys do not account for online-only brands that have emerged in the last few years. Moreover, the estimates of new platform-based economic activity include only platform-mediated workers who use a platform for full-time employment. They neglect the majority of platform-mediated work that is part-time and the ecosystem of new economic activity around platforms (e.g., an Uber driver working 40 or more hours per week would be counted, but a talent agent for YouTubers would be ignored). The taxonomy captures – and the case studies illustrate – the complex ways that platforms are generating, transforming, and reorganizing distinct types of work, employment, and value creation that the existing literature does not consider.

Fifth, it is important to consider the impact of platforms on work quality. From 1997 to 2016, the share of high-tech employment within the service industry increased by 16 percent (Roberts and Wolf, 2018). Since many platforms provide services, it is plausible that platforms are contributing to and potentially accelerating the migration of high-tech employment into service-providing industries. Occupational restructuring toward high-tech work within the service sector is certainly generated in part from *within platform firms*. It will be driven by the types of workers (e.g. computer programmers, mathematicians) that are directly employed and contracted to create and maintain platforms, as well as from non-platform organization content producers (e.g. web developers) *that are likely to be less well-compensated and more contingent*. On the other hand, a myriad of activity is generated by the *platform ecosystem* that is contingent, with unpredictable demand for services and pay, highly volatile work hours and income, limited worker protections and benefits, and job tracks that do not have standard career ladders. This does not preclude upward mobility, but mobility is likely to be more capricious. The impact of platforms on income distribution and inequality needs careful examination. Indeed, within the platform economy there seem to exist two divergent trends with respect to quality of work, that might contribute to the

overall occupational polarization in the US economy that began in the late twentieth century.

Finally, and more generally, it is evident that at the macro level platforms are, in some cases, reorganizing entire work sectors. As we saw with Amazon self-publishing, hiring was different than what one would expect from a traditional publishing house indicating a change in skills towards digital. This may be indicative of a more general tendency for domain specific skills to change as platforms become ever more pervasive in the twenty-first century economy.

In order to address pressing research and policy questions, it is necessary to first systematically identify, classify, and measure labor within the platform economy. Our taxonomy illustrates the distinct types of work, employment, and value creation that is being driven by the increasing centrality of platforms to large swathes of the economy.

6 Conclusion

Just as factories changed value creation, platforms, electronic institutions, stable arrangements of rules – albeit rules mostly for now set by the platforms – are transforming value creation, the scope of market competition, and influence the arrangements of power in the economy, not just in the labor market.

This paper proposes a framework for understanding the platform economy, reorganization of work, and the labor forces as market are reorganized and the scope of competition is redefined. The case studies illuminate how the framework opens out the dynamics of work and labor markets in diverse, but significant, platforms. The data from the cases suggest that the dimensions of changes in the labor market have been greatly underestimated.

Of course, this just begins the discussion. How particular tasks are integrated into the platform and platform ecosystems is a matter as well of regulatory rules and business strategies. Moreover, the labor market dynamics in these categories will vary by firm and sector. For example, Uber, Airbnb, and Upwork involve platform-mediated

work, but the tasks and labor markets are very different. Nonetheless, these categories, and the variation within them, provide a starting point for research to understand how platforms are reorganizing socio-economic life.

List of Tables

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