Dependence and Precarity in the Platform Economy

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Abstract

Since its introduction in the late 2000s, there has been growing interest in sharing economy platforms. To explain outcomes, scholars have taken two main approaches—institutionalism, which focuses on employment classification and precarious labor, and technological control via algorithms. Both predict relatively similar outcomes for workers. On the basis of 111 in-depth interviews with workers on seven platforms (Airbnb, TaskRabbit, RelayRides, Uber, Lyft, Postmates and Favor) we find that because platform labor is weakly institutionalized, worker satisfaction, autonomy and earnings vary significantly across and within platforms, suggesting dominant interpretations are insufficient. The extent to which workers are dependent on platform earnings to pay basic expenses rather for supplemental income explains the variation in outcomes, with supplemental earners being more satisfied and higher-earning. This suggests platforms are free-riding on conventional employers. We also find that platforms are hierarchically ordered, in terms of what providers can earn, conditions of work, and their ability to produce satisfied workers. Our findings suggests the need for a new analytic approach to platforms, which emphasizes labor force diversity and connections to conventional labor markets.

Keywords: platform labor, sharing economy, algorithmic control, precarity, economic dependence, Uber, Airbnb.

Introduction

The emergence of Uber and related companies has led to considerable interest in the phenomenon of platform labor. While these "digital intermediaries" currently involve only a small fraction of the labor force (Katz and Krueger, 2017), they are seen as harbingers of a new type of labor management. Gerald Davis has predicted widespread "Uberization" in which companies abandon long-term contracts in favor of task-based work, employee-free organizations, and an organizational structure akin to a "web page" rather than the modern corporation (Davis, 2016a, 2016b; Scholz, 2016; Vallas, forthcoming). Arun Sundararajan foretells an "end to employment" (Sundararajan, 2016). Longtime analysts of the technology sector, Martin Kenney and John Zysman argue that: "We are in the midst of a reorganization of our economy in which platform owners are seemingly developing power that may be even more formidable than was that of the factory owners in the early industrial revolution" (Kenney and Zysman, 2016: 62).

While many analysts assume that platforms represent the future of labor management, explanations for why differ. Technologists argue that digital technologies distinguish platforms from conventional firms, that algorithmic control is the crucial factor in workers' experiences, and emphasize discontinuity with previous systems of labor control (Edelman and Geradin, 2016; Rosenblat and Stark, 2015; Lee et al., 2015). By contrast, institutionalists see platform labor as the next stage in an ongoing process of precaritization (Kalleberg and Vallas, 2017; Scholz, 2016; Ravenelle, 2019) which has replaced the full-time, stable employment of the postwar era. They focus on policy choices, most notably employment versus independent contracting (V. B. Dubal, 2017; V. Dubal, 2017; Rogers, 2015; Cherry, 2016; Tomassetti, 2016; Rahman and Thelen, 2018; Kennedy, 2017).

While both approaches capture important aspects of platform labor, our findings suggest they are at best incomplete. Because technology and policy are similar for all workers, these approaches predict that workers should have common experiences and outcomes. This is true both across the sector, where the tendency is to treat all platforms as similar, as well as in the characterization of workers' experiences. However we find strong differentiation across platforms, as well as across workers on a single platform, with respect to job satisfaction, remuneration, autonomy, and management control.

The practice of conceptualizing platform labor as undifferentiated is attributable to a number of factors. The institutionalist approach treats each labor regime largely as a monoculture rather than a diverse eco-system. For technologists, the tendency to assume common outcomes is mostly due to a deterministic approach which underplays the fact that the technology is always deployed in combination with particular policies. Furthermore, like precarious work itself (Kalleberg and Vallas, 2017), platform labor is under-theorized, on account of particularities of the evolution of the literature. One is a focus on whether sharing platforms are beneficial or exploitative for workers, at the expense of a more analytic approach (Schor and Attwood-Charles, 2017). A second is that the literature has been disproportionately about one company—Uber. Uber is in many ways unique, and in any case, focusing on one entity obscures the operation of the larger platform eco-system. By contrast, we have reached our conclusions by studying many platforms. To date, there is no comparable multi-platform dataset, as other multi-platform studies involve far fewer platforms (Ticona, Mateescu, and Rosenblat, 2018; Ravenelle, 2019).

In this paper we shift the focus from describing workers' experiences to a more general question: what are the determinants of labor outcomes on platforms? We have identified two key features. The first is weak labor institutionalization, and especially the absence of platform control over hours of work. This leads to outcomes that are driven in large part by the economic situations providers bring to the platforms, in particular how economically dependent the worker is on platform earnings. While economic dependence is also relevant in other workplaces, its importance is heightened in this context because the labor force is more situationally diverse than in conventional employment. Ours is the first paper to explicitly analyze the role of economic dependency, although the concept has been noted in the literature (Kuhn and Maleki, 2017; Lehdonvirta, 2018; Ravenelle, 2019). The second feature is that the platform economy is nested within the general labor market and larger trends in the availability and quality of jobs influence the experience of platform labor. We find that in order to achieve positive outcomes for their workers, platforms are free-riding on the security provided by conventional employment, suggesting a parasitic relationship between the two labor markets.

Our research is based on a seven platform qualitative study of providers in the Boston area. We confine our focus to consumer-oriented companies, frequently referred to as "the sharing economy." We have conducted 111 in-depth interviews with providers on Airbnb, TaskRabbit, Uber, Lyft, Postmates, Favor and RelayRides. We describe platform conditions for providers, focusing on the adequacy of earnings, the effort/earnings bargain, autonomy and flexibility, and overall satisfaction. We find that when income is supplemental (i.e., the provider has multiple sources of income), satisfaction is higher, autonomy is greater, hourly wages are generally higher and conditions are better. By contrast, those who are dependent on the platform to fund basic living

expenses express more dissatisfaction, and experience more precarity. We also find a second axis of variation across platforms. Although platforms are generally open to almost everyone,[1] the asset requirements and skill levels needed to succeed vary considerably, as do outcomes. We believe that our emphasis on economic dependence, the hierarchy of the platform eco-system, and the parasitic relationship between platform and conventional labor, represents a new approach to the phenomenon of platform work.

Theoretical Approaches to Platform Labor

There is a longstanding body of research across social science disciplines that understands the work process and labor market outcomes as a product of historically varying institutional regimes that align state and corporate policy. Examples include the French "Regulation School" (Boyer and Saillard, 2002) and the American "Social Structures of Accumulation" approach (Bowles, Gordon, and Weisskopf, 1986), both of which focus on the institutional specificity of regimes of capital accumulation and labor control. Scholars distinguish the laissez-faire labor regime of the 19th century from the post-WWII social contract, in which employers afforded high levels of security to their workers, passed on productivity increases as higher wages, and tolerated labor unions (Marglin and Schor, 1989; Burawoy, 1979; Kalleberg, 2018). Within institutionalism, the varieties of capitalism literature and subsequent accounts of national differences (Hall and Soskice, 2001; Thelen, 2014) are more particularistic than the Regulation School, however they also assume dominant national institutional frameworks. The breakdown of the postwar regime is understood as a return to market-based processes for managing and remunerating labor, with the use of terms such as "great risk shift," "fissured workplace," "precariat," and "Polanyian double-movement" (Hacker, 2008; Kalleberg, 2013, 2018; Standing, 2011; Weil, 2014; Beck, 2000; Hatton, 2011).

This literature identifies firm-led institutional restructuring as the driving force undermining the security and liveable wages of the postwar regime. Market-based labor regulation also entails more frequent and longer durations of unemployment, including for the white-collar and highly educated workers (Lane, 2011; Sharone, 2013; Chen, 2015), who eventually became a source of platform labor.

For institutionalists, the platform sector is an acceleration, or next stage of the larger trend toward precarity, rather than something fundamentally new (Collier, Dubal, and Carter, 2017; Rahman and Thelen, 2018; van Doorn, 2017). A recent study of "alternative labor arrangements" found an increase from 10.1% to 15.8% of the labor force between 2005 and 2015, a period roughly coinciding with the appearance of platforms (Katz and Krueger, 2017). This approach has focused on the use of independent contractor status rather than traditional employment, and the charge of misclassification, particularly by Uber (V. Dubal, 2017; V. B. Dubal, 2017; Cherry, 2016; Kennedy, 2017; Rogers, 2015). Misclassification is seen to give "immunity" (van Doorn, 2017) to companies and buyers, by shifting responsibility and risk onto workers (Ravenelle, 2019; Robinson, 2017; Ladegaard, Ravenelle, and Schor, 2018). Re-classification as employees and achieving collective voice is therefore key to improving working conditions and altering platform outcomes, although some are pessimistic about the likelihood of such reforms (Collier, Dubal, and Carter, 2017).

By contrast, technologists see platforms as a break from previous labor regimes. Some analysts focus on digital matching, seamless payment systems, and reduced transaction costs (Edelman and Geradin, 2016; Horton and Zeckhauser, 2016; Cramer and Krueger, 2016) in these efficient multi-

sided markets (Rochet and Tirole, 2003; Evans and Schmalensee, 2013; Hagiu, 2009). Others argue that "algorithmic control" increasingly determines both social outcomes and labor outcomes (O'Neil, 2016; Pasquale, 2015). Aneesh, who studied a software firm that outsourced tasks to Indian programmers (2009) coined the term "algocracy" to describe a form of labor control that is distinct from both markets and bureaucratic (or institutional) control. Platform researchers have made similar arguments, for example that ratings-triggered deactivation of drivers on ridehailing apps represents a form of "algorithmic management" (Rosenblat and Stark, 2015; Robinson, 2017; Lee et al., 2015; Rosenblat, 2018). Using online driver postings from Uber drivers, Rosenblat and Stark find that algorithmic management is facilitated via informational asymmetries such as the company's ability to surveil workers via the app, the production of driver uncertainty about how surge pricing works, and the fact that drivers must accept rides blindly. They also argue that the algorithm achieves "soft control" via techniques such as gamification and behavioral nudges.

While there is little doubt that technological developments have both enabled and structured platform firms, this approach can suffer from technological determinism. A notable exception comes from ethnographic studies of digital labor, or crowdwork, which focus on social and cultural aspects of these global labor markets (Irani, 2015a, 2015b; Gray et al., 2016). Algorithmic control involves human action and in the platform labor context, is always paired with bureaucratic policy, such as the ratings cutoff for deactivation. Furthermore, as we and Charles (2018) argue, the power of the algorithm to control behavior and influence outcomes is variable across workers.

Both technological and institutionalist approaches assume common outcomes for workers because they labor under common policies and technological management. However, we find marked

differences across our respondents. This is due to two aspects of the platform economy which have not been sufficiently recognized—weak institutionalization of labor control and a parasitic relationship to the conventional economy. While much of the discourse about platforms references issues of labor flexibility and autonomy, analysts have mostly been concerned about how much flexibility workers actually have (Hall and Krueger, 2018; Berg and Johnston, 2019) rather than impacts on the diversity of the workforce. But hours flexibility is a key part of what makes platforms different. Conventional firms generally exercise control over workers' hours and hours variation is mainly across job type, rather than person (Altonji and Paxson, 1988; Schor, 1992). By contrast, Hall and Krueger found that 51% of Uber drivers work 1-15 hours per week, 30% work 16-34 hours, 12% work 35-49 hours and 7% work more than fifty hours (Hall and Krueger, 2018). Platforms' willingness to accept providers irrespective of their other work commitments results in a more "situationally" diverse workforce. This diversity also manifests itself through a lack of common economic behaviors. Schor (2015) finds that platform workers do not conform to a single behavioral model, but vary based on whether or not they are income maximizers and the extent to which social and ethical considerations determine their actions. The existence of a diverse workforce results in different levels of economic dependency on platform earnings, our key explanatory variable. [2] The literature may have failed to account for this diversity because it has been so Uber-centric. While Uber's size makes it an obvious object of study, it is also unusual in that it has entered an industry with large economic rents and attracted unprecedented amounts of capital. Driving is a widely available skill, so the industry is prone to excess supplies of labor (Dubal, 2017). Ridehailing has a higher percentage of full-time (dependent) earners than most platforms. It is also well-documented that Uber is a harsh manager. Qualitative studies of drivers

provide evidence of poor working conditions, dissatisfaction and desperation (Rosenblat and Stark, 2016; Robinson, 2017; Ladegaard, Ravenelle, and Schor, 2018).

A second insight is that the platform economy must be partially understood in relationship to the general labor market (Schor, 2017). In the early days, many providers opted for platform work because they were unable to find conventional employment, in the wake of the Great Recession. Farrell and Greig (2017) find that the rate of growth of platform labor is influenced by conventional labor market conditions. The platform sector is nested within the larger labor market and trends in the availability and quality of jobs influence the experiences of platform workers. More specifically, the positive experiences of many platform workers are due to the benefits and security they simultaneously receive from their main employers, suggesting that platforms are free-riders.

Methods

As noted above, we believe a multi-platform design is best for studying questions about labor outcomes across the sector. We selected seven platforms (Airbnb, TaskRabbit, Uber, Lyft, Postmates, Favor and RelayRides (later renamed Turo)) which conform to the Commerce Department's criteria for "digital matching firms," namely the use of information technology to facilitate peer-to-peer transactions and ratings systems, hours flexibility for workers, and worker-provided tools and assets (Telles, 2016: 3–4). These criteria result in the inclusion of labor services as well as rental platforms in which the bulk of the revenue is a rent or return to capital. We conducted 111 semi-structured interviews with earners in the Boston area, ranging from 40-90 minutes (some ride-hailing interviews were shorter).[3] Respondents also completed a short survey about their earnings and demographic profile.[4] Interviews are concentrated among people aged

18-34 because this group constituted nearly all users when the research was begun and continue to be over-represented in the sector. A Pew survey of gig labor platforms found that 42% were aged 18-29 and another 39% were in the 30-49 year old range (Smith, 2016). Interviews began in 2013 with Airbnb, RelayRides, and TaskRabbit providers, and in 2015 and 2016 we added the delivery and ridehailing apps. In 2015, we conducted second interviews with nine providers from the 2013 round. Interviews were largely conducted in person although a few Airbnb and TaskRabbit interviews were conducted via Skype with people in other cities. We are aware that our sampling strategy introduces a selection bias, because it does not include people who are no longer active on the platforms. However, because we are explaining the coexistence of satisfied and dissatisfied providers, rather than satisfaction levels, this bias is not disqualifying.

Here we offer a very brief description of each platform. Airbnb is a peer-to-peer housing exchange that offers whole home and shared listings, and uses online descriptions, and ratings and reviews to match guests and hosts. RelayRides is a peer-to-peer car rental service, akin to Airbnb for vehicles. TaskRabbit is a general labor services site on which customers hire "taskers" to perform services such as housecleaning, deliveries, handyman work, petsitting, moving and assembling furniture as well as online tasks such as being a virtual assistant or product tester, or doing translation. Uber and Lyft are ride-hailing platforms that match drivers to people who need rides. Our interviews were with drivers on the lower-priced UberX. Postmates and Favor are Uber-like delivery services which were originally envisioned as bicycle courier services offering a range of deliveries. They now both specialize in delivering items from convenience stores, takeout from restaurants, and miscellaneous items from various retailers, and deliveries are carried out via a range of transportation options—bikes, cars, public transport and walking, with bikes and cars

predominating. We have amalgamated Uber and Lyft as one case, and Postmates and Favor as another because the services are so similar and because most of the providers we interviewed worked on both platforms simultaneously.

Describing our respondents

Descriptive statistics about our sample can be found in Table 1. (Insert Table 1 about here.) The breakdown by case is 27 from Airbnb, 26 from Favor/Postmates, 11 from RelayRides, 31 TaskRabbits and 16 drivers from Lyft/Uber. Some respondents are active on multiple platforms, for example Airbnb and TaskRabbit, however we have assigned each person to one platform based on the one they were more involved with or earned more from. As noted, our sample is young, with a mean age of 28.5. Drivers and Taskers are slightly older than respondents from the other cases. Our sample is roughly two-thirds male. While this is not surprising for the delivery and driving, it is somewhat unexpected for Airbnb and TaskRabbit. For Airbnb it is partly because in some heterosexual host couples we interviewed the man. For TaskRabbit it may be due to a more favorable labor market for women in Boston, given the preponderance of medical and educational institutions. With respect to race, 60% of our sample is White, with proportions Black, Hispanic and Asian at 15%, 12%, and 8% respectively. Our sample is highly educated, with 22% holding graduate and 51% college degrees. Another 19% have completed some college and while there are a few college dropouts most in this category are currently enrolled. Only eight did not go beyond high school and just one person in the sample did not finish high school. Our demographics differ from some of the national surveys, such as Pew (Smith, 2016), partly due to our location and because our age range is different, but mostly because we do not include crowdwork, and we have a much smaller fraction of drivers. Table 1 also includes respondents' reported monthly earnings

on all sharing economy platforms, broken down by case. We find that the largest two groups (45% and 29%) earn either less than $500 or between $500 and $1500. Only 4 respondents, two of whom are Airbnb hosts, report earnings of more than $5000 per month.

Experiences vary by the extent to which providers rely on the platform for their primary earnings. Based on answers to survey questions about what they use their money for as well as the interview data, we coded our respondents into three categories, shown in Table 2. (Insert Table 2 about here) "Platform dependency" includes those who are wholly or primarily dependent on the platform for their livelihood. This group is roughly equivalent to full-time workers. "Partially-dependent" includes those who rely somewhat on platform earnings, but either work on multiple platforms or have part-time jobs, small businesses or other sources of income. "Supplemental earners" are those for whom the income is not part of their regular income, is not relied upon for basic expenses, and is considered extra. Many of the providers in this third category have full-time employment or activity (i.e., schooling). Using this categorization, we estimate that 25% of our sample are dependent on the platform, 32% are partially-dependent, and 42% are supplemental earners. In contrast to demographic characteristics, our breakdown is very similar to Pew's national sample with respect to the uses of gig income (Smith, 2016). They find for 29% of workers the income they earned "is essential for meeting my basic needs," compared to our 25%. Their second category—an "important component of my budget, but not essential"—was 27%, compared to our 32%. And 42% of Pew respondents say the income is "nice to have, but I could live comfortably without it," identical to our fraction. As expected, this distribution varies considerably by platform. None of our Airbnb or RelayRides respondents rely on this rental income as a primary source. Forty percent and fifty-four percent respectively are partially-dependent. Among TaskRabbits,

45% use the platform for supplemental income, 26% are partially-dependent and 29% are dependent. Postmates and Favor workers show a more equal distribution across the three levels of dependency, with 27% fully dependent, 38% partially-dependent and 35% using their earnings as an income supplement. Drivers are much more dependent than earners on the other platforms, with 75% driving for a living, and just a few in the other categories. We have also calculated monthly earnings broken down by platform dependency, as shown in Table 3. (Insert Table 3 about here) As expected, those who use income as a supplement earn less, with 51% in the under $500 category and 27% between $500 and $1500, and 32% earning more than $1500 a month. Among the middle category of partial-dependence, the largest group is in the middle range. Finally, 43% of those who are dependent on the platform for their primary income source earn in the $1500-5000 range. However almost half of that group earns less than $1500 per month.

We find that platform dependency has strong relationships to both satisfaction and precarity. Those who are not dependent on the platforms have better experiences and more control over when and how they work. They are more discriminating about whom they accept as customers, the amount of time they work, their conditions of work, and their schedules. They can more easily avoid exchanges they suspect will be unsafe or financially risky or will yield low earnings, or end up being negative experiences. These axes of control serve to enhance satisfaction, raise earnings, and ensure safer and more pleasant working conditions. By contrast, participants who rely on the platforms to pay their basic expenses feel more pressure to accept exchanges. They express more concern about their reputations and the ratings systems. They experience their situations as more precarious, although the extent of dissatisfaction varies by platform. Because both platform dependency and the specifics of the work vary across platforms, we have organized our findings

by case. To avoid repetition we have interwoven the intermediate findings on partially-dependents with the two main categories.[5]

Platform Independence

Airbnb providers are earning not mainly from their labor effort, but from the economic rents they can command from property they either own or control via leases. They have valuable assets to rent and hosting does not require much labor effort, which results in strongly positive experiences. Hourly earnings are by far the highest across the sample, and work burdens are low. A large subset also reap a substantial non-pecuniary benefit from hosting—meeting and getting to know strangers. This is an appealing combination: high earnings, low work effort and significant social benefit. Albert, a 33-year-old software worker, was drawn to the platform because "well, it's good income, first of all, for not very hard work I would say," while he also likes "meeting different people" and "having people around." To most of our participants, the least enjoyable aspect of hosting is the cleaning—but even this is seen as a simple task. One host reports that cleaning is "fairly easy. We had like a washer machine in the apartment, and so we just changed the sheets, washed them, and good to go. … I guess I don't mind doing it, and in some ways it's simpler than dealing with [a professional cleaner] and scheduling them especially if it's like every two or three days or whatever." Even among those who are partially dependent on the platform to help pay rent, the effort bargain is attractive. Dennis, 23, and his wife began hosting to earn some extra money and because "life is expensive here…Someone, you know, sleeps in the bedroom for a couple days, and you got a couple hundred bucks. So, good deal. … Like, oh this is really easy, you don't have to do much. People just want to be kind of left alone most of the time and so do we."

Some of the most satisfied hosts we've talked to live in Cambridge, where there is strong demand from guests who are highly educated and highly employed, and often going to academic conferences or attending graduations. Karen, a 33-year-old Harvard researcher, had friends renting space in her home for "next to nothing" until she discovered Airbnb. She now has dozens of guests every year, has hired a professional cleaner and makes about $2,500 a month.

> I honestly think it was within five minutes [after creating a profile], somebody booked the room for 10 days. It was $1000 within two seconds. A really amazing woman from Japan was coming to visit her daughter who was graduating from Harvard. And so it's sort of been like that ever since, where there's definitely lulls. I mean, you're not going to get rentals really between November and March…But from March to November, you can.

RelayRides owners earn much less than Airbnb hosts, but report similarly positive experiences. Will, a political operative whose expensive car sits idle while he travels, reports that "the juice is worth the squeeze." He loves that his car is no longer a drain on his finances, and has become an income-earning asset. He is able to mitigate risk by refusing potential renters he considers "sketchy." Nathaniel, who rents out on both Airbnb and RelayRides explains that part of his comfort with the exchanges is his limited downside risk. He doesn't rely on his car to get to work, and the Airbnb property is a family vacation home. He is not dependent on this income, plus he gets peace of mind from the platform-provided insurance. "I feel like I'm equipped to deal with it and it won't be a big deal. So if I was reliant on my car to get to work every day, or if my financial situation was such that, you know, could put me in a really bad position if something happened, then I would probably be a lot less likely to use the service."

Rather than creating precarity, as we find on other platforms, Airbnb and RelayRides add to economic security and respondents' sense of agency, and enable lifestyles that they could not otherwise afford. Thirty-year-old Hannah moved into the expensive Beacon Hill neighborhood,

"which I didn't think I could even live in on a teacher's salary because it's like a joke in Boston." For Charvak, who earns in the six figures, RelayRides income financed a high mileage hybrid vehicle he bought to make long car trips cheaper and greener. A number of our hosts are using their earnings to pay off educational debt, finance luxury spending (such as a spectacular wedding), or travel more.

TaskRabbit providers who have other jobs and use the platform for supplemental income also report high satisfaction. They like the flexibility, control and high hourly wages they can earn. In the Pew survey (Smith, 2016), 42% of gig workers reported they work on platforms "for fun or to do something in [your] spare time." Many of our taskers note the appeal of using their time off work "productively," explaining that they are otherwise bored. Earning money under these circumstances is a boon. Members of this group tend to have flexible schedules, low living costs, and are more likely to be students. Charles is a 28-year-old Chinese American graduate student in social work who earned roughly $750 per month over his four months on TaskRabbit. He regarded his earnings as "kind of like a safety net income, I guess" and stressed, like many, the flexibility of the platform. Even though Charles' skill set is not particularly specialized, he can wait for higher paying, more convenient tasks. TaskRabbit has replaced the income he earned from a catering job that was an "undesirable position" where managers treated workers poorly. For people like Charles, platform labor is an alternative to low-end work in the conventional economy, rather than spurring a race to the bottom.

The ability to be discriminating about tasks also matters for Ernest, a 26-year-old African-American mechanical engineering student who earns most of his income driving for an upscale

furniture store. Ernest is able to vary his hourly rate by the desirability of the task, earning from a low of $75 to $150 for tasks he does not like, such as standing in line. He reports being "really picky" about tasks, and only does about three per month. Ernest is able to charge high wages because he doesn't need the work. He likes heavy lifting because "nothing can go wrong with the heavy lifting" and he often finishes the task in thirty minutes, but is paid for the full hour. Other providers also tell us they've learned to pick up tasks they know will take much less time than advertised (such as snow-shoveling), thereby yielding high hourly rates. Diversification is another strategy for non-dependent workers. Maria optimizes her labor across a part-time hotel job (which gives her benefits), TaskRabbit and Uber. A 38-year-old immigrant from Brazil with only a high school education, Maria reduced her hours at the hotel after a divorce to accommodate her children's schedules. When we interviewed her, she was working 40 hours a week driving for Uber, grossing $50 an hour. However, because she is responsible for expenses with Uber, she prefers $35 on TaskRabbit. Eventually Maria was able to raise her hourly housecleaning rates to $39 and $50 (for basic and deep cleaning), and likes the fact that once a task is booked, she will definitely be paid for it, unlike with Uber where low demand may reduce earnings. We find that some Taskers, especially those with longer histories on the platform, build stellar reputations via large numbers of successful tasks, putting them in a position to command high rates. They are helped by the platform's algorithm, which pushes "elite" or "lead" Taskers to the top of the list, where customers see them first. Christopher is a 24-year-old Haitian-American with a bachelor's degree from Harvard who earns $3,500 per month on TaskRabbit, in addition to having a full-time, but flexible Emergency Medical Technician job. Christopher has been active on the site for years and has done more than 500 tasks. He tends not to maximize his hourly rate, but prefers to get more work. However, his rate is high—$60 per hour for physical labor jobs—and he explains that

he has “so many reviews at this point, like, if someone doesn’t want to hire me at the price that I set it at then, like, I’m not going to feel bad.” Similarly, Mark, for whom managing Airbnb apartments is his main source of income, says he’s “learned how to really push, really push up my rates” by completing many jobs and earning positive reviews.

Part-time or casual drivers on ride-hailing apps who are supplementing a main source of income report similarly positive experiences. They feel liberated from the nine-to-five work structure, and perhaps more than anything else, like that they don’t have to report to a boss. They are enthusiastic about the software that creates novel economic opportunities and enables strangers to connect in an environment of trust. Nathan says Uber is “probably the best thing ever,” because he now has an easy and convenient way to make extra cash, for example when he picks up passengers on the commute to his full-time job or when he has some spare time. “When I’m bored, instead of playing videogames I just turn on the app, wait for a ride and just go on my hustle.” He’s not earning as much in his full-time job as he’d like and feels he’s not saving enough for retirement because his employer doesn’t give a 401K match, so he’s putting his Uber earnings into a retirement account. Twenty-eight-year-old Bobby, who is White and works as a digital media instructor in a public school while also pursuing an MA in education, has used ride-hailing as a means to supplement the income from his teaching job and to reduce commuting expenses. He says that he drives 6-10 hours a week, depending on “where I am financially” and if “I want to do specific things that are going to cost more money.” The weekend before the interview he “ran like straight out of money on a Friday,” so he drove some hours to pay for concert tickets.

More than a third of the couriers on Postmates and Favor are supplemental earners. Tamara was a Black woman in her late twenties who regaled our interviewer with stories of thrift. Tamara came from a military family, married a plumber, and moved from the South to Boston to work as a special education assistant. She and her husband had a young baby and were trying to create a stable middle-class life for themselves. While Tamara did not make much in her regular job, she prided herself on being resourceful. She began making deliveries as a Postmates courier, which she liked because the baby slept well in the car. As she put it:

> My husband and I, we're really, we're kind of entrepreneurs ourselves. He actually just started an Airbnb thing…We are subletting in our house, and then we are running two other houses. So we're on Craigslist a lot, and I saw it on Craigslist about a year ago, and I was like, hey, I think I will give this a try. He was like, well, yeah we could kind of use the money. I was like, well, I mean, it's something I can take a little one with me while you are at work or you're late. I was like; it's something we don't really have to worry about.

Tamara did not feel pressure to accept jobs she didn't want to take, and didn't hesitate to speak up when she thought a customer was being unreasonable. Asked about safety concerns, she explained: "I don't feel any. I like it [Postmates] because I don't have to go in their house, and that's a perk for me. Then plus, when it gets dark out, I don't get out of the car. I make them come down and get it. Which, I love being able to do that." Tamara provides an example of how a supplemental earner can afford to risk low customer ratings and violate company policy (by not getting out of the car) to reduce risks and achieve job satisfaction.

Chris was an undergraduate at a local university who occasionally worked on Postmates when surge pricing was in effect and the premium made it worth his while. He didn't depend on Postmates for an income, stating, "Most of it goes towards student loans or car payments. And some of it's for recreation." He liked that it allowed him to be noncommittal, being on the app only

when he wanted to. Chris enjoyed listening to fantasy football and driving, which fit well with the work. He thought that Postmates paid well, even if they didn't pay what was advertised. Because the income is supplemental for him, Chris also has the luxury of being unconcerned about how ratings are determined and how the system allocates work. When asked if he ever worried about his rating, he replied: "Like, I have a 4.9 and I'm, like, what they would call an 'awful worker.' Like, they give you these food bags to keep the food fresh, and these stickers that you put on the bag that say, like, 'Have a nice day.' I, like, don't use my food bag unless it's going to be more than 20 minutes." Because of his situation, Chris was unconcerned about violating company policy concerning food bags and stickers. Michelle, a Japanese-American woman in her late-twenties, worked as a software engineer before quitting to "explore music as a hobby" at the Berklee College of Music. She was quick to point out that she did not need the income, stating that she only joined the platform because she met a courier outside her apartment who said if she attended an orientation and provided his name, he'd receive a promotion. Michelle's discretionary approach is revealed by the way she earmarked her earnings. "I think of it as going towards food expenses, because I'm delivering food. And it's not really that much, you know?" In general, delivery providers who do not need the income avoided the undesirable aspects of the work. They didn't feel pressure to work during disagreeable hours, accept difficult orders, or hesitate to say "no" to a task or customer out of fear about the impact on their rating. They expressed greater satisfaction with the pay than couriers whose earnings were used for basic expenses.

Precarity and Dependence on the Platform

Our findings for dependent providers are markedly different than for those who use the platforms to supplement full-time earnings. Many dependent providers also enjoy the work or prefer it to

their existing alternatives, as we would expect given that they remain active on the platforms. However, they are far less satisfied, report less flexibility, and have less freedom to hold out for higher wages than their non-dependent counterparts. Their situations are more precarious, particularly if they do not have housing from parents or spousal incomes to rely on. Among the Taskers, nine are attempting to earn full-time on the platform. Some were recent college graduates, hoping to land regular jobs. They were more sanguine about their experiences, and their dissatisfaction related more to the labor market than their treatment on the platform. However, a number of them were interviewed in the early period, a time when providers felt the platform "had their back," which a number of respondents felt was no longer the case after the platform abandoned its auction model in 2014 for less variable rates. Providers further removed from college, or who had experienced job loss, were not so positive. Derek lost a $200,000 a year job and has been unable to find new employment in software, picking up jobs on TaskRabbit and Craigslist. He also finds off-platform work through contacts he meets on TaskRabbit, which he considers a great benefit of the platform and he did discuss some lucrative tasks. However, he also expressed considerable bitterness. He described a day when he had no other work, so he picked up a delivery job that in the end yielded only $10 an hour and was "the stupidest thing I ever did…I mean like there are many times that you do this and you think, I'd be way better off working at McDonalds because I'd make the same amount of money and I'd have free fries."

Julian, a single White 32-year-old male, is also articulate about the pitfalls of relying on the platform. With TaskRabbit, it's "actually really a race to the bottom." He reports that one poster told him "it's almost exploitative the things she can get people to do for $10." Julian was trying to be an entrepreneur, selling and writing about software. He had lost a full-time job as a surgical

technician, and along with it his home. So he sold all his possessions and bought a membership in a co-working space that offered Internet and some free food. He tried to hide his homelessness by running to the co-working space every morning so that it looked like he needed a shower because of his exercise routine, rather than his homelessness. "It's absolutely mentally exhausting to keep up all these projects and this farce about my living situation." At the time of the interview, he'd earned only $4500 on the platform. Julian discussed his situation in frightening terms: "It's like I'm going to die because I'm not going to buy food, or I'm going to freeze to death in the wintertime…I made it work though." But he saw his situation as temporary. He was learning a programming language that he felt confident would guarantee him a job and $80,000 a year. "So it's really going to be a 180 for me to go from, like, hustling around and doing Task Rabbits for 25 dollars to being really employable and having a really valuable skillset." At the same time, he really enjoys a lot of the work, finds it "pleasurable" and rates the platform a "10."

While our respondents mentioned race to the bottom a number of times, the platform's switch away from the auction model raised hourly wages, and many Taskers can find jobs at good rates. Racquel reports her personal wage floor is $25 per hour. Another Tasker reports a $17 per hour wage. But the higher wages that have prevailed since mid-2014 are likely a key factor explaining why demand is not more robust, and must be seen in the context of low total earnings. (The company also increased its service fee to 30% for first-time transactions.) Racquel's $25 per hour will only be yielding her about $10,000 this year. Derek is earning $12,000-20,000 a year. Our experience trying to do ethnographic research on the platform bears out the lack of demand—while it was easy to sign up, over a period of months our researcher was unable to get any tasks. As Derek explains: "Working for TaskRabbit is just a fantastic way to always stay at the poverty level,

right? But at least you can pay your phone bill and you can buy some food and the landlord isn't upset with you." We also found evidence of deteriorating provider conditions on the platform. A number of our early respondents stopped participating. Among those who stayed active for a while, ratings of the experience dropped sharply. "They used to really, like, I don't want to say fight for us, but they were definitely like more responsive, I should say… Most TaskRabbits feel that way though, it's not just me." Another explained that the company used to care about the individual rabbits, but no longer does." A third went farther: "We really are just cannon fodder…They don't really care about us."

Some of the dependent providers were able to make it work, but a number of them live with their parents. Mark, a White 24 year old, is an evening college student who does tasks during the day and earns about $25 per hour. He puts 20% of his earnings into savings and the rest is for his personal expenses, which mostly includes transportation and eating out. He takes the 6:30 AM train to the major urban area and then works until he takes the train back for evening classes. Since he is already committed to spending the day working, Mark places his wages below the average price for a given task so that he can fill his day with work. He isn't comfortable with some tasks, like building IKEA furniture, and doesn't own a car to do deliveries, so he relies heavily on the "quick assign" market. (Quick assign is when a purchaser does not select the tasker but puts out a request and the first tasker to accept the job wins it.) Mark also feels he needs to take almost every task he can. He has lost the much-vaunted temporal flexibility of the platforms, and has adopted the regular early commute and full day of work. He has also lost the ability to choose or to set a good rate, because he needs to underbid for tasks in order to get enough work.

Similarly, dependent delivery couriers accept nearly every request. It was not uncommon for these participants to work on multiple courier platforms simultaneously, waiting in their car or on their bike for one of their apps to come through with a job. Favor was preferred by these couriers, as it guaranteed $15 an hour for the hours worked, unlike Postmates, where respondents reported waiting for hours without receiving a request or earning anything at all. But Favor shifts are limited, and tend to go fast. There's also a downside to Favor's wage guarantee, which is that couriers cannot turn down deliveries without incurring a penalty. This means that they must take jobs they know or suspect will be problematic for one reason or another. This becomes especially difficult if they also add a Postmates shift for hours they have already committed to Favor. This was worth doing because Postmates gives algorithmic priority for people who reserve shifts in advance (in comparison who those who just turn on the app). However, none of our respondents actually knew how much that priority actually helped. But simultaneously committing to both apps also increases the likelihood of penalties on Favor.

All of our dependent respondents articulated critiques of their situations and felt it was a less-than-ideal working arrangement. However, many felt they had no other options. Some had lost conventional jobs or were unable to find work. Others were shut out of other platforms. Ervin, a Black man in his late 20s, had worked for Uber before signing up with Favor, but was deactivated when Uber changed the minimum model requirements for its drivers. He had moved to Boston from Oakland, California to attend graduate school for social work. Ervin described himself as "lower class," and when asked how he settled on Favor, replied, "So I needed the money and I have a car. I actually was doing Uber before, but my car is too old. I have a 2000 or 2001. They changed their policies… The money [on Uber] was better than Favor, yeah." Ervin had just

graduated, but was struggling to find work and was desperately trying to save enough money to move to Philadelphia. As the interview progressed, he appeared increasingly overwhelmed. When asked what he needed the money for, Ervin said, "Saving to move, my credit card bill, car repair because I need to get that in the shop, so yeah. I've been kinda, you know, not knowing because I know it's gonna be expensive. All I know is it's only gonna get worse. But it's like, do I keep my car and risk it getting worse or do I take it in now and take this huge financial blow?" Ervin's one asset, besides his graduate degree (which was not paying off at this time) was breaking down when he needed it the most. Another courier, Charles, came from an impoverished town, had a criminal record and found getting steady work very difficult. He was hoping to eventually start college with the dream of becoming a therapist, but for now, he was taking the bus from Connecticut to sleep in his brother's dorm room. Charles was only able to work in spurts, as his scooter would break down and, in the winter, he would have to find a car. One day, on an online courier group, it was announced that Charles won $100 for his excellent customer service. He was delivering a lunch order when he was rear-ended in traffic. Although he complained of whiplash, the post proclaimed that Charles nonetheless completed the order in the time allotted. By the logic of the platform, it was his lucky break, but in terms of physical well-being, he felt compelled to keep working immediately after an accident, foregoing needed medical attention.

Erratic earnings is another problem. While supplemental earners are able to turn off their apps when business is slow, traffic is bad, or weather is forbidding, dependents find themselves locked into undesirable situations. For drivers and deliverers this can be because they have to front money for a vehicle. This was the case for Horatio, a courier who did not own a car. At times, he would

take advantage of Zipcar promotions, explaining that any money was better than no money, regardless of the razor thin margin.

> I don't have to pay for gas with a Zipcar. Because you pay $30.00 Monday through Thursday if you get the car from 6 p.m. to 8 a.m., so with Favor you could have probably a good four or five hours, so if you make at least the $30 within the first two hours, then the rest of it is profit. It depends. Sometimes you get better nights than others, sometimes it's worth it and sometimes it's not.

Despite having a bachelor's degree in business, Horatio was unable to find full-time work, and was cobbling together an income on various delivery platforms. He seemed genuinely at a loss in terms of what he should be doing. He was tired and lacked optimism about his future. Daria, a White woman in her early twenties, came from a poor family and seemed to be constantly on the move. She described her dad as a "deadbeat," and wasn't in contact with her mother. After following an ex-boyfriend to Boston, Daria looked for work that would keep her from having to live on the streets, and found it at a downtown convenience store making breakfast sandwiches for construction workers. This wasn't enough to cover rent, so she began looking for additional work and stumbled across Favor. While it gave her an opportunity to earn some extra money, it was a grueling schedule. As Daria recalled:

> I would bug my boss at the convenience store for the schedule to be on time please for that week and then as soon I had that I would put every hour that I wasn't working at the convenience into my like Favor availability and then I'd just like work all the time. I would do like weird hours at the store. I'm like not really much of a morning person. So I would start Favor when they opened, which I think changed from like 11:00-10:00 or like 11:00-9:00 or 10:00-9:00, something like that. It got earlier during the time I was working there and I would just take first shifts and then I would go over to the convenience store like 2:00 and work from 2:00 until 10:00 and then I would go back to Favor from like 10:00 until midnight or 10:00 until 1:00 or whatever, depending on the day.

Eventually Daria began to work full-time as a courier, first for Favor, and then for a local non-platform courier company, which paid better and was more consistent. Like Horatio, Daria seemed tired, fatalistic, and resigned to a future of low-wage, unsteady work.

Twelve of the sixteen Uber and Lyft drivers we interviewed are dependent on the platform. Dependence undermines the flexibility and autonomy that ridehailing companies tout and many drivers desire. Respondents who have resisted full-time driving were especially articulate at explaining why. Thomas, a 27-year-old Uber driver is partially-dependent, earning about $12,000 a year from the platforms. He says it's "impossible" to have a decent hourly wage if you simply drive whenever you want. "So in order to be a full-time driver and make a living wage you have to drive every rush hour." To match the hourly wage of a bus driver, he has to catch the rush both in the morning and in the afternoon, and ideally also be on the road as early as five in the morning, when there's substantial airport traffic. Forty-one-year-old Alice, who has two children and drives between 15 and 30 hours a week to boost her family's household income resembles Thomas in that she is unwilling to drive full-time but feels compelled to drive when the demand is high.

> Maybe 1:00, and then I know it's busy, and then I maybe stop for a little bit and go back out at 5:00 when there is rush hour. Then again in the nighttime, there might be a game and I take everyone to the game. Then after the game I'm out there again, you know. … I'm a hustler, you know. I'm a very hard working person. It's just me. Because everyone, we all like, we have bills, and we all like, we like nice things. We all want better things in life, so yeah, sometimes I, I starve myself. I'll just eat later, you know. It's not the best thing to do, but if it's busy, and I'm needed on the road I'm going to be on the road you know. I don't think I'm going to starve myself to death, you know. Eventually I will get something to eat. …It's like, why work from 1:00 [to 3:00] PM for half the price when you know, I can work from 3:00 to 5:00 and make double the money in less time. You know?

Our respondents explain that the workday of a driver has a substantial vacuum of activity in the middle of the day, and the lost income will have to be recouped by driving when the app tells them there is demand. In many cases that means that they feel compelled to work outside of the conventional office hours, e.g. weekends and late evenings. Rather than freeing up time for family and social leisure activities, drivers have little business when everyone else is at work, and more

when everyone else is free. Changing conditions also lead to added precarity and anxiety. Drivers report that platform rules and rates are in continual flux and that they cannot rely on conditions at any point in time. Many of our participants are anxious about the direction the platform is going, in large part because they feel powerless about the changes. Drivers might not have a boss who tells them what to do, but they are constrained by the platform's measuring stick, and the threat of sanctions. Boris, 33, has been driving for Uber for several years and is currently leasing a few cars to other drivers. He suggests these jobs are precarious.

> Uber…kind of force people to…They say that there is no… need to stay online on certain hours unless you want to. But then, if you are online and you don't accept certain trips, basically your acceptance rates go down…And they require like at least, what, 95% acceptance rate. And then when you go lower than 95 acceptance rate, you have a chance of being deactivated…And that goes not only by acceptance rates as well as like by canceling the trips. Although they are saying like you have a full right to cancel the trip. …So, whenever the time comes, they will have an excess of drivers or they will need to get rid of some bad drivers… they hold their right to cancel you.

Boris says that drivers are also squeezed by top-down decisions that hit everyone, regardless of their ratings and scores.

> I mean, you're kind of limited to those rules that are set by Uber. And then you're looking right in terms of the profits. And then, on top of all that, the rate can be decreased at any time without any explanation … [if] you figured, like, okay, here it is, $1.50 a mile [for gas], and I think I can make money out of it, you went on and bought a brand-new Prius … And then when you put all this stuff together and you have a great tool to operate, and then … the rate cuts half, you're like, what should I do? The only thing left is just to cry and say, like, oh, these are bad guys.

Variation Across the Platforms

We find that outcomes vary by platform, a finding also noted by Ravenelle (2019). We summarize our findings in Figure 1. (Insert Figure 1 about here) While most of the literature has treated the sector as a monolith we argue it is better understood as a vertical structure, more akin to the conventional labor market. First, there is the asset structure. Airbnb requires access either via

ownership or lease to an apartment. In addition, the location of the property determines its ability to attract guests, and hosts who are White, have higher incomes, and have a BA are more likely to have the opportunity to successfully earn on the platform. (Cansoy and Schor, 2018). TaskRabbit appears to have an informal educational (or human capital) requirement of either a college degree or at least college enrollment, and nearly a quarter of Taskers have graduate degrees. This platform yields much higher wages than those which specialize in delivery or driving, so lack of formal education is likely functioning as a barrier to high earnings. One reason may be that customers are themselves highly educated and prefer to hire others of their educational class, even for manual or low skilled work, such as housecleaning or moving. Driving and delivery platforms require less in the way of assets. Driving apps only require a car of relatively recent vintage (both Uber and Lyft offer deals for low lease rates, but only if drivers satisfy a quota of weekly rides). Delivery apps can be joined with no physical assets (or education).

While we do not have accurate hourly wages to compare remuneration structures, there is an ordering across the four platforms which matches the asset requirements. Airbnb yields the highest earnings, with our hosts mostly earning in the $100 per night range. Some earn less, and the high in our sample is $350 per night, with variation by desirability of the property and whether the rental is an entire apartment or a room within a unit. TaskRabbit wages are generally above $25 an hour, and can range to more than $100. We don't have good data on net hourly earnings from drivers, in part because of the need to subtract expenses, which not all drivers do, as well as the complex bonus structures now in place. Robinson (2017) suggests net hourly earnings can be as low as $7.50, although many drivers earn more. Favor couriers could sometimes secure the $15 per hour guarantee, but on Postmates the rate is often less, with workers reporting hourly wages

as low as $8 per hour, without accounting for waiting time. Airbnb hosts face the lowest levels of threat, although one was sued by his condo board and another, who couldn't afford his apartment without hosting, was forced to stop by other building residents. Taskers experience precarity of earnings, but have more control over their work than drivers or couriers. Drivers are experiencing declining levels of autonomy and control and increasing competition for business. Couriers who are not platform dependent are able to retain control and autonomy but dependent earners are often desperate. The platform hierarchy is also roughly ordered with the fraction of dependent workers, with the exception of the reverse position of ridehailing and delivery apps.

Discussion

A persistent theme in the critical literature is the fear that platforms are inducing a race to the bottom which will end in worker exploitation and misery (Ravenelle, 2019; Robinson, 2017; Rosenblat, 2018; Scholz, 2016; V. Dubal, 2017). Our findings suggest this dystopian future is less likely if the weak institutionalization we currently find on platforms persists. For platforms, the ability to attract highly educated, productive workers who provide good service and reliability is a great benefit. For this reason, one might expect them to continue hours flexibility. However, there are indications on some platforms of a push for longer hours. This is particularly the case on Uber and Lyft, where gamification, nudges and other behavioral strategies attempt to keep drivers behind the wheel longer (Rosenblat and Stark, 2016), likely on account of high attrition (Hall and Krueger, 2018). Similarly, anecdotal evidence suggests Airbnb is trying to get its hosts to make their properties more available. If platforms become less tolerant of supplemental earners and the proportion of dependent workers grows over time, satisfaction, hourly wages, and autonomy will decline. Still, the availability of alternative options in the larger labor market will regulate this

pressure. If jobs are plentiful elsewhere, platforms will be forced to improve conditions. If labor markets are slack, platforms may well be an important part of the race to the bottom. Given current uncertainties about the extent of labor displacement from artificial intelligence, the state of aggregate demand, and globalization, predicting the future is a precarious task itself. If substantial diversity does persist it is likely there will be more attention to the fact that platforms are free-riding on conventional employers who offer full-time work and benefits. Platforms may be forced to shoulder costs they are now externalizing. This would make dependent platform employment a more appealing prospect.

Conclusion

In this paper we have emphasized the importance of platform dependency, as well as the variation in platforms as key axes of differentiation in sharing economy. Our findings suggest that access to alternative sources of income and security are almost a pre-condition for satisfying provider experiences. This suggests that platforms are free-riding on conventional employers, who provide the security and stability to make platform work desirable. These findings highlight the need to do more work with those who exit the platforms. We also believe our findings would be strengthened by testing the robustness of our findings with a large scale survey. Another issue is more attention to the trajectory of platforms. In addition to issues of institutionalization, there is evidence of declining conditions on the ride-sourcing platforms as they cut rates and increase control.

Finally, an unexplored but important dynamic in the platform sector is its role in exacerbating inequality. The high education levels of providers, coupled with the predominance of supplemental earners suggests that platforms are facilitating a new kind of opportunity hoarding by the more privileged segments of the middle class (Schor, 2017). Similarly, we find that the novelty of these

apps has reduced the stigma associated with manual tasks such as driving, housecleaning and delivery, and induced many highly educated people to take on this work. In the current era of downward economic mobility, this is not surprising. But it does suggest an even more complex situation for those interested in constructing an equitable labor market for all.

Table 1: Descriptive Statistics*

	Airbnb	Relay Rides	TaskRabbit	Favor & Postmates	Uber & Lyft	All Platforms
Age						
Mean Age	28.3	29.4	25.5	29.5	31.6	28.5
Gender						
Male	17	8	19	19	13	76
	(63.0%)	(72.7%)	(61.3%)	(73.1%)	(81.2%)	(68.5%)
Female	10	3	12	7	3	35
	(37.0%)	(27.3%)	(38.7%)	(26.9%)	(18.8%)	(31.5%)
Race						
White	17	6	17	16	5	61
	(77.3%)	(75.0%)	(56.7%)	(61.5%)	(31.2%)	(59.8%)
Black	0	0	5	5	5	15
	(0.0%)	(0.0%)	(16.7%)	(19.2%)	(31.2%)	(14.7%)
Hispanic	2	0	4	2	4	12
	(9.1%)	(0.0%)	(13.3%)	(7.7%)	(25.0%)	(11.8%)
Asian	2	2	2	2	0	8
	(9.1%)	(25.0%)	(6.7%)	(7.7%)	(0.0%)	(7.8%)
Other	1	0	2	1	2	6
	(4.5%)	(0.0%)	(6.7%)	(3.8%)	(12.5%)	(5.9%)
Education						
High School or less	0	0	1	3	4	8
	(0.0%)	(0.0%)	(3.4%)	(11.5%)	(25.0%)	(7.4%)
Some College	1	0	7	8	5	21
	(3.7%)	(0.0%)	(24.1%)	(30.8%)	(31.2%)	(19.4%)
College	19	3	15	12	6	55
	(70.4%)	(30.0%)	(51.7%)	(46.2%)	(37.5%)	(50.9%)
Graduate Degree	7	7	6	3	1	24
	(25.9%)	(70.0%)	(20.7%)	(11.5%)	(6.2%)	(22.2%)
Monthly Earnings						
$499 or less	4	16	8	10	1	39
	(18.2%)	(66.7%)	(100.0%)	(38.5%)	(7.1%)	(41.5%)
$500-$1499	11	1	0	6	12	30
	(31.8%)	(29.2%)	(0.0%)	(38.5%)	(7.1%)	(26.6%)
$1500 or more	7	7	0	10	1	25
	(50.0%)	(4.2%)	(0.0%)	(23.1%)	(85.7%)	(31.9%)

*Column percentages reported for each variable.

Table 2: Platform Dependence*

	Supplemental	Partially-Dependent	Dependent
Airbnb	16	11	0
	(59.3%)	(40.7%)	(0.0%)
Relay Rides	5	6	0
	(45.5%)	(54.5%)	(0.0%)
TaskRabbit	14	8	9
	(45.2%)	(25.8%)	(29.0%)
Favor & Postmates	9	10	7
	(34.6%)	(38.5%)	(26.9%)
Uber & Lyft	3	1	12
	(18.8%)	(6.2%)	(75.0%)
All Platforms	47	36	28
	(42.3%)	(32.4%)	(25.2%)

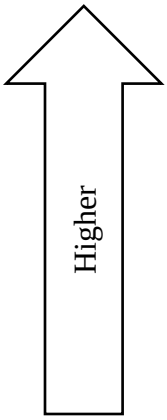
*Row percentages reported for each variable**.**

Table 3 Platform Earnings by Platform Dependence*

	Dependent	Partially-Dependent	Supplemental
Monthly Earnings			
$499 or less	6	13	20
	(15.4%)	(33.3%)	(51.3%)
$500-$1499	3	14	8
	(12.0%)	(56.0%)	(32.0%)
$1500 or more	13	12	5
	(43.3%)	(40.0%)	(16.7%)

*Row percentages reported for each variable.

Figure 1: Platform Hierarchy



Asset Requirements	Wages and Earnings	% Supplemental Earners
Airbnb	Airbnb	Airbnb
TaskRabbit	TaskRabbit	RelayRides
RelayRides	RelayRides	TaskRabbit
Uber & Lyft	Uber & Lyft	Favor & Postmates
Favor & Postmates	Favor Postmates	Uber & Lyft

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Notes

[1]There are some barriers such as certain types of criminal records or lack of institutional banking although these vary by the platform.

[2] Our analytic approach bears a family resemblance to economic models of efficiency wages (Shapiro and Stiglitz, 1984; Bowles, 1985; Schor and Bowles, 1987), which focus on the economic rent available in the current job in comparison to the next best alternative, however the efficiency wage model does not take into account the adequacy of wages to finance living expenses..

[3]Recruitment differed slightly by platform. In most cases we eliminated users who were outside our age range or did not have at least five trades on the platform. (The vast majority have done far more jobs/hostings, with some providers doing hundreds of jobs.) On TaskRabbit, we posted the interview as a task, which readily yielded informants. On Airbnb we queried providers via the platform, and once we made contact we let them know we were interested in interviewing them. The platform repeatedly deactivated our account when it realized that we were attempting to interview hosts. We created multiple accounts but eventually reverted to snowball sampling. On Postmates and Favor our researcher attended orientations and met people who he later attempted to interview. He also joined online fora (Facebook primarily) and recruited there. For Uber and Lyft we also tried to recruit via online groups but were unsuccessful. We ended up taking rides and asking our driver if he/she would be interested in an interview. We also attended meetings of drivers. We posted on Twitter and occasionally used Facebook ads to recruit, however these methods were unsuccessful. We started with a payment of $30 per interview and raised it to $40 over time.

[4]The survey included a number of case specific questions as well as some open-ended questions, and respondents were free to answer as they liked. Case differences included the units in which

earnings were measured, to conform with platform custom (i.e., Airbnb hosts think monthly, on other platforms they calculated weekly earnings).This resulted in differences in how respondents interpreted questions so we have done some re-coding to create comparability across cases. Furthermore, as the project evolved we introduced some changes in the survey to reflect changing practice as well as some shifts in research questions.

[5]The closest comparison study to ours is Ravenelle's (2019), who interviewed providers on Airbnb, Uber, TaskRabbit and Kitchensurfing. She groups respondents into three categories—success stories, strivers, and strugglers. The latter have strong affinities with our dependent earners—strugglers are financially precarious, experience sexual harassment, workplace injuries, threats to bodily safety, are cheated out of earnings by unscrupulous customers, and find themselves unwittingly drawn into criminal acts such as drug dealing, prostitution or violence. Ravenelle does not provide estimates on the numerical breakdown of her sample so we cannot be confident that her outcomes are more negative, but they seem to be. Her sample is less educated and less White than ours and New York City is a harder place to survive than Boston.