Deliver on the Promise of the Platform Economy

Yujie (Julie) Chen
Sophie Ping SUN
Jack Linchuan Qiu

Authors

Yujie (Julie) Chen is Assistant Professor at the Institute of Communication, Culture, Information, and Technology at the University of Toronto, Mississauga.

Sophie Ping SUN is Assistant Professor at the Department of Journalism and Communication at the Chinese Academy of Social Science.

Jack Linchuan Qiu is Professor at the School of Journalism and Communication at the Chinese University of Hong Kong.

Research coordination team

Principal Investigator: Anita Gurumurthy
Co-investigators: Deepti Bharthur, Nandini Chami
Editorial Support: Shruti Sunderraman, Vinay Narayan
Design: Purnima Singh

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Research Report

January 2020

Julie Yujie Chen

Sophie Ping SUN

Jack Linchuan Qiu

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1. Executive Summary

This paper examines the influence of digital platforms on Chinese workers across two booming on-demand service industries: ride-hailing and food-delivery. Between December 2017 and December 2018, we conducted over 100 semi-structured interviews with participant workers on both kinds of platforms, and over 20 interviews with other stakeholders, including company managers, managers from third-party labor agencies, engineers at the R&D department of the platform firm, and grassroots work organizers, in Beijing (both ride-hailing and food-delivery industries) and Shenzhen (only ride-hailing industry).

In addition, we conducted a nationwide survey study of drivers (N=1,889) on ride-hailing platforms and a survey study of riders on online takeaway platforms in Beijing (N-1,399). We systematically reviewed local and national government policies and regulations concerning digital development in general and digital platforms in particular in order to make our study historically informed and culturally sensitive. Though digital platforms have attracted considerable scholarly and legal attention in the past few years, this project is among one of the first to center on worker's experience, and through their lens, to understand the impact of platformization of work in China. The study offers valuable insights on work conditions, worker's struggles, resistance and autonomy; highlights the gaps in existing policies and puts forward empirically informed policy suggestions toward inclusive development in the digital era.

Our empirical findings are three-fold. First, young, migrant, and informal workers dominate the platform-mediated on-demand service industries in China, which is consistent with the dominance of informal work in China's service economy. Second, platform workers face intersectional labor control from algorithms designed and used by the digital platforms – the so-called "invisible boss", as well as traditional human managers. There is a rapid expansion of third-party labor agency for platform-mediated markets for both ride-hailing and food delivery services, which exert no less significant influence on worker's welfare and livelihood than algorithmic control of the work process. Worker's informal status and the multiplication of third-party labor agency exacerbate algorithmic control and the segmentation of the existing informal labor market. Third, workers engage in an array of formal and informal organizations to survive and thrive in the platform economy, ranging from forming social media support groups to exchange mundane tactics, to organizing collective actions like protests and strikes. Local factors, which include but are not limited to the policies made by local regulatory authority and the robustness of local trade unions and grassroots worker-community cause local disparity in workers' livelihood across geography. Nonetheless, we find some promising efforts made by grassroots worker organizations and local branches of the official trade union to support platform workers. Overall, policies and regulations lag behind in addressing, in a clear and viable manner, the issues associated with "double bosses" facing platform workers and the respective responsibilities of platform companies and third-party labor agencies for workers' welfare.

Our analysis leads to the conclusion that policy for the good practice of platform work is incomplete without addressing broad challenges of regulating private platform companies and their business model. Therefore, we put forward recommendations in the areas of labor protection, platform governance, and value redistribution, of which some areas require cross-departmental collaborations among policy-makers.

First, the employment status of participating workers in the digital platforms needs to be officially recognized and properly addressed in the emerging and future regulations of on-demand service

platforms. A possible starting point can be to extend the existing Labor Contract Law to address the multilateral contractual relationship involving workers, third-party labor agencies, and the platform companies, and to stipulate the respective responsibility and liability of the intermediary and platform company for workers' access to worker protection, social security, welfare, and viable channels to redress their grievance. Second, a joint legal and regulatory panel of multiple stakeholders needs be in place to offer a space for discussions on platform governance. The panel ought to include representatives of policy-makers, corporates, legal scholars, workers, and trade unions, among others, in order to oversee and inspect the operations of platform companies, particularly regarding a fair handling of workers' data and deployment of algorithms to leverage economic opportunities. The multi-stakeholder audit panel should maintain an inclusive communication and reporting mechanism for local operations of the digital platforms. Third, All China Trade Union Federation (ACTUF) – the only officially sanctioned trade union in China needs to expand its service scope to cover the rapidly growing group of platform workers. At both national and local levels, the ACTUF should play a more active role in working with other governmental branches (e.g. Taxation Bureau, and Human Resources and Social Security Bureau) as well as grassroots worker-communities to urge a fair value redistribution among workers, platform companies, and the public.

2. Context & Rationale

More and more economic and social activities nowadays are mediated by digital platforms. Digital platforms, acting more than to match supply and demand, also reshape economic and social relations (Gillespie, 2010; Kenney & Zysman, 2016) and redefine some of the fundamental cultural concepts such as sharing and employment (Sundararajan, 2016). Researchers have acknowledged the potential of information and communication technologies (ICTs, with platform technologies included) in reducing waste, advancing efficiency, and unleashing innovation. Nonetheless, an unregulated platform economy brings more harms than benefits to its participants and broader society (see for example, Chen, 2017; Rosenblat & Stark, 2016; Scholz, 2016). The appeal to public policy sectors to rein in giant privately-owned digital platforms has spread from Europe and the US to different countries in Asia.

Against the backdrop of mushrooming scholarly interests in issues of inequality and the job quality of platform work (Doorn, 2017; ILO, 2018) and increasing regulatory attempts to tame its "dark side" so as to protect workers (Goudin, 2016), China merits rigorous investigation. The amount of empirical researchers that map out the state of play of the platform economies and the relevant regulations pale in comparison with the media attention paid to the expansion of digital platforms and tech companies. Chinese tech companies – such as Baidu, Alibaba, Tencent, and DiDi Chuxing – start to gain global influence not only in the capital market but also in setting competing design norms against their Silicon Valley counterparts. For example, four out of ten most well-funded private companies in the world are based in China. Namely, DiDi Chuxing (hereafter DiDi), Meituan-Dianping (a.k.a. China internet Plus), Toutiao, and Lu.com (CB Insights, 2018a). Facebook's recent move to integrate Facebook Message, Instagram, and WhatsApp was considered to have been inspired by WeChat's model counterparts (Y. Chen, Zhifei, & Qiu, 2018; Vaidhyanathan, 2019).

It is even more crucial to conduct empirical studies if one considers the number of participant workers involved in the platform economies in China. There were more than ¥2.9 trillion ($432 billion) worth of transactions in China's platform economy in 2018, with an annual growth rate of 41.6 percent (State

Information Center Sharing Economy Research Center 2019).[1] The market is estimated to have involved 760 million users and 75 million service providers (ibid.).[2] The number of people offering services via digital platforms are growing steadily in past three years (SIC & ISCCSE 2018; State Information Center Sharing Economy Research Center, 2019). However, little is known about the work conditions, experience and prospects, as well as general welfare of those millions of platform workers in China. Furthermore, the influx of labor force onto the platform economy corresponds to the ongoing economic restructuring in China, which has channeled more and more workers to the service sectors than manufacturing and construction (National Bureau of Statistics of China, 2015). The experience of platform workers may shed light on the transformation of work by digital platforms and point to the broad developmental and legal challenges facing workers in the developing countries.

> **The experience of platform workers may shed light on the transformation of work by digital platforms and point to broader developmental and legal challenges they face**

This report presents studies about service providers on ride-hailing apps and food-delivery apps as to explore the broad trend of platformizing service work in urban China. Both fall into the category of "work on-demand apps" that facilitate local services to be performed by local people (De Stefano, 2015). The chosen two types of digital labor platforms are at the frontier of capital investment, technological innovations, as well as experimenting with new forms of employment that test existing regulatory frameworks.

Online ride-hailing market has been consolidated in the past few years and it is now dominated by DiDi that controls 94.6 percent of the internet-enabled ride-service market (Xiao, 2017), followed by eight to ten additional active ride-hailing platforms.[3] Different from Uber, DiDi covers traditional taxi service in addition to a wide range of private transport service—a model shared by regional market leader Grab in Southeast Asia. A total of 21 million drivers used platforms to get and fulfill ride requests in 2017 (SIC & ISCCSE, 2018). As one of the most well-funded tech start-up, DiDi has received $18.57 billion funds in total (more than Uber's $16.9 billion) (CB Insights, 2018b). It engages in aggressive global acquisition and investment to expand its market to Europe, Africa, Middle East, Southeast and South Asia, and North Africa. The discursive strategy adopted by DiDi is to align with the central government's ambitions to informatize the economy and create jobs (See DiDi, 2016; SIC & ISCCSE, 2017, 2018). China's takeaway service industry, worth ¥8.7 trillion ($1.3 trillion) in 2017 with an online penetration of 13.4 percent, is expected to grow to ¥14.1 trillion ($2 trillion) with an online penetration of 29.5 percent (S. Dai, 2018b). As of February 2017, there are 322 million food-delivery app users in China, with a year-on-year growth rate of 66.2 percent (CNNIC, 2018a). Two leading companies—Meituan Waimai and Ele.me—jointly control 90 percent of the online takeaways market (Sijia 2018). Ele.me is now part of Alibaba, and Meituan Waimai is a part of Meituan Dianping, whose largest investor is Tencent. Eleme was reported to have more than one million deliverers in 2016 (China internet Network Information Center, 2017). Meituan Dianping went IPO in September 2018, with a market value of $50 billion in Hong Kong stock exchange (Zhu & Jourdan, 2018). Meituan reported to have operated in more 2,800 cities in 2017 and have 531,000 daily active riders on its platform in the 4th quarter of 2017 (Meituan-Dianping, 2018).

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1 In most of the Chinese government documents, the platform economy is framed misleadingly as "sharing economy". We use platform economy throughout this report to avoid confusion and ambiguity.

2 No statistics are available about the service providers' employment status.

3 It is difficult to have a definitive number of ride-hailing platforms in use because new platforms serving local markets emerge constantly, and some of them are short-lived. Some trade agencies calculated that there are about 80 ride-hailing apps in China

The paper aims to understand Chinese platform workers' experience and channel worker's perspectives and voices to advance understandings of platforms and digital technoloies for economic growth and social inclusion. The empirically informed study helps us pinpoint to the gaps in the existing legal measures and regulatory frameworks of platform economies for a more inclusive and sustainable development agenda.

3. Theoretical framework: An embedded approach towards platformization of work

Digital platforms are not given or static entities but involve dynamic processes in which platforms implicate and interact with other social and economic forces, as well as institutions. Serving as gateways that operate the mechanism of inclusion/exclusion/discrimination (Gillespie, 2010; van Dijck, Poell, & de Waal, 2018), platforms do not come into being on their own, nor do they operate in a power vacuum. Scholars have recognized connectedness as the primary character of digital platforms (van Dijck, 2013). The connected character suggests the embeddedness of digital technologies in the society, as well as the visible and invisible linkage that extends from the platform immediately involved to other platforms and ICT infrastructures. While deep penetrations indeed make digital platforms surface as a significant force for reconfiguring technological, economic, and social orders (Kenney & Zysman, 2016), platforms, as van Dijck and colleagues point out, are "an *integral* part of society, where conflicts of interest are currently played out at various levels" (van Dijck et al., 2018, p. 2, *emphasis* in original). Platforms are always *becoming* also because they constantly collect data and use data to calibrate and change policies and algorithms used on platforms. As far as the studied platforms in our project are concerned, change is constant also because the online market for both ride-hailing and food-delivery are still in the process of developing, because of ongoing market competition and possible regulatory measures in the future. Numerous money flood into the market taking the forms of subsidies to attract consumers and cash incentives for workers, which makes the demand and supply on the market fluctuate (Crabtree, 2018; Soo, 2018).

Framing platforms as becoming, as well as situated in the larger ecosystem, also necessitates our study being attentive to the specific historical, social, and cultural context in China and the characteristics of the digital ecosystem within that context. This particular analytical angle is informed by the concept of post-colonial computing, which was first proposed to reorient human-computer interface design philosophy (Irani et al., 2010; Philip et al., 2012). The concept recognizes the post-colonial conditions in their own right as the undergirding reality facing developed and developing world alike rather than the aberration from or reaction to a more general global trend (Philip et al., 2012). In so doing, scholars are able "to broaden the conversation about technology development by placing it in a theoretical and transnational context without relying on dualisms such as developed/developing, traditional/scientific, or colonial/postcolonial" (Philip et al., 2012, p.8).

Consequently, we approach platformization as embedded mediation and reconfiguration process in which platforms are deployed and intertwine with existing socio-economic structures, regulatory architecture, and cultural forces, to help create certain social and economic order. Along this line, we identify the following interlacing dialectic factors to shape the platformization of service work in China.[4]First, there is the longstanding tension between technocratic orientations in China's development policy and the economic and discursive marginalization of workers. Techno-nationalism—the belief and

[4] These characteristics speak to the broad contexts that have wider impacts beyond the studied platforms in this report. This by no means suggests that left-out or under-addressed factors (such as market competition) in the following passages are unimportant or irrelevant.

practice of developing national economy and prestige through advancing technological progress and vice versa—underpins China's policies for telecommunication and internet industries (Zhao, 2010). It is also well documented that the tech-driven developmentalism has repeatedly marginalized, if not failed, Chinese working class since the economic reform in the 1980s (Chan & Ngai, 2010; Hong, 2014). Chinese digital economy shares with global digital capitalism in forming a structurally asymmetric power relations between the companies and government on one hand *and* the users and workers on the other (Rosenblat & Stark, 2016; Schiller, 2008; Srnicek, 2016). Consequently, rhetoric and guiding reports issued by the central government remains technocratic and dominant in the discursive field (Hong, 2017; Chen and Qiu, 2019), and therefore the voices from workers are difficult to be heard.

> **It is also well documented that the tech-driven developmentalism has repeatedly marginalized, if not failed, Chinese working class since the economic reform in the 1980s**

On the one hand, the nationalistic and technocratic discourses translate into strong pro-commerce yet politically conservative policy orientations, offering institutional catalyst to the rise of internet giant companies. In the gesture that amounts to which Hong (2017) called as "technological fix" for national economy, the government invests heavily in the construction and improvement of ICT infrastructure (e.g. 5G wireless networks). On the other hand, the existing economic structure and the labor force remains dominated by migrant informal workers—286 million in 2017 (National Bureau of Statistics of China, 2017). This largely fits labor scholars' estimation that the informal employment accounted for 59 percent of the urban employment (Huang, 2009). As Huang (2009) has pointed out, data about informal workers (e.g. wage and educational level, work conditions, etc.) are not captured in the official statistics on the economy and labor market.

The online market facilitated by on-demand service platforms has become the new magnet to attract workers. About 9.5 percent of the entire labor force have participated in the platform economy as a service provider.[5] But there are gaps in the baseline knowledge regarding the composition of these platform workers (e.g. full-time vs. part-time), the worker trajectory and work conditions, among others. Empirical studies that bring workers' experience to the center and fore would shed light on transformations brought by digital platforms to the employment and formulate counter-narratives to challenge the technocratic development policy, and in so doing, provide evidence to support potential regulatory interventions for worker welfare. Second, the legacy tension and disparity between regulatory bodies at the national and local levels is significant. At first glance, the central government and the giant internet companies seem to constitute a reciprocal alliance—"alliance capitalism" (Higgins, 2015), wherein companies benefit from policy incentives so as to contribute to materializing the nation's blueprint of Made-in-China 2025 and other global ambitions. Chinese internet companies' expanding global presence echoes the government's aspiration to seek international recognition embodied in strategies such as the Belt Road Initiative. However, labor politics at the local level cannot be overlooked. Since China's economic reform in the late 1970s, the central government has delegated the local governmental agencies to be in charge of developing economy and implementing labor regulations passed by the central government. This eventually created a "decentralized legal authoritarianism" that local government and regulatory bodies have more direct impact on and deeper involvement in local workers' work conditions and welfare (Lee, 2007, p. 11).

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5 Author's calculation based on the total number of service providers in the platform economy – 75 million – and the size of labor force in China 788 million (State Information Center Sharing Economy Research Center 2019; World Bank, 2019).

The concept of "decentralized legal authoritarianism" remains relevant to study the labor politics for platform workers. For instance, regulations of ride-hailing platforms have started to become decentralized and varied from city to city. In July 2016, seven State Ministries led by the Ministry of Transport, issued the *Interim Administrative Measures for the Business of Online Taxi Booking Services* that was set to take effect in November 2016 (hereafter *Interim Measures*). The *Interim Measures* legalized ride-hailing platforms in China and set broad guidelines and rules for license or certification system for platform companies, vehicles, and drivers, respectively, but delegated the responsibility for policy implementation and local regulations-making to the concerned local authorities such as transportation departments. This causes remarkable local discrepancies. For example, Beijing disqualifies non-local residents (those without Beijing household registration) from becoming platform drivers (Beijing Transportation Committee, 2016), but Shenzhen only requires one-year proof of residence in the city from applicant driver (Shenzhen Transportation Committee, 2016).[6] Shenzhen started to roll out new vehicle requirements that only electric cars are eligible to apply for Road Transport Business License—the operational license for online booking taxis (Shenzhen Transportation Committee, 2018). Beijing's municipal rule, on the other hand, has been consistent in only issuing Road Transport Business License to vehicles with Beijing license plates. Ride-hailing platform companies' compliance with local regulations vary significantly from platform to platform, and from city to city. DiDi, for example, obtains legal operational licenses in only 51 cities out of more than 400 cities where it operates, ranking fifth in the list of legal ride-haling apps where a platform called Wanshun Jiaoche (Yue, 2018). A recent study on DiDi's political strategy proved the company's tendency to align with Central government's technocratic discourse but to wrestle with local regulators with mixed outcomes because of the local disparities (Chen and Qiu, 2019). In addition, how platform workers organize to fulfil online requests and fight against the unfair treatment is an important shaping force for the practice of platform work (J. Y. Chen, 2017; Gray, Suri, Ali, & Kulkarni, 2016; Salehi et al., 2015). According to a recent China Labor Bulletin's report, the new industries involving digital platforms (e.g. couriers and food-delivery) have become the new battlegrounds for labor disputes, protests and strikes for wage arrears/theft and work injury among others (China Labor Bulletin, 2018). However, questions of how digital platforms are regulated, and how local regulations and other localized factors impact workers' livelihood, are poorly supported by empirical evidence. In short, our research framework and the relevant contexts outlined above lead us to pay special attention to the interplay among:

1.   Workers' grounded experience with the on-demand service platforms against the dominant discourses that frame platform economy as being innovative and *new*, as well as the broad socio-economic context they are living in;

2.   Gaps and disparities among regulations and policies at the national and local levels *and* workers' voices and narratives about the platformized work process;

3.   Platform company's operation across space and encounters with the workers and regulatory bodies, at both national and local levels.

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6 One-year proof of residence can be a rental contract or police registration. This is different from local residence household registration. China implements household registration system that divides the population into urban residents and rural residents. Rural residents usually face barriers in finding jobs and enjoy employment-related benefits and social security in the cities.

4. Methodology

Though DiDi dominated the market, our study targeted all drivers on the ride-haling apps. Expanding from the existing knowledge, we chose to carry out a-year-long virtual ethnography and conduct a nationwide survey study distributed through four national social media accounts for drivers. The nationwide questionnaire was also distributed online by interviewees, in drivers' social media groups, and via public accounts. We also encouraged drivers to share the link of the questionnaire with their fellow drivers. The survey included 35 questions, which was designed to capture drivers' basic demographic background, their work conditions (including their status of full-time/part time, independent/hired drivers, working hours and incomes, knowledge about the ride-hailing market, etc.), their experience with the ride-haling apps, and their knowledge about and participation in drivers' collective actions.

The survey also captured a couple of significant independent variables proven in the past studies, such as their status of being full-time or part-time drivers (Wu & Li, 2018) and their employment as traditional taxi drivers or private drivers (J. Y. Chen, 2017). The survey contained a variety of question types including yes/no/not applicable, multiple choices, five-point Likert items, and open ended questions. For example, drivers were asked to identify the most important factors that impact their income on a five-point Likert scale. Factors included platform policies, their job performance, local policies, miscellaneous costs out of their own pockets, and others. Survey participants were also asked to express their most concerned issues related to the online ride-haling market in an open question. We received 1,889 valid survey responses.

We identified key actors in the domains of market, legislatures and regulations, and civil society for each type of digital ecosystem. We took some common measures to collect literature and secondary data for both types of platforms. After identifying key actors in the respective platform ecosystem, we systematically reviewed relevant academic publications and collected secondary data from news in the press, industry reports, press releases from platform companies, as well as relevant statistics released by governmental offices, policies, regulations, and legal cases. Rigorous review of academic publications and systematic collection of secondary data enabled us to contextualize the findings and establish meaningful connections between our project and the broad landscape of digital economy and digital policies in China.

Bearing in mind the aim to foreground workers' perspectives, we collected our primary data through surveys and ethnography. Ethnography includes participant observations (online and offline) and interviews with workers and other stakeholders. Surveys were designed to capture a broad overview about workers' social and economic background and their experience with the on-demand work platforms.

In our research operations, we made a few adjustments because the regulations and market development of the ride-hailing platforms and the food-delivery platforms are not at a comparable stage and because of the existing knowledge about the two platforms. Ride-hailing apps were legalized in 2016, but there is no regulation for the online takeaway apps except for those to protect food safety and consumer rights. The online ride-hailing market is slightly more mature than the online food-delivery market because of the monopolistic position of DiDi (though competitors always exist). The online food-delivery market is still up for grabs among two leading companies, which suggests in-pouring of capital and cash incentives for both consumers and riders and potential market restructuring.

Detailed accounts of sites of study and research procedures for each case of digital work platforms are as follows.

Table 1. Network of Actors for the Online Ride-hailing Platform Ecosystem

Market Actors				
Domestic and global investors	Platform companies: DiDi Chuxing (the leading player); Yidao (ride-sharing); Shouqi (taxi and private car service); Caocao Zhuanche (ride-sharing); Meituan (private car service); Dida (taxi service); Shenzhou (private car service); Uber China (private car service)	Passengers	Third-party intermediaries (labor agencies, car rental companies, etc.)	Drivers: 1) Taxi drivers (state-owned and private companies) 2) Independent private drivers 3) Private drivers who work for intermediary firms
State Actors				
Central government that legalized the ride-hailing platforms		Local regulatory authorities (policy discrepancies may occur)		
Non-state Actors				
NGOs		Social media public accounts and private groups by and for drivers		

4.1 Ride-haling platforms: Sites of study and primary data collection

The research team has researched Chinese ride-hailing platforms before and as a result, accumulated connections with drivers' communities and social media public accounts.[7] Taxi drivers in China have a long history to form their virtual communities through ICTs (Ding, 2014), and they carry on this tradition

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7 Social media public accounts refer to information dissemination channels on the social media platform WeChat.

when getting ride requests via digital platforms. Studies showed that it is very common for drivers to join in private social media groups at both national and/or local levels, and they treat their social media networks as one of the most important sources for information about ride-hailing platforms and market (J. Y. Chen, 2017).

Virtual ethnography primarily involves observations on the information and content shared in the social media groups and circulated in the public accounts. We also conducted interviews in Beijing and Shenzhen. Beijing and Shenzhen were selected because the two cities implemented quite opposite regulations on platform drivers and we wanted to examine the local impact on drivers. In-depth interviews with drivers usually lasted 60-90 minutes. If we exchanged social media accounts with drivers, we maintained occasional and informal conversations via social media. Sometimes drivers shared the screenshots of their work performance with us during the interview and after. In total, we interviewed 40 drivers from Beijing and Shenzhen. We also visited one ride-hailing platform company and interviewed one employee there. Additionally, we interviewed four public accounts administrators, where the public accounts were dedicated to providing information related to ride-hailing platforms and market to drivers across the nation. In Shenzhen, we also interviewed two driver-turned-grassroots organizers who try to organize the first-of-its-kind platform driver trade union.

4.2 Food-delivery platforms: Site of study and primary data collection

The existing legal framework for takeaways tends to present online food-delivery services as part of internet-enabled new economy, akin to the discourses for ride-hailing apps. New regulations on food-delivery platforms prioritize food safety and consumer protection. Some local branches of All-China Federation of Trade Union (ACFTU) such as the Shanghai municipal branch played an active role in initiating measures to help riders establish the first trade union of its kind nationwide (Qian, 2018), which suggested a possibility to get state actors involved.

Table 2. Network of Actors for the Online Food-delivery Platform Ecosystem

Market Actors				
Domestic and global investors	Platform companies: Meituan Ele.me Baidu Waimai[8]DiDi Waimai	Consumers	Participant restaurants and third-party labor agencies	Deliverers: a) Riders hired by platform firms b) Riders who work for intermediary firms c) Crowd sourced riders
State Actors				
No nation-wide legislature yet for the apps, but there are local policies in domains of food safety and consumer protection			Municipal branches of All-China Federation of Trade Unions[9]	

We conducted our study about riders on the food-delivery platforms in Beijing, China, where no trade union of riders exists yet. The research team carried out seven-month long ethnographic research in a number of sites (e.g. street corners, restaurants) where riders tend to concentrate for resting in four districts in Beijing (Chaoyang, Haidian, Xicheng, and Dongcheng). The fieldwork involved participant observations and interviews. We observed riders' daily routines, work pace, and how they kill their in-between time. We built rapport with riders in informal conversations before requesting interviews. Initial interview took 60-90 minutes, and occasionally, we conducted follow-up interviews. Follow-up interviews lasted no more than 20 minutes. All interviews were face-to-face and scheduled to best suit participants' schedule and their preferred locations (see in the Appendix a list of interview questions). We used snowball sampling to recruit more interview participants.

About five months into the fieldwork, we distributed paper and online surveys to riders we encountered (see a blank survey in the Appendix). The survey had 39 questions which were intended to capture Beijing riders' basic demographic and education background, the work conditions (including their status of labor contract, working hours and wages, knowledge of and access to relevant legal protection, etc.), and their perceptions and experience of the platform work. It used a variety of question types including yes/no/not applicable, multiple choices, and five-point Likert items. Riders were also asked to identify their most concerned work-related issues. We asked the participants to widely distribute the survey among their co-workers. Snowballing proved to be an effective strategy because food-delivery riders, of whom a majority are migrant workers from rural areas to cities, tend to have family and friends who were also co-workers, and hence they are more likely to trust co-workers than unknown researchers.

8 Though Ele.me purchased Baidu Waimai in August 2017, as of August 2018, Baidu Waimai app and riders wearing the uniform remained working.

9 All-China Federation of Trade Unions (ACFTU) is the only legal trade union in China and it is part of the government.

We also interviewed representatives of other stakeholders, including participant restaurants and the platform company. These interviews lasted about 60 minutes and there were no follow-up interviews except for checking facts or quotes.

Overall, we collected 1,399 valid survey responses from riders and conducted 60 rider interviews, and 20 interviews with managers of the riders, managers from third-party labor agencies, engineers at the R&D department of the platform firm, and workers in the participant restaurants at the food-delivery platform.

4.3 Procedure of analysis

Ethics: all data collection methods we used and ethical considerations were subject to a rigorous and thorough review by the Sub-research Ethics Committee of Media, Communication and Sociology in the University of Leicester, the United Kingdom. Official ethical approval was granted prior to the commencement of the project. No part of the study was carried out without prior informed consents from research participants who were each, offered an information sheet and given ample time to raise questions about the project. We took measures to protect the confidentiality and privacy of our research participants in accordance with the Leicester University's Research Code of Conduct and the University's Research Ethics Policy.

All data was anonymized. All interviews were transcribed. We conducted discursive analysis of our secondary data and used the insights to contextualize and theorize our study. We examined interviews with other stakeholders against the broad themes we detected from workers' interview and survey responses, and cross-referenced them.

For each case, we utilized quantitative analysis for our survey data and qualitative analysis of interview data. For each case, in order to develop a valid coding scheme for the interview data with platform workers (riders for food-delivery and drivers on the ride-haling apps, respectively), we randomly selected 10 interviews and three research team members openly coded the interviews to identify salient themes. A series of codes were discussed, created, defined, refined and expanded to describe broad common themes. When a consensus for one code was reached, we normally preserved one or two more specific sub-codes. We highlighted the most representative voices and narratives during the coding process.

We treated interviews with workers as narratives, which were also interpreted along with fieldwork notes and observations of the virtual communities. This methodological choice was made because of the merit of the narrative inquiry method to challenge the existing knowledge production system by restoring the voices of those who are historically marginalized (Bochner & Riggs, 2014). Specifically concerning drivers on the ride-haling platforms, we categorized the media contents from their virtual communities and public official accounts in order to identify behavioral and informational patterns. We identified three broad categories: 1) mundane activities and social sharing (including sharing job performance screenshots), 2) information dissemination (e.g. about the platform policies, local regulations), and 3) self-regulating and -organizing activities. All in all, by combining discursive analysis, quantitative analysis of questionnaires, with qualitative analysis of interviews, the field, and workers' narratives, we were able to, following Bochner and Riggs' method, "humanize the human sciences, placing people, meaning and personal identity at the center" (2014, p. 195) and portray platform worker's work life in a richer and more nuanced manner.

5. Results and Findings

In this section, we first present results from each type of on-demand work platform, and then analysis and discussions of shared and distinctive characteristics of platform workers. We organized our analysis and discussions by broad categories in order to make meaningful connections between the platformization of service work and the broad political economy of digital platforms, the digital ecosystem and the policy landscapes in China.

5.1. Platform workers: young, fluid, and informal

Both online ride-hailing and food-delivery markets are dominated by workers below 40 years old, but the proportion of the young generation (below 25) differs (Figure 1). Specifically, about 90 percent of food-delivery riders in Beijing were migrant workers, 80 percent were 30 years old or younger, and 70 percent were unmarried. Full-time riders in Beijing earned an average of ¥4,048 (approx. $589) monthly, lower than the average monthly wage (¥4,500) for urban workers in the catering industry (Beijing Statistics Bureau, 2017). That a majority of ride-haling platforms (including the market leader DiDi) allow traditional taxi drivers to use the apps partially contributed to an older work force in the online ride-hailing industry. For example, 17 percent of drivers who reported to have worked in the industry for more than 10 years were for certain taxi drivers, because the ride-haling apps appeared in China less than eight years ago.

Figure 1: Age Distributions of Platform Workers: Drivers on the Ride-hailing Platforms (Above) and Riders for the Food-delivery Apps (Below)
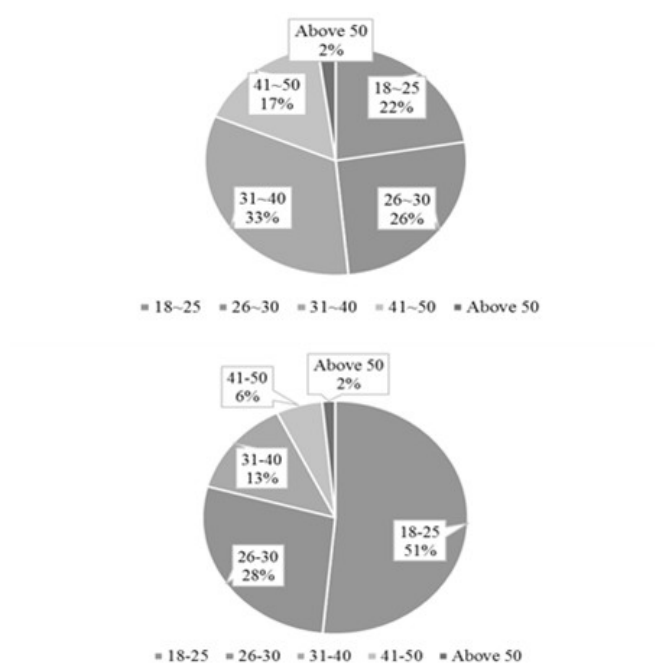
Different from Chinese ride-hailing platforms' business module of expanding from the existing taxi industry (J. Chen, 2017), food-delivery apps construct a new digitally-mediated market, so the dominance of new-comers is more salient. About 75 percent of riders have worked less than a year, and riders of less than three months of experience accounted for more than half of our surveyed rider population in Beijing. Despite being new to the market, riders were also quite fluid. With the exception to the newest riders (less than 3 months), of whom nearly half worked on one food-delivery app, there was a noticeable common trend among riders with varied experience in the industry to hop among different delivery platforms (Figure 2). For example, nearly 80 percent of riders with 3-12 month of experience have changed platforms. The high fluidity is made possible by an expanding market and low barriers to become a rider. In Beijing, one only needs to be less than 45 years old, with a health certificate, no criminal record, and the driving skill of e-bikes to be interviewed by the recruitment team.[10]

Many of the riders told us in the interview that they shifted to the online food-delivery market from traditional service jobs such as repairers and air conditioner cleaners. They treated food-delivery as temporal in-between jobs or a source of extra income. All these explain the combination of a high proportion of new incomers and a high level of fluidity among riders. All on-demand service platforms deploy the rhetoric of flexibility and quick money-making. For example, Meituan app greets riders with the message: "take orders with liberty and extra money made easy." Part-time workers constitute a good part of the online labor force for both types of platforms—43 percent on the ride-hailing apps and 60 percent on the food-delivery apps, respectively. We found, unsurprisingly, full-time riders were better protected since they were more likely to have labor contracts (46 percent vs. 21 percent), or labor agreements (if without labor contracts) (53 percent vs.29 percent), than their part-time counterparts.[11] Scholars have long recognized that labor market segmentation prevails under capitalism because it undermines workers' collective power, and the practice has intensified in the digital economy (Dyer-Witheford, 2015; Kalleberg, 2003; Reich, Gordon, & Edwards, 1973), which involves more precarious workers such as crowd sourced and part-time gig workers who have little or no access to institutional safety nets (Scholz, 2016).

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10 From our interview with one hiring manager at the food-delivery platform company.
11 China's Labor Contract Law (2008) only protects workers who sign the employment document specified as labor contract, but not those who sign labor agreements.

Figure 2: Number of Apps Riders Have Worked on According to the Length of Being Riders for Food-delivery
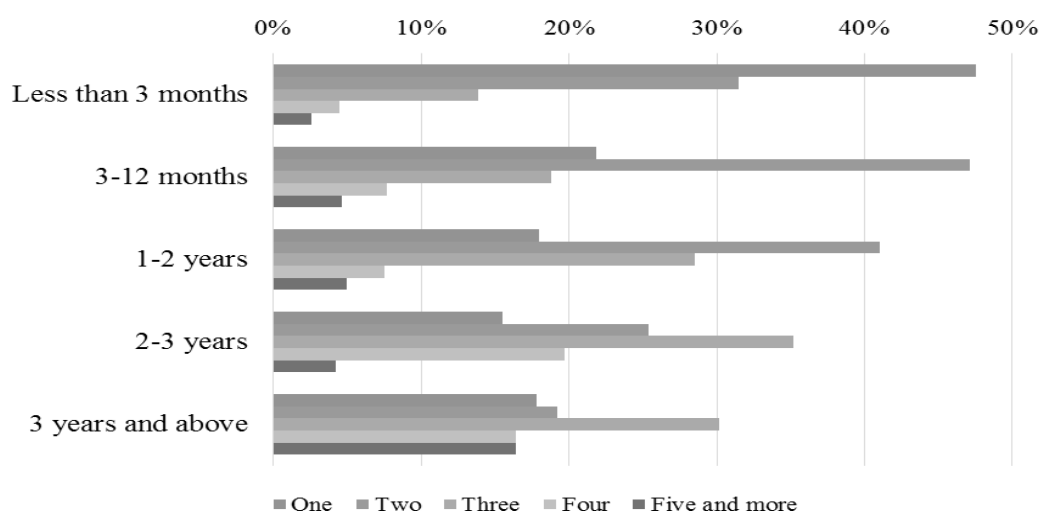

Recent studies about on-demand service platforms found that labor segmentation tended to exploit the legacy inequalities associated with specific contexts where the platforms operate. For example, nationality, gender, and race are indicative of workers' advantages or disadvantages in the platform economy in the developed countries (Ticona, Mateescu, & Rosenblat, 2018). Social institutions and the dominant informal labor market in China play important roles in shaping the course of platform economies (J. Y. Chen, 2017). In this project, we further discovered, Chinese on-demand service platforms aggravate the informality and further labour segmentation. Thus, a nuanced analysis is in order about the shared and different segmentation mechanisms on the two platforms and the implications for workers and platform economies.

Full-time employment status is proven to be a significant factor in determining the degree of drivers' submission to the "making-out" game on the platform by extending their work time (Wu & Li, 2018). Overall, part-time workers worked less on both platforms. Close to 70 percent of part-time drivers for ride services and 40 percent of part-time riders for food delivery worked less than 8 hours a day. The figures of the full-time workers on the two platforms were 10 percent and 27 percent, respectively (Figure 3). Cross-platform comparison between ride-hailing and food-delivery, however, showed that most (90 percent) full-time riders' worked less than 12 hours but 30 percent of the full-time drivers remained working above 12 hours daily. Platform incentives alone cannot fully explain the disparity between the two. Instead, the disparity has to do with the different payment methods for transport service and food-delivery service. Riders are piece workers and they normally get paid by a flat rate (¥7 to ¥9) for each successful delivery. The flat rate sometimes rises, for instance, on inclement weather days. Nonetheless, the incentive is not the only factor at play. One rider explained:

There were snow flurries yesterday. The weather was bad and I only wore one layer of clothes. Even if the rate was raised to ¥10 (approx. $1.5), not worth it. My phone cost me several thousand Yuan. [What if I] dropped it and it's ruined. Not worth it. (Rider A)

Figure 3: Comparing Daily Working Time between Full-time and Part-time Workers: Drivers (Above) and Riders (Below)
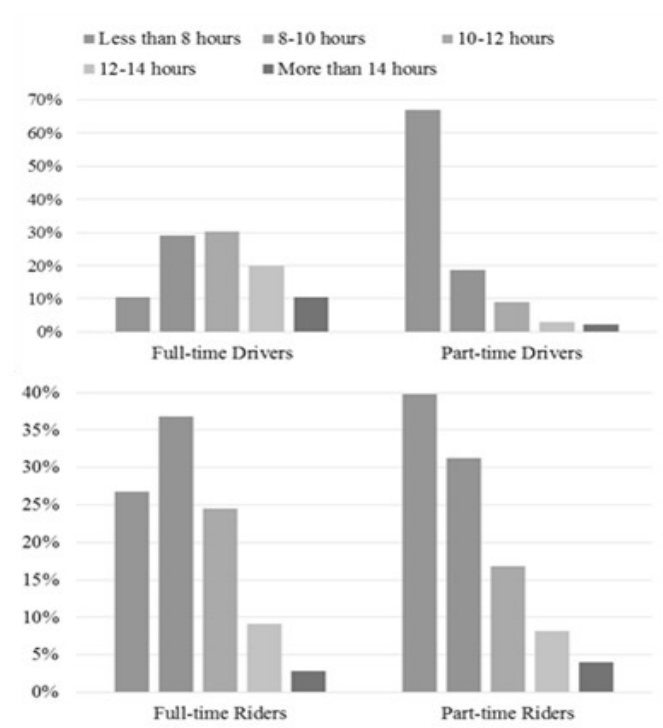
Apart from the division between full-time and part-time, we found a proliferation of informal employment types. The online ride-hailing market consists of, at least, taxi drivers, independent (moonlighting) private drivers (namely the independent contractors), drive-to-own drivers,[12] and subcontracted drivers. Subcontracted drivers include those directly hired by the platform companies[13] and those who are hired by fleet companies that affiliate with platform companies. Each group of drivers face different levels of income deductions by the platform or the employer company. Similarly for the online food-delivery market, there are at least four different types of riders: 1) platform-hired riders, 2) crowdsourced riders, 3) subcontracted riders who are hired and 4) in-house riders. The discrepancy between each employment type illustrates varied levels of informality and collective bargaining power

12 Early as April 2016 after DiDi consolidated the domestic market, it introduced a drive-to-own program to recruit drivers. Successful applicants only needed put down ¥20,000 deposit to get a free new car from a partner auto company to drive full-time for DiDi. They had to join a revenue-sharing program and meet certain number of fulfilled ride services in the next two to three years for them to own the car.
13 For instance, Shouqi yue che, a ride-hailing app introduced by the state-owned enterprise Shouqi Group in Beijing. Drivers on its platform are all formally employed by Shouqi Group.

(Table 3). The fragmentation of labor force among on-demand workers undermines the possibility for massive, cross-category collective actions. Nonetheless, their collective precarity as migrant workers led all types of riders unequivocally to identify "to increase income" as their number one motivation to become online food-deliverers, which further suggests how the platform economy is generally entrenched in the existing informal labor market.

Table 3. Different Types of Riders and Their Respective Labor Rights

Rider-type	Employer	Labor contract	Base salary	Social security contributions
Platform-hired	Platform company	Yes	Yes	Platform and individual
Crowdsourced	independent contractor	No	No	Individual
Subcontracted	Third-party labor agencies	Mostly no	Mostly no	Individual
In-house	Restaurant	Mostly no	Mostly no	Individual

5.2. The black box and the visible hands for the platform labor control

The heterogeneity of the labor force complicates the questions of labor control in the platform economy and shifts the distribution of risks, rewards, and accountability among platform companies, intermediaries, and participant workers – namely, drivers and takeaway couriers. The black box of algorithmic control often compound with visible means of labor segregation and management when platform-hired or subcontracted workers are involved.

a. Omnipresent algorithms

Drivers on the ride-haling platforms and riders on food-delivery apps are subject to algorithmic control (Rosenblat & Stark, 2016) and surveillance of the platform companies.

> If I want to go home from the city center, say, at 7.00 pm and I switch my account to Hitch mode, ready to get ride requests on my way home, but the platform never sends me orders in the direction to home. It doesn't want me [to go home]. I will have to wait until after 9.00 pm unless I am willing to drive home with vacant seats. If I switch to Hitch mode after 9.00 pm, there will be orders. (Driver A in Beijing)

Rider experienced multiplications of work when the algorithm fails, which added insult to injury if they were pressed by time:

> The order allocation software is stupid. It constantly sends us orders with destinations of opposite directions. You need [to] call the team manager and ask him/her to change it. It takes time to solve this kind of problems. Riders work under strict time constraints. This's extra [work]. (Rider B)

Platform companies collect massive amount of data from workers. DiDi is reported to collect information about drivers' location and current speed every three seconds (Etherington, 2016). Other companies do not shy away from putting in place a real-time monitoring system as one informant said,

> We have a real-time surveillance system… Since job allocation is completed automatic, we need such as a system to monitor…so that we can watch over the workings of our platform in all business districts across the city on one hand. On the other hand, we can intervene manually if something goes wrong. (A member of high-level engineering team in a food-delivery platform company)

The asymmetrical power relation between workers and platform companies enable the latter to shift the benefits away from workers. A rider explained how he coped with the ever changing reward policy on Ele.me—the food-delivery app, but ended up giving up.

> At the end of last year, [Ele.me's] customer rating system changed to three smiley faces. The middle one is on by default setting, indicating satisfaction. But we [the riders] need customer also select the right smiley face, because that one is for "good rating for the deliverer." I used to send SMS to customers to remind them of clicking the right smiley face. But then the system changed again. Customer need put in their ratings for "dispatching service." Then I can't keep up with [the policy] reminding all customers. I used to earn about ¥1,000 ($146) extra every month as the reward of favorable customer ratings, but now I only get about 30 good rates [equivalent to ¥60 bonus]. (Rider C)

b. Labor market segmentation meet algorithms

Algorithms are complicit in creating an internally segmented labor market with different labor valorization for drivers. It involves visible categorization (e.g. taxi vs. economy car vs. luxury car service on ride-hailing platforms) (J. Y. Chen, 2017). We found considerable disparities between taxi drivers and private car drivers about influential factors on their income. Taxi drivers ranked illegal vehicles as their top one influential factor on income, and platform commission as the least important because 1) illegal vehicles have been their long-term competitors and 2) taxis are exempted from commissions by ride-hailing platforms. The opposite was the case in the eyes of private drivers on the platforms (Figure 4).

Figure 4: Rankings of influential factors on income for private car drivers (Above) and taxi drivers (Below) (Note: 5 = most important and 1= the least important)
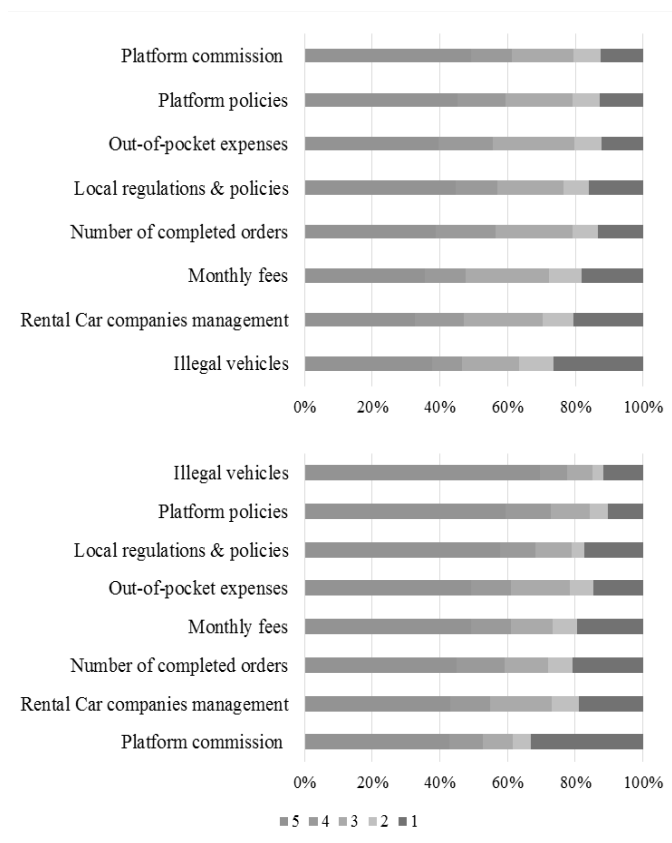
In addition, taxi drivers tended to have more pointed opinion toward illegal vehicles and platform policies, weighing them much more heavily than the rest influential factors. Private car drivers did not see significant distinctions between the top four impacting factors on their income.

Algorithms are complicit in creating an internally segmented labor market with different labor valorization for drivers. It involves visible categorization (e.g. taxi vs. economy car vs. luxury car service on ride-hailing platforms) (J. Y. Chen, 2017). The algorithmic valorization of labor are also more contingent. DiDi for instance, rolled out a "minimum wage guarantee program" (MWGP) in March 2018 in several cities as a countermeasure against the competition from Meituan, which had just announced the company's plan to branch into the ride-hailing market. The program ensures a daily minimum wage of ¥600 (approx. $87) to drivers who meet the minimum requirements and up to ¥800 ($116) in Beijing or ¥816 ($119) in Shenzhen, respectively, when they exceed the minimum requirements. Drivers in the program also enjoy priority over non-participant drivers to be allocated more lucrative jobs via algorithms, such as long distance ride requests to the airport.

Table 4. Requirements to claim the minimum wage guarantee program benefits (Beijing)

1)	Check-in everyday
2)	Online for 10 hours/daily or above
3)	Online for 4.5 hours/daily or above during the time periods of 7-10am, 5-8pm, and 9-11pm
4)	A seven-day transaction success rate 90 percent or above
5)	A seven-day dispatch acceptance rate 85 percent or above

MWGP is an invitation-only program. DiDi selects potential candidates and sends invitations to them via the platform, but the platform never discloses its selection criteria. In both Beijing and Shenzhen, there are partner car rental companies, which are eligible to recruit candidate drivers in a wholesale fashion. To claim the benefits, MWGP drivers have to, among others, stay online for a minimum of 10 hours/daily, including 4.5 hours of staying on-call during the rush hours (Table 4). As a trade-off, participant drivers relinquish all kinds of rewards (e.g. rush hour bonus etc.) available on the platform. Drivers also need to agree to be dispatched to designated areas whenever needed. Some drivers expressed helplessness when they were ordered to stay in the downtown areas, wasting their gas in the long queue during rush hours, despite their preference to leave the overcrowded regions. They often said "we had no choices", or "we had to go." The algorithm-facilitated dispatching, coupled with excessive online time, greatly fixates drivers' schedule and mobility. Nothing is further from the truth to call it a flexible job.

> On average [we got] 40 ride orders a day. Staying online…Sometimes dispatch orders demand me drive more than 100km with vacant seats (Driver B in Shenzhen)

While participant drivers in the MWGP found themselves constrained by long hours and limited mobility, outsider drivers found the program unfair and problematic because the job allocation algorithms for lucrative ride requests are discriminatory against non-MWGP participants.

> The platform prioritizes MWGP drivers for all well-paid gigs, not matter how badly their services. They don't have to worry about customer complaints either. (Driver C in Shenzhen, also a grassroots union organizer)

A screenshot of a MWGP driver's interface showed no place for custom ratings. The reality that drivers hired by partnering rental companies enjoy an expressway in the algorithm-controlled system tilts the playing field.

> Because no one has the access to the allocation algorithm [except the platform company], even the government can't intervene to assess whether it's fair or not. Drivers for cars owned by [partner] rental companies were easier to get well-paid jobs, but the jobs went to [other] private car owners were like trash. [Platform] always says it's fair to everyone, but only drivers know what really is going on. (Driver C)

Other outsider drivers shared Driver C's opinion.

> Every driver should be treated equally by the platform. [Platform] can't discriminate against [us] by constructing a hierarchy of drivers for job allocations. [It] needs [to] protect the rights and interests of a majority of drivers, reduce the commission, and grant drivers practical security in many respects, such as insurance claims and subsidies for fines issued by local transport authorities. [Platform] can't trick drivers or pay lip service. (Driver D)

Though there is no publicly available statistics about the exact percentage of MWGP drivers among all driver population, such a program aggravates an existing segmented labor market along the lines of employment types, creating a contingent division between quasi "organizational insiders" and "outsiders" (Kalleberg, 2003), only that contingent division line is more elusive and secretive.

On the online takeaway market, we found the intertwining and compound effect of algorithmic control and the age-long labor management manifested in 1) worsening treatment of platform-hired riders collectively and 2) riders' experiences of (compressed) temporality on and beyond the platform.

Early-comer platform-hired riders used to have a brief period of good days in 2016 and early 2017 with decent wages and generous incentives and rewards, partially because of an expanding market and a shortage of labor force in the city. A rider recollected his early days in the industry:

> I earned a hefty wage in 2017…in April or May, I made about ¥10,000 ($1,455) a month.[14] There were few riders then and many subsidies. After people heard the stories about how good food-delivery was paid, they all came. The more workers are available, the less subsidies are offered. The pay is just average now. (Rider D)

Indeed, according to our informants, their overall job quality (including income) has seen a dramatic decline as the market gradually comes under the control of two leading companies—Ele.me and Meituan (CNNIC 2018), which both concomitantly decided to subcontract their delivery services. Riders' busy hours concentrate on meal times. All full-time platform riders in our study told us that they are required to be online during 11.00 am-2.00 pm and 5.00-8.00 pm. Riders are free to take rest during off-peak hours. However, platform-hired riders tend to get less jobs—concentrating on the range of below 15 daily deliveries, while other groups of riders are more likely to get over 15 daily deliveries (Figure 5).

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14 The median monthly wage in Beijing in 2017 was $983 (Rapoza, 2017).

Figure 5: Daily average deliveries performed by different types of riders during the busiest month
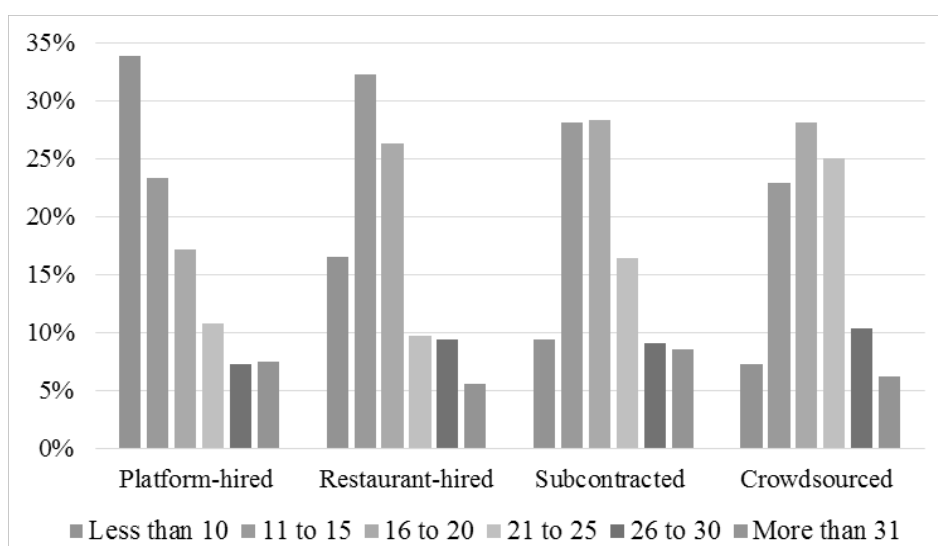
One possible explanation for the divergent job-allocation between platform-hired riders and others is that they were treated as market retainer and reserve labor by the system. When the demand is high, other types of riders are prioritized for job allocation, so that they are motivated to stay on the platforms. When demand is low and less attractive to other groups of riders, platform-hired riders are mobilized to fulfill the jobs to prevent the platforms from losing customers. In other words, platform-hired riders took the brunt of the volatile market at the hands of algorithms that can detect the flow of demands at a granular level. This also explains why they listed "unstable income" as their top one concern about the job, whereas all other types of riders are most worried about "accidents like personal or work injuries".

A new wave of subcontracting that started from late 2017 further proves that the initial hefty wages and labor protections offered by the platform companies to their own riders are the ephemeral exceptions, not the rules in the platform capitalism. The platformization of food-delivery work is still in the process of *becoming.* In April 2018, we learned from our informants that Meituan-hired riders in Beijing faced unilateral terminations of their contracts and bulk transfer of their employment relations to several different third-party labor agencies. After a three-month grace period, they would lose their base salary, labor contract, and all of their employment benefits but would be subject to a harsher management directly by the employer company. A rider described the transition:

> "Now it's like we are all sold to the third party [labor dispatching company]. You have nothing to do with Meituan (the food-delivery app) from now on; the [labor dispatching] company will take over…[the company] will not pay our social securities or pension, no minimum wage. It increases our income instead… The [employer's] company changed. Nothing changed except that my income may change. But if my income changed, everything would change." (Rider E).

At times, third-party labor agencies have an equal impact, if not more, on the wages subcontracted riders earn on a daily basis.

> We just had a new rule [in my team] which demanded everyone to complete at least
> 18 orders per day. If you fell short of that, you would lose your perfect attendance
> allowance—¥800 (approx. $116). (Rider C)

Time constraint is one of the most common challenges facing riders in their work process. They often described their delivery work pace as "out of time" and full of "constant anxiety about being on schedule." In its IPO prospect, Meituan-Dian boasted about an average delivery time of 30 minutes for its on-demand service (Meituan-Dianping, 2018, p. 2). The credo of being on-time often translates to anxiety, stress, and other emotional labor (Hochschild, 2003) inflicted on riders.

> [The store] hasn't finished cooking, so how am I supposed to deliver the pizza [on
> time]? My next order request is going overtime soon, so I feel extremely worried.
> Should I keep waiting? (Rider F)

> My company has a rule of 95—on-time completion rate of 95 percent within 40
> minutes. No matter how many simultaneous orders you have, eight or ten, you have
> to meet the requirement. But you feel miserable [because] you can't accomplish
> them all. (Rider G)

Algorithm-dictated time control can be devastating when it is deployed by strict subcontractor employers. The goal of on-time completion rate sometimes forces rider to choose between their personal safety and getting paid (or avoiding punishment or unfavorable ratings). Accidents involving delivery persons shot up rapidly in 2017 (Shepherd, 2017). Riders explained the dilemma they faced, when asked if they ever break the traffic laws.

> Yes, [I] went through the right light. In such a hurry. Indeed [I felt] pressured. There
> were too many orders at the same time, [so] I couldn't finish them all on time. In
> fact, I am in a hurry like hell by the minute. The system set[s] the time for you. (Rider
> H)

Overall, labor control for Chinese on-demand digital workers goes far beyond the level of algorithms and the work process defined by the platforms. It takes the shape of a network as well as a hierarchy. Algorithms are deployed at once for labor control and discipline *and* for labor market segmentation, serving capital's strategy of "divide-and-conquer" in dismantling a potentially united worker force. Though algorithms are often used in an ad hoc and opaque fashion and platform companies deny any roles played by their algorithms other than being neutral, decisions made by algorithms and materialized by the platform have direct impact upon workers, individually and collectively. Just like social media platforms' role in curating users' online content and by extension shaping public discourses (Gillespie, 2018), digital work platforms broker economic rewards, risks and opportunities among workers. A clearer definition of platform companies' intermediary roles and their correspondent liabilities in the legal framework not just for good job quality but for long-term workers' rights and welfare is in order.

5.3. Regulations and (self-) organizing in the shadow of data capitalism

The global sweeping of on-demand service facilitated by digital platforms has attracted international attention, ranging from legal debates about the classifications of the employment status of workers, as well as the employer status of platform companies (see for example, Cherry, 2015; Prassl & Risak, 2015), to initiatives led by international organizations such as ILO to lay the groundwork to define what fair

work and decent work with good job quality ought to be like (ILO, 2018; see also, fair work). Supranational actions to standardize platform work are undoubtedly significant, particularly in respect to delineate the platform's responsibility and liability for decent wage and workers protection. Nonetheless, we found, workers' self-organization and local factors are relatively under-addressed. Formal and informal organizing and everyday resistance are prevalent among workers, partially because workers in our study live through the digital transformation of Chinese society no less than the rest of Chinese population. Digital technologies enable workers to form both nationwide and localized networks of communities, extending workers organizations onto the larger media environment (Qiu, 2016).

Local factors such as local regulations, law enforcement and existing, or thereof lack of, institution and infrastructure for workers' social security and welfare, have a great, if not more direct, impact on the lived experience of informal on-demand service workers like the drivers and riders in our study. Their lived experiences, including struggles and resistance, expose some fundamental power dynamics among multiple stakeholders at the local level, which may provide viable pathways toward concrete changes for the future. In the following, we elaborate on workers self-organizations and contestations on the platforms and in local sites in the shadow of platform capitalism.

5.4 Networked communities of practices

Our findings about workers struggles echo past studies. We found close to 40 percent of drivers have participated in strikes or protest, corresponding to China Labor Bulletin's (2016) observation that the new economy has become one of the most contentious fields for labor struggles. Consistent with our previous study (Chen, 2017), we found multi-homing—workers using multiple devices or having multiple accounts on different platforms—and installations of cheating apps to game the system remain common among drivers, with 23 percent and 18 percent, respectively. About 35 percent of riders also reported simultaneously working for two food-delivery platforms, and close to 20 percent of riders multi-homed on three platform companies. Multi-homing may reflect platform workers' agency to game the system. It can also be interpreted as the tactics they have to develop in order to make ends meet given the declining wages and intensifying competitions.

Scholars have well-documented the use of communication tools to build professionally and socially supportive communities—both online and offline—among precarious workers on digital platforms (see for example, Chen, 2017; Gray, Suri, Ali, & Kulkarni, 2016; Rosenblat & Stark, 2016), or even before the rise of platform economies (Ding, 2014). Similar to Rosenblat's (2018) findings about the online networks built by Uber drivers in the US, drivers in our study also develop vibrant online communities and learn from each other about how the platform works and how to perform satisfactory jobs, among other things. Different from their counterparts in the US, however, the networks Chinese platform workers develop are primarily mobile. With a close-to-saturation-point penetration rate, WeChat dominates as the communication channel for both drivers and riders, though with varied degrees of using the tool for activist causes. Functionalities on WeChat for 1) private groups, 2) Public Accounts, and 3) Moments – a status sharing functionality—are the top three channels for drivers to learn about information related to online ride-hailing market, the platform policies, local regulations, as well as news and mobilizing information about strikes and protest.

Multi-homing may reflect platform workers' agency to game the system and can be interpreted a tactic they have to develop in order to make ends meet.

WeChat groups also play a vital role in daily communications for riders. Our statistics showed that 38 percent riders in Beijing have three or less WeChat Groups and 31 percent of riders have three to five WeChat Groups. Different from drivers' WeChat groups that are more egalitarian and consist of mostly drivers, WeChat Groups for riders are more likely to be deployed for labor monitoring and management. Particularly for platform-hired riders and subcontracted riders, their supervisors or team leaders are usually present in the WeChat Groups and use the Groups as the platform to make instantaneous announcement. The messages circulated in those announcement groups are predominantly issued by managers or supervisors which allow very limited interactions among group members. Though the potential for riders to organize and mobilize themselves in WeChat Groups are substantially restricted when their managers are present, the instantaneous communications afforded by WeChat Groups offer them certain buffer and resources to handle high-paced and sometimes unpredictable delivery work. For instance, riders use WeChat Groups to find second-hand market for e-bikes, batteries, and other accessories needed for working as riders. They also rely on WeChat groups to find back-up shifts if they encounter accidents or e-bikes break down. Some riders also mentioned that they warn each other in the virtual group about neighborhoods with rampant thieves of e-bike batteries. Both drivers and riders use groups to help the communities cope with influential factors external to the platform. It is through these online communities of practices that platform workers in China participate and coproduce vernacular knowledge (Burgess, 2006) about the platformized work environment, for the purpose of subsistence, everyday resistance, as well as counteractions.

5.6 Contestations

Our survey showed that, except for their opposite attitudes toward illegal vehicles and platform commissions, taxi drivers and private car drivers on ride-hailing platforms both recognize fluctuating platform policies and rewards, local regulations and policies, and out-of-pocket expenses as top influential factors on their income. The converged understanding of who determines their income among competing groups of drivers suggests a two-headed, or multi-headed governance mechanism for platform workers is taking shape. Local regulations and policies play critical roles in determining drivers' livelihood because, as already discussed, local transportation authorities across the nation have passed local regulations that include varied criteria for the platform companies, vehicles, and drivers. By the end of 2017, more than 210 municipal governments, including Beijing and Shenzhen transportation departments, have passed localized bylaws to regulate the ride-hailing market (China's National Information Center and internet Society of China Sharing Economy Committee 2018). Local authorities are also responsible for regulation and policy implementations. Beijing mandates a 'double-local' rule— that is, only drivers with Beijing *hukou* operating vehicles with Beijing license plates are eligible to work legally on the platforms (Beijing Transportation Committee 2016). Our informants estimated that more than 80 percent of drivers are breaking Beijing municipal rules. Shenzhen, a migrant city that has in place many migrant-friendly social policies, required one-year proof of residence in the city from an applicant driver since 2016. But in the spring of 2018, it updated its rule so that only electric cars can be used to apply for the operational license for ride-hailing service (Shenzhen Transportation Committee, 2016, 2018). Local policies that set various requirements for vehicles and drivers indeed embody the

needs of local authorities, whether for managing population mobility, stimulating new industries, or a variety of other reasons. But the relationship between drivers and platforms is left mostly undefined across the nation and, as a result, platforms have little legally mandated responsibility for checking drivers' eligibility or protecting drivers' work conditions, social security, and long-term welfare, let alone signing labor contracts with full-time drivers.

Policy orientation of this kind is more likely to make drivers' life more precarious than pressure platform companies into compliance. As of June 2018, DiDi had legal operational licenses in only 51 cities out of the more than 400 cities where it operates (Yue, 2018). In 2017, it was also reported to have participated in recruiting unqualified drivers to work on the platform in other cities (Yangtze Evening Paper, 2017). This grey legal position and brazen evasion of regulations have allowed the company to grow rapidly. DiDi accrues more and more value by exploiting the informality of workers and the regulatory loopholes to pursue market shares and solidify data collection infrastructures (Chen & Qiu, 2019). As the definitive feature of platform capitalism (Srnicek, 2016), data underlies the operation of DiDi's platform and its expansion into a wide range of urban transport from taxi service to diverse private car services to most recently, bike-sharing and smart traffic systems. In 2017, DiDi handles 20 to 25 million ride requests daily that are carried out by four million drivers and as a result, DiDi processes 2,000 terabytes of data (Sawers, 2017). DiDi establishes partnerships with more than 50 leading taxi companies in Tier-1 and Tier-2 Chinese cities. More importantly, it aims to datafy urban transport eco-system (with taxis being part of it) and put itself at the center of the converging networks of information, traffic, and transaction for all kinds of vehicles and transport services under its platform umbrella. Data and inherited data capture infrastructure propel DiDi to shape the digital conditions for the transport infrastructure. However, the value is appropriated without paying any price to build or maintain existing urban transport infrastructures.

Ride-hailing platform companies' obscure legal status also puts a majority of drivers in a collectively vulnerable position because of illegitimacy *de jure.* They suffer the brunt of market volatility, as well as the penalties inflicted by suddenly tightened local regulations. For example, in spring and summer 2018, two tragic cases of rape-and-murder of female passengers by DiDi Hitch drivers were exposed and attracted tremendous public attention (see S. Dai, 2018a; Lo, 2018).[15] Concerning local authorities tightened regulations of the platforms and the ride-hailing market and also launched a series of crackdown of illegal platform drivers in the same manner as they used to repress gypsy cabs in pre-DiDi days. Varying local regulatory barriers for platform drivers represents a continuation of "the multi-headed, multi-tiered management" that characterizes the taxi industries in China (Chen, 2017, p.7). For example, Beijing issued inclement fines and penalties for illegal drivers (up to ¥ 30,000 of fines and temporal seizure of driver's license) (innoinsights, 2018). In Shenzhen, authorities ordered DiDi to improve its safety by the end of September, otherwise, the company's operational license would be revoked. Under the pressure from the members of the public and the regulators, platform companies also tightened their measures for security. For example, it suspended the Hitch service for a week and later on tightened the eligibility for drivers who can access orders in late-night (11pm-5am). New criteria included: 1) background check, 2) consistency between vehicle and driver registrations, 3) drivers on the platform for more than 6 months, 4) over 1000 orders fulfillment, 5) no safety complaint filed in the past year, and 6) less than 1 percent complaint rate.[16] Many drivers were suspended from offering ride service during late-night time. Our survey on drivers who worked more than a year in the industry

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15 It's note-worthy that complaints filed by passengers of sexual harassment and assaults by drivers long predate the exposures of tragic murders in 2018.
16 Information from a driver's screenshot.

showed that there is a sharp decline in the volume of ride-requests and a significant increase in working hours and stress level as compared to one year before (Figure 6) . Our driver informants also mentioned that, in the midst of "sensitive" climate, appeals to correct erroneous decisions made by the platform become "impossible."

While it is too early to predict if this new round of scandal-prompted regulations by the local authorities and platform companies are effective or sustainable or not,[17] the investigations into these scandals nonetheless set the stage for authorities to intervene in data-related regulations for the ride-hailing market. In the aftermath of the second murder, the national ministry of transport announced the establishment of a national supervision platform and required all ride-hailing companies including DiDi to connect their operational information and data to it and to ensure the quality and accuracy of the information (Ma, 2018). Shenzhen municipal government also required the platform company to fill its report with the local supervision platform, which showed that "around 5,000 drivers and nearly 2,000 vehicles do not possess cab-driving certificates or vehicle business permits from authorities" (Shenzhen government, 2018). Guangdong Provincial Transport Department—which oversees Shenzhen municipal transport department—went further to require data transparency from the company but this was rejected by DiDi (*Shenzhen Daily*, 2018). Similar mandates for data sharing were also made by other municipal authorities in cities like Shanghai and Chongqing—two other directly governed cities, along with Beijing and Tianjin. However, attempts made by local governments to seek data-sharing about illicit drivers prior to the murders encountered non-cooperation or slack attitudes from the local branches of the platform company (Xu, 2018).

Figure 6: Changes in work conditions in the past year

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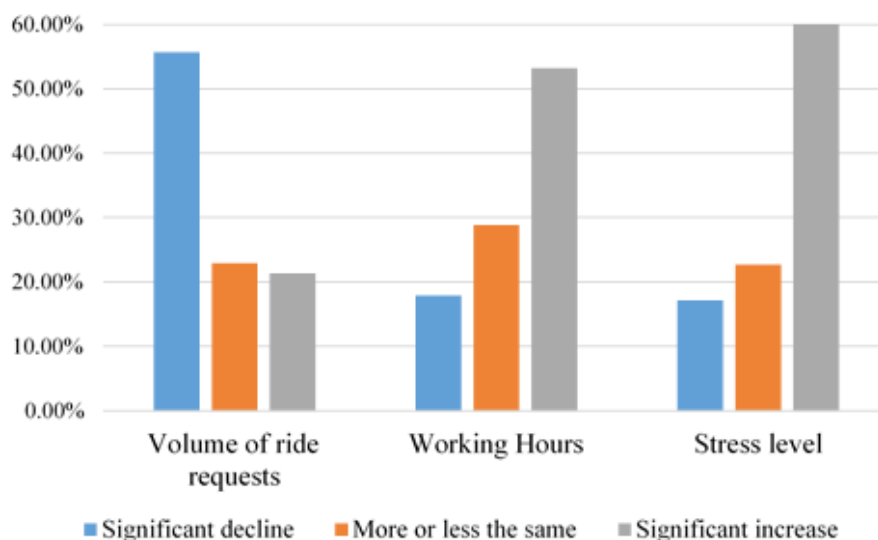
17 The swing of the regulatory pendulum in the traditional taxi industry from acquiescence to sudden measures to crackdown illegal drivers is well documented.

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Unpredictable swing of local regulations and the unilateral power the platform has in determining drivers' access to the online market, along with a deteriorating work environment, further aggravated the vulnerability of informally employed drivers.

> It's not easy to be a driver…as a full-time driver, [my life] is difficult. I feel anxiety all day long. Without social security, I run high risks driving around [transporting people], more than ten hours a day every day. In addition, I constantly worry about customer complaints, and being disqualified and forced out of the business (Driver E)

Local factors are not restricted to local regulations directly related to platforms. Historical absence of sufficient institutional or infrastructural support for Chinese informal workers, as reflected in Driver E's words, also leave precarious food-delivery couriers to their own when the socio-political tides are against them. In November 2017, a fire in an industrial neighborhood in Beijing where migrant workers concentrate took 19 lives, of whom 17 were migrant workers. The fire exposed crammed living conditions of migrant workers that often contain seriously potential safety hazards. The municipal authorities started a 40-day long campaign of citywide "safety check." The safety check quickly led to a large scale seal-up unsafe flats and buildings and a massive eviction of migrant workers in Beijing (Zhuang & Cai, 2017), which forced migrant workers to move to more expensive parts of the city or leave the city altogether. Many riders in the food-delivery industry quickly found a dramatic reduction in affordable charging points for their electric bikes because prior to the safety check, riders normally charged their e-bikes at home but their past neighborhoods where affordable housings concentrated were either demolished or sealed up.

Not all local factors impact platform workers negatively. We found budding positive changes at the local levels, too. For example, Shanghai trade union in the Putuo District helped set up the first labor union for riders in Shanghai which reached more than 400 membership in 2017 (Qian, 2018). There is also grassroot efforts to establish an unofficial union for drivers in Shenzhen. While awaiting the official sanction from the municipal branch of the All-China Federation of Trade Unions (ACFTU), the grassroots union organizer explained to us the motif and purpose of the union:

> After years of experience and conversations with platform drivers, we were frustrated by the industry as such. The overall education level among drivers is not that high, so we wanted to organize ourselves to prevent new-comers from being swindled, help drivers adjust their mental attitude, reduce the frictions between passengers and drivers, as well as between drivers and platforms…(Driver C in Shenzhen, also a grassroots union organizer)

Though there is no definitive sign in either Beijing or Shenzhen municipal authorities or branches of ACFTU to establish platform workers unions like that for riders in Shanghai, efforts from grassroots activists and non-state, local players point to a potential direction for further regulations of work-on-demand platform economy.

6. Discussion

Current legal framework and policies of on-demand service platforms in China fall short in capturing the praxis of platform economy comprehensively, especially the varied practices by workers, regulators, and other parties at the local level. Regulations and policies align with the technocratic discourse of development and lean toward the governments and successful enterprises at the expense of workers'

stability and welfare. Despite the large and growing number of participant workers and the rhetoric of development, there is little evidence so far that the policy agenda for Chinese digital economies in general is interested in addressing the possible impact of the platformization on the nature and structure of work in the future. But the magnitude of the transformation of work force because of platform technologies should catch policy-makers' attentions. Since the dominance of informality is likely to persist, some of the experiences and lessons of encountering platformization of work may have wider applicability for other developing societies.

First, regulations of digital platforms in general terms are ambiguous and inconsistent in China. As far as online media content is concerned, China's *Cyber Security Law* and a series of administrative rules issued by Cyberspace Administration of China (CAC) in the wake of its passage have allocated the responsibility to the platform companies for monitoring online content in order to "protect national security and public interests." Digital content platforms may not necessarily be held accountable in legal terms for information on their sites that is deemed as harmful to the national security and public interests, but the administrative rules impose self-censorship on internet platforms for news management and online expressions. However, in relevant regulations and policies, the responsibilities and liabilities of commercial platforms, which include e-commerce platforms as well as on-demand service platforms, are undefined or ambiguous. For example, a new comprehensive *E-Commerce Law* was passed in August 2018 and will take effect on January 1st, 2019. In one of the few places where the law stipulated the liabilities of the platforms for participant third parties (consumers and merchants), the Article 38 of the *E-Commerce Law* provided that "if a Platform Operator [platform company] fails to examine the qualifications of its Operators on Platform [merchants] or fails to protect its consumers' safety in respect of goods or services that may affect a consumers' health, the Platform Operator shall take the *corresponding* liability to consumers" (*italic* for emphasis).

While other clauses stipulated e-commerce platforms' "joint liabilities" for "infringing the legitimate rights and interests of consumers" when personal safety or property safety is not properly protected, the scope, nature, and degree of the corresponding liability for consumption of health-related goods is left deliberately undefined. Similarly, regulations on on-demand service platforms' liabilities for workers' employment contracts, safety, and work conditions are not clearly defined. The divergence in the regulations of media content platforms and commercial platforms reflects a fundamental incoherent attitude held by the policy-makers toward platforms that may be used to political actions (e.g. the formation of public sphere on the social media) and the platforms for economic transactions. Though institutional willingness of the central government to standardize and regulate the rapidly growing market is evident in the passage of *E-Commerce Law* and recently tightened regulations of the ride-hailing platforms, continued divergence poses legal challenges for future legislatures about digital platforms in general.

Secondly and more directly related to on-demand service platforms, the platformization of work in China does not just involve digital platforms and algorithms. As already discussed, Chinese platform workers face algorithmic labor control from platform companies no differently from their counterparts elsewhere in the world (See other studies such as, Lehdonvirta, 2018; Rosenblat & Stark, 2016). The platform economy in China, however, is deeply entrenched in the preexisting informal labor market and the momentum of what labor scholar Ching Kwan Lee has called "decentralized legal authoritarianism" (Lee, 2007). Studying factory workers unrest, Lee (2007) argued that the central government institutionalized a regime to contain workers' collective actions at the local level, which she called "decentralized legal authoritarianism." Varying localized regulations, along with pre-existing informal

labor market and constantly changing platform policies and reward schemes, tend to further labor market segmentations and make participant workers' life more precarious. The question of employee status is prominent in the law suits and legal debate around on-demand worker's rights in the platform economy (Cherry, 2015). Where the informal economy is the norm, it is not incidental that the rise of middleman is accompanying the platform economy in China. All these complicate the legal status of platform companies and the legal relations between participant workers, the middleman labor agencies, and the platform companies. There ought to be a regulatory framework that systematically addresses multiple participant parties and specifies the correspondent responsibilities and liabilities for different parties involved, or even, as some scholars envision (Prassl & Risak, 2015).

Thirdly, whether and to which extent the business model of the leading platform company can apply across sectors and industries needs careful analysis and serious qualifications. We already presented nuanced differences between ride-hailing market and online takeaway market and the respective workers in the sectors. Scholars studying platform workers in the U.S. have made similar cautions against overgeneralizing the impact of technologies and the business model across sectors (Ticona, Mateescu, & Rosenblat, 2018). How platform technologies change the economy is implicated in and mutually constitutive of the contexts and the unfolding digital eco-system within that contexts. Along this line, it is crucial to create space for workers, local non-governmental organizations or unions to grow into a viable channel for workers' experiences. It is significant to establish such a channel when the regulatory landscape is occupied by big government and big capital by allowing new representatives onto the table to not only counter value accruement of data capitalism—massive data capture without recompense either to workers or users or to the local publics for infrastructural construction and maintenance. Having workers' voices feeding into the policy-making process is also to create a more efficient feedback loop about the state of play of the industry. In so doing, regulations may turn from being reactive, especially to tragedy or scandals, to being preemptive. This possible direction of agile policy-making by incorporating workers' voices ought to complement supranational standards and national regulations of platform economies.

7. Concluding policy recommendations

Based on our study, we make the following policy suggestions:

1. Policy-makers need to develop a systematic and consistent regulatory framework that distinguishes the legal parameters for the middleman sector and the platform companies, by specifying their responsibilities and liabilities for platform workers such as minimum wage, access to social security, work injury insurance, and viable communication channels to redress their grievance. Social security programs needs to be reformed to develop portable (from one occupation to another) and accumulative (from multiple platforms, regardless full-time or part-time status) schemes.

2. Labor Contract Law should be extended to include multilateral contractual relationship involving workers, third-party intermediary companies and the platforms.

3. At the national level, a joint legal and regulatory body needs be in place to oversee and inspect platform companies for its operations in handling data and deploying algorithms to leverage economic opportunities for participant workers. The multi-stakeholder audit panel should

maintain an inclusive communication and reporting mechanism for local operations of the digital platforms.

4. Policy makers also need make a comprehensive data benefits distribution law to redistribute the value accrued from data collections and datafication by the platform companies to the public welfare departments such as social security bureaus and infrastructure offices. These public welfare departments should be obligated to invest this part of economic value to expand portable and accumulative social security schemes and local public infrastructure construction.

5. Given the local discrepancies in regulations, there ought to be more efforts to help establish platform worker organization at the local level. This can be achieved via local branches of All China Trade Union Federation (ACTUF) or grassroots workers NGOs. In the meantime, since ACTUF is the only official trade union in the country, it needs to reconsider its service scope in the face of a rapidly growing platform labor force. At both national and local levels, the ACTUF should play a more active role in working with other governmental branches (e.g. Taxation Bureau and Human Resources and Social Security Bureau) as well as grassroots worker-communities to urge a fair value redistribution among workers, platform companies, and the public.

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