Science & Society, Vol. 87, No. 4, October 2023, 502–530

Control of the Platform Reserve Army: The Roles of the State and Capital in China's Platform Economy

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ABSTRACT: The rise of digital platforms has formed a platform reserve army. The platform reserve army is the stagnant reserve army of contemporary digital capitalism, which brings challenges to labor control. Using data collected from an original survey of over 600 ride-hailing drivers in two Chinese cities, the roles of the state and capital, as well as their interactions in shaping capital's control over the platform reserve army in China, are clarified. Against the backdrop of the state's market-formalization policy, ride-hailing platforms have aligned with third-party rental companies that provide qualified vehicles. The platform-rental company alliance has effectively trapped a significant share of drivers to maintain an adequate and stable labor supply. Given their capacity to manipulate and restructure the reserve army, platforms have capitalized on the state's regulations to strengthen their control over labor.

KEYWORDS: platform reserve army; digital platforms; labor control; market formalization; China

1. Introduction

IN VOLUME I of *Capital*, Marx proposed the theory of the reserve army of labor. In Marx's view, the existence of a reserve army — referred to as the "relative surplus population" that can be potentially drawn on whenever needed — is a prerequisite for exploitation and capital accumulation; it is also continuously reproduced by capitalism through technical change, cyclical recessions, primitive

accumulation, and imperialist expansion. The reserve army of labor comprises three parts: the floating, the latent, and the stagnant. The floating reserve army is the workers who are cyclically hired and fired by capital; these workers "are sometimes repelled, sometimes attracted again in greater masses" (Marx, 1976, 794). The latent reserve army primarily refers to the surplus population in rural areas because "capitalist production takes possession of agriculture" (*ibid.*, 795). The stagnant reserve army is represented by the workers in the "modern domestic industry," which coexisted with capitalist manufacture and factories in the early stage of the Industrial Revolution era. These workers lived on jobs outsourced by capital, with raw materials usually provided by capital. The stagnant reserve army "forms a part of the active labor army, but with extremely irregular employment" (*ibid.*, 796). Overtime work and poverty were widespread among these workers because of the irregularity of outsourcing jobs. As Marx put it, "(the capitalist) sets himself systematically to work to form an industrial reserve force that shall be ready at a moment's notice; during one part of the year he decimates this force by the most inhuman toil, during the other part he lets it starve for lack of work" (*ibid.*, 608).

The stagnant reserve army is of particular interest for comprehending irregular labor or gig workers on digital platforms today. The number of these workers has been exploding as unemployment and under-employment have deepened globally in traditional sectors. In this paper, we argue that platform labor exists in the same form as the stagnant reserve army. Like the workers in the "modern domestic industry," gig workers receive orders from digital platforms on an irregular basis, and they have no formal employment relationship with platforms. In this perspective, we call platform labor "the platform reserve army," as it is the stagnant reserve army of contemporary digital capitalism, working for digital platforms that utilize advanced information technologies to organize production and exchange and extract surplus value. We highlight the "reserve army" in the above concept because platform companies do not purchase the labor power of platform workers from the reserve army in a regular way; instead, platforms keep them at arm's length by dispatching tasks without offering regular employment. Workers are not required to appear in a fixed workplace at a particular time, but rather have relative autonomy on time arrangement. They can frequently log on and off platforms or shift working between platforms. Platform companies

recruit workers when market demand rises and dismiss them when it falls without taking responsibility for labor reproduction.

Nevertheless, the cost of the flexibility is easily overlooked. This flexibility, while contributing to the functioning of on-demand production, poses a serious threat to platform profitability when the free entrance and exit of workers challenge the adequate and stable supply of service. Faced with the high turnover rate, platforms often have to offer bonuses — not always cheap and profitable — to mobilize the reserve army to meet market demand. Hence, it is crucial for platforms to control the labor force, shape their decisions on labor time, and seize their autonomy on flexibility for the need of capital.

Our study belongs to a booming literature on labor control in the platform economy. While a vast literature has analyzed the technological and organizational aspects of the control, there is a lack of analysis on the state's role and its interaction with platform capital. Thus, we take the ride-hailing platforms in China as a case to explore the roles of the state and capital in shaping the control over the platform reserve army. Based on an original survey of over 600 ride-hailing drivers conducted in two Chinese cities, Nanjing and Beijing, our study finds interactions between the state's regulations and the capital's responses to the regulations in shaping the mode of labor control on China's ride-hailing platforms. On July 28, 2016, the State Council of China approved and released "the world's first nationwide online ride-hailing regulations," lifting the online ride-hailing industry out of the grey area (Clover and Ma, 2016; Meng and Luo, 2016). To be granted legal status in the market, both ride-hailing drivers and vehicles should obtain special ride-hailing licenses. Municipal governments across the country have since stipulated nuanced regulations for what qualifications or standards these licenses entail (Ma and Li, 2018). In response to regulations, we find that the platforms have aligned with third-party car rental companies to provide qualified vehicles to drivers who are otherwise constrained from working with an eligible car. Yet, a significant share of drivers feels trapped in the industry by the platform-rental company alliance. To pay off car loans or rents, drivers bound by rental or rent-to-own[1] Agreements have

1 As explained below, "rent-to-own" is a mortgage loan arrangement.

ended up working extra-long hours and bearing low hourly income, indicating that the platform has strengthened its control over labor.

This study on the platform reserve army contributes to the Marxian literature in the following aspects. First, we follow the tradition of labor process research in the Marxian political economy but provide a nuanced understanding of labor control in digital platforms. We emphasize that platform capital's control of the labor process necessitates its control of labor time for the platform, not despite temporal flexibility provided to workers, but precisely because of it. Therefore, revealing the mechanism platforms use to control labor, particularly depriving workers of this flexibility, becomes crucial. Second, in his analysis of the decline of domestic labor, Marx also analyzed the role of the state. As Marx argued in *Capital*, the extension of the Factory Acts set limits to the use of child labor that the competitiveness of the "modern domestic industry" relied on; thus, the state's regulation promoted the mechanization of factory production and resulted in the decline of domestic labor.[2] Our study also highlights the role of the state in better comprehending the evolution of capital-labor relations in the platform economy, which reveals the contemporary relevance of Marxian approaches. The case of the ride-hailing industry in China provides a valuable opportunity to observe how the state's regulations can shape capital-labor relations in a rapidly evolving new form of economy.[3] Nevertheless, in contrast to Marx's analysis of the "modern domestic industry," our analysis finds that the interaction of the state and capital has not blocked the development of the new mode of production but rather enhanced its vitality because platform capital, as the dominant player in evolving digital economy, is capable of capitalizing on the state's regulations to manipulate and restructure the platform reserve army and strengthen its control over labor.

2 "[A]s regards labor in the so-called domestic industries and the intermediate forms between them and manufacture, as soon as limits are set to the working day and to the employment of children, those industries go to the wall. Unlimited exploitation of cheap labor-power is the sole foundation of their ability to compete" (Marx, 1976, 605).

3 Notably, the rise of the platform economy has complicated the meanings of capital and labor because platform companies and gig workers are not in a formal employment relationship, and gig workers usually prepare means of production by themselves. Nevertheless, platform companies and gig workers exist in a special capitalist relation of production, the core of which is the production and extraction of surplus value. Thus, this paper views the relationship between platform companies and gig workers as a capital-labor relation.

2. *Policy Background and Literature Review*

2.1 *Market Formalization in China's Platform Economy*

China's platform economy has witnessed an enormous growth in recent years. Top digital companies in China, such as Alibaba, Tencent, Didi Chuxing, and Meituan have achieved massive valuations in the financial market. The rapid expansion of the platform economy is largely associated with China's regulatory environment, which has experienced a transition from a stage of loose regulations (2016–2019) to a stage of strict regulations (2020 to present). In 2016, the Chinese government launched the "tolerant and prudent" policy. "Prudent" does not mean that the government is cautious or skeptical about developing new industries; instead, it reflects its determination to restrict itself from intervening and leave the rest to the market. In so doing, this principle has granted a loose regulatory environment for the emerging platform sector. Starting in 2020, China's digital platforms have dramatically expanded because they have the advantage of reducing face-to-face interactions in the background of COVID-19. Facing the chaotic expansion of the new business model, the Chinese government began to strengthen the regulations on platform monopoly, personal data security, and financial risks associated with the ever-growing platform companies. At the end of 2021, the Chinese government put forward that the state shall "curb the disorderly expansion of capital" and "set up a 'traffic light' for capital" (Zhao, 2021).[4] Platform capital is the main target of these new regulatory policies.

The transition in the regulatory policy has indicated that the rise of the platform economy has been deeply embedded in the political structure of the Chinese state. The inconsistency between the two stages has revealed that the state pursues multiple objectives, and, from the state's perspective, the importance of each objective varies over time, depending on the context that the state is facing. These objectives include a global leadership position in advanced technologies, new job creators against economic slowdown, gains in technical progress and efficiency, a stable market order, and social stability, all of which are associated with long-term goals such as economic development and global competence, rather than the interest of a

4 It is noteworthy that "capital" is being used in a casual sense, not a theoretical one.

particular social class. When the expansion of platform capitals deviates from these goals, the state will use its regulatory power to reorient its path, as has happened since 2021. Nevertheless, it is crucial to note that the Chinese state is not a separate entity, above and apart from the social classes. While the state embeds the platform economy in its political structure, it must adopt policies to support the new economic model and incentivize capitals as key players in the platform economy. Hence, intense regulations and supportive incentives exist in the state's policies; two different regulatory attitudes coexisted, which are more apparent when one compares the central government with local governments. Generally, the central government tends to focus on global competence and job creation, while the local governments tend to focus on local economic and social stability. Accordingly, the central government exhibits a more supportive attitude towards the platform economy; local governments, by contrast, are more cautious in promoting the sector.

Specifically, the "tolerant and prudent" policy evidences the central government's supportive attitude. This policy was formulated in the post-2015 supply-side structural reform, which replaced the massive fiscal stimulus and thus imposed pressures on employment. It was also a time when China's private sector investment struggled with stagnant growth, putting further pressure on employment. Under these circumstances, the ride-hailing sector was given the green light and promoted on the national development agenda as a champion of job creation (Chen, 2020; Jiang, 2016). Indeed, the ride-hailing sector has a number of advantages in job generation. For instance, platform jobs present a combination of flexibility and low technical barriers to entry. Private car ownership in China has increased rapidly in recent years, making the online ride-hailing industry a convenient solution for many of the unemployed and underemployed. Moreover, as a nascent industry, China's ride-hailing sector has attracted intense financial investment worldwide, predicting long-lasting job opportunities. The "tolerant and prudent" regulatory approach signals that, amid economic downturns, the central government embraces the platform economy by creating a loose regulatory environment.

Nevertheless, policymakers have also been cautious, as evidenced by government restrictions on the platform economy. Even in the stage of loose regulations between 2016 and 2019, China did not adopt a laissez-faire policy. The restrictions were demonstrated by the

municipal governments' regulations on local ride-hailing platforms since this newly emerging industry had imposed immediate challenges to the governance of urban space and local markets. In contrast to the Internet economy at the beginning of the 21st century, the platform economy is not entirely virtual; its development demands two dimensions of spaces to grow in the physical world. First, the development of the platform economy needs infrastructure space. Because the provisioning of ride-hailing services uses physical resources (such as roads and parking facilities), excessive expansion of the industry can aggravate traffic congestion and air pollution in metropolitan areas (Hawkins, 2019; Erhardt et al., 2019; Zhen, 2017; Yu, 2016).

Moreover, ride-hailing services can divert passengers from public transportation to private vehicles; thus, public transport as a common pool resource would be under-utilized. Second, the development of a platform economy needs market space. The services provided by online ride-hailing drivers and traditional taxi drivers are highly homogeneous, but the former is often less costly to passengers for various reasons. For instance, ride-hailing platforms usually provide heavy subsidies at the early stage of development to entice passengers (as well as drivers); also, part-time ride-hailing drivers are more likely to accept lower price rates. More importantly, because the platforms provide no employment-related benefits to drivers, they enjoy a labor cost advantage and, hence, a price advantage over traditional taxi companies. As a result, the development of ride-hailing platforms in China poses a serious threat to the traditional taxi industry. There was rising discontent among traditional taxi companies and drivers: the fast-growing industry provoked taxi driver strikes and protests across China (Liu, 2015; Chen, 2018; Gong et al., 2017).

Amid both supportive and cautious regulatory attitudes, platform regulations focusing on market formalization have taken shape in China. The municipal governments have demanded that emerging industries obey existing laws and regulations intended to regulate market order and avoid excessive competition. In the ride-hailing industry, online platforms must follow regulations that largely mimic those governing the traditional taxi industry. These regulations focus mainly on setting market entry barriers for drivers and vehicles, requiring platforms and producers on the platform to be qualified, registered, and monitored. In so doing, municipal governments attempt to balance the platform economy and the traditional economy. Despite the

transition from loose to strict regulations, both stages highlight market formalization and endeavor to reserve necessary market spaces for the traditional economy. This is the key to understanding policymaking in the realm of the platform economy.

2.2 Precarious Work and Labor Control

Platforms act as intermediaries that connect service/product providers and customers, furnishing platform companies with an easy escape from employers' obligations (including, but not limited to, minimum wage, social insurance, and paid sick leave) and allowing them to outsource and pursue lean production in a heightened form (Zwick, 2018; Srnicek, 2017). During the last several years, there has been an explosion of discussion on the precarious nature of platform jobs (Edelman and Geradin, 2016; Prassl and Risak, 2016). Also increasing is the literature that explores how the rise of the platform economy has aggravated labor precarity in China (Chen, *et al.*, 2020; Chen, 2018; Sun, 2019).[5]

In addition to labor precarity, another important topic is labor control on the platform. Studies have found that advanced information technologies enable platforms to implement real-time and automatic supervision. With these technologies, customer feedback and ranking and rating systems are widely used as management strategies (Gandini, 2018). Although platform workers may be free to decide when to work and for how long, under sophisticated algorithmic management, they cannot decide how their work should be done once they log in (Rosenblat and Stark, 2016). In China's context, Chen and Sun (2020) find that China's food delivery platforms have built up a real-time tracking system, which enables customers to monitor the location of the couriers and the progress of the orders in real time, forcing couriers to meet the customers' expectations. In addition, gamification or building work as a game for couriers has also been used as an important strategy for food delivery platforms (Sun, 2019). The gamified system is not only an instrument for algorithmic management but also an important strategy to manipulate the platforms'

5 It is noteworthy that platform and precarity are preconditioning and reinforcing each other. The rise of the platform economy has gained strong support from the vast existence of informal labor; meanwhile, platforms have increasingly transformed the labor market landscape, pushing more formal labor toward informal and precarious labor.

flexible labor supply "in an agile and cost-effective way," enabling the platforms to better meet shareholders' expectations (van Doorn and Chen, 2021). Organizational forms are one of the focuses in the studies on China's food delivery platforms, which have designed a system of delivery stations to recruit and organize couriers that provide efficient and reliable services to restaurants willing to pay a premium (Liu and Friedman, 2021).

Regarding labor control in China's ride-hailing platforms, Wu *et al.* (2019) found that Uber in China used an incentive pay system, a customer evaluation system, and flexible work arrangements to attract workers and control the labor process. Ride-hailing drivers are more responsive to incentives when this is their only job (Wu *et al.*, 2019; Qi *et al.*, 2019). Qi and Li (2020) highlight that the ride-hailing platform creates subordination of labor to the platform through its control of market access and data as well as a system that stratifies workers into different groups.

Nevertheless, the current literature has ignored a crucial question, *i.e.*, the relationship between the precarious nature of platform jobs and the specific forms of labor control on the platform. The current literature tends to believe that they are two separate aspects of platform jobs or that the algorithm-based control has constituted or aggravated the workplace precarity of workers. In contrast to the current literature, we call for a more systematic view to understand the relationship between labor precarity and labor control. The precarious nature of platform jobs enables the platform to mobilize labor flexibly and to avoid the costs arising from employers' obligations; however, the flexibility is not always favorable to the platform, for the following reasons. First, the mobilization of flexible labor supply is costly. To attract and retain customers, platforms must make workers available at the right time and the right spot to provide services. It is for the platform to build up a customer base and a barrier to entry when it enters a new market. When there is intense competition, platforms will utilize incentives such as bonuses to enroll new workers and make current workers work longer, which may significantly damage the platform's profitability. Second, there are uncontrollable factors for the platform that may increase costs and uncertainties. Precarious workers tend to stabilize their livelihoods by simultaneously participating in multiple jobs; consequently, when the platform hopes to mobilize

more workers, it has to compete with other job providers, including other platforms and traditional employers. The floating nature of precarious workers means that macroeconomic, sectoral, and institutional changes (uncontrollable for platforms) may affect their options and behaviors, making it more difficult for the platform to incentivize them. Third, the high turnover rate of workers may affect the quality of services they provide. Platforms hope to ensure that the quality of services is above the bottom line, which is crucial to satisfying and retaining customers and maintaining the network effects. Precarious workers with a higher turnover rate are more likely to increase their short-term income by sacrificing the quality of their services. Due to these reasons, the labor control on the platform is not solely determined by the available technologies; instead, it is a response to the adverse effects on the extraction of surplus value that appears hand in hand with labor precarity. The rise of car rental companies in China's ride-hailing industry, which is the focus of this paper, is a typical example of such a response. This institution plays a crucial role in hiring and training drivers, promoting work motivation, and relieving drivers' negative emotions (Zhao, 2021). It also effectively extends the work hours and ensures a stable labor supply. Qi *et al.* (2019) find that the rise of car rental companies is associated with longer working hours for drivers who work with a rental car. Li (2022) further finds that Didi has created a fresh vehicle leasing market and leveraged debt to secure a dependable and disposable labor force.

Despite the studies mentioned above, there has rarely been a thorough investigation of the role of the regulatory environment in the rise of these special forms of labor organization. Yet, the platform economy as a novel economic form is experiencing constant transformation in multiple dimensions, including labor control and organization. Such transformation has constantly shaped, and been shaped by, the regulatory environment. An analysis of labor control and, more broadly, social relations in the platform economy, therefore, should consider the impacts of regulations. China's ride-hailing industry has witnessed the rise of car rental companies and the subsequent formation of the particular mode of labor control. An important question arises: whether the platforms intentionally initiated these changes or they had no intention but had to cope with regulations? The answer to this question remains ambiguous. It should be emphasized here

that this question is not merely empirical. Its theoretical significance lies in understanding the complex interactions between regulations and capital-labor relations in the age of digital platformization. These interactions have increasingly challenged the conventional wisdom that more regulations or state participation is generally favorable to labor and unfavorable to capital and highlighted the active roles of capital in coping with regulations and shaping the landscape of social relations. In this respect, our study echoes Hassel and Sieker (2022), who find that universal welfare and liberal employment law paradoxically facilitate the rise of precarious work.

3. *About the Survey*

Our analysis is based on Didi Chuxing (Didi hereafter), which has captured 80% of the Chinese online ride-hailing market since it acquired Uber's China operations in 2016.[6] Didi Express is the core service of Didi. From 2018 to 2020, we conducted multiple rounds of questionnaire surveys on more than 600 Didi Express drivers. To find drivers to interview, our team randomly selected a route and hailed vehicles through the Didi App between 9 a.m. and 5 p.m. Prior to the survey, each respondent was informed that the survey was for research purposes only and anonymity was guaranteed; consent was obtained from each respondent. The questionnaire sought information on drivers' demographic details, social and economic status, driver's work mode (*i.e.*, how drivers acquired their vehicles), and work conditions (*e.g.*, work hours and work schedule).

In addition to questionnaires, we conducted deep interviews with more than 60 drivers, each lasting 30 minutes to one hour. This mixed method allows us to conduct both quantitative and qualitative analyses. Specifically, the 2018 round of surveys was conducted in Nanjing in July 2018 with about 160 respondents; the 2019 round was conducted, respectively, in Nanjing in June 2019 with about 250 respondents and in Beijing in July 2019 with about 230 respondents. In July 2020,

6 From July 2021 to January 2023, the Chinese government initiated an investigation of Didi and banned the registration of new users for cybersecurity and national security risks. This investigation, which happened after our surveys, is a separate issue. Nevertheless, the penalty only slightly reduced the market share of Didi, which might be evidence of the effectiveness of the platform's labor control.

amid COVID-19 and China's lockdown policy, we interviewed sixteen ride-hailing drivers in Beijing about how the pandemic had affected them. We also interviewed three municipal-level regulators, three staff members of a platform company, and about twenty traditional taxi drivers. Moreover, we visited eight car rental companies and one traditional taxi company.

Although there have been studies on ride-hailing drivers that employ the survey method, our approach has several advantages. First, our survey was conducted within three years, during which the municipal governments pushed for the gradual formalization of the industry. This allows us to observe a transition in the industry. In particular, two months after our first Nanjing survey in 2018, a female passenger in Yueqing, Zhejiang province, was murdered by a Didi driver, after which the enforcement of government regulations in Nanjing was significantly strengthened (Yang and Liu, 2018). Second, in addition to qualitative assessment, we also performed quantitative analysis. The relatively large sample size allows us to gauge how much a platform-car rental company alliance has impacted labor control. Third, instead of distributing questionnaires online, we surveyed face-to-face, which significantly increased response rates and allowed the interviewers to probe for more detailed and accurate information from the interviewees.

We chose Nanjing and Beijing because comparing these cities uncovered some interesting findings. On December 21, 2016, Beijing's municipal government issued its ride-hailing service regulations, stipulating that the development of ride-hailing services should be tailored to address concerns specific to Beijing, including traffic congestion, air pollution, and the under-utilization of the traditional taxi system (Beijing Municipal Commission of Transport, 2016). A parallel document was issued in Nanjing on January 19, 2017, which underlines that public security organs should assist relevant supervisory departments to "actively prevent and appropriately manage mass incidents in the taxi industry and maintain social stability" (Municipal Government of Nanjing, 2017). With these concerns in mind, the Beijing and Nanjing municipal governments set concrete qualification requirements for both ride-hailing drivers and vehicles. The regulations stipulated by the two cities share a common and essential element: a requirement for "dual licenses." Each prospective ride-hailing driver must apply for

a special "online ride-hailing driver license." Also, ride-hailing operations require a special "online ride-hailing vehicle license," indicating the vehicle's commercial status.

Despite similarities, marked differences distinguish the stringency of the two cities' regulation measures. These distinctions are primarily determined by differences in the policy objectives of the two municipal governments. Compared to Nanjing, Beijing imposes more stringent regulations on driver and vehicle qualifications. For example, in Nanjing, the prerequisite for applying for a ride-hailing driver's license is a local residence permit; in contrast, Beijing municipality requires a local *hukou* (permanent Beijing residency status), which is extremely difficult, if not impossible, for ordinary migrants to obtain (Liu and Shi, 2019). Also, although a local license plate is the main prerequisite for applying for a ride-hailing vehicle license in both cities, in practice, such a requirement is far more difficult to fulfill in Beijing. Clearly, the more stringent ride-hailing regulations unveiled in Beijing are intended to narrow the entry of vehicles and drivers (migrant workers, in particular) into the market. It reflects Beijing's pressing goal of limiting the population, minimizing congestion, and harnessing pollution.

Table 1 presents the demographic characteristics of the drivers in the survey. Our data show that a typical Didi driver was about 40 years old, male, married, and had 1.3 kids on average. In Nanjing, about 40% of drivers came from rural areas, while in Beijing, 67% had a rural origin. Overall, 61% of drivers were migrants; this figure was 78% in Beijing. The significant proportion of migrants highlights the importance of migrant experiences in the gig economy (van Doorn and Vijay, 2021). About 40% of drivers had a junior high education or less, 39% had a senior high school or secondary vocational education, and 20% had a college or tertiary vocational education. About 58% of the drivers in Nanjing had no access to the urban social security system (including pension, urban medical insurance, unemployment insurance, and housing provident fund); in the Beijing cohort, this figure was 63%. These characteristics suggest that Didi drivers face the living costs of raising a three- or four-member family. However, their economic capacity is constrained by their relatively low education level, migrant background, and the lack of formal support from the welfare state.

TABLE 1
Demographic Characteristics of Drivers

	Pooled	Nanjing, 2018	Nanjing, 2019	Beijing, 2019
Age (years)	40.11	37.65	41.35	40.47
Gender				
Female (%)	3.86	3.64	4.76	3.03
Male (%)	96.14	96.36	95.24	96.97
Marriage				
Single (%)	6.42	8.86	6.00	5.19
Married (%)	93.58	91.14	94.00	94.81
Region of origin				
Rural (%)	49.92	40.85	39.84	67.39
Urban (%)	50.08	59.15	60.16	32.61
Habitat				
Local (%)	39.38	43.90	52.59	21.74
Migrant (%)	60.62	56.10	47.41	78.26
Number of kids	1.31	1.21	1.31	1.36
Education level				
Junior high or lower (%)	40.45	28.29	35.92	53.85
Senior high or secondary vocational (%)	39.32	48.03	42.45	29.86
College or tertiary vocational (%)	20.23	23.68	21.63	16.29
Access to social security				
Uninsured (%)	58.04	65.58	48.40	63.48
Insured (%)	41.96	34.42	51.60	36.52

Source: Authors' survey data.

4. *Findings from the Survey*

4.1 *Capital's Response to Regulations: The Platform-Rental Company Nexus*

The regulatory hurdles laid out by the Nanjing and Beijing municipal governments are a tough call for Didi. The numbers of service providers and passengers on ride-hailing platforms are mutually dependent. When drivers are in short supply, a vicious cycle of losing passengers by losing drivers can occur. Moreover, despite Didi's dominant market share, competition in China's ride-hailing industry becomes increasingly intense as new rivals (including but not limited to Meituan, Shouqi, and Caocao) enter the market (Armstrong and

Wang, 2018). The platform has to achieve a balance between complying with regulations and retaining as many drivers as possible. Under such circumstances, Didi has built a platform-rental company nexus to accommodate the regulatory environment. As we shall explain shortly, in the regulatory environment of the ride-hailing economy in Nanjing, the arrangement of such a nexus ensures that the platform and its drivers abide by ride-hailing regulations, thus retaining drivers on the platform.

Nevertheless, it should be noted that the platform-rental company nexus is inadequate to solve the regulation dilemma in all places. For example, in Beijing, rental companies cannot provide licensed ride-hailing vehicles due to more stringent policies. Consequently, unlicensed vehicles, as well as drivers, still widely exist across China. Data from the Ministry of Transport show that licensed vehicles on the Didi platform only accounted for about 20% by May 2021 and 50% by May 2022 (see Figure 1). That is, the platform-rental company nexus is an attempt to adapt to the regulatory environment affordably; however, the platform will still dispatch orders to unlicensed drivers and vehicles whenever the adaptation is too costly. In that case, the platform aligns with the central government and wrestles with local

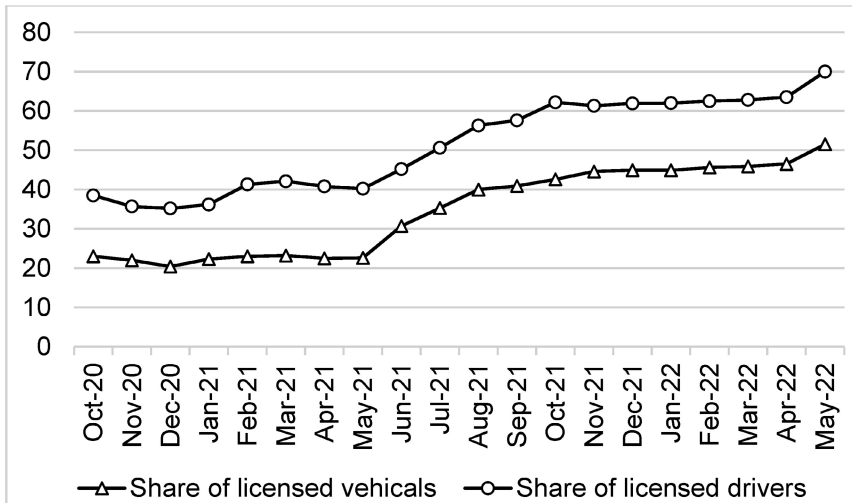

Figure 1. Shares of Licensed Vehicles and Drivers on the Didi Platform (%).
Source: Ministry of Transport, People's Republic of China.

governments by leveraging its bargaining power as a digital utility provider and job creator (Chen and Qiu, 2019).

Pressured by mounting discontent among the deeply-affected traditional taxi industry, Nanjing has, since April 2018, suspended the issuance of ride-hailing vehicle licenses, which was interpreted by the media as the "first Chinese city to ban new ride-hailing vehicles" (Hersey, 2018). The municipal government's stated aim was to alleviate the "pressure on urban transportation management caused by the rapid growth of the ride-hailing sector" (Municipal government of Nanjing, 2018). By then, Nanjing had granted about 40,000 ride-hailing vehicle licenses, four times the number of traditional taxi vehicles. Indeed, such restrictions on the issuance of vehicle licenses have been widely used by local governments across the country to preserve the market order and avoid excessive competition.

Notably, right before the suspension was announced, the rental companies in Nanjing massively invested in qualified vehicles and hoarded ride-hailing licenses. Based on Didi's driver performance ranking by revenue, one of the drivers we interviewed in Nanjing estimated that about 20,000 ride-hailing vehicles were in operation on the platform. This estimation implies that at least half of the licensed vehicles were not in operation, many of which were hoarded by rental companies. Didi promises to prioritize drivers with a rental car when dispatching ride-hailing orders. A driver with the experience of driving both his own car and a rental car told us that, while there is no difference in peak hours in order dispatching, drivers with a rental car certainly get more orders during non-peak hours.

In some cases, Didi holds shares of the rental companies. Most rental companies' profits come from the rents or car-loan interest the drivers pay. In addition, rental companies also retain a portion of the commission in management fees, which accounts for about two percent of the drivers' gross fares (Li, 2021). According to our survey, in 2019, up to about 40 percent of ride-hailing drivers in Nanjing acquired vehicles from rental companies. Nanjing's rental companies offer drivers two options: for rent or rent-to-own. The latter is equivalent to a mortgage loan: the driver makes a down payment and pays monthly rent for a certain period (usually three years), after which the driver owns the vehicle with a ride-hailing license.

In essence, these rental companies are the third party of the third party. As an intermediary layer, they sit atop the ride-hailing platform,

which is itself the intermediary between drivers and passengers. In this arrangement, the strategic alliance of the platform and car rental companies has, to a great extent, replicated the operation of the traditional taxi industry: the platform-rental company nexus provides licensed taxi vehicles, while individual rentee drivers provide taxi services and submit a significant percentage of the gross fares to both platforms and rental companies.[7] The principal difference is that the traditional mode usually involves standard employment relations, but the new one does not.

Unlike their counterparts in Nanjing, car rental companies in Beijing cannot provide ride-hailing vehicle licenses. Therefore, the alliance between Didi and rental companies in Beijing is less developed than in Nanjing. Nevertheless, rental companies in Beijing are still indispensable because they supply vehicles with a Beijing-registered license plate, whose issuance has been rationed tightly since 2011. About 24% of Beijing drivers in our sample rely on rental vehicles. In contrast to Nanjing, few rental companies in Beijing offer rent-to-own contracts. This is because, to sign a rent-to-own contract, the driver must own a license plate in the first place; it does not make sense for drivers who already have a license plate to rely on a rental company that offers nothing but the lease of a license plate.

Because ride-hailing licenses for drivers and those for vehicles are both difficult to obtain, Didi in Beijing has been operating in the "grey area": the platform continues dispatching orders to unlicensed drivers and vehicles. To retain drivers, Didi has promised to reimburse the fines paid by unlicensed drivers who are caught (Rao, 2018).[8] Also, the platform frequently sends drivers real-time alerts about temporary traffic control zones; our interviews reveal that these alerts are, in fact, warnings about regulators' random checks on unlicensed drivers and vehicles.

4.2 *Structural Change in Drivers' Work Mode*

Based on the ownership of their vehicles, we categorize ride-hailing drivers into three work modes: driving with one's own car,

7 Rent accounted for 29% and 37% of gross income (not including commission fees charged by the platform) for drivers in Nanjing and Beijing, respectively. The commission fees were equivalent to about 25% of gross income.

8 The drivers that we interviewed have confirmed this pattern. Nevertheless, Didi's promise is never written in a formal contract, which means that the platform can always modify or cancel the promise.

driving a rental car, and driving a car with a rent-to-own contract. Figure 2 presents the statistics. Compared to 2018, Nanjing in 2019 saw a significant increase in the percentage of drivers who worked with a rented car (from 7% to 20%), and so was the percentage of those bound by a rent-to-own contract (from 14% to 20%). Overall, between 2018 and 2019, the share of drivers with a rental contract doubled, increasing from about 20% to 40%. In the Beijing cohort, about 76% of drivers worked with their own vehicles, and 24% rented vehicles; no drivers acquired their car through a rent-to-own arrangement.

Our interviews indicate that regulations were the main drive behind the structural change in drivers' work mode. Once caught by the regulators, unlicensed drivers may face heavy fines (approximately 10,000–30,000 RMB). Although Didi promised to reimburse the fines, being caught is not cost-free. A Beijing driver shared with us his experience:

> The inspector (from the local department of road transport administration) did not wear uniforms. He just pretended to be using his cell phone by the street. When I parked my car by the street, he glanced at me as well as my car, and immediately knew that I was a Didi driver. He then jumped into my

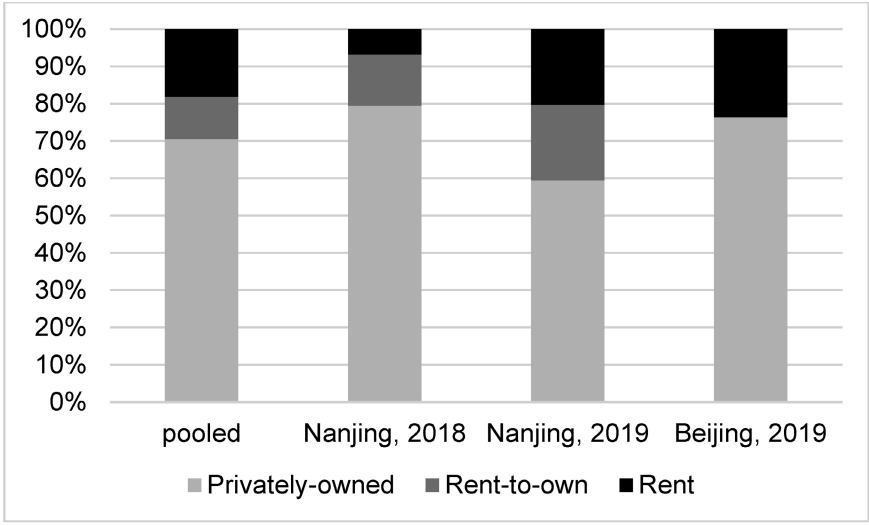

Figure 2. Vehicle Ownership by Survey Groups.
Source: Authors' survey data.

car. This is how my car was detained. Didi reimbursed the fine for me, but it took more than three days for me to get my car back. It was so annoying. If I am caught three times in a row, my driver's license will be suspended for half a year. It will also affect my credit score.

Not only the experience of being caught and penalized but also the uncertainties associated with such an experience forced many of the unlicensed drivers to seek legal status. A driver in Nanjing replaced his old car with a new one, only to meet the ride-hailing vehicle requirements:

Up until last year (2017), most ride-hailing vehicles were unlicensed. Since last year, however, more and more drivers have been caught and fined. Because, at the beginning, the platform rewarded drivers with generous bonuses, a lot of drivers bought new cars to fulfill the licensing qualifications. So did I. However, after I bought the new car, almost all bonuses disappeared.

This driver had his new car licensed right before Nanjing suspended the issuance of vehicle licenses in April 2018. Since the suspension, getting a licensed rental car has been the only option for new drivers if they want to operate legally. Some drivers with no licensed vehicles finally quit the market. A driver in Nanjing expressed his hesitation about staying in the industry:

The car that I am currently driving does not have a ride-hailing license. As the regulations are increasingly being enforced, I may get a licensed car from a rental company. However, I feel these companies charge way too much: a comparable rental car without a ride-hailing license costs only half the price. I will just wait and see. If the inspections get even more frequent and stringent, I will consider getting a licensed car or just quitting the business.

This example shows that a driver with a licensed rental car pays rent for both the car and the license, and the price of the license accounts for half of the total rent. As such, the license has significantly increased the fixed costs for drivers who rent licensed cars. To cover these costs, these drivers must work longer hours to make higher gross income.

Notably, the regulations not only pushed drivers to the rental companies but also reshuffled the drivers. As mentioned, the rental companies had massively hoarded licensed rental cars before Nanjing suspended the issuance of new ride-hailing licenses in early 2018.

Following the suspension and with the promotion of the rental companies, there was a major increase in the number of drivers with rental cars in the market. Intense competition among these drivers dragged down their average gross income; as a result, many of them decided to quit the market. As one of the drivers we interviewed in Nanjing shared with us:

> Quite a lot of ride-hailing drivers switched to driving a rental car around March or April 2018. But just half a year later, many quit the business because they had little income left after paying the rent. There were many defaults.

The remaining drivers are more likely to be those who have fewer options in the job market and have to work longer hours to reach the "making ends meet" income level.

Although, as we have explained previously, rental companies in Beijing cannot provide vehicles with a ride-hailing license, they can help reduce the uncertainty of whether the fine imposed on an unlicensed driver can ultimately get reimbursed. A Beijing Didi driver who worked with his own car before driving a rental car told us:

> When I drove my own car, I had to pay the penalty out of pocket if I was caught; nobody really knows whether and when I could get reimbursed by the platform. If not, it will be a massive loss of my own. However, now, the rental company will pay the penalty for me.

We also find from our other interviews that, after paying the penalty, rental companies will get reimbursed by the platform.

4.3 *Effectiveness of Labor Control*

The regulations restrict the platforms with the purpose of market formalization; however, the platforms have coped with the regulations by establishing their nexus with rental companies. This nexus has strengthened labor control in two aspects. First, drivers working longer hours accounted for a larger share, making the supply of labor on the platform more stable. Second, as the average working time per driver increased, per hour gross income decreased, which means that the platform could mobilize and extract cheaper labor. Therefore, the regulations are not merely restrictions on the platform;

by pushing drivers to car rental companies, they have also promoted favorable organizational changes. The platform alone cannot realize such changes because, without the regulations, it is unnecessary for the drivers to participate in the rental-car work mode. We discuss these aspects below.

The involvement of rental companies enables drivers in Nanjing to obtain legal market status and reduces uncertainties for unlicensed drivers in Beijing. However, the workplace precarity of these drivers has been significantly intensified. Our survey shows that in 2019, on average, the monthly car rent in Nanjing and Beijing was 3,800 RMB and 4,700 RMB, equivalent to about twice the local minimum monthly wages. Moreover, some rental companies have deployed financial maneuvers to trap drivers, including but not limited to setting a meager initial down payment and later charging high-interest rates. Struggling with mortgage or rent, drivers with a rental or rent-to-own contract must significantly extend their work hours. A driver who steered a rental car in Beijing introduced us to his grueling work schedule:

> I start my work every morning at about eight o'clock and drive home around midnight. I usually get home at 1 or 2 a.m. The next morning, I started my work again. I would take one day off at the weekend, but it is not a full day. I still work on that day until I earn the rent; otherwise, taking a day off means a loss. When I take one day off, I usually get together with other drivers for dinner; other times, I just sleep.

Ensuring effective control over labor supply by lease or debt relationship is not new. During the 1970s, the debt-bondage mechanism was used in Peru to compete for labor: debt-bonded semi-proletarians were compelled to sell both their own labor power and that of their kinsfolk to rich and middle-class peasants (Brass, 1983). Under global capitalism, wage labor has been increasingly replaced by debt-bonded labor to improve profits; in particular, scholars have noted the important role that labor contractors or intermediaries play in recruiting and retaining forced labor, trapping workers in debt bondage and exploitation (Barrientos, 2013; Brass, 2009; Lee, 2019). As various cases show, the market discipline imposed by debt exacerbates the systematic vulnerability of workers and creates pressure on those who remain at work (LeBaron, 2014).

In the case of the ride-hailing industry, just as the platform takes advantage of its intermediary position to control drivers' access to the ride-hailing market, the rental companies employ rental or rent-to-own contracts to manipulate drivers' exit from the market, even though there are no formal employment relations between drivers and the platform/car rental companies. While the leasing or rent-to-own contracts offered by third-party companies lower the barrier to entry, they increase the barrier to exit. With lower bargaining power, drivers encumbered by debt or lease payments end up accepting the platform's constant changes in payment/rewards policies and working longer hours.

Figure 3 presents the weekly working time of the surveyed drivers by work mode (vehicle ownership) and survey cohort. Drivers' work time is calculated by multiplying daily work hours and the number of work days per week. The questions we used in the survey are: How many hours do you work as a ride-hailing driver every day? How many days do you work as a ride-hailing driver per week? It should be noted that work time under this definition should be longer than the platform's definition of "online time"; our calculation includes the time that drivers use to prepare for taking orders, including but not limited to cleaning and fueling up their cars.

Our results show that, on average, the surveyed ride-hailing drivers worked 65.1 hours per week, and the 2019 Nanjing cohort worked the longest (66.7 hours). For all cohorts, drivers who had either a rental or a rent-to-own contract worked significantly longer than those who worked with their own cars. For example, in 2019, drivers who worked with a rented vehicle worked 81.3 hours per week in Nanjing and 84.3 hours per week in Beijing, while their counterparts who steered their private cars worked less than 60 hours. We also quantitatively estimate how much a rental or rent-to-own contract can increase work time. Using multiple regression controlling for confounding factors such as demographic characteristics and economic status, we find that these drivers worked 20–50% more hours than drivers who worked with their own vehicles.[9] Overall, drivers with a rental or rent-to-own contract accounted for half of the total labor supply in terms of hours worked, significantly higher than their share in the driver population. These statistics reflect effective labor control in the form of a lease or debt relationship.

9 The authors will supply additional and more detailed quantitative results upon request.

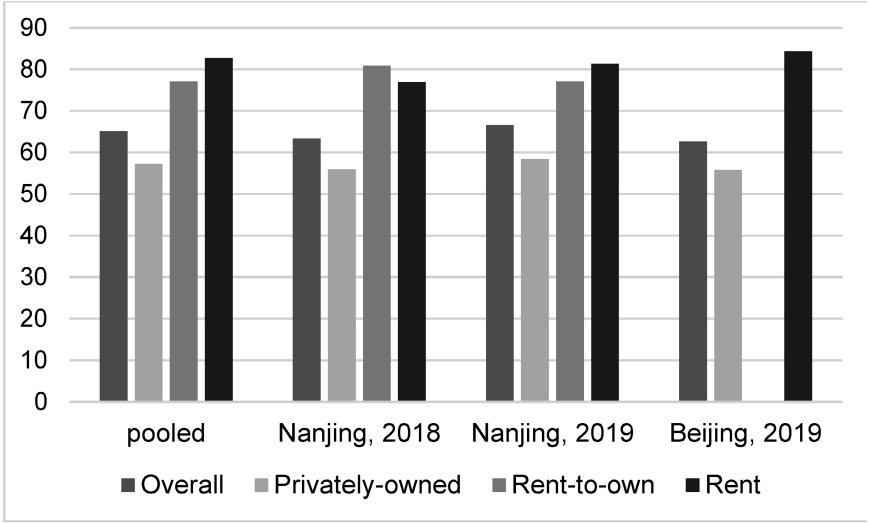

Figure 3. Drivers' Weekly Work Hours by Vehicle Ownership and Survey Cohort. *Source*: Authors' survey data.

Finally, the reduction in labor costs demonstrates the platform's effective labor control. We measure labor costs by drivers' gross income (*i.e.*, operating revenue) per work hour, which reflects how much the platform has to pay (excluding the commission fee charged by the platform) to a driver in exchange for the driver's one-hour work. We show the relationship between drivers' work hours and their per-work-hour gross income in Figure 4. Two facts emerge from the scatter plots. One is that, for all cohorts, there is clearly an inverse relationship between drivers' working time and their hourly rates.[10] A related fact is that, compared to the 2018 Nanjing sample (Figure 4-Panel B), the average gross income per work hour for the 2019 Nanjing sample (Figure 4-Panel C) is significantly lower. This is because, under the regulations and the platform-rental company nexus, the share of drivers working with a rental car (hence working longer hours) increased significantly between 2018 and 2019 (Figure 2). Our interviews reveal

10 To eliminate the impact of outliers, we run regressions between drivers' working time and hourly wage rates with winsorized samples. The results show that the inverse relationship is statistically significant and stable.

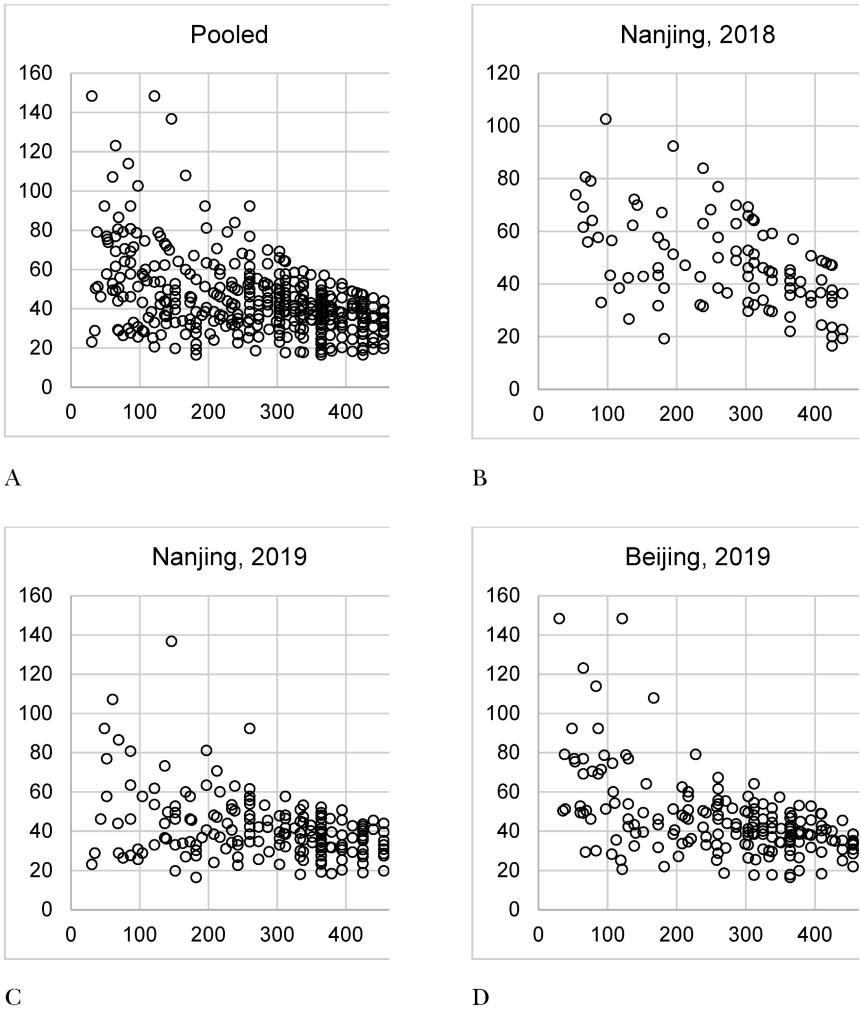

Figure 4. Work Hours (x-axis) and Gross Income per Work Hour (y-axis).
Source: Authors' survey data.

that the inverse relationship between work hours and per-hour income exists largely because car utilization is higher for part-time drivers than their full-time counterparts: specifically, part-time drivers tend to only work during peak hours when the platform provides more bonuses, whereas full-time drivers, especially those working with a rental vehicle

and bearing leases/debts, have no choice but to keep working during non-peak hours. As a result, their average gross income per work hour declines, which nevertheless implies reliable services for the platform.

5. *Conclusion and Discussion*

This study has revealed that digital platforms, paradoxically, are unsatisfied with a labor force of extreme temporal flexibility, as they claimed. Quite the contrary, platforms have to and do actively manipulate and restructure the platform reserve army by shaping workers' decisions on labor time and efforts. Our study emphasizes the complex relationship between labor precarity and labor control in the platform economy. As our fieldwork shows, one of the most effective mechanisms for controlling the platform reserve army is to align with rental companies and form a debt relationship so workers are compelled to work long hours. Their longer hours lead to more market supply of their service and add more downward pressures on hourly income. At the same time, this study has also explored how the market-formalization regulations and platform capital's reactions to these regulations have shaped the control over the platform reserve army. The regulations have created a restrained but generally favorable institutional environment for the ride-hailing sector. One major problem with this arrangement is that the employment relationship in the new industry is quickly changing, not subject to the existing regulatory framework, creating a manipulable space for platform capital. In both Beijing and Nanjing, regulators have primarily focused on the market and shown no interest in intervening in the relationship between the platforms and drivers, leaving the allocation of gains between capital and labor to be determined by biased bargaining power and the forms of existence of the platform reserve army to be determined by platform capital.

The dynamic between the state and capital has shaped and intensified the precarious conditions that ride-hailing drivers face. Rather than simply attributing capital-labor relations and workers' welfare to regulation or the lack of it, our study presents a more nuanced analysis. We argue that how regulation shapes capital-labor relations largely depends on capital's strategies to cope with the regulation, which has been crucial in the background of rapidly developing digital platforms. Capitals' agency in the formation and transition of new economic models, such as the platform economy, is a crucial factor for

reforming regulatory policies globally. With the rise of the platform economy, digitalized gig work has penetrated more and more sectors. Digital platforms have leveraged variegated organizational forms to achieve flexible labor supply and effective labor control. In the case of the ride-hailing industry, our analysis shows that regulations that focus exclusively on the marketplace and neglect the workplace can only encourage more rental or debt arrangements. These arrangements favor capital and workplace labor control at the expense of workers' welfare. This observation does not contradict the literature that deregulation associated with the rise of neoliberalism since the mid-1970s has increased labor precarity. Instead, it stresses the complexity of regulation and the convolution of platform managerialism in today's discussion on labor precarity.

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