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Cross-Boundary Subsumption: Toward a Political Economy of Platform Labor

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Abstract

The existing body of research on the platform economy provides a variety of interpretations of platform labor. Nevertheless, current studies have either placed exchange rather than production at the core of their interpretations or overlooked the historical continuity of the type of labor to which platform labor belongs. Employing a historical-comparative approach, this article introduces the concept of "cross-boundary subsumption" to illuminate the characteristics of platform labor. Drawing insights from investigations and interviews conducted on ride-hailing platforms in China from 2018 to 2020, this article delves into how cross-boundary subsumption works in reality. The goal is to improve the understanding of platform labor and uncover the limits of the current models of the platform economy.

Keywords

cross-boundary subsumption, platform economy, platform labor, Marxian political economy, China

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The surging growth of the platform economy in recent years has significantly contributed to the transformation of modes of labor, generating new types of jobs organized by digital platforms and new types of laborers who have neither a formal nor an informal employment relationship with an employer. This platform labor, epitomized by the labor undertaken in the food delivery and ride-hailing services sectors of the platform economy, has attracted pervasive academic attention across a variety of disciplines.

Against this backdrop, several fundamental questions arise: What is the nature of platform labor? Is it a new form of traditional employment-based labor? Or do we need a new framework to understand it? The current literature provides three principal interpretations. First, orthodox or neoclassical economics perceives the platform economy as a marketplace characterized by its pervasive network effects and views platforms as market intermediaries (Rochet and Tirole, 2003). Platform laborers, according to the neoclassical perspective, are market players who sell goods or services through a platform intermediary and whose behaviors are largely consistent with those of self-employed units or even profit-oriented small-scale firms. In this approach, there is no theoretical space for platform labor because platforms are treated as de facto marketplaces rather than workplaces. The second interpretation, provided by the New Brandeis School of legal studies, considers platforms as a form of digital infrastructure (Khan, 2018). The infrastructure metaphor is also popular in science and technology studies, which tends to characterize platform owners as "landlords" or "rentiers" of digital infrastructure (Sadowski, 2020; Birch and Cochrane, 2022; Christophers, 2022). Thus, platform laborers are understood as infrastructure users who pay rent to the platform owner. Proponents of both these interpretations believe that the weak position of platform laborers reveals that they are market players or infrastructure users, yet neither regards platforms as workplaces. Consequently, there is "labor associated with platforms" but no "platform labor."

The third interpretation, which we call the "regulationist" approach, is pervasive in sociology and communication studies. Proponents emphasize that platform labor reflects a form of regulatory arbitrage through which platform capital (i.e., the owners of platforms) evades social responsibility for its employees (J. Chen, 2018; Chen and Qiu, 2019; Chen and Sun, 2020). In contrast to the first two approaches, the regulationist approach emphasizes the antagonistic interests of platform capital and platform laborers and the need to embed this new type of capital–labor relation (or in Marx's words, relation of production) under institutionalized regulations. This approach places production at the core of platform studies; nevertheless, it tends to treat platform labor as a wholly novel phenomenon, focusing on the new technological aspects of production (e.g., digitalized automation, data

collection, and algorithmic management). Thus, it overlooks the fact that similar types of labor with common attributes have existed historically, despite the distinct technological aspects of production in the platform economy. As argued below, exploring these common attributes can improve our understanding of platform labor and uncover the limits of the contemporary models of the platform economy.

Adopting a Marxian political economy perspective, this article introduces the concept and analytical framework of "cross-boundary subsumption" 跨界统合 (CBS) to illuminate the fundamental characteristics of platform labor. CBS refers to a type of capital–labor relation wherein capital, by making use of the laborer's pursuit of a livelihood, can flexibly and cost-effectively recruit and utilize geographically dispersed labor. The term "cross-boundary" refers to platform capital's spanning of capitalist production, which follows the logic of profit, and laborers' individual production 个体生产方式 or petty production 小生产方式, which follows the logic of livelihood (i.e., pursuing a livelihood instead of profit), while "subsumption" refers to platform capital's use of laborers' pursuit of livelihood to increase its profit. In this sense, we use "subsumption" according to Marx's concepts of "formal subsumption" and "real subsumption," which connote capital's control and domination of laborers.

Theoretically, this article aligns with the tradition of Marxian political economy. Platform studies has been inherently interdisciplinary since its inception, and the Marxian political economy approach stands out for two reasons. First, Marx's analysis of capitalist manufacturing 工场手工业 and modern large-scale industry 大工业 laid a solid foundation for examining the capitalist production process and corresponding capital–labor relations. This line of inquiry surged in popularity during the 1970s, under the leadership of Harry Braverman (1974), Stephen Marglin (1974), Richard Edwards (1979), and others. This longstanding research tradition focuses on historical-comparative analysis. Second, political economy emphasizes the reciprocal shaping of the capitalist production process in tandem with competition between firms and the accumulation (expansion) of capital. It advocates situating the production process within the broader frameworks of market competition and macroeconomic dynamics to provide a holistic view of the constraints and contradictions inherent in the production process. In utilizing this approach, this article aims to provide new insights into the platform economy.

This article is grounded in surveys and interviews conducted on China's ride-hailing platforms by the authors and their team from 2018 to 2020. Face-to-face questionnaire surveys were carried out with more than 650 ride-hailing drivers in Nanjing (2018–2019) and Beijing (2019–2020). We collected comprehensive data on drivers' personal characteristics, work patterns,

subjective attitudes, and other aspects. Opting for face-to-face surveys rather than online methods ensured data authenticity and higher response rates. Moreover, the team conducted in-depth interviews that ranged from thirty minutes to one hour in length with over sixty drivers.[1] Additional interviews were conducted with traditional taxi drivers, officials from relevant government departments, staff from platform companies, and personnel from car leasing companies. The team has continuously monitored industry developments related to expansion, financing, competition, and regulation in the ride-hailing sector since 2018, resulting in a nuanced and comprehensive understanding of this sector of the platform economy. Drawing on this evidence from the ride-hailing sector, we seek to explain how CBS works and its constraints in the platform economy.

The article is organized as follows. The following section describes what CBS is, examines examples of variations on the CBS concept in history, and demonstrates that platform labor exemplifies CBS. Thereafter, this article delves into ride-hailing platforms to explain how CBS works in the context of the platform economy. We then discuss the contribution that the concept of CBS can make to our understanding of platform labor. A final section concludes.

An Overview of the CBS Framework

What Is CBS?

CBS refers to a type of capital–labor relation in which capital recruits and utilizes geographically dispersed labor without directly hiring laborers, thus meeting its demand for flexible and low-cost labor. As is explained below, examples of CBS appear in a variety of capital–labor relation contexts, of which platform labor is only one.

CBS has three essential attributes. First, "cross-boundary" refers to the boundary between labor and capital. Under CBS, capital does not hire laborers. Put differently, for Marx, the commodity "labor power" is defined as the capacity for labor initially possessed by laborers but sold to capital. Thus, capital under CBS does not purchase labor power from laborers or assimilate it into a part of capital. Without the exchange between labor power and capital, the boundary between labor and capital remains; nevertheless, capital crosses this boundary and utilizes labor. To illustrate the connotation of CBS, consider a comparison with the factory system. Since the onset of the Industrial Revolution in the late eighteenth century, the factory system has stood as the quintessential mode of capitalist production. It generally implements a centralized model of production, meaning that laborers regularly

gather at a common workplace, collectively using machinery and raw materials in the production process. The factory system has prevailed in capitalist production since the Industrial Revolution largely because the centralized model is associated with economies of scale and other efficiencies that arise from laborers' cooperation within the same workplace. Because capital requires laborers to be present at the production site at specific times each day, it directly employs them so as to have the authority to instruct them to work for designated periods. Under the factory system, there is no distinct boundary between laborers and capital because labor power is a commodity bought by capital and owned by capital during the production period.[2] Since capital hires laborers, it generally pays wages according to their basic consumption needs. While wages in a factory may fluctuate, capital bears a certain responsibility for the livelihood of laborers for as long as it needs their labor. In contrast, under CBS, capital does not purchase labor power; instead, capital utilizes labor without hiring laborers, paying laborers a wage according to the amount of labor provided, but this wage does not necessarily meet laborers' consumption needs.

Second, it is crucial to note that "subsumption" necessarily complements "cross-boundary" because the latter implies an inherent tension. On the one hand, "boundary crossing" potentially benefits capital because of the flexibility it brings to capital; given that capital utilizes labor without hiring laborers, capital can frequently adjust the amount of labor it utilizes to meet its production needs. On the other hand, "boundary crossing" means that there is a relatively loose relationship between laborers and capital, in stark contrast to the hierarchical structure often seen in the factory. This loose relationship poses potential obstacles to capital's pursuit of profits because it is not always the case that capital can recruit the number of laborers it needs or at the low cost it wants. Without being hired by capital, laborers flow frequently from job to job and place to place, making both the availability of labor and the price of labor power uncertain for capital. Geographical dispersion only worsens this uncertainty. Therefore, "boundary crossing" simultaneously creates potential benefits and obstacles to achieving those benefits. To transform the "potential benefits" into surplus value, capital must overcome these obstacles and achieve the subsumption of labor.

How, then, does capital achieve this subsumption? This is the third attribute of CBS. Under CBS, the attainment of labor subsumption depends on whether capital can leverage its influence over laborers' livelihoods. There are various concrete measures that capital adopts in real-world examples of CBS; among all these measures, labor subsumption typically is achieved by capital's strategical application of pressure on the livelihoods of laborers. Importantly, CBS implies a "grafting" or transplantation of capitalist

production onto the individual production of laborers. These two production modes can be independent and pursue their respective goals: capitalist production seeks profit and individual production seeks to maintain the livelihoods of laborers and their families. However, under CBS, these two modes of production are linked and integrated by capital, forming a composite mode of production. This integration provides a potential means for capital to control geographically dispersed labor because laborers engage in individual production and, driven by the need to maintain their livelihoods, are thus willing to work long hours, which intensifies their self-exploitation. Under CBS, given effective measures (as we will discuss in the case of ride-hailing platforms), capital can take advantage of this logic to extend working hours and lower the unit price of producing each item (or providing each service).

In summary, the existence of CBS is contingent on specific conditions: "boundary crossing" provides capital with opportunities to achieve a flexible and low-cost utilization of labor; however, whether these opportunities can be realized by capital is contingent on whether capital can utilize its influence on laborers' livelihood to achieve the subsumption of labor.

Marx's "Modern Domestic Industry" as an Example of CBS

In volume one of *Das Kapital*, Marx analyzed the "modern domestic industry" 现代家庭工业, which is a historical example of CBS. Marx observed that during the Industrial Revolution, the rise of machine-based modern industry eliminated old-style domestic industry and created new, capital-affiliated types of domestic industry. The latter type, mainly observed in the lace-making and straw-plaiting sectors, was "an outside department of the factory, the manufactory, or the warehouse" (Marx, 1967 [1887]: 461). Capital not only commanded an army of hired labor, it also set "in motion, by means of invisible threads, another army: that of the workers in the domestic industries, who [dwelt] in the large towns and [were] also scattered over the face of the country" (Marx, 1967 [1887]: 461-62). Although capital did not hire domestic labor, it united domestic labor by outsourcing orders, which was usually combined with the provisioning of raw materials. In this way, capital was the actual employer of domestic laborers. The modern type of domestic industry was organized in two forms: one was undertaken by women in their own houses, with or without the help of their children; the other could be organized by so-called "mistresses" in their houses, enrolling "women, girls, and young children" in the name of "lace-schools" or "straw-plait schools" (Marx, 1967 [1887]: 467-69).

In Marx's analysis, the relationship between capital and domestic workers differed from that between capital and hired workers. Capital did not

purchase the labor power of domestic workers, and domestic workers often found themselves engaged in multiple jobs simultaneously. Work derived from outsourcing by capital was merely one source of income for domestic workers. Consequently, capital was not obliged to ensure that the overall income of domestic workers was sufficient to provide a livelihood, which left workers in a state of high uncertainty. As Marx articulated, "In the outside department of the factory, of the manufactory, and of the warehouse, the so-called domestic workers, whose employment is at the best irregular, are entirely dependent for their raw material and their orders on the caprice of the capitalist, who, in this industry, is not hampered by any regard for depreciation of his buildings and machinery, and risks nothing by a stoppage of work, but the skin of the worker himself" (Marx, 1967 [1887]: 478). The ebb and flow of production seasons affected the lives and livelihoods of domestic workers. As Marx put it, "Here then he [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 want of work" (Marx, 1967 [1887]: 478).

Regrettably, Marx did not afford ample consideration to this "modern domestic industry," also known as the "capital–domestic labor" model. According to him, this model relied on the exploitation of cheap labor and would eventually be phased out with the evolution of technology. Particularly when production tools were still rudimentary, the technological and organizational advantages of centralized production within the factory system were not readily apparent. Consequently, the cost advantages of the new type of domestic industry were pronounced. However, as the means of production changed, the cost advantages of such domestic labor diminished compared to a centralized production that utilized advanced means of production, such as machines.

Marx illustrated his point with the example of sewing machines. The use of sewing machines evinced a significant economy of scale: under the factory system, sewing machines could be used most efficiently under a centralized model of production. Laborers in the modern domestic industry also could purchase and use sewing machines; however, when the price of sewing machines fell because of improvements in machine manufacturing, the laborers in the modern domestic industry who had bought the more expensive generation of sewing machines lost their competitive advantage. Meanwhile, producers of sewing machines launched a new business model in which laborers could rent machines by the week, which further weakened the competitive advantages of laborers who had previously purchased sewing machines. As this example shows, in the modern domestic industry, an individual's survival space was constrained by their weak tolerance for risk.

Other Examples of CBS

Marx did not expect that production models similar to the capital–domestic labor model would persist after the advent of mechanized industry. Yet the "grafting" of capitalist production and individual production has remained in existence in different forms. The "putting-out" system in Western Europe that emerged before the Industrial Revolution exemplifies CBS. Here merchants provided raw materials to rural laborers, who then produced goods at home. When production was completed, merchants collected the finished products and paid wages to the laborers (Marglin, 1974; Fu, 2014). Fernand Braudel (1984) evaluated the benefits of the putting-out system for merchants, stating that it allowed them to reduce fixed costs, especially in response to fluctuations in demand:

> The most frequent form taken by industry in town and country was the putting-out system, a pattern of working which had become general throughout Europe and had enabled mercantile capitalism from a quite early stage to take advantage of the surplus of cheap labour in the countryside. . . . The putting-out system thus combined town and country, craft and farming, industrial and family labour, and at the top, mercantile and industrial capitalism. To the artisan, it meant a life that was balanced if not exactly peaceful; to the entrepreneur, it meant the possibility of keeping fixed capital costs down and more particularly of coping with the only too frequent gaps in demand. (Braudel, 1984: 593)

In the long historical period after the Industrial Revolution, the dominant mode of production in developed capitalist economies did not exhibit the characteristics of CBS. In the early twentieth century, the Fordist production system advocated vertical integration to achieve standardization of components and reduce unit costs through economies of scale. Vertical integration emphasized establishing large-scale factories, placing the entire production process under the hierarchical management of the factory, and did not involve the integration of individual production. Since the 1970s, however, the trajectory of production modes has shifted toward embracing labor flexibility, leveraging cheap labor in developing countries, increasing outsourcing, and establishing global production networks. In such networks, "lead firms" (e.g., Apple) utilize their monopolies over technologies and market access to repress the gains of "strategic partners" (e.g., Foxconn) that assemble products for lead firms. Labor-intensive manufacturers like Foxconn have to rely on lead firms owing to the massive orders they receive from lead firms. While this approach underscores the dominance of lead firms over peripheral manufacturers within the production network, it does not engage with the notion of individual production by laborers posited by CBS. The concept of CBS

proposed in this article revisits Marx's analysis of the capital–domestic labor model, attempting, on a historical-comparative basis, to conceptualize a class of capital–labor relations characterized by integration between capitalist production and individual production. We argue that CBS, represented by models such as the capital–domestic labor model, has its own vitality and is not a transient phenomenon in history but repeatedly appears on the historical stage. Under capitalism, multiple modes of production are always interwoven and coexist, and these create better conditions for capital accumulation. Although Marx and later political economists undervalued models of CBS, petty or family production has long been widespread in developing countries. Many studies of labor and agrarian issues in developing countries reveal that family production is integrated and dominated by capital in various forms (Wu, 2012; Huang, 2013; Huang, 2015; Y. Chen, 2018). Following these studies, this article proposes that CBS as an analytical framework can be used to understand the tension within specific types of labor throughout history, including in the digital era.

Previous studies have extensively discussed "semi-proletarianization" in developing countries (Arrighi, 1970; Arrighi, Aschoff, and Scully, 2010; Gürel, 2011; Qi and Li, 2019), which is a phenomenon interwoven with CBS. Semi-proletarianized laborers own a small amount of land that is not sufficient to maintain a livelihood; thus, in addition to cultivating their land, they must participate in wage employment. In other words, these laborers participate in two modes of production: capitalist wage employment and family farming. The capital that hires these laborers does not need to provide a wage sufficient to meet all of the laborers' consumption needs; instead, it can reduce wages to the level needed to fill the gap between consumption needs and family farming income.

During the past decade, the rapid rise of platform labor has presented a new example of CBS. As shown in Figure 1, the structure of the platform economy model is strikingly similar to that of the capital–domestic labor model. Like capital during the Industrial Revolution, platform capital integrates platform labor. Among migrants, who constitute a large share of platform laborers worldwide, livelihood means not only maintaining basic survival; it also involves higher-level needs, such as urban settlement, social interactions, personal development, and family reproduction. In the capital–domestic labor model, capital delivers raw materials to domestic workers for processing and pays wages on a piece-rate basis. The processed products are returned to capital, which then sells the products to consumers. In the platform model, capital provides information about market demand to laborers, who provide services based on this information. Capital pays compensation to laborers based on the quality and quantity of services provided. In both

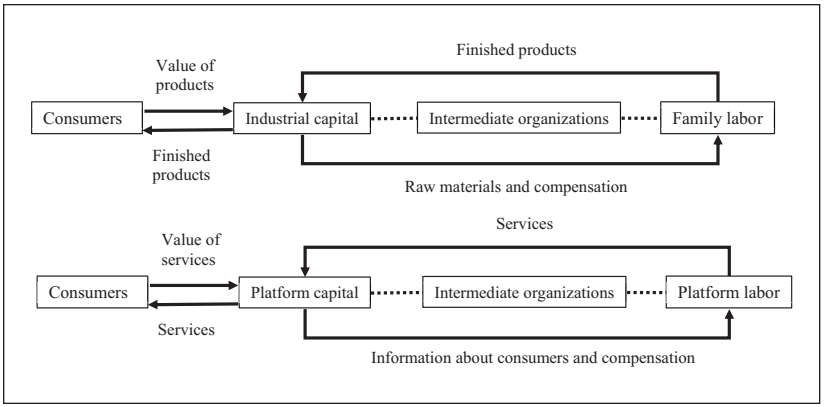

Figure 1. A comparison of two models of CBS: (1) The "capital–domestic labor" model. (2) The "platform labor" model.

models, intermediary organizations help capital recruit, assign tasks, supervise performance, and discipline labor, just as "mistresses," "lace-schools," and "straw-plait schools" did under the capital–domestic labor model. As Marx said, "a whole series of plundering parasites insinuate themselves between the employer and the workman" (Marx, 1967 [1887]: 462). Examples of platform labor include car leasing companies in the ride-hailing sector and logistics stations in the food-delivery sector.

This article is inspired by previous studies that have viewed platform labor as a reiteration of older systems of production. For example, Matthew Finkin (2016) argues that platform labor resembles the putting-out system in terms of its costs and flexibility, yet in its use of information technology to supervise labor, it improves on that system. Jim Stanford (2017, 2021, 2022) suggests that the key features of platform labor (on-demand work, piecework, remote work, etc.) have characterized previous production systems, such as the gangmaster system, the putting-out system, the dependent contractor system, and post–Industrial Revolution owner-operator systems. Note that while these studies emphasize that platform labor is not an entirely new phenomenon, they do not propose a general conceptual and analytical framework to explain its various forms and iterations. This is precisely the gap that this article aims to fill.

As in other examples of CBS, platform capital uses a variety of technological and organizational measures to address the challenges that result from its loose organizational structure. Sometimes, platform capital reverts to traditional organizational forms to tighten organizational relationships.

Crucially, the tensions and dilemmas that arise from "boundary crossing" imply a dynamic process of labor–capital conflicts. Ding Wei (2021), for example, highlights the interplay between ride-hailing drivers and platforms: drivers engage in numerous rule-violating actions, such as manufacturing fake orders, while the platforms continuously use driver actions to collect and accumulate data, improve technologies, and counteract resistance. Zhao Lei and Han Yue (2021) note that the atomized state of ride-hailing drivers and the algorithmic control to which they are subjected can lead to negative emotions (e.g., frustration, disappointment, and anger). Their study also indicates that ride-hailing platforms employ car leasing companies to reduce the "attrition rate" of drivers through the establishment of a hierarchical control system and by providing a channel for venting on drivers' WeChat groups.

While CBS necessarily involves laborers, not all platforms are directly connected to laborers. Indeed, the term CBS mainly applies to labor services platforms that connect laborers to consumers, such as ride-hailing platforms, food delivery platforms, household services platforms, and crowdsourcing platforms. In terms of scale, labor services platforms provide most of the employment in the platform economy. On these platforms, individual production is grafted onto the larger system of capitalist production. Although e-commerce platforms, livestreaming platforms, content-sharing platforms, and other platform types differ significantly from labor services platforms, they, too, bring together a large number of independent laborers and individual business owners (Zhang, 2020); thus, to some extent, these platforms align with the diagnostic characteristics of CBS.

CBS in the Ride-Hailing Sector

CBS's core feature is that it allows workers to pursue their livelihood goals while simultaneously setting a "labor power–ownership boundary" that allows capital to organize and control labor. A "livelihood logic" plays a crucial role in the organization and control of platform labor. On platforms, labor is organized and controlled to achieve three goals. First, the platform must continuously attract new labor in a setting characterized by free labor mobility. Second, to establish a stable labor supply and thus prevent customer loss because of inability to meet sudden increases in demand, the platform must retain existing workers. Third, the platform must supervise and train workers to ensure that its service quality requirements are met.[3] The following section examines how platforms use a livelihood logic to achieve these goals.

Competition for Livelihood

The term "livelihood competition" describes the competition between platform workers to achieve a livelihood. To this end, workers engaged in this competition must accept lower unit prices, longer working hours, and stringent management requirements. This is advantageous to the platform, which obtains an ample labor supply and extracts high surplus value.

At the beginning of our investigation, several closely related questions perplexed us: What kind of people make up the community of ride-hailing drivers? What is their purpose in choosing this profession? Do they drive because it provides a livelihood, or do they simply enjoy flexible work? Our survey results revealed that the issue of livelihood is significant for ride-hailing drivers, for two reasons. First, among the surveyed drivers, the average age was forty years, 96 percent were male, 94 percent were married, and 61 percent were internal migrants. On average, surveyed drivers had 1.3 children, indicating that ride-hailing drivers, as a whole, are in a life stage characterized by significant livelihood pressure. Additionally, in terms of their education level, 40 percent of drivers had a junior-high-school-or-below level of education, while 80 percent had a high-school-or-below level of education, suggesting that educational levels limit their career choices.

Second, when asked why they worked in ride-hailing, 71 percent of drivers responded that they needed a livelihood. Typical responses included: "To earn money"; "To support the family and subsidize household expenses"; "Because of mortgage pressure"; "To reduce the burden on my children"; "Business is slow, so I can't continue my previous job"; "I am getting older and can find no better job"; "I am unemployed and doing ride-hailing during the transition to a new job"; and "I just arrived here, this is a temporary job that I am picking up quickly." Only a minority said they undertook this work because of its flexibility or to "pass the time."

Faced with a group of workers whose goal is to maintain their livelihoods, the optimal strategy for the platform in recruitment and organization is to set a "zero threshold" for entry so as to maximize the number of drivers. In established market conditions, the more drivers there are, the fiercer the competition among drivers, which is more advantageous for the platforms. Our investigation results confirmed that ride-hailing platforms seek to minimize recruitment thresholds.

Traditional centralized production models have three types of thresholds: skill thresholds, wherein employers select workers with the required skills on the basis of specified standards; incentive thresholds, wherein employers additionally select from many applicants with the required skills to make applicants feel that the job is not easy to obtain, thus reducing the post-employment

turnover rate; and policy thresholds, wherein the employees that employers seek must meet government regulatory requirements.

Ride-hailing platforms minimize the skill threshold. For example, the ride-hailing platform Didi 滴滴 (aka Didi Chuxing 滴滴出行 or Didi Kuaiche 滴滴快车) only requires drivers to have "driving experience of at least three years." The industries developing fastest in the platform economy are those that have low skill requirements. Indeed, entrepreneurs deliberately construct such platforms because they can organize large numbers of individual producers. With the assistance of technologies such as the Internet of Things, big data, and artificial intelligence, the platform decomposes and organizes the labor process, separating concept and execution in the manner outlined by Braverman (1974). The platform provides extremely detailed regulations on how drivers should contact passengers, determine passenger locations, drive (e.g., routes and speeds), complete transactions to receive rewards, and resolve disputes when they arise between drivers and passengers. Therefore, although driving for ride-hailing platforms requires some experience, the core skill requirements are relatively modest, and plenty of workers meet these requirements.

Moreover, the platform has no rules for preferential admission, and so there is no incentive threshold. Finally, the platform opportunistically complies with policy thresholds, depending on the implementation efficacy of the policy and the platform's bargaining power relative to that of local governments. According to data released by the Ministry of Transport, from October 2020 to May 2022, the compliance rate of vehicles on the Didi platform increased from 23 percent to 52 percent, and the compliance rate of drivers increased from 39 percent to 70 percent.[4] Although the rising compliance rates indicate that the platform is trying to comply with policy requirements, a considerable number of vehicles and drivers remain uncompliant. For example, Didi's subsidiary, Huaxiaozhu 花小猪, has a compliance rate lower than that of Didi and one of the lowest rates among national ride-hailing platforms.

The "zero threshold" allows the unemployed to directly enter the platform economy, breaking down boundaries between unemployment and platform labor, yet it also directly exposes platform labor to macroeconomic fluctuations. During a macroeconomic upswing with generally increased employment opportunities, fewer new workers join the platform, leading to an increase in working hours and income for existing workers. However, when the macroeconomy experiences a downturn, a large number of underemployed laborers flood into the platform economy, leading to a decrease in working hours and income for platform workers, further intensifying competition among workers. For example, the COVID-19 pandemic contributed to

significant macroeconomic fluctuations in recent years. In July 2020, Beijing experienced a significant decrease in ride-hailing orders because of the pandemic, but the number of operating ride-hailing vehicles increased, resulting in reduced driver income. Among the sixteen drivers that we interviewed in July 2020, two started working for ride-hailing platforms after the pandemic, and five drivers extended their working hours after the pandemic. As one driver said:

> Now the inputs and outputs are disproportionate. Before [the pandemic], I could make over seven hundred or eight hundred yuan [in cash flow per working day]. Now it's difficult to make six hundred. There are fewer orders, and sometimes I don't get orders for one or two hours. Last year, I could easily use up the ten hours [the platform's daily maximum service time], but now I only use four or five hours a day, driving over four hundred kilometers normally, and there's one hundred and fifty kilometers of empty driving.

Another driver showed us his cash flow from March to July 2020. In March and April—the periods most severely affected by the pandemic—the driver's monthly cash flow was only around 10,000 yuan. In May and June, cash flow recovered to around 14,000–15,000 yuan per month. However, in July, owing to a pandemic resurgence, cash flow by mid-month was only about 6,000 yuan.

When thresholds are lowered, the platform uses bonuses to enhance the attractiveness of platform work. Bonuses are an important means for the platform to attract drivers, and their existence makes the work of drivers more like a "competition for livelihood." Bonuses mainly depend on how urgently the platform is trying to attract drivers. In our sample survey, 83 percent of drivers had received bonuses of different amounts during the previous month; among drivers who received bonuses, the average proportion of the bonus relative to a driver's turnover was 15 percent. Our survey in Nanjing for two consecutive years revealed the variability of bonuses. In 2018, when Didi and Meituan 美团 (aka Meituan dache 美团打车) were fiercely competing to dominate Nanjing's ride-hailing market, almost all drivers qualified for bonuses, with bonuses being equivalent to 29 percent of turnover on average. In 2019, when the competition ended, the proportion of drivers who qualified to receive bonuses decreased to 86 percent and the bonus-to-turnover proportion rapidly dropped to 14 percent.

The variability of rewards exposes platform workers to the dynamics of industry competition. Because platform expansion is primarily supported by financial capital, fluctuations in workers' conditions are indirectly influenced by the adequacy (or inadequacy) of funds in the financial market. Financial

capital is concentrated on the process of platform capital's seeking of monopolies, and once a monopoly is achieved, investment tends to decrease. Consequently, workers receive more subsidies during interplatform competition but suffer a noticeable decline in income after monopolization by one platform. Moreover, platform competition is a dynamic process: a monopoly platform struggles to maintain its monopoly position for an extended period, and new platform enterprises, supported by financial capital, often challenge existing platforms. Workers find themselves in the ebb and flow of dynamic competition within platform capital, gaining subsidies in some periods and losing them in others. Finally, the accessibility of financial capital is uncertain. When financial capital liquidity is insufficient or loses confidence in a specific platform, financial support can cease, which negatively impacts platform workers.

As platform competition in the Nanjing market settled, the percentage of drivers who reported being dissatisfied or very dissatisfied with their income increased from 41 percent in 2018 to 52 percent in 2019. As one driver said:

> Back when Meituan entered, it was quite good. Now, without the competition, it's not as good. Honestly, without Meituan and only Didi, we wouldn't have bought these cars. What does the industry's "on-and-off" state mean? When Didi first entered the market, we started with Didi. At that time, it was similar to when Meituan had just entered the market. We could make over ten thousand yuan a month. Then, after the merger of Kuaidi 快的 [Kuaidi dache 快的打车], Didi, and Uber, they became one, and at that time, driving felt like voluntary work. Later, when Meituan came out, the prices gradually increased.

Livelihood Pressure

By setting a "zero threshold," platforms open their doors, attracting drivers who seek a livelihood, which initiates a competition for livelihood. At the same time, platforms attempt to manipulate "livelihood pressure," ensuring that drivers with greater pressure constitute a certain proportion of the driver community. The greater the livelihood burden a driver bears, the more dependent they become on this work, stabilizing the services drivers provide to the platform.

Under CBS in the platform industry, the labor supply is characterized by a high turnover rate. Laborers consider the various jobs for which they qualify and reasonably allocate their labor time and production resources within limited choices. When other employers offer higher incomes or better opportunities outside the platform economy, workers often quit their platform jobs and take new ones. Our survey data show that 39 percent of drivers had worked

in the ride-hailing sector for less than a year, while 66 percent had worked in it for less than two years. Only 64 percent of drivers planned to continue working in the ride-hailing sector in the future; the remainder planned to seek alternative employment, start a business, or were undecided.

The high turnover rate of drivers clashes with the platforms' urgent need to meet market demand, prompting efforts by platforms to stabilize the labor supply as a means to address this issue. In the daily operation of ride-hailing platforms, market demand can be classified into three categories: basic stable market demand, which exists at different times on different dates; daily cyclical market demand, such as morning and evening peaks; and market demand that occurs only on specific dates (such as holidays or major events). To consolidate their market position, platforms must meet all three types of demand simultaneously. Therefore, platforms must embed a stable workforce in the flexible production system to meet the first type of market demand, while the other two types of demand are addressed by attracting workers through incentives at specific times and locations.

We found that the ride-hailing sector uses two methods to stabilize its labor supply. First, platforms establish voluntary incentive plans, such as Didi's "Feiying" 飞鹰 and "Jingying" 精鹰 plans, which are designed to incentivize full-time drivers. All such plans set minimum working hours and order volume requirements for drivers who join the plan; Didi's plans, for example, require plan members to finish a minimum number of weekly or monthly orders. For drivers, such plans are advantageous because they ensure a minimum income level, or they provide bonuses to drivers who complete tasks. One driver described the mix of "stability" and "flexibility" as a form of "hedging":

> For our type of drivers, we earn money for each order we complete, plus the platform's peak-hour bonuses; there are also plans like Feiying and Jingying. These two types are actually hedging 对冲 [against each other].[5] Didi wants to maximize its own interests and divides people into two groups. The policies for these two groups are hedging [against each other], and, in the end, the rewards will become less and less.

However, these incentive plans cannot achieve a stable labor supply over the long term. Because they are voluntary, the plans lack mandatory requirements, and drivers are not obligated to participate. Drivers who do not join the plan receive higher bonuses during peak hours than those who do join. Drivers can also exit the plan at no cost if they cannot meet the minimum task requirements, which challenges the goal of labor supply stabilization. One driver we interviewed refused to participate in an incentive plan, stating that

the plan "imposes too many restrictions and is too tiring." Another driver, who had joined the plan, found the plan's requirements overly stringent: "I drove the car for twelve hours a day, which was due to the plan. I felt dizzy. I used to be in the Jingying plan. If I drove continuously for a week, I couldn't take it. As a result, the platform said I rested too much and kicked me out. I didn't pay attention to its regulations; it required resting for fewer days in a month."

In the second method, car leasing companies, which act as intermediary organizations, stabilize the labor supply by establishing debt relationships with drivers. That is, car leasing companies place drivers in debt by requiring drivers to lease or purchase cars and then pressuring those drivers to consistently work long hours. Without changing the "cross-boundary" status of CBS in the ride-hailing sector, they select and manage drivers to establish a core stable workforce (Qi and Li, 2020).

In Nanjing, car leasing companies vary in size: some have only a few cars and occupy a cramped office; others have hundreds of cars and occupy an entire floor. They fall into three main categories: most are converted car dealerships now involved in both car sales and leasing services; a few are directly funded by platforms or automakers; and some are traditional taxi companies transitioning to the ride-hailing sector.

The relationship between car leasing companies and platforms is cooperative. Car leasing companies receive as a management fee from drivers a portion of the platform's commission, which amounts to 1–3 percent of the driver's income (Li, 2022). Car leasing companies maintain a "corporate account" 对公账户 with the platform, allowing drivers of leased cars to receive more orders, a crucial condition for attracting drivers. Having strengthened ride-hailing regulations nationwide, regulatory authorities now generally require drivers and vehicles to obtain operating qualifications, making car leasing companies a primary means for many drivers to obtain compliant vehicles. The leasing model attracts large numbers of those who migrate to cities. Working in the ride-hailing sector is often the first job for these migrants, and because they lack funds, local licenses, and/or household registration, the leasing model in many cases is their only opportunity for achieving compliance and finding work (Zhang, Qi, and Li, 2021).

Previous research has demonstrated that car leasing companies play important roles in vehicle and driver compliance, resolving driver dissatisfaction and providing safety training (Zhao and Han, 2021; Li, 2022, 2024). However, car leasing companies also play a significant role in stabilizing the supply of drivers for ride-hailing platforms. Situated between drivers and platforms, car leasing companies allow drivers to obtain vehicles through leasing or purchase (via leasing-to-own). These drivers pay monthly installments to car

leasing companies or to financial institutions that cooperate with car leasing companies. The debt obligations that these drivers assume subtly reconstruct their livelihood pressure: drivers now bear both the pressure of daily expenses and that of debt, and, to pay their debt, they must continue to work on the platform. Drivers who decline to assume this debt often cannot obtain compliant vehicles and struggle to establish a livelihood.

The stabilization of the labor supply and the precarity of the labor itself present an interesting contrast. The labor supply stabilization mechanism brings stability to capital rather than workers. Debt relationships have been used to control labor since the putting-out and capital–domestic labor systems. This form of stabilization exacerbates labor precarity because it trades that precarity for labor supply stability. In the ride-hailing sector, in the absence of exit barriers, when the industry experiences a downturn, a market contraction, or increased competition, drivers can exit and switch to other professions to mitigate declining income. However, ride-hailing drivers saddled with debt from leasing or purchasing vehicles are deprived of the choice to exit, forcing them to bear risks. Although platforms usually prioritize dispatches to drivers of leased cars (including those who purchase cars through leasing-to-own), they cannot shield drivers of leased cars from risks that affect the entire platform or industry. Drivers of leased cars who experience debt pressure tend to work longer hours. Indeed, our survey shows that drivers who obtained vehicles through leasing on average worked 83 hours per week (those who purchased cars through leasing-to-own worked 77 hours), while other drivers worked 57 hours.

Threats to Livelihood

For platforms to benefit from CBS, the effective disciplining of labor is crucial. Existing studies highlight labor disciplining technologies and systems employed in the platform economy, such as digital monitoring, algorithmic management, customer ratings, and reward-and-punishment systems. Rather than reexamining these technologies, this article examines the disciplining of platform labor from the standpoint of CBS—specifically, the creating of threats to workers' livelihoods and the power to discipline them through "screening power."[6]

As was mentioned earlier, platforms absorb labor through a "zero threshold" approach and stabilize labor supply through the construction of intermediary organizations and debt relationships. These measures ensure a stable quantity of labor but do not guarantee its quality. Under CBS, workers engage in individual production, exercising strong autonomy and control over their actual labor input. Under centralized production, capital's disciplining of

labor primarily involves in-process supervision and real-time correction, with dismissal occurring only when correction is ineffective. In contrast to centralized production, capital in CBS cannot supervise and correct the labor process in real time; it can only inspect the product after production. As such, under CBS, capital's disciplining of labor mainly occurs on the basis of ex post facto examination. When a worker's product is found to be unsatisfactory, capital penalizes and disciplines the worker through performance evaluations or screenings.

In the platform economy, which lacks direct employment relationships, platforms cannot fire workers, but they can refuse to assign work tasks to specific workers, permanently or temporarily excluding them from the platform. This "screening" is an essential means of labor control for platforms. Platform capital's screening power is akin to non-platform enterprises' firing power, constituting the unemployment threat in the platform economy. Platform capital frequently and extensively utilizes low-cost digital monitoring methods to exercise screening power. Workers who are screened become "invisible" to consumers. Capital does not need to explain to workers the reasons for and duration of their screening, nor does it need to compensate them.

In the case of ride-hailing platforms, there are two situations in which platforms screen drivers. First, drivers who do not meet the platform's basic requirements are screened out. For example, after a 2018 criminal case in Leqing, Zhejiang, in which a young female passenger was raped and murdered by her Didi driver, ride-hailing platforms gradually strengthened requirements for drivers and implemented facial recognition to ensure that drivers' identities matched their accounts. We encountered a driver with a criminal record during our investigation, who was initially engaged in ride-hailing but later was excluded because of the platform's stricter rules. This example illustrates that platforms have the power to establish rules, screen specific workers, and selectively use this power to meet their needs. Second, when a platform discovers that a driver's service does not meet quality requirements, the platform reduces the number of orders for the driver, constituting a chronic, temporary, and automatically executed screening. The platform collects comprehensive data on the entire labor process, and data generated on productivity, transactions, and customer evaluations serve as criteria for exercising screening power, constituting tools for disciplining labor. For example, Didi adopts a service rating system, about which one driver shared the following experience: "Now, the high score is 130 points. If [your average rating] drops to just over 110 points, it's challenging to receive orders. After completing five hundred orders, the system can restore your points, but it takes a month, which is very difficult to endure. You only get ten

to fifteen orders a day, and you can't make much money. It's like two hundred or three hundred yuan a day."

Platform-based disciplining of workers through screening power is one of the causes of labor precarity. Screening power comes from platform capital's control over the market and digital infrastructure. In the ride-hailing industry, drivers receive information from the platform, including the passengers' locations, contact information, destinations, routes and pricing, demand hotspots, and more. From our interviews with drivers, we learned that platforms also provide information about "traffic control," that is, identifying locations in which regulatory scrutiny of noncompliant ride-hailing activities is focused. Workers cannot find passengers and engage in transactions without using the platforms, creating dependency, a prerequisite for the existence of screening power. The exercise of screening power is entirely dictated by platform capital and its needs, with workers having no influence over this process. We observed instances where disputes between drivers and passengers made it challenging to ascertain fault. In such cases, the platform often blamed the drivers in order to maintain customer loyalty, consistently exerting screening power by lowering drivers' ratings. This presents a form of precarity that platform drivers must confront.

The Implications of CBS

CBS has two important implications: one concerns policy, the other the sustainability of the platform economy.

Rethinking the Precarity of Platform Labor

First, the rise of platform labor has contributed to the pervasive precarity of labor (Standing, 2011; Kalleberg and Hewison, 2013; Jonna and Foster, 2016; Su and Yao, 2019; Feng, 2021), and this has important policy implications. There is a perception, commonly seen in existing studies, that attributes the precarity of platform labor to a regulatory arbitrage of platform capital. This perception implies that platform labor is an outlier of some regulated "standard" labor (usually with an employment contract and social security coverage); thus, policymakers can change the situation as long as they are determined to impose regulations on platform labor to transform it into "standard" labor. However, those who advance this perception overlook the fact that platform labor is a historical continuation of a longstanding type of capital–labor relation, which the authors of this article call CBS. CBS has strong efficacy for capital: it can potentially increase production flexibility and reduce labor costs. As noted above, the loose organizational structure

associated with "boundary crossing" means that capital must make use of the laborers' livelihood logic to achieve subsumption, transforming potential benefits into real profits.

Importantly, the precarity of platform labor largely results from platform capital's strategic exploitation of laborers' livelihood logic. In the ride-hailing sector, pursuing a livelihood is the fundamental force that compels drivers to persist in platform work. Capital leverages the livelihood logic to gather a reserve army of drivers, instigate competition, cut costs, prolong working hours, and discipline laborers, all of which may cause labor precarity. In our opinion, the perspective that platform labor is an "outlier" of "standard" labor needs to be reconsidered because it leads to two disturbing issues in policy responses: the tendency to overlook this outlier and the tendency to regulate platform labor as if it were "standard" labor. While the first tendency may exacerbate the precariousness of platform labor, the second one could substantially undermine the basis of the platform economy because the precarity results from capital's way of exploiting platform labor.

We conclude that there is a need for regulatory policies that constrain platform capital's abuse of the livelihood logic of laborers, thus ensuring that laborers can achieve a minimally stable livelihood. Regulations should focus on measures that alleviate laborers' livelihood challenges, improve their bargaining power, and prevent excessive exploitation by platforms. Such efforts should include curbing monopolistic behaviors, reducing laborers' dependence on a single platform, and exploring innovative social security systems tailored to platform laborers, ensuring basic guarantees for their livelihoods.

Rethinking the Technologies of the Platform Economy

The second implication of CBS concerns the limits of the contemporary platform economy. Platforms employ advanced technologies to match laborers and customers, but the platform economy features an asymmetric combination of technologies. That is, advanced technologies increase the number of orders, allowing laborers to make full use of their production capacity, but laborers use traditional technologies to deliver their service. For example, a ride-hailing platform may match a customer with the nearest driver, yet from a technological standpoint the driving process largely mirrors that of the traditional taxi industry. In fact, the platform's service significantly conserves neither labor nor gasoline compared to traditional taxis.

While we do not deny the technological progress made by platforms, we suggest that there are limits to the technological advantages of platforms. The advanced technologies for matching laborers and customers must be complemented by intense labor and other inputs from the laborers; thus, how far a

platform can lower the price of its services is largely constrained by labor and other costs. Marx's analysis of the limits of the "modern domestic industry" remains relevant: because domestic laborers in the past used old-fashioned technologies, domestic industry largely relied on the low cost of labor to survive, but capital inevitably abandoned that industry when the factory system became more technologically efficient.

The technological limits of the platform economy will eventually lead to its demise. In the meantime, platforms cause tensions between capital and laborers. Because there is fierce competition between platforms, platform capital is eager to provide cheap services to attract customers. However, because the price of services is associated with intense labor inputs by platform laborers, capital will inevitably repress the interests of laborers, and this will either intensify labor precarity or induce capital–labor conflicts.

Conclusion

By introducing the concept of CBS, this article sheds light on the intricate relationship between capitalist production and individual production. To this end, we examine three principal themes. First, we attempt to contextualize the platform economy through a historical-comparative lens, unveiling a historical continuity in labor control. The case study of ride-hailing platforms begins by delineating the methods employed by the platforms to attract new laborers, including the reduction of entry barriers and the utilization of temporary rewards and bonuses. Second, we examine how platforms try to stabilize the labor supply by constructing intermediary organizations. Third, we scrutinize platforms' use of screening power to discipline laborers. Laborers cannot intervene in this process and, consequently, they are exposed to the risk of losing their livelihoods.

The concept of CBS centers on the theoretical significance of Marx's capital–domestic labor model. Unlike previous models that centered on market exchange, our concept places production at the forefront of platform studies, rectifying to some extent the limitations found in categories such as the "bilateral market" in orthodox economics and "digital infrastructure" in legal studies and science and technology studies. While the bilateral market concept emphasizes equal horizontal relationships and digital infrastructure depicts the unequal relationship between platform users and "internet landlords," CBS casts light on the vertical power dynamic between laborers and capital. This unique production mode, characterized by CBS, demonstrates resilience but is not without limitations, echoing Marx's insights in his analysis of labor in the "modern domestic industry."

This article also uncovers the political-economic logic that underlies the dynamic conflicts between platform laborers and capital. By highlighting the loose organizational structure of capital–labor relations, the CBS framework inherently acknowledges the importance of the autonomy of laborers. Laborers with autonomy are concurrently inclined to resist or engage in opportunistic actions against capital. Consequently, capital must continually adapt organizational and technological responses to laborers' behaviors that are unfavorable to capital's achieving of labor subsumption. Finally, the CBS framework highlights capital's incorporation of the livelihood logic into its pursuit of profits—a topic not extensively discussed in the previous literature.

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Notes

1. To find drivers to interview, our team randomly selected routes 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.
2. Note that in the factory system, the boundary appears when the production period ends. For instance, when the shift of a worker ends or when the worker is fired, capital does not own the worker's labor power.
3. The first and second conditions both concern the number of laborers. If the platform cannot consistently attract new laborers or retain current laborers, the total number of laborers on the platform will steadily decline. The third condition concerns the quality of the services that laborers offer.
4. The compliance rate is the share of vehicles/drivers among all ride-hailing vehicles/drivers that have an "online ride-hailing vehicle/driver license." To qualify for these licenses, the vehicle or the driver must meet certain requirements. Different municipal governments stipulate different requirements; some, such as local *hukou* status, are extremely difficult for drivers to meet.
5. "Hedging" was an expression used by the interviewee. It means the platform simultaneously adopts two types of arrangements: under the first arrangement, the piece rate that the driver receives is relatively high but the platform does not require the driver to meet a minimum number of orders; under the second arrangement, the piece rate is low but the platform can require the driver to meet a minimum number of orders. The use of both types simultaneously allows the

platform to achieve a stable core supply of labor and a flexible supply of labor, which allows it to withstand variability in the market.

6. Screening can achieve the same effect as firing: both impose threats to the laborer's job and livelihood. But in contrast to firing, screening can be implemented frequently, repeatedly, and cheaply because supervision is digitalized. In most cases, screening does not precipitate resistance among laborers.

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