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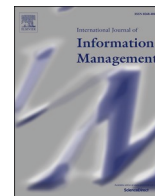
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Research article

Understanding the individual labor supply and wages on digital labor platforms: A microworker perspective

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ABSTRACT

The emergence of crowdsourcing as a new form of work has introduced a paradox among workers who receive small payments for piecemeal microwork yet continue to participate in microwork digital labor platforms (DLPs). To better understand what sustains microworkers' participation, this study draws upon individual labor supply theory to quantitatively examine the impacts of microworkers' motivations, perceptions, and preferences on their labor supply and wages. To explore the meaning of monetary rewards for microworkers, a qualitative inquiry explores microworkers' spending patterns. Based on a survey of 306 microworkers on Amazon Mechanical Turk, our hierarchical regression analysis reveals that while individual motivations for monetary rewards, enjoyment, and microtime structure have some impact on the microwork labor supply and wages, their impact is limited. Our thematic analysis uncovers diverse meanings attached to microwork earnings. The two most noted are meeting subsistence needs and nonessential expenditures, both of which have positive effects on microwork wages. By investigating the elasticity of the microwork labor supply and wages and offering a nuanced understanding of monetary rewards, our study contributes to information management research on DLPs. Moreover, it provides practical insights for various stakeholders, including microworkers, requesters, and DLP operators.

1. Introduction

Advancements in digital technologies have given rise to digital labor platforms (DLPs), which facilitate new forms of work like microwork, tapping into the collective human resources. Platforms such as Uber, Instacart, and Amazon Mechanical Turk (MTurk) have transformed the organization, assignment, and execution of work. Acting like market intermediaries, these platforms connect and match buyers (clients) with sellers (workers) (Harmon & Silberman, 2019), accommodating both digitized and location-specific work. While platforms like Uber and Instacart focus on location-specific services such as transportation and food/grocery delivery (Mäntymäki et al., 2019), others like MTurk and Upwork accommodate digitized work, including general-purpose microwork like image labelling (Deng & Joshi, 2016) and domain-specific freelance work like website design (Taylor & Joshi, 2019).

This study focuses on digitized general-purpose microwork facilitated by DLPs, with a particular interest in the online workforce engaged

in microwork (referred to as microworkers). As a fast-growing model of the gig economy (Kuhn, 2016), microwork DLPs provide individuals from diverse backgrounds with the opportunity to undertake small jobs and earn incomes (Di Gangi et al., 2023). This new form of work is rapidly gaining momentum, evident in platforms like MTurk where more than 500,000 people have registered and 400,000 microtasks are available at any given time (Deng et al., 2023).

Since their inception more than a decade ago, microwork DLPs have presented both opportunities and challenges for microworkers. Despite the promises of monetary rewards, enjoyment, autonomy, flexibility, and work/life balance offered by microwork DLPs (e.g., Deng & Joshi, 2016), researchers have raised concerns regarding unfair treatment and lack of worker protections. For example, prior research has found that workers on MTurk were at risk of being exploited and marginalized (Deng et al., 2016) and were not protected by social insurance (Bieber & Moggia, 2021). Moreover, the low pay rates of microwork diminish the appeal of microworking, yet microworkers continue to participate in the DLPs. However, reasons behind the paradox introduced by

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crowdworking, this new form of work, remain ambiguous. It is unclear why microworkers sustain their engagement in microwork and whether it is possible for them to earn a good wage on microwork DLPs. With this background, in this study, we address the following two questions: 1) *What factors influence microworkers' individual labor supply and wages on a microwork DLP?* and 2) *What does the money earned from microworking mean to microworkers?*

To answer these questions, we draw upon individual labor supply theory, which employs the neoclassical approach to estimate the wage elasticity of the labor supply (i.e., the effect of changes in wage rates on changes in labor supply) regulated by the interaction between income and substitution effects (Hsiaw, 2013; Lazear, 1991; Sharif, 2000). In the context of microworking, however, the clients (task requesters) pay piece rates instead of time rates, rendering the wage rate earned by microworkers unknown. Our study thus investigates the elasticity of not only the microwork labor supply but also wages with respect to microworkers' motivations, perceptions, and preferences. Specifically, we adopted a mixed methods research design (Mingers, 2001) and conducted two studies leveraging data collected from 306 microworkers on MTurk, a popular microwork DLP. The quantitative study tests our proposed research model through hierarchical regression analysis, suggesting that microwork motivations (i.e., monetary rewards, enjoyment, and microtime structure) have a limited impact on the microwork labor supply and wages. Moreover, the motivation for monetary rewards is negatively associated with hourly wages. To further explore the nature of monetary rewards, we performed a thematic analysis of microworkers' patterns of spending microwork earnings and identified two themes—meeting subsistence needs and nonessential expenditures—as the two main purposes that are positively associated with microwork wages. The qualitative study provides additional predictive power for microwork wages, complementing the quantitative study.

This study makes three contributions to information management (IM) research on microwork on DLPs (e.g., Wang et al., 2022). First, the trade-off between work and leisure advances our understanding of labor supply decisions by considering the foregone benefit. Second, the qualitative nature of monetary rewards (e.g., spending purposes) introduces a new theoretical lens through which we can view the fairness judgement of microwork payments and revisit the conceptualization of monetary rewards. Third, the microwork outcomes of supplying labor and providing wages at both macro and micro levels augment motivational studies on intention to participate and enrich the existing research on sustained participation. The findings on the elasticity of the microwork labor supply and wages also offer practical implications for multiple stakeholders on DLPs.

2. Literature review

2.1. Digital labor platforms for microwork

Microwork DLPs connect clients (task requesters) and workers through an open call to trade completion of bite-sized microtasks for a small payment (Horton & Chilton, 2010). These digital platforms allow Internet users worldwide to find microwork that was previously unavailable to them, while enabling employers to access on-demand labor power globally. Apart from monetary rewards, microwork on DLPs provides workers with a channel to acquire knowledge and to practice relevant skills such as writing, typing, information retrieval, and data processing. The conduct of microworking is characterized by autonomy, skill variety, and task simplification (Kaufmann et al., 2011).

Focusing on microworkers' motivations, prior studies have examined factors driving individuals' participation, including making money, improving skills, entertainment, and making an impact (Deng et al., 2016; Ipeirotis, 2008; Kaufmann et al., 2011). The DLPs such as MTurk seem to provide extreme temporal flexibility, giving workers full control over how to spend each hour and minute on a platform. Individuals were attracted to the *autonomy* in making their own decisions on “*what,*”

“*when,*” “*where*” with regard to microworking, and the *flexibility* to perform the small tasks during spare time and get paid seamlessly online (Deng & Joshi, 2016).

Yet scholars have expressed increasing concern about the paradox in this digital workforce. One big concern is about a power imbalance in microworking. Prior research has suggested that the design of the platforms may generate greater market power for task requesters than for workers doing the tasks for pay on the DLPs (Kingsley et al., 2015). In addition, scholars are puzzled by one complex paradox: the payments for the piecemeal microwork are small, yet participation in the microwork DLPs is increasing. Hara et al. (2018) found that the mean hourly wage on MTurk was \$3.13 with the median hourly wage at \$1.77. Despite the low remuneration, an increasing proportion of workers reported microworking as a major income source. According to the 2016 Pew survey of 3370 MTurk workers, 25 % of U.S. workers in the survey considered MTurk as the source of “all or most” of their income even though 52 % of them reported making an hourly rate of \$4.99 or less (Hitlin, 2016).

Against the backdrop of the low remuneration (Ettlinger, 2016), although monetary and nonmonetary factors (e.g., monetary rewards and enjoyment) can motivate workers' participation in DLPs, there is a lack of understanding about how these factors sustain the supply of workers, let alone the extent to which motivational factors spur microworkers to earn higher wages. Prior research on microworkers' allocation of time (Jiang et al., 2021) has highlighted the temporal context of deciding to engage in microworking at a micro level (e.g., per task), but it remains unclear how microworkers make their labor supply decisions on a macro level (e.g., per week). To explore additional factors sustaining microworkers' participation at micro and macro levels, we next review the theory of individual labor supply, which informs our study.

2.2. Individual labor supply theory

The theory of individual labor supply has its roots in the neoclassical model of labor supply that explains an individual's choices in allocating time for work and leisure, which are the primary sources of individual utility (Heckman, 1993). To estimate the amount of time spent on work, the neoclassical theory of individual labor supply posits that the individual chooses the optimal number of work hours to maximize utility given the trade-off between work and leisure. The key factors that affect the individual labor supply decision revolve around the wage rate offered and the individual's preferences for work and leisure, which may vary with the wage rate. The dynamics between wage rate and labor supply, i.e., the wage elasticity of the labor supply, are regulated by substitution and income effects (Boppart & Krusell, 2020). As the wage rate increases, the opportunity cost of leisure rises accordingly, so that the individual is willing to substitute more work hours for leisure hours, which is known as the substitution effect. An increase in the wage rate also leads to the income effect, which may motivate the individual to consume more leisure and work fewer hours. For workers aiming at a target income, such a target serves as a reference goal that regulates workers' labor supply in a dynamic manner (Camerer et al., 1997; Hsiaw, 2013). As the income gets close to the target level, an increase in the wage rate can demotivate the individual from working.

As the substitution and income effects result in mixed relationships between wage rate and labor supply, the net effect depends on which effect plays a dominant role. A conventional labor supply model in the literature is the labor supply curve that distinguishes between the dominance of substitution and income effects based on the levels of the wage rate (Boppart & Krusell, 2020). At a low wage level, when the wage rate increases, an individual worker is willing to work more hours because of the rising opportunity cost of leisure associated with the increase. In this regard, the substitution effect prevails, so that labor supply increases with the wage increase, giving rise to an upward-sloping segment of the labor supply curve. At a high wage level, an increase in the wage rate means that the target income can be earned

by working fewer hours. The importance of leisure becomes salient as the individual income approaches the target level, so the individual is likely to allocate more time to leisure than to work. The income effect dominates the substitution effect, suggesting a negative relationship between wage rate and labor supply, i.e., a backward-bending curve.

While the neoclassical model of individual labor supply remains analytically significant, empirical studies on the relationship between wage rate and labor supply have observed deviations from the conventional utility maximizing hypothesis (Sharif, 2000). For instance, at low wages below a certain level, the quantity of labor supplied increases with a reduction in the wage rate, demonstrating a forward-falling instead of upward-sloping segment (Sharif, 1991). The backward-bending labor supply can occur not only at high wages but also at very low wages.

To explain the observed labor supply behavior, researchers have further emphasized the importance of subsistence and reservation wages, which play a role in adjusting the individual labor supply (Barzel & McDonald, 1973). When a worker lives below a subsistence level, the individual supplies more labor to survive even in the face of a decrease in the wage rate. Although the labor supply theory assumes that the reservation wage establishes a threshold below which the worker prefers to quit supplying labor, the below-subsistence labor supply suggests that the worker may continue working regardless of the reservation wage.

In the context of DLPs, microworkers are informed of the payment for each microtask at a piece rate instead of a formal wage rate. Depending on their task selection and performance efficiency, microworkers can earn different wage rates (Hara et al., 2018). In contrast to the elasticity of labor supply relative to wage rates offered upfront by traditional employers, the wage rates earned by microworkers may be a consequence rather than an antecedent of microwork participation. The lack of formal wage regulations and the varying wage rates earned from microworking mean that the elasticity of the labor supply predicted by the neoclassic model of individual labor supply may not fully depict the dynamics of the labor supply and wages on DLPs. Therefore, it is important for us to consider the wage rate as an outcome and investigate the elasticity of the wage rate along with the labor supply on microwork DLPs.

3. Research design

To address the research questions, for a better understanding of microworkers' individual labor supply and the wages on microwork DLPs, we conducted two studies through a mixed methods approach (Mingers, 2001). Specifically, the quantitative study (Study 1) proposed and tested a research model hypothesizing the effects of microworkers' motivations for, perceptions of, and preferences for microworking on their labor supply and wages. The qualitative study (Study 2) further examined microworkers' perceived meanings of the monetary rewards from microworking by exploring how microworkers spend the money. Our thematic analysis of textual responses by microworkers identified two main uses for microwork earnings, i.e., meeting subsistence needs and nonessential expenditures, which are positively associated with weekly and hourly wages.

The quantitative and qualitative studies complement each other in unravelling the circumstances under which microworkers are willing to supply more online labor and are able to earn higher wages from microworking. While the theory of individual labor supply suggests that the extent to which a worker lives below a subsistence level affects the individual labor supply in traditional workplaces, there is a lack of understanding about how monetary rewards contribute to microworkers' subsistence, which in turn can affect the wages earned from DLPs. The quantitative analysis, using hierarchical regression models, tests the hypotheses derived from individual labor supply theory, whereas the qualitative analysis allows us to further distinguish the nature of the monetary rewards with respect to spending patterns, which are then included into the research model to enhance the predictive power for

microwork wages.

4. Study 1

4.1. Overview

According to the neoclassical model of labor supply (Hsiaw, 2013; Lazear, 1991; Sharif, 2000), an individual's labor supply decision is affected by a set of factors, including the wage offered, the individual's utility for monetary and non-pecuniary rewards provided by working, preferences for exchanging leisure for work, the reservation wage, and whether the individual sets an earnings target. In the context of microwork DLPs, we hypothesize a set of relationships between microworker-related factors and two individual outcomes of microworking (i.e., labor supply and wages), as depicted in the research model in Fig. 1. The microworker-related predictors include three microwork motivations (i.e., monetary rewards, enjoyment, and microtime structure), two perceptions of microworking (i.e., as work and as leisure), and two preferences for microworking (i.e., a reservation wage per task and an earnings target). In this section, we elaborate on the development of each hypothesis.

4.2. Effects of microwork motivations

With the intrinsic and extrinsic motivations identified in prior research on microwork DLPs (Deng & Joshi, 2016), this study examines the effects of two worker motivations—monetary rewards and enjoyment—on the microwork labor supply and wages respectively. Microwork DLPs mediate the supply and demand of digital laborers and facilitate the transactions between task requesters and microworkers (Gandini, 2019). In this regard, a DLP can be regarded as a labor market in which microworkers trade their time and energy in return for monetary rewards. As their motivation for monetary rewards increases, microworkers have a stronger inclination to make money from microworking, so they are willing to direct greater effort toward performing microtasks. A typical indicator of effort is effort duration, i.e., the length of time an individual devotes to a particular task or activity (Bonner & Sprinkle, 2002). Thus, we predict that microworkers will supply more hours of labor as their motivation for monetary rewards becomes stronger:

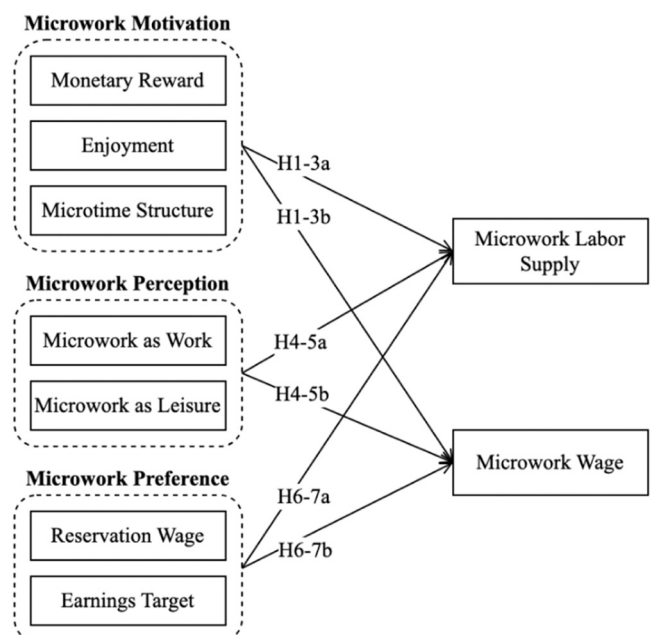


Fig. 1. Research model.

H1a. : The motivation for monetary rewards is positively associated with the microwork labor supply.

Given the economic exchanges on DLPs, microworkers highly motivated by money are likely to make a considerable effort to earn money. In addition to effort duration is the effort devoted to learning, characterized as strategy development (Bonner & Sprinkle, 2002), which helps improve microwork wages. High earning workers on MTurk utilize a strategic approach to selecting microtasks that are worth performing (Savage et al., 2020). The money-market relationships render the exchanges between microwork effort and payments transactional, suggesting a positive relationship between the motivation for monetary rewards and microwork wages (Heyman & Ariely, 2004). Therefore, we predict:

H1b. : The motivation for monetary rewards is positively associated with microwork wages.

Besides monetary rewards, microworkers may be intrinsically motivated by the enjoyment of microworking. For instance, performing the microtask of image labelling is perceived as playing games by some workers, so they are willing to spend time on microworking despite the low pay rates (Upchurch et al., 2016). Such an intrinsic motivation for enjoyment may attenuate the disadvantage of low payment so that microworkers are willing to spend time on performing interesting microtasks. This reasoning leads to the following hypothesis:

H2a. : The motivation for enjoyment is positively associated with the microwork labor supply.

With the presence of enjoyment as an intrinsic motivation, making money may play a less dominant role in microworkers' participation. When microworkers are motivated by enjoyment, it is the intrinsic appreciation (e.g., interest, meaningfulness) rather than the extrinsic payment that exerts a greater impact on microworkers' participation. A higher motivation for enjoyment may prompt microworkers to devote more time to microworking even though they may not be able to earn a proportionate amount of money in return, thereby resulting in a lower level of microwork wages. In this regard, microwork wages could decline as microworkers' motive of pursuing enjoyment increases. Thus, we hypothesize:

H2b. : The motivation for enjoyment is negatively associated with microwork wages.

Microtime structure is another important factor in microwork motivation. Microtime structure refers to the extent to which microworkers make use of small blocks of time in a structured and purposive way (Jiang et al., 2021). The granular microtasks can easily fit into small chunks of time (e.g., several minutes) that would otherwise be wasted or undervalued. For instance, microworkers perceive performing microtasks as a more fruitful way to spend free time than watching TV, playing online games, or otherwise wasting that time (Ipeirotis, 2008), suggesting their tendency to allocate time to a productive activity. Microtime structure could motivate microworkers' participation, but the small amounts of time spent on microworking may reduce the labor supply. Thus, we predict:

H3a. : The motivation for microtime structure is negatively associated with the microwork labor supply.

Moreover, the short, bite-sized microtasks that fit the motivation for microtime structure are highly likely to provide lower pay rates (e.g., one cent per task for image labeling), compared with relatively long, complex microtasks (e.g., five dollars per task for audio transcription). Compensated by the productive use of microtime on top of monetary rewards, microworkers who are motivated by microtime structure are more likely to perform microtasks with lower payments, resulting in lower wages. Therefore, we predict:

H3b. : The motivation for microtime structure is negatively associated

with microwork wages.

4.3. Effects of microwork perceptions

Work and leisure are differentiated in traditional workplaces. Work is understood to be remunerative, required by social norms, and necessary for the maintenance of the self and family, whereas leisure is "nonwork," not remunerative, not required by social expectation, and not necessary for survival (Kelly, 1972). While the formal paid job makes work distinguishable from leisure, researchers take a subjective perspective and consider leisure a state of mind or a psychological experience (Neulinger, 1981). That is, leisure is a mental and spiritual attitude that connotes inward freedom, calm, and pleasure, regardless of the time and form. Due to the distinct nature of work and leisure, an individual's labor supply in traditional employment depends on the work-leisure dichotomy, i.e., the trade-off between allocating time to work and to leisure activities.

Different from employment in traditional workplaces, microworking on DLPs can blur the work-leisure dichotomy because microworkers may perceive microwork as both work and leisure. The perception of microwork as work refers to the extent to which microworkers perceive completing microtasks to be like regular work (e.g., a salaried job), whereas the perception of microwork as leisure refers to the extent to which microworkers perceive completing microtasks to be a leisure activity. Given the time spent on DLPs, available activities competing against each other are not only market activities like regular work, but also non-market activities like homemaking and leisure activities. Therefore, microworking can be the equivalent of not only a regular job but also a leisure activity. The traditional work-leisure dichotomy turns into the coexistence of perceptions of microwork as both work and leisure for microworkers on DLPs.

The perception of microwork as work renders microworking as a counterpart to a salaried job in a traditional workplace, which requires a supply of labor on a regular basis and provides a primary income for subsistence. Microworkers with the perception of microwork as work are highly likely to routinize microworking on DLPs as a nine-to-five job online, especially if they are unemployed, or as overtime, complementing their salaried job (Keith et al., 2019). Therefore, the greater the extent to which microworking is perceived as work, the larger will be the quantity of labor supplied to microwork. Thus, we predict:

H4a. : The perception of microwork as work is positively associated with the microwork labor supply.

In microworking on DLPs, the amount of payment for a microtask is predefined by its requester, but the wages earned by a microworker during a specific time period (e.g., one hour) can vary with his or her attitude toward microworking. Perceiving microwork as regular work, microworkers may strive to earn a wage comparable to the wages of a salaried job (Kaufmann et al., 2011). To match microwork wages with salaries in traditional workplaces, perceiving microwork as a regular job may prod microworkers into honing their microwork skills (e.g., searching for high-paying tasks, enhancing efficiency in task completion), which can result in high wages. Based on the reasoning, we hypothesize:

H4b. : The perception of microwork as work is positively associated with microwork wages.

By contrast, when microworkers perceive microworking as leisure, their labor supply is probably limited to the leisure time domain (e.g., off-the-job hours). If microworkers are fully employed in regular workplaces, the leisure perception renders the time spent on microworking as leisure time, which is casual and ad hoc. With a relaxed state of mind, microworkers have no urge to devote substantial time and effort to performing microtasks; thus, their commitment to a microworking routine is not serious, suggesting a small labor supply. Therefore, we hypothesize:

H5a. : The perception of microwork as leisure is negatively associated with the microwork labor supply.

Perceiving microworking as leisure also implies that money is not the paramount concern. As enjoyment and the playfulness of leisure become more salient, microworkers probably pay more attention to the hedonic nature of microwork (Kasunic et al., 2019), allowing them to prioritize the inherent interest over the external payments for microtasks. The pleasure from microworking may attenuate microworkers' desire for a money reward, resulting in a lower wage. Thus, a higher degree of leisure perception may be associated with lower wages:

H5b. : The perception of microwork as leisure is negatively associated with microwork wages.

4.4. Effects of microworker preferences

In a traditional workplace, the reservation wage can be considered the minimum acceptable market rate of return to labor in the formal or informal sector, i.e., the rate below which workers will reject a job offer (Lippman & McCall, 1976). The reservation wage rate can take different forms, such as an hourly wage in developed countries or a daily wage in developing countries. As a function of the worker's preference and unearned income, the reservation wage sets the low limit to the labor supply (Sharif, 2000). Assuming that individuals will quit working when the wage rate is below the reservation level, the neoclassical economic model of labor supply examines the relationship between the quantity of labor supplied and the wage rate above the reservation wage.

Microworkers on DLPs may also set a reservation wage for the monetary rewards of their labor. Because the wage rate can vary vastly across microtasks and microworkers, it is difficult for microworkers to calculate an accurate hourly or daily rate to set the reservation level before they participate. Instead, microworkers can easily obtain the information for each microtask payment, which provides a feasible way to filter out tasks with payments below a specific amount. In the context of DLPs, we investigate the reservation wage at the task level, i.e., the pay rate per task below which a microworker is not willing to accept the microtask. The lower the reservation wage, the more microtasks are acceptable to microworkers, which may increase the labor supplied for completing more microtasks. Therefore, we hypothesize:

H6a. : The reservation wage is negatively associated with the microwork labor supply.

However, a lower reservation wage makes it more likely for microworkers to perform microtasks with lower payments, which in turn may reduce the level of wages. By contrast, when microworkers set up a high reservation rate, they pass up microtasks below their reservation wage, which are probably low-paying tasks, and focus on those tasks fulfilling their minimal expectations. As the reservation wage increases, the wages earned by microworkers may increase:

H6b. : The reservation wage is positively associated with microwork wages.

In addition to the reservation wage as the low bound of the pay rate per task, workers may also set a target level for their earnings, another important worker preference that affects labor supply (Altman, 2001). Considering the absence of worker's reference-dependent preferences in the classical model of labor supply, the target earnings model of labor supply explains how an income target can serve as an internal commitment device that prevents workers from early quitting (Camerer et al., 1997; Hsiaw, 2013). Setting target earnings has also been observed in microworking: some microworkers are "target earners," aiming at certain earnings targets (Horton & Chilton, 2010).

Regarding target earnings as a personal goal for reference, workers have the tendency to work toward the target level with persistence. Prior research on the daily labor supply found that workers with reference dependence over an earned income target earn more than those without

such a reference (Dupas et al., 2020). Target earners, compared with microworkers without an earnings target, are driven by pursuing their goal; they are likely to dedicate more time and effort to microworking, increasing the labor supply. Thus, we hypothesize:

H7a. : The microwork labor supply is higher for microworkers who have earnings targets than for those who have no earnings targets.

When it comes to wages earned from microworking, the aim of achieving an earning target may be conducive to improving wages by spurring microworkers to strategize their microwork practices (Savage et al., 2020). As the microtask payments range from little to none, to attain their earnings goal, target earners need to either strategically choose microtasks with payments that are worthy of the time and effort or strive to complete more microtasks during a time period. Thus, an earnings target may motivate microworkers to earn higher wages by calculated attempts at microworking. Therefore, we predict:

H7b. : Microwork wages are higher for microworkers who have earnings targets than for those who have no earnings targets.

5. Research method

5.1. Data collection

We selected MTurk as the sample site for our empirical study, as it is a general-purpose microwork DLP with a representative range of microtasks (Hara et al., 2018), such as relevance evaluation, data digitalization, audio transcription, and image labelling. Such simple microtasks on MTurk are referred to as "human intelligence tasks" (HITs). Workers on MTurk choose from available HITs and complete them in exchange for small payments. We administered our survey as a HIT, offering each respondent one dollar for completing the survey HIT on MTurk. A total of 347 workers clicked the survey link and 306 completed responses were collected. The descriptive statistics for the sample are presented in Table 1.

In line with the composition of MTurk workers in terms of their country of residence, majority of the respondents in our sample were from India (57.52 %) and the U.S. (38.24 %). Of the 306 respondents, 60.46 % were male, 78.76 % were between 20 and 39 years old, 78.43 % had a bachelor's degree or higher education level, and 51.63 % were fully employed. The sample demographics are consistent with those of MTurk workers in prior studies (e.g., Deng & Joshi, 2016; Difallah et al., 2018; Goodman et al., 2013; Jiang et al., 2021; Ross et al., 2010). As shown in Table 1, the sample consisted of microworkers performing different types of microtasks (HIT types) with varying levels of microwork experience (MTurk tenure).

5.2. Measurements

The measurements of the constructs in the research model include items adapted from previously validated measurement scales with wordings modified for the microwork DLP context, along with self-developed items asking factual questions related to microwork behavior and wages on MTurk (see Supplementary Appendix A for the measurement items). Additionally, we collected demographic information as control variables: age, gender, country, education, employment status, and tenure (in months) on MTurk (see the descriptive statistics in Table 1). Some of the variables were coded as dummy variables: gender (1 = male, 0 = female), employment status (1 = fully employed, 0 = not fully employed), and country (1 = India, 0 = not India). Below we present the measurements in detail.

Microwork Motivations Based on the previously validated Work Preference Inventory (WPI) (Amabile et al., 1994), we measured monetary rewards and enjoyment as extrinsic and intrinsic motivations. Microtime structure is measured by the Time Structure Scale (Bond & Feather, 1988; Feather & Bond, 1983), which was adapted to the

Table 1
Descriptive statistics of sample demographics.

Demographic variable	Level	Frequency	Percentage (%)
Gender	Male	185	60.46
	Female	121	39.54
Country	USA	117	38.24
	India	176	57.52
	Other	13	4.25
Age	< =19	6	1.96
	20-29	150	49.02
	30-39	91	29.74
	40-49	30	9.80
	50-59	21	6.86
Education	> =60	8	2.61
	High school	45	14.71
	Vocational / Technical school	21	6.86
Employment status	Undergraduate	156	50.98
	Master / Postgraduate	84	27.45
	Full-time job	158	51.63
	Part-time job & Not a student	45	14.71
	Unemployed & Not a student	47	15.36
Most frequent HIT type	Part-time student	16	5.23
	Full-time student	40	13.07
	Information gathering	38	12.42
	Data verification / clean-up	41	13.40
	Photo / video processing	31	10.13
	Data processing	32	10.46
Tenure on MTurk	Filling out surveys	154	50.33
	Other	10	3.27
	< = 12 months	142	46.41
	13 - 24 months	105	34.31
	25 - 36 months	42	13.73
	37 - 48 months	11	3.59
49 - 60 months	5	1.63	
> 60 months	1	0.33	

microwork context by anchoring to the microtime allocated to microworking. Each item was answered on a seven-point Likert scale (1 = “strongly disagree” and 7 = “strongly agree”). The reliability, as measured by Cronbach’s alpha, for the three motivations are acceptable (i.e., 0.66 for monetary reward, 0.84 for enjoyment, and 0.84 for microtime structure).

Perceptions of Microworking Informed by the research on the definition of leisure (Iso-Ahola, 1979), we measured the perception of microwork as leisure by asking microworkers to evaluate the activity of completing HITs on MTurk with a unipolar attitude scale (i.e., 1 = “not leisure at all” and 7 = “leisure at its best”). There is no extant instrument to measure the perception of microwork as work, so we developed a counterpart item (i.e., 1 = “not work at all” and 7 = “completely work”), according to the unipolar item for the perception of microwork as leisure.

Microworker Preferences Microworkers’ reservation wage per task was measured by their preference for filtering out microtasks whose payments are below a specific amount. Microworkers were asked whether they filtered microtasks by payment per task. If the answer was yes, microworkers were required to specify the amount below which microtasks were excluded; otherwise, the reservation wage was regarded as 0. Microworkers’ preference for setting an earnings target was operationalized as a dummy variable, namely a target earner, by asking whether they set up an earnings target when completing microtasks on MTurk.

Microwork Labor Supply and Wages The microwork labor supply was measured by the self-reported duration of microworking at both a macro and micro level: weekly hours (i.e., the number of hours spent on microworking per week, on average) and minutes per task (i.e., the number of minutes spent on one microtask, on average). We measured

microwork wages at two rates: weekly wages (i.e., self-reported amount of money earned per week) and hourly wages (i.e., weekly wage divided by weekly hours).

5.3. Data analysis

Given that all constructs were measured by the survey data, we examined common method bias using Harman’s single factor test (Harman, 1976), which posits that common method bias presents if a single factor accounts for more than 50 % of the variance of all constructs. In our study, the variance explained by one factor is 24.4 %; thus, common method bias is not a serious concern. To test multicollinearity, we further calculated the variance inflation factor (VIF) values for predictors and control variables. The results are VIF values between 1.04 and 2.08 (see Supplementary Appendix B), below the threshold of 3.3 (Kock & Lynn, 2012), suggesting that the data are not subject to multicollinearity.

We then conducted descriptive and correlation analyses of all constructs and present the results in Table 2. Among all 11 constructs, three latent constructs related to microwork motivations, i.e., monetary reward, enjoyment, and microtime structure, were measured by multiple reflective items, whereas the remaining were measured by single items because of their factual nature. Through the confirmatory factor analysis of the three microwork motivations, we calculated their average variance extracted (AVE) and composite reliability (CR), as presented in Table 2 with the squared roots of AVEs in the diagonals. The values of AVEs exceed 0.5 and those of CRs are greater than 0.7, indicating convergent validity and reliability at an adequate level (Shrestha, 2021). The square roots of the AVEs of the three constructs are greater than their correlations with any other constructs, suggesting the discriminant validity of the multi-item constructs (Fornell & Larcker, 1981). The values of AVEs and CRs of the remaining single-item constructs are one by default.

To distinguish between the significance of the effects of different predictors on the two outcomes, we conducted hierarchical regression analysis, entering predictors into the regression model in steps to see the change in R-squared. In this study, the hierarchical regression is iterated in four steps, through which control variables, three microwork motivations (i.e., monetary rewards, enjoyment, and microtime structure), two perceptions of microworking (i.e., microwork as work and microwork as leisure), and two microworker preferences (i.e., a reservation wage and an earnings target) are included in the regression model sequentially. The change in R-squared as per F-statistic was tested by the analysis of variance (ANOVA) across the stepwise models.

6. Results

The results of the hierarchical regression analysis are presented in Table 3. The predictive powers of the independent variables on the microwork labor supply differ between the macro (i.e., weekly hours) and micro (i.e., minutes per task) level. Among the three microwork motivations, while the motivation for monetary rewards has a positive effect on the microwork labor supply at the macro level, enjoyment has no significant impact. The negative relationship between microtime structure and the labor supply is significant at both the macro and micro levels. Microworkers’ perceiving microwork as work exerts a positive effect on weekly hours of microworking, whereas target earners spend less time per task than those without an earnings target. Thus, the results support H1a, H3a, and H4a, but do not support H2a, H5a, H6a, and H7a.

Regarding microwork wages, the positive relationship between the motivation for monetary rewards and weekly wages is crowded out by the effect of the perception of microwork as work, yet the motivation for monetary rewards is negatively associated with hourly wages. Neither enjoyment nor microtime structure affects microwork wages. The positive effect of work perception and the negative effect of leisure perception are significant for weekly wages but not hourly wages.

Table 2
Descriptive statistics of and correlations among variables.

Variable	AVE	CR	Mean	SD	1	2	3	4	5	6	7	8	9	10	11
1. Monetary reward	0.58	0.78	5.70	0.95	0.77										
2. Enjoyment	0.68	0.87	5.25	1.23	0.11	0.83									
3. Microtime structure	0.58	0.77	5.19	1.21	0.10	0.59	0.76								
4. Microwork as work	1.00	1.00	5.39	1.44	0.34	0.17	0.03	1.00							
5. Microwork as leisure	1.00	1.00	4.41	1.76	-0.02	0.37	0.44	-0.10	1.00						
6. Reservation wage	1.00	1.00	0.50	3.23	0.08	-0.02	0.01	0.01	-0.01	1.00					
7. Earnings target	1.00	1.00	0.49	0.50	0.33	-0.06	-0.02	0.13	-0.05	0.13	1.00				
8. Weekly hours	1.00	1.00	20.93	14.83	0.25	0.11	-0.06	0.38	-0.08	0.04	0.09	1.00			
9. Minutes per task	1.00	1.00	14.48	11.45	0.01	0.04	-0.13	-0.01	-0.06	-0.10	-0.13	-0.10	1.00		
10. Weekly wage	1.00	1.00	41.51	45.43	0.17	-0.11	-0.06	0.12	-0.18	0.13	0.29	0.32	-0.19	1.00	
11. Hourly wage	1.00	1.00	2.70	3.83	-0.10	-0.18	-0.07	-0.09	-0.08	0.02	0.08	-0.26	-0.05	0.46	1.00

Notes: Diagonal elements are the squared roots of AVEs of reflective constructs; off-diagonal elements are correlations among latent constructs. AVE: average variance extracted; CR: composite reliability; SD: standard deviation.

Although the relationship between reservation wages and earned wages is not significant, target earners have a higher weekly rate than those without an earnings target. Thus, the regression results of microwork wages lend support for H4b and H7b.

The mixed effects of the motivation for monetary rewards on the microwork labor supply (positive for weekly hours) and wages (negative for hourly wages) suggest that longer hours of microworking may dilute hourly wages due to diminishing marginal returns. Microworkers' perceiving microwork as regular work serves as a salient predictor of labor supply and wages at the macro level (i.e., weekly basis), whereas the perception of microwork as leisure compensates for monetary rewards, given its negative association with weekly wages.

Certain control variables are significantly associated with the microwork labor supply and wages. The country where microworkers reside plays a significant role, in the sense that Indian workers supply more hours per week yet earn less than workers from other countries (e.g., the U.S.), which is probably due to the different levels of economic development. In addition, those who have a longer tenure as a registered worker on MTurk have lower weekly wages and hourly wages, suggesting that the rate of microwork wages decreases with microwork experience.

The ANOVA analysis results of the stepwise models are also shown in Table 3. We included the control variables only in the base model. Adding new predictors to the regression step by step has increased the R-squared accordingly (see the ΔR^2 in Table 3), the significance of which is tested by the F statistic (see the ΔF Statistic in Table 3). Although there are significant increases in R-squared with respect to weekly hours (Models 2–4), minutes per task (Models 6–8), and weekly wages (Models 10–12), the models on predicting hourly wages witnessed few changes in R-squared for Models 14–16.

As the last step of the hierarchical regression involves Model 4, 8, 12, and 16 consisting of all predictors, to check the robustness of the hierarchical regression, we conducted structural equation modeling (SEM) analysis using smartPLS 4 (i.e., a typical software for component-based SEM suited for predictive applications explaining variance) to test the entire proposed model predicting the four dependent variables simultaneously (Gefen et al., 2000). The results of the SEM analysis (see Supplementary Appendix C) are consistent with the regression results in Table 3, suggesting robust results derived from the hierarchical regression analysis.

7. Study 2 - qualitative study

7.1. Overview

To understand the limited predictive power of microwork motivations, specifically the motivation for monetary rewards, we addressed the second research question about the meaning of money by conducting a follow-up qualitative study exploring the patterns in spending microwork wages. To obtain an in-depth understanding of how the money

earned from microworking meets microworkers' consumption needs, we also inquired how the microworkers spent the money through an open-ended question, "How do you usually spend the money earned from Mechanical Turk?" in the survey. To analyze microworkers' responses, we adopted thematic analysis (Boyatzis, 1998; Braun & Clark, 2006), a qualitative method for identifying, analyzing, and reporting certain themes or patterns across an entire data set.

7.2. Method

Following the thematic analysis guidelines articulated by Braun and Clark (2006), we first carried out an open coding to identify an initial pool of codes. Next, we sorted and grouped codes to higher-order themes based on commonalities among first-order codes, and collated each code's data extracts to its corresponding theme, constructing a data structure with abstractness for deriving theoretical insights from the inductive research (Gioia et al., 2013). We then iteratively refined the themes through screening all collated extracts for each theme and made necessary revisions. After checking for any missing codes, we finalized the set of themes and organized subgroup codes in a hierarchical structure.

To facilitate the thematic analysis of the qualitative data, we developed a coding scheme that includes descriptions of the codes, indicators specifying the key characteristics of the codes, qualification and exclusion criteria, and examples (see Supplementary Appendix D). To ensure the reliability of our thematic analysis, two independent coders followed the coding scheme and analyzed the data using NVivo 10, a qualitative data analysis software. The inter-rater reliability of the results is satisfactory, with a Cohen's Kappa index of 0.908. We finalized the results of the thematic analysis by resolving the discrepancies between the two coders' results through further discussion to reach consensus (see the examples of the discrepancy resolution process in Supplementary Appendix E).

7.3. Results

We classified the codes emerging from the thematic analysis into six themes: meeting subsistence needs, nonessential expenditures, purchasing, financing, other uses, and general purpose, each of which includes multiple codes specifying detailed sub-categories. The themes and codes are not mutually exclusive: a microworker could spend his or her microwork earnings for multiple purposes. For instance, one could allocate a portion of the money for subsistence needs such as food, and the remaining amount to nonessential expenditures such as movie tickets. The diverse codes suggest that the money earned from microworking entails a wide range of meanings to different microworkers.

The results of our thematic analysis show that microworkers distinguish between subsistence needs from nonessential expenditures, providing empirical evidence for microworkers' subjective meanings attached to money. Of the respondents, 58.82% allocated microtask

Table 3
Results of hierarchical regression.

Independent variable	Dependent variable																				
	Microwork labor supply						Minutes per task						Hourly wage								
	Weekly hours			Model 3			Model 4			Model 5			Model 6			Model 7			Model 8		
	Model 1	Model 2	Model	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12	Model 13	Model 14	Model 15	Model 16				
Monetary reward	0.257 **	0.154 **	0.148 *	0.022	0.047	0.089	0.076	0.02	0.073	0.166 **	0.076	0.02	-0.347 ***	-0.108 +	-0.126 *						
Enjoyment	0.104	0.109	0.11	0.106	0.113	0.111	0.114	0.116	-0.014	0.089	0.114	0.116	0.084	-0.007	-0.007						
Microtime structure	-0.179 *	-0.144 *	-0.218 **	-0.225 **	-0.218 **	-0.216 **	-0.027	0.026	0.022	-0.04	0.027	0.026	-0.078	0.044	0.044						
Microwork as work	0.289 ***	0.287 **	0.287 **	0.056	0.083	0.075	0.057	0.047	-0.015	0.234 ***	0.217 **	0.217 **	-0.018	0.094	0.088						
Microwork as leisure	-0.035	-0.035	-0.037	-0.039	-0.039	-0.037	-0.142 *	0.068	-0.042	-0.142 *	-0.142 *	0.068	0.075	-0.042	0.088						
Reservation wage	0.181 **	0.169 *	0.052	0.07	0.066	0.061	0.178 **	0.178 **	-0.012	0.068	0.178 **	0.178 **	-0.349 ***	-0.042	-0.012						
Earnings target (Yes)	-0.079	-0.054	-0.04	-0.069	-0.062	-0.063	-0.503 ***	-0.457 ***	-0.374 ***	-0.361 ***	-0.503 ***	-0.457 ***	-0.347 ***	-0.389 ***	-0.374 ***						
Country (India)	0.068	0.041	0.013	0.042	0.03	0.042	0.089	0.084	0.089	0.076	0.089	0.084	0.09	0.084	0.086						
Gender (Male)	-0.025	-0.021	0.004	0.042	0.031	0.042	-0.02	-0.032	-0.084	-0.032	-0.07	-0.082	-0.078	-0.071	-0.086						
Age	0.01	0.04	0.037	0.056	0.083	0.075	0.041	0.036	0.041	0.036	0.057	0.047	-0.018	-0.007	-0.008						
Education	0.04	0.022	0.031	0.091	0.085	0.088	-0.002	0.011	0.014	0.011	0.014	0.022	0.085	0.076	0.082						
Employment (Full-timer)	306	306	306	306	306	306	306	306	306	306	306	306	306	306	306						
Tenure (month)	0.038	0.119	0.185	0.026	0.058	0.063	0.153	0.186	0.249	0.153	0.249	0.283	0.169	0.174	0.183						
Observations	0.038	0.081	0	0.026	0.032	0.024	0.153	0.033	0.063	0.153	0.063	0.034	0.169	0.005	0.009						
R ²	1.98 +	9.67 ***	11.74 ***	1.319	3.48 *	0.81	9.01 ***	4.46 **	12.83 ***	9.01 ***	4.46 **	6.83 **	10.12 ***	0.63	1.58						
ΔF statistic																0.7					

Notes: + p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001

earnings to meeting subsistence needs in terms of necessities (e.g., food, rent), education expenses, and bills. For example, one respondent spent the microwork earnings for necessities such as, “Paying for electricity bills, mobile recharge, petrol allowance. Likewise, I greatly spend that money for my basic needs. thanks to mechanical turk.” Another microworker spent the earnings for the educational purposes, explaining that “I buy supplies that I need for school or books.” As reflected in the microworker remarks, the earnings from their microwork play a role similar to that of a regular income from a traditional workplace. Despite the small amount of microtask pay, for those who have difficulty making ends meet, the monetary rewards can be an essential, accessible, and stable source of income to survive.

In addition to meeting subsistence needs, money from microworking was also set aside for nonessential expenditures, something not in their regular budget. For some workers, their nonessential expenditures may be spending on a purchase they normally consider unnecessary or a luxury, as one worker elaborated, “I would spend money earned on AMT to buy some gadgets, toys (for my son) or things which I would hesitate or think twice to buy with my regular income.” For other workers, nonessential expenditures may be for leisure, like dining out with friends: “Eating out with friends without dipping into the money I earn at my real job.” One quarter of the respondents considered microtask payments as “extra” earnings, instead of money for survival. Some workers even attempted to collect the extra small payments to use for big, nonessential purchases, e.g., golfing, or a fancy dinner. The small payments could, over time, accumulate to serious money, especially when workers realized that through routine and hard work, they could amass enough for fairly large expenditures such as vacations.

Some microworkers also mentioned that they spent their microwork earnings on purchases (e.g., “buy some items through amazon.com”, “buy electronic devices”), or saved up the money for financing, as one worker explained, “The primary purpose is saving for my only daughter. I use the money for purchasing gold for her. It is a great asset for her future.” Some ad hoc purposes (e.g., donation or treats for dogs) were included in the theme of “other use,” whereas in the “general-purpose” category, 2 % of the respondents did not distinguish between microwork earnings and other sources of incomes.

Table 4 presents all codes and more examples. Among the six themes, microworkers mentioned meeting subsistence needs and nonessential expenditures as two major purposes for microwork earnings. Consequently, we regarded these two themes as two dummy variables denoting the two typical purposes of consumption and included them into the hierarchical regression model to analyze their effects on the microwork labor supply and wages. As shown in Table 5, while meeting subsistence needs and nonessential expenditures have no significant impact on the microwork labor supply, they are positively associated with the rates of microwork wages. Compared with the regression results of the proposed hypotheses (i.e., Models 4, 8, 12, and 16 in Table 3), the addition of meeting subsistence needs and nonessential expenditures brings about significant increases in the R-squared of weekly wages (ΔF Statistic = 4.60, p < 0.05) and hourly wages (ΔF Statistic = 4.32, p < 0.05), suggesting that the nature of monetary rewards also plays a significant role in predicting microwork wages.

Factoring in whether microwork earnings meet subsistence needs or provide for nonessential expenditures deepens our understanding of the role monetary rewards play in the microwork labor supply and wages. Although the association between meeting subsistence needs and the labor supply is not significant, microworkers’ deliberately attaching specific purposes to microwork earnings has a positive impact on their wage rates, uncovering the significance of the qualitative meanings of monetary rewards and the nuances underlying monetary rewards in addition to the motivational perspective and quantitative measure of money.

Given the diversity of our sample (see the demographic statistics in Table 1), we performed post hoc analysis by comparing the values of all constructs and the regression results of the full model across different

Table 4
Theme structure and code frequency for spending microwork wages.

Theme	Code	Frequency	Excerpt example
Meeting subsistence needs (n = 180 / 58.82 %)	Necessities and daily expenses	153	<ul style="list-style-type: none"> I usually have to need money for my all my basic needs, I'm a poor student and my family don't support me so i need to work on AMT I spend the money for meeting the household requirements. The pension I get is not enough to meet my household requirements. Toward rent, bills, food and other necessities. Gas for car, essentials like shampoo, tea at cafe as have nowhere else to spend time (homeless)
			<ul style="list-style-type: none"> I usually have to need money for my all my basic needs. I'm a poor student and my family don't support me so i need to work on mturk. MTurk money greatly helps me make basic ends meet. It will use for my day today life expenses.
			<ul style="list-style-type: none"> I have Two Children. My Earnings are fully and fully go to my Children Education. Its helps to my child studies. Through this I will say the Thanks to Mechanical Turk. Its helps to my child Growth. Thanks for give the opportunity to work with your hits. I mostly use money earned from Mechanical Turk to my educational purposes I am spending the money for educational loan. I use the other half to make an extra student loan payment. i spend the money for college studies I use it to pay my child's school fees To look after my daughter's education.
			<ul style="list-style-type: none"> I put it in a special account which I use to pay extra on my credit cards each month. I clear all my small debts with that money I surprised my husband with \$600 to pay off our credit card bill. I've just been saving it thus far, but I'll probably use it toward some credit card bills. Providing our loan amount interest. I make my loan payments first. Repay money lent to me by family
Debt or credit card bill		15	<ul style="list-style-type: none"> If it is not needed for bills, I use it for repairs that otherwise would get put off
Other basic needs		20	

Table 4 (continued)

Theme	Code	Frequency	Excerpt example
Nonessential expenditures (n = 77 / 25.16 %)	Nonessential or luxurious things	66	<ul style="list-style-type: none"> (brakes for the car, a graphics card for a computer that is constantly crashing because of an old graphics card) I buy some clothes or shoes or other goods for myself I spend the money exclusively for me. I buy clothes, accessories, shoes, watches etc. I will usually spend the money for my child to buy clothes, toys etc. Meeting my needs like apparels, gadgets etc. I spend it to buy cosmetics. I spend for my wife's medical treatment Medicines, prescriptions I would spend money earned on AMT to buy some gadgets, toys (for my son) or things which I would hesitate or think twice to buy with my regular income. I don't have enough income to have a luxury life but it is enough to meet my basic needs and to have a small saving. So Money made from AMT is mostly used to purchase above mentioned items and to so some online shopping including apparels, house hold items, accessories, etc. and at times charities. Small purchases I normally wouldn't make, or would feel guilty making - for example, unneeded leisure/ fun purchases on things I don't really need. Occasionally, I use mTurk funds to assist in paying for a big purchase I need, but wouldn't have enough money for otherwise. On a rare occasion order something from Amazon that I would not otherwise have been able to afford. On frivolous amazon purchases on which I would not normally spend my money earned from my full-time job. Buying nonessential items like electronics. Spending for extra luxury purchase. Vacation and small luxuries On things I want but don't need. For example, a special kind of shampoo instead of just regular shampoo.
			Pocket money

(continued on next page)

Table 4 (continued)

Theme	Code	Frequency	Excerpt example
	Leisure	37	<ul style="list-style-type: none"> • To fulfill my pocket money • Mainly to support my hobbies or to buy things that are meant to be used for leisure purposes. Books can be an example. • On fun stuff. If I wasn't getting something completely fun out of it, I don't think I could justify the low pay rate. • To give the partial amount to "Ashrama" for my happiness. • Golfing stuff or a fancy dinner out with my wife. • Small purchases I normally wouldn't make, or would feel guilty making - for example, unneeded leisure/fun purchases on things I don't really need. • The occasional fun purchase (I just bought a video game last night with it). • A trip that I took to Virginia last year to see an airshow.
	Gifts	14	<ul style="list-style-type: none"> • It also paid for my step-mother's birthday present, my son's birthday present • If there is a special occasion coming up (holiday, birthday, etc.) I will use part of the money that I would normally save to buy gifts. • I use it to cover expenses for gifts. • I use it as my extra money to spend on gifts. • I usually buy things from amazon.com and gift it to friends, relatives on their birthday. • I have used some of the money to buy items for my baby, such as Christmas and birthday gifts. • Small gift for my lovely wife. • All of my Christmas gift shopping.
	Other extra spending	15	<ul style="list-style-type: none"> • Extra expenditure not essentials • I also spent a whole month's worth of income (\$500) on taking my wife out for her birthday. It's an interesting experience to buy an \$80 bottle of wine that you know would cost only \$27 in the store, and also know that it took 5-6 days of hammering on a keyboard to make the money for that wine. One sips it, and feels that it was a \$1000 bottle... • I spend it on books and Music CDs that I cannot buy from the country I currently reside in. • I typically use the money earned for extras, such as

Table 4 (continued)

Theme	Code	Frequency	Excerpt example
Purchasing	Amazon purchase ^a	17 (n = 41 / 12.40 %)	<ul style="list-style-type: none"> • holiday items for my daughter, • The money I usually earn on here goes toward cigarettes and soda. • To support my home brewing. • I have spent some on perennial plants for my gardens • Fulfilling small wishes • I usually transfer the money to my Amazon account and keep it there until I need to purchase something from there. • I convert it to credit on Amazon's main website and buy photography supplies, clothes, candy, books, etc. I have never actually moved the money to my bank account. I spent it all on Amazon. • Toward my amazon purchases - kind of like a coupon for amazon • Buy stuffs from amazon for personal uses. • I spend my earning for Amazon online shopping only • Sometimes on Amazon gift cards.
	Electronic devices	9	<ul style="list-style-type: none"> • I usually spend the money by buying electronic gadgets • Buy computer parts • I always look to purchase new electronic devices like mobile, tablets • Buy some electronic items • Used to buy the mobile phones
	General purchase	18	<ul style="list-style-type: none"> • I usually spend money purchasing something for my family. • I usually spend money to shop online • I spend money earned from mechanical turk to go shopping. • I do shopping with this money • Mostly to do online shopping
Financing	Saving for specific target	15 (n = 39 / 12.75 %)	<ul style="list-style-type: none"> • I am saving it in a separate bank account. After some days, I will be getting more money and I am planning for a huge expense with it. Really, very useful for me. • I am saving up to help hubby pay off his student loan. When I hit 350\$ I did treat myself to the Mac 187 makeup brush that I have wanted for awhile. • I haven't withdrawn any yet, but I am planning on building an outdoor enclosure for my cats. • I am saving for a wedding, and want to be able to pay for some of it through Mechanical Turk.

(continued on next page)

Table 4 (continued)

Theme	Code	Frequency	Excerpt example
	Saving in general	24	<ul style="list-style-type: none"> • But the lion’s share of it is being saved toward a home improvement project that I’ve given myself a year to save for. • Generally I think it as an extra income, so I try to save it for my favorite trip in the future. • I honestly just place it in my savings account. I enjoy saving money for the future, and I find that AMT provides me with a nice “safety net.” • I usually transfer half of what I earn per month into a savings account. • Fixed deposits savings in bank. And I usually don’t spend earned money for shopping, I save it. • Well to be honest I never requested for a cheque or amazon gift card for the [money] I earned on MTurk. I just used to store that money on my account only. If that builds up in great amou[n]t then i’m definitely gonna spend that on me and my family. • I will save some amount for future benefit. • I have not yet withdrawn any amount from mturk. • Usually I don’t spend this money. • To enable larger amounts of savings • Emergency purpose • I give a share of the money to my parents also. • I donate a portion to a public group. • Pay for costs of my dog (vet insurance, food, medicine, toys, etc). • Cat food, dog food, kitty litter • Treats for the dogs • It used to increase my income. i will use it for any propose. • I use it my general needs and not particular one. • It is a relatively small amount, and it goes right into my bank account with other money. There is no special distinction in how I spend it, compared to other funds.
	Other uses (n = 11 / 3.59 %)		
	General purpose (n = 6 / 1.96 %)		

Note: a. Workers on MTurk can transfer their earnings to an Amazon.com gift card.

groups of microworkers with respect to demographic variables (see Supplementary Appendix F). Differentiating between different groups of microworkers, we found that the effects of the motivation for monetary rewards exhibit different patterns.

8. Discussion

In contrast to microwork participation investigated in the literature

Table 5

Results of regression including subsistence needs and nonessential expenditures.

Independent variable	Dependent variable			
	Microwork labor supply		Microwork wages	
	Weekly hours Model 17	Minutes per Task Model 18	Weekly wage Model 19	Hourly wage Model 20
Monetary reward	0.155 *	0.085	0.002	-0.157 *
Enjoyment	0.111	0.109	0.124 ⁺	-0.004
Microtime structure	-0.148 *	-0.212 **	0.013	0.046
Microwork as work	0.294 ***	-0.07	0.206 ***	0.062
Microwork as leisure	-0.038	-0.036	-0.131 *	-0.026
Reservation wage	0.027	-0.094	0.063	-0.016
Earnings target (Yes)	0.012	-0.122 *	0.176 **	0.073
Meeting subsistence needs	-0.027	0.012	0.145 **	0.165 **
Nonessential expenditures	0.02	-0.029	0.110 *	0.011
Country (India)	0.056	0.054	-0.423 ***	-0.365 ***
Gender (Male)	-0.041	-0.061	0.077	0.086
Age	0.009	0.042	-0.066	-0.071
Education	0.006	0.084	0.035	-0.019
Employment (Full-timer)	0.033	0.087	0.034	0.096 ⁺
Tenure (month)	0.03	0.007	-0.111 *	-0.125 *
Observations	306	306	306	306
R ²	0.187	0.088	0.305	0.21
ΔR ²	0.002	0.001	0.022	0.023
ΔF statistic	0.22	0.16	4.60 *	4.32 *

Notes: + p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001

(e.g., motivation, intention to continue, work satisfaction, and frustration) (e.g., Deng & Joshi, 2016; Jiang et al., 2021; Taylor & Joshi, 2019), this study advances our understanding of two important outcomes, i.e., the labor supplied to microwork DLPs and the wages earned from microworking. Distinguishing the microwork outcomes at the macro level (i.e., weekly hours and weekly wages) from those at the micro level (i.e., minutes per task and hourly wages), our mixed methods study derives four key findings that uncover the nuances of microworkers’ behavioral patterns through both quantitative and qualitative approaches.

First, the motivation for monetary rewards has mixed effects on the microwork labor supply and wages. While making money may drive worker’s initial participation (Deng & Joshi, 2016), it may not necessarily sustain the labor supply and raise wages. Microworkers who were strongly motivated by monetary rewards were likely to work more hours per week, thus increasing the labor supply for microwork. However, their weekly wages did not increase: instead, they earned a lower hourly wage. Such a negative effect suggests that microworkers’ motivation for monetary rewards cannot ensure earning a high wage, and even results in their participation at the cost of earning a low hourly rate, which is salient for specific demographic groups, e.g., the US, male, youth, full-timers, and novices (see Supplementary Appendix F5).

Second, perceiving microwork as work or leisure, as an overall attitude toward microworking (Keith et al., 2019), plays different roles in the microwork labor supply and wages at the macro level but not at the micro level. As shown in Table 5, the perception of microwork as work positively predicts both weekly labor supply and wages, whereas the perception of microwork as leisure has no impact on the weekly labor supply but compensates for low weekly wages. Differentiating microworkers’ country of residence and gender, we find the heterogeneous effects of microworkers’ demographic backgrounds on the relationships between work/leisure perceptions and weekly wages. Specifically, the positive effect of the perception of microwork as work on weekly wages is significant for the groups of the US and male,

whereas the negative effect of perception of microwork as leisure on weekly wages is significant for the groups of India and female (see [Supplementary Appendix F4](#)).

Third, setting an earnings target affects the labor supply and wages in different ways, which varies across demographic groups. In line with prior research on target earners on DLPs ([Dupas et al., 2020](#); [Horton & Chilton, 2010](#)), our study suggests that target earners are likely to earn higher wages. Moreover, our empirical study supports the relationship at the macro (weekly) level but not at the micro (hourly) level, indicating that the pursuit of target earnings drives microworkers to earn more in the long term. At the micro level, target earners are probably speedy task-takers who complete each task quickly, but such quick task completion may not lead to higher hourly wages, especially if each task is poorly paid. Among different demographic groups of microworkers (see [Supplementary Appendix F](#)), microworkers' county of residence and gender are the main factors that moderate the effects of earnings target on the microwork labor supply and wages.

Furthermore, by investigating microworkers' purposes for the income and revealing the six themes (including meeting subsistence needs, nonessential expenditures, purchasing, and financing), the qualitative study deepens our understanding of the role that monetary rewards play in microwork wages. The positive associations between a specific meaning of money (i.e., meeting subsistence needs) and microwork wages imply that the qualitative nature of monetary rewards regulates the extent to which microworkers work toward earning high wages. Microworkers in different demographic groups respond to the subjective meanings attached to monetary rewards differently. For instance, to meet their subsistence needs, Indian/female workers are likely to earn higher weekly wages than American/male workers. With respect to the efficiency of making money on DLPs, it is the qualitative nature of money, i.e., meeting subsistence needs, instead of a motivation for money, that can positively predict hourly wages.

In light of these findings, we further discuss the theoretical contributions our study makes to IM research on microwork DLPs and the implications for multiple DLP stakeholders including microworkers, requesters, and DLP operators, as well as the limitations and future research directions.

9. Theoretical contributions and implications

Drawing upon individual labor supply theory ([Hsiaw, 2013](#); [Lazear, 1991](#); [Sharif, 2000](#)), this study integrates the neoclassical economic factors with psychological factors to predict the microwork labor supply and wages. Our study advances IM research on DLPs in three ways. First, the limited impact of microworkers' motivations on their labor supply and wages and the co-existence of work- and leisure-oriented attitudes toward microworking suggest relaxing the assumption about the nature of the labor supplied to DLPs, which is presumably regarded as the online counterpart of the labor supply in traditional workplaces. There has been a longstanding debate on the nature of DLP participants, who are neither employees nor traditionally defined independent contractors, freelancers, or the self-employed ([Kuhn & Maleki, 2017](#)). Such a controversy brings about the ambiguity in the appropriateness of applying IM theories stemming from traditional workforces to DLPs. Assuming laborers on DLPs are workers, prior studies on IM activities on DLPs ([Bakici, 2020](#); [Nwafor et al., 2022](#)) have primarily adopted motivational and social-psychological perspectives to explain online laborers' (dis)continuance intention.

With the blurred line between work and leisure on DLPs, theories that have their root in traditional workplaces, such as the theory of work motivations, may not fully explain why people participate in microworking. Instead of assuming microworkers are narrowly defined workers, individual labor supply theory informs the debate on the trade-off between work and leisure, especially when it comes to managing and sustaining participation in DLPs ([Alam & Sun, 2023](#); [Chen & Horton, 2016](#)). To this end, our study allows us to incorporate both work and

leisure perceptions of microworking into online laborers' information processing and decision making.

Second, the subjective meanings attached to monetary rewards, coupled with the substitution and income effects proposed by individual labor supply theory, unravel the conceptual complexity of money beyond its quantitative nature and articulate the mixed impact of monetary rewards on the labor supply. The inductive findings on microworkers' perceptions of monetary rewards offer a new theoretical lens through which to revisit the conceptualization of money when it is the reward for participation in nonstandard employment such as DLPs. Concerned with the predominant research attention to quantitative nature of monetary rewards ([Chen & Horton, 2016](#); [Hara et al., 2018](#); [Horton & Chilton, 2010](#)), our study calls for reconceptualizing the construct of monetary reward in nonstandard employment. In contrast to standard employment, which is characterized by a work-oriented attitude and as a primary source of income, nonstandard employment is subject to varying attitudes toward participation (e.g., work versus leisure) and participants' own interpretation of the meaning of the monetary rewards. Apart from the motivational conceptualization of monetary reward and the economic nature of money as a medium of exchange, it is worthwhile to further theorize different meanings of monetary rewards in nonstandard employment.

The nuanced understanding of monetary rewards and their effects on microwork wages also illuminates the controversial discussion of the fairness of microwork wages ([Fieseler et al., 2017](#); [Nwafor et al., 2022](#)). While the monetary rewards of microwork serve as a typical financial incentive, the low pay levels might raise ethical concerns about the poorly paid microwork. In the face of the signalling effect of low pay levels, individual labor supply theory introduces the elasticity of the labor supply to examine worker perceptions of microworking activity and associated monetary rewards, suggesting the subjectivity involved in evaluating microworking on DLPs. Apart from the amount of microwork payments, the perception of monetary rewards may affect online laborers' judgements about the fairness of the payments.

Third, our focus on the outcomes for the microwork labor supply and wages has broadened the existing IM theoretical foundations by embracing the economic perspective. The economic thinking about the labor supply at the individual level brings in microwork outcomes that are beyond the continuance intention. While a substantial number of studies (e.g., [Bakici, 2020](#); [Brawley & Pury, 2016](#); [Deng & Joshi, 2016](#); [Di Gangi et al., 2023](#)) have examined microworkers' participation and experiences, the extent to which the drivers of participation can sustain their microwork effort lacks theoretical underpinning and empirical investigation. The existing research on microworkers' continued intention sheds light on sustainable participation, yet the continuance intention hardly captures the intensity of continued participation. Our study acts as a response integrating motivational, economic, and psychological accounts to advance the understanding of sustainable participation in DLPs.

10. Implications for practice

This study offers practical insights for various stakeholders involved in microworking, including microworkers, requesters, and DLP operators. For microworkers, the negative association between the motivation for monetary rewards and hourly wages shows that microworkers who are more driven by making money are more likely to earn a lower hourly wage, inferring a more precarious working condition for extrinsically motivated workers and rendering them more susceptible to exploitation by low-paying microwork. Microworkers are encouraged to keep track of their wage rates, through which they can adjust their labor supply decisions or work strategies to avoid microworking at an undesirable wage rate.

Furthermore, the dominant impact of the perception of microwork as work signals a trend of professionalism in terms of the microwork labor supply and earnings. When microworkers refer their online labor as

work, which has its root in traditional workplaces, they may bring a work ethic and professionalism to DLPs, thereby increasing the weekly labor supply and wages (see Table 5). However, the professionalism driven by the perception of microwork as work fails to raise hourly wages, evident in the low pay for microworkers on DLPs. In our study, microworkers' hourly wages were positively associated with meeting their subsistence needs. The meaning attached to the monetary rewards may spur microworkers to improve their efficiency (e.g., hourly wages) by microworking strategically. If microworkers regard online work as a *profession*, they may consider strategizing their work practices, e.g., honing skills for specific tasks, taking tasks in parallel, or filtering out low-paying tasks, to increase both work effort and efficiency, rather than simply increasing their work hours.

With respect to requesters, a sustained labor supply comes from those who consider microwork as regular work. In this regard, requesters may consider job enrichment factors such as meaningfulness, informative feedback, and worker training and growth in their microwork design, instead of simply posting mundane, repetitive tasks on the DLPs. Several task design tactics are worth considering, such as deliberating task background and significance, providing detailed instructions and training, giving feedback for task performance, and introducing gamification mechanisms. When targeting a specific group of workers, requesters need to consider the unique work patterns of the target workers and make the tasks more accessible and compelling for them.

Furthermore, requesters need to be prudent about applying the recruiting practices of traditional workplaces to DLPs. Our study shows that work tenure on DLPs may not be an accurate indicator of work quality. Requesters may be willing to pay a bonus to attract seasoned workers. Yet those seemingly experienced workers are not necessarily high-quality workers. Rather, they may have adapted to low-paying DLPs and earn at a relatively low rate, as evidenced in the negative relationship between tenure and wages in our study. Meanwhile, given their higher perception of microwork as work compared with novice workers (see Supplementary Appendix F1), experienced workers are more likely to perceive microworking as an online counterpart to regular offline work.

For DLP operators, the theoretical underpinning of individual labor supply theory provides implications about managing online platform workforces with differential practices by inferring heterogeneity in workers' attitudes and perceptions, as well as their activity intensity and earnings. Online laborers' choice of hours depends primarily on their perception of the nature of microworking (i.e., work versus leisure), suggesting the professionalism of those who perceive microwork as an online counterpart to a salaried job. However, these long-hour microworkers are not necessarily high-hourly-wage earners. Online laborers' varying labor supply, coupled with uncertain wage rates, can also serve as behavioral information for DLPs to identify different segments of online laborers, each of which can play a unique role in sustaining the labor supply and the labor performance platform wide.

As a digital labor hardly qualifies for the legal definition of "worker," the decision making and policy making of DLPs should refer to microworkers' actual behaviors and consider a contextualized, differential, and adaptive approach to balancing between laborers' self-regulation and the intervention of the digital platform in the gig economy. For instance, professional microworkers may be a reliable source of labor, whereas casual microworkers may enhance the diversity of the entire online platform workforce. Distinguishing between different groups of online laborers is beneficial for DLPs in employing different management practices tailored to different target workers.

11. Limitations and future research directions

Our study has several limitations. First, with the focus on microwork DLPs that transact small, simple tasks with a piece-rate pay system, sampling microworkers from MTurk is subject to the limitation of single-

site data collection. The dynamics of the MTurk DLP does not represent the broad range of DLPs (e.g., platforms for ridesharing and food/grocery delivery). In addition to the differences in the types of work, DLPs also demonstrate variability in the digitalization of work elements (e.g., task, asset, governance) (Joshi et al., 2022). These platform-specific factors (e.g., the nature of the work, worker qualifications, payment structure, task approval mechanisms) might influence both the predictors and outcomes in our research model. Therefore, we suggest applying the findings to other contexts with caution. Future research could compare and contrast worker motivations, perceptions, and preferences across different types of DLPs and worker groups and consider the impact of a platform's digital properties, variability, and governance structure. Second, with the proposed predictors derived from individual labor supply theory, our study predicts microworkers' behavioral outcomes, a portion of whose variances remains unexplained. Future research may consider additional predictors to enhance our understanding of the individual labor supply and wages on DLPs. Third, the findings of microworkers' various spending patterns show that money varies not only in quantitative amount but also in qualitative meaning, which could pave the way for future research examining the role of money in motivating and sustaining online laborers. The diverse contexts inferred from the spending patterns can also inform future research into the heterogeneity of workers in the gig economy.

12. Conclusions

Labor markets are witnessing a dramatic transformation: standard employment is increasingly supplemented or replaced by crowdwork mediated by DLPs (Gandini, 2019), where a predefined wage is lacking and the dichotomy between work and leisure is blurring. Examining the elasticity of the microwork labor supply and wages against microworkers' motivations, perceptions, and preferences, we find that the predictive powers of microwork motivations on the labor supply and wages dwindle as microworkers routinize their participation as regular work and pursue target earnings. While we cannot ignore the question of how tough economies in a region have pushed people to work for so little remuneration, such as those who attempt to "survive" on MTurk, we may acknowledge the mindfulness when people made the labor supply decision and doggedly defined and worked toward fulfilling different pecuniary purposes, which manifests the qualitative nature of monetary rewards that also plays a significant role in microworkers' wages. With varying patterns of the microwork labor supply and wages, perhaps in the future we will view microworkers as pioneers who began the reconfiguration of labor relations through a critical shift in the meaning of employment (e.g., work versus leisure) and the desirability of a guaranteed income (e.g., meeting subsistence needs versus nonessential expenditures). Such discussions are underway (Graeber, 2013) and microworkers are part of the conceptual landscape for reimagining the future of work and the workforce.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests. Ling Jiang reports financial support was provided by Social Sciences and Humanities Research Council of Canada.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.ijinfomgt.2024.102823.

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