Research on the Mechanism of the Digital Economy's Impact on Labor Market Structure

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Abstract

As the core driver of the new round of technological revolution and industrial transformation, the digital economy is reshaping the operational logic and structural form of the global labor market. From the perspective of theoretical economics, this study systematically identifies the core transmission paths through which the digital economy affects labor market structure, and analyzes the micro-mechanisms of digital technology's impacts across four dimensions: total employment, employment structure, wage determination, and labor relations. Drawing on stylized facts, it further summarizes emerging characteristics and challenges facing the current labor market. The findings reveal that the digital economy exerts a dual effect of creative destruction on the labor market: while technological progress generates new jobs and optimizes resource allocation efficiency, it also triggers structural contradictions including skill mismatch and employment polarization. Finally, targeted policy recommendations for labor market regulation are proposed to adapt to digital economy development, providing a theoretical reference for mitigating structural employment pressures and achieving balanced labor market growth.

Keywords

digital economy, labor market structure, skill-biased technological progress

1. Introduction

The accelerated iteration and penetration of digital technologies—including big data, artificial intelligence, and cloud computing—have positioned the digital economy as a core engine of economic growth. Its restructuring effects on production modes and industrial structures have gradually transmitted to the labor market [1]. According to the Digital China Development Report (2024), China's digital economy has exceeded 55 trillion yuan, accounting for over 45% of GDP. The deep integration of digital industrialization and industrial digitalization is reshaping labor demand structures, supply models, and allocation efficiency. As the core of factor markets, the compatibility between labor market structure and digital technological progress is directly tied to total factor productivity improvement and high-quality economic development.

Existing literature offers divergent perspectives on this relationship. Some scholars argue that digital technologies reduce demand for low-skilled labor through automation, leading to employment polarization; others highlight the emergence of new employment forms such as platform work, which expands employment boundaries. However, most studies focus on single-dimensional empirical tests, lacking systematic theoretical

analysis of internal mechanisms-especially the interaction between technological progress, institutional constraints, and dynamic labor market equilibrium. Against this backdrop, this study constructs a theoretical interaction model within the framework of theoretical economics, clarifies core mechanisms, and provides theoretical support for resolving structural contradictions.

2. Core Concepts and Theoretical Foundations

2.1 Definition of Core Concepts

The digital economy is centered on reconstructing factor allocation via digital technologies [2]. Referencing the Statistical Classification of Digital Economy and Its Core Industries (2021), this paper defines the digital economy as an economic form that takes data as a key production factor and digital technology as a core driver, encompassing two pillars: digital industrialization (manufacturing of digital products and provision of digital services) and industrial digitalization (digital transformation of traditional industries). Unlike the traditional economy, the digital economy exhibits distinct traits such as diminishing marginal costs, significant network effects, and enhanced factor mobility—characteristics that determine the uniqueness of its impact on the labor market.

Labor market structure refers to the proportional relationships and interaction modes of components within the labor market. This study defines it across four core dimensions:

Total employment: Dynamic changes in employment scale and unemployment rates

Employment structure: Skill composition, industrial distribution, and employment form diversity

Wage determination: Wage gaps and salary pricing logic

Labor relations: Employment models and rights protection mechanisms

These dimensions are interrelated and collectively form the analytical framework for examining the digital economy's impact on the labor market.

2.2 Theoretical Foundations

The skill-biased technological progress theory serves as the core theoretical basis for analyzing the digital economy-labor market nexus. This theory posits that technological progress exhibits heterogeneous effects on labor demand across skill levels: digital technologies substitute for repetitive tasks performed by low-skilled labor while complementing the creative work of high-skilled labor, thereby widening skill-based wage gaps. Additionally, the labor market segmentation theory suggests that the digital economy may exacerbate divisions between formal and informal sectors. New forms of employment such as platform work, lacking sound institutional safeguards, are prone to being confined to the secondary labor market.

The neoclassical employment theory and search and matching theory provide complementary analytical frameworks. Neoclassical theory emphasizes the role of spontaneous market adjustment, arguing that digital economy-induced shifts in labor demand will achieve new equilibrium through wage elasticity and labor mobility [3]. In contrast, search and matching theory focuses on information frictions in the labor market, noting that digital platforms reduce information asymmetry and shorten search times to improve labor allocation efficiency—but may also exacerbate market imbalances through issues like algorithmic discrimination.

3. Mechanisms of the Digital Economy's Impact on Labor Market Structure

3.1 Total Employment

The digital economy's impact on total employment reflects the creative destruction paradigm, rooted in the dynamic interplay between substitution and creation effects. The substitution effect arises from the automation of repetitive tasks, particularly prominent in labor-intensive manufacturing and service sectors. Robots and intelligent assembly lines have drastically reduced demand for low-skilled labor, placing jobs such as assemblers and cashiers at high substitution risk. The World Economic Forum's Future of Jobs Report (2025)

estimates that 23% of global jobs face high automation risks, with low-skilled positions accounting for over 70%.

The creation effect operates through three channels:

Digital industrialization: Directly generates new roles such as data analysts and AI engineers, driving skill-upgrading in the labor force

Industrial digitalization: Transforms traditional jobs (e.g., smart agriculture technicians, industrial internet operators) by integrating digital technologies with conventional industries

Platform network effects: Spur growth in supporting gig jobs, including food delivery riders and live stream assistants, which have seen explosive expansion

In the long term, the creation effect is likely to outweigh the substitution effect, yielding a net positive impact on total employment. In the short run, however, substitution shocks may trigger structural unemployment.

3.2   Employment Structure

The digital economy drives labor market structure toward a dual trend of polarization and upgrading. Employment polarization is characterized by growing demand for both high- and low-skilled jobs, coupled with the contraction of middle-skilled positions, forming a U-shaped distribution. Middle-skilled jobs—dominated by routine tasks—are vulnerable to automation and lack the creativity of high-skilled roles or the flexibility of low-skilled work, leading to declining demand for positions such as accountants, administrative clerks, and traditional technicians [4]. High-skilled jobs remain in strong demand due to complementarity with digital technologies, while low-skilled jobs concentrate in non-automatable face-to-face services (e.g., housekeeping, elderly care), amplifying labor market polarization.

Employment structure upgrading manifests in three dimensions:

Skill upgrading: Rising demand for digital and hybrid skills pushes the labor force toward high-skill groups, incentivizing workers to enhance capabilities through education and training

Industrial upgrading: Booming digital services (e.g., digital finance, telemedicine) shift employment toward the tertiary sector, especially high-end services

Form upgrading: Platform and flexible employment emerge as new growth drivers, breaking spatial-temporal constraints of traditional employment but also introducing instability risks

3.3   Wage Determination Mechanism

The digital economy reshapes wage determination by altering labor marginal productivity and market competition dynamics, with two key outcomes: expanding skill premiums and widening wage inequality. Skill-biased technological progress boosts the marginal output of high-skilled labor, prompting firms to offer higher salaries to attract talent; conversely, low-skilled labor faces stagnant wage growth due to substitution effects, widening the skill-based wage gap [5]. Additionally, platform monopolies and algorithmic pricing further exacerbate inequality: leading platforms capture excess profits via market dominance, driving up salaries for core technical and managerial staff, while platform gig workers—hampered by weak bargaining power—face algorithm-controlled wages and inadequate social security coverage.

Regional and industrial disparities amplify wage gaps. Eastern China and core cities, with concentrated digital resources and high-skilled labor, exhibit significantly higher wage levels than central and western regions. Digital industrialization sectors maintain wage leadership over traditional industries, while industries lagging in digital transformation see sluggish wage growth, solidifying industry-based wage barriers.

3.4   Labor Relations

The digital economy fosters flexible, diversified labor relations, disrupting traditional fixed-employment models. In platform and gig economies, workers typically hold non-standard contracts with platforms, lacking fixed working hours, clear labor relation definitions, and statutory benefits (e.g., work injury insurance,

medical coverage). While this model enhances labor mobility and allocation efficiency, it exposes workers to rights violations: algorithm-driven piece-rate wages and order dispatching systems may infringe on rest and remuneration rights.

Digital technologies also complicate labor relation supervision. Algorithmic discrimination and data misuse enable hidden exploitation—for instance, platforms may set unreasonable performance targets to suppress actual incomes, while personal data breaches violate worker privacy. Traditional regulatory frameworks fail to adapt to new employment forms, and insufficient institutional supply and regulatory lag further intensify labor relation conflicts.

4.   Stylized Facts and Practical Challenges

4.1   Stylized Facts

Empirical evidence from China's labor market illustrates the digital economy's structural impacts:

Widening skill wage gap: National Bureau of Statistics data show that high-skilled workers earned 2.8 times the income of low-skilled workers in 2024, a 0.6-fold increase from 2015, with digital skills emerging as the key driver of wage premiums

Growing employment polarization: The share of middle-skilled jobs fell from 42% in 2015 to 35% in 2024, while high-skilled positions rose from 18% to 27%; low-skilled service jobs remained stable

Booming new employment forms: By the end of 2024, China's platform employment exceeded 400 million, with flexible workers accounting for over 60%, becoming a critical pillar of employment growth

4.2   Practical Challenges

Despite its growth-promoting effects, the digital economy presents structural challenges:

Severe skill mismatch: Rapid digital technology iteration has left labor supply structures lagging behind demand, creating a paradox of labor shortages for high-skilled digital roles and employment difficulties for low-skilled workers

Inadequate rights protection: Social security coverage for platform gig workers remains below 30%, with frequent incidents of algorithmic exploitation and ambiguous labor relation definitions triggering social conflicts

Deepening labor market segmentation: Digital economy-induced wage gaps and employment opportunity disparities have widened regional, industrial, and group-based inequalities, hindering balanced labor market development.

5.   Conclusions and Prospects

This study systematically analyzes the mechanisms of the digital economy's impact on labor market structure from a theoretical economics perspective. The digital economy acts on total employment through substitution and creation effects; drives employment polarization and upgrading via skill-biased technological progress; reshapes wage determination by altering labor marginal productivity; and triggers labor relation conflicts through new employment forms. These impacts carry dual attributes, bringing both development opportunities and structural challenges such as skill mismatch and insufficient rights protection.

Future digital technology iteration will deepen integration between the digital economy and labor markets, accelerating structural adjustments. On the research front, scholars can leverage microdata to examine heterogeneous impacts on specific groups (e.g., young workers, women) and explore paths for algorithm governance and digital skill training. In practice, policy innovation is essential to achieve coordinated development: institutional supply must be strengthened to resolve structural contradictions, facilitating balanced labor market growth and high-quality economic development.

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Conflicts of Interest

The authors declare no conflict of interest.

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