The Impact of Foreign Direct Investment on Employment Structure—A Digital Financial Inclusion Perspective

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Abstract. This study examines how foreign direct investment (FDI) affects employment structure and whether digital financial inclusion mitigates this effect. Using panel data for 30 Chinese provinces from 2012 to 2022, we estimate province fixed-effects and panel threshold models. The results show that FDI significantly impedes the shift of employment toward the tertiary sector, and this finding remains robust across alternative specifications. Digital financial inclusion exhibits a single threshold effect. Its development weakens the adverse effect of FDI but does not reverse its direction. The effect of FDI also varies across regions. It is statistically insignificant in eastern and central China but significantly negative in western and northeastern China, with a larger adverse effect in the northeast. These findings suggest that policymakers should improve the quality of inward investment, strengthen digital financial infrastructure, and adopt region-specific investment policies.

Keywords: foreign direct investment, employment structure, digital financial inclusion, panel threshold model.

1. Introduction

Upgrading the employment structure is an important component of high-quality development. China's 14th Five-Year Plan for Employment Promotion calls for fuller and higher-quality employment and places particular emphasis on alleviating structural employment mismatches. The report to the 20th National Congress of the Communist Party of China also stresses high-standard opening-up and better-quality trade and investment cooperation. Against this background, policies for attracting foreign investment must consider not only the scale and quality of investment but also its effects on employment structure.

Foreign direct investment (FDI) may have opposing effects on employment structure. On the one hand, foreign entry expands investment and embeds foreign firms in local supply chains. It can therefore increase labor demand and introduce new technologies and management practices. On the other hand, technology-intensive projects and automated production may displace low-skilled workers. Stronger competition may also cause domestic firms to reduce employment. FDI inflows therefore do not necessarily increase the employment share of the tertiary sector. Their effects depend on the sectoral destination and technological characteristics of foreign investment, as well as regional absorptive capacity.

Digital financial inclusion offers a new perspective on this relationship. Digital payments, online lending, and data-driven risk assessment expand access to financial services. They lower financing barriers for micro, small, and medium-sized enterprises and entrepreneurs. They also reduce information frictions in recruitment, job search, and vocational training. These changes can help domestic firms absorb technological spillovers from FDI. They can also help displaced workers enter service-sector jobs, start businesses, or take up flexible forms of employment. Digital financial inclusion may therefore weaken the adverse effect of FDI on employment structure.

This study addresses three questions. First, does FDI impede the upgrading of employment structure, measured by the employment share of the tertiary sector? Second, does digital financial inclusion moderate this effect in a nonlinear manner? Third, does the effect vary across regions? We use panel data for 30 Chinese provinces from 2012 to 2022. We augment a province fixed-effects model with a panel threshold model and conduct a regional heterogeneity analysis. The results show that FDI has a significant negative effect on employment structure. Digital financial inclusion partly

mitigates this effect but does not reverse it. The adverse effect is more pronounced in western and northeastern China.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 develops the mechanisms and research hypotheses. Section 4 describes the models, variables, and data. Section 5 presents the empirical results. Section 6 concludes and discusses policy implications.

2. Literature Review

The literature provides a basis for examining the relationship between FDI, digital financial inclusion, and employment structure. It mainly studies the employment effects of FDI and those of digital financial inclusion.

2.1. Foreign Direct Investment and Employment

Studies of the employment effects of FDI reach two broad conclusions: FDI can either promote or suppress employment. Positive effects mainly arise through investment expansion, interindustry linkages, and technological spillovers. Cai and Wang show that foreign-funded enterprises account for a small share of employment but grow rapidly and contribute positively to employment growth [1]. Feenstra and Hanson find that foreign entry changes the relative demand for workers with different skill levels and increases the skill premium [2]. Lipsey and Sjoholm also show that foreign-owned firms pay higher wages, consistent with productivity and skill premiums generated by FDI [3].

FDI may also reduce employment through competition and substitution. Huang finds that foreign entry raises employment initially, but the crowding-out effect on domestic firms may strengthen as the scale of foreign investment expands [4]. Liang's firm-level analysis shows that FDI raises wages in domestic firms, although its effect on employment is unstable [5]. Qiu further argues that the employment effect of FDI changes with the stage of development and the composition of investment [6]. These studies indicate that the employment effect of FDI is not unidirectional. It depends on the sectoral allocation and technological intensity of investment and on the capacity of local firms to absorb spillovers.

Interindustry linkages and technological substitution are important channels through which FDI affects employment. Using industry-level data, Li finds that the indirect employment effect generated through upstream and downstream linkages exceeds the direct effect [7]. Mao shows that FDI penetration affects labor demand in manufacturing through changes in production efficiency [8]. Wang and Han document a long-run relationship among FDI, employment structure, and industrial structure. They identify technological progress as an important driver of employment restructuring [9]. FDI may therefore create jobs by expanding value chains, while reducing demand for traditional jobs through capital and technology substitution.

2.2. Digital Financial Inclusion and Employment

Digital financial inclusion affects employment mainly by easing financing constraints, encouraging entrepreneurship, and reducing information frictions. Sun and Chai find that it improves regional employment quality and generates spatial spillovers [10]. Ma and Wang also report a significant positive effect on employment [11]. Manyika et al. argue that digital finance broadens access to financial services and creates employment opportunities [12]. Bianchi shows that credit constraints restrict entrepreneurship, whereas better access to finance can release entrepreneurial and employment potential [13]. Evidence from China further suggests that digital financial inclusion promotes employment in private firms and self-employment [14], improves employment quality [15], and affects the income and occupational choices of flexible workers [16]. It also stimulates firm innovation [17], thereby strengthening the capacity of domestic firms to absorb technological spillovers from FDI.

Existing studies examine the employment effects of FDI and digital financial inclusion separately. Few place both factors in a unified framework, and even fewer ask whether digital financial inclusion changes the effect of FDI on employment structure. We measure employment structure by the employment share of the tertiary sector, estimate the effect of FDI, and identify both the threshold role of digital financial inclusion and regional differences in the effect.

3. Theoretical Mechanisms and Research Hypotheses

3.1. FDI and Employment Structure

Foreign-funded enterprises often possess advantages in capital, technology, and management. Their entry intensifies competition and changes the employment conditions faced by domestic firms through wage premiums and competition for skilled workers. Under competitive pressure, domestic firms may scale back production, exit the market, or substitute capital and technology for labor. When FDI flows mainly into capital-intensive manufacturing, the new jobs may not offset the loss of traditional positions. Workers may also find it difficult to move into the tertiary sector. FDI may therefore impede the upgrading of employment structure, as measured by the tertiary-sector employment share.

H1: FDI has an adverse effect on regional employment structure.

3.2. The Threshold Role of Digital Financial Inclusion

Information asymmetry raises financing costs for micro, small, and medium-sized enterprises. It also increases the costs of job search and matching [22]. Digital financial inclusion uses mobile payments, online lending, and data-driven risk assessment to expand access to financial services. Firms and entrepreneurs without conventional collateral can thus obtain funding more easily. Digital platforms also improve access to information on vacancies, job seekers, and vocational training. This access helps workers move into entrepreneurship, flexible employment, and service-sector jobs. At an early stage of development, digital infrastructure and service coverage remain limited, so the mitigating effect may be weak. Once digital financial inclusion reaches a sufficiently high level, its financing and information advantages become more effective and may reduce the adverse effect of FDI more strongly.

H2: Digital financial inclusion moderates the relationship between FDI and employment structure in a nonlinear manner. The adverse effect of FDI weakens when digital financial inclusion reaches a higher level.

3.3. Regional Heterogeneity

The resource-based view holds that an economic actor's ability to exploit external opportunities depends on the resources it can access and organize [23]. The same logic applies at the regional level. Infrastructure, industrial capacity, human capital, and government support affect how well foreign-invested projects connect with local industries. These resources also determine how quickly displaced workers can move into the tertiary sector. Resource-rich regions are better able to absorb technological and knowledge spillovers from FDI and to provide workers with retraining and skill development. Resource-constrained regions are more likely to face weak industrial linkages and skill mismatches. The effect of FDI on employment structure may therefore vary across regions.

H3: The effect of FDI on employment structure exhibits regional heterogeneity.

4. Model Specification and Data

4.1. Model Specification

To estimate the effect of FDI on employment structure, we specify the following province fixed-effects model:

$$EmpStr_{it} = \alpha_0 + \alpha_1 FDI_{it} + \gamma Controls_{it} + \theta_i + \varepsilon_{it} \quad (1)$$

where i indexes provinces and t indexes years; Empstr denotes employment structure; FDI denotes foreign direct investment; Control is the vector of control variables; θ_i captures province fixed effects; ε_{it} is the idiosyncratic error term; and α is the coefficient to be estimated.

To examine how the employment-structure effect of FDI varies with the level of digital financial inclusion, we use the digital financial inclusion index as the threshold variable and specify the following panel threshold model:

$$\begin{aligned} EmpStr_{it} = \alpha_0 + \alpha_1 FDI_{it} * I(DigFin_{it} \le \eta_1) + \alpha_2 FDI_{it} * I(\eta_1 < DigFin_{it} \le \eta_2) \\ + \alpha_3 FDI_{it} * I(DigFin_{it} > \eta_3) + \gamma Controls_{it} + \theta_i + \varepsilon_{it} \end{aligned} \quad (2)$$

where I(·) is an indicator function that equals 1 when the condition in parentheses is satisfied and 0 otherwise, and η is the threshold parameter to be estimated.

4.2. Variables and Data Sources

To distinguish the conceptual term from its empirical measure, we use foreign direct investment (FDI) to refer to actually utilized foreign investment. The variable nfdi is the natural logarithm of actually utilized foreign investment, and DigFin is the digital financial inclusion index.

The dependent variable is employment structure (Empstr), measured as the share of total employment in the tertiary sector. A higher value indicates a stronger concentration of employment in the tertiary sector.

The core explanatory variable is nfdi. Following Zhang et al. [18], we measure FDI using actually utilized foreign investment reported in provincial statistical yearbooks and take its natural logarithm.

The threshold variable is digital financial inclusion (DigFin). We use the provincial aggregate index from the Peking University Digital Financial Inclusion Index to measure regional development of digital financial inclusion [19].

The control variables are industrial structure (Stru), human capital (Edu), trade openness (Openup), government expenditure (Public), and urbanization (Urban). Industrial structure is measured by the share of tertiary-sector value added in regional GDP. Human capital is measured by the average years of schooling among people aged six and above. Trade openness is measured by the ratio of total imports and exports to regional GDP. Government expenditure is measured by the ratio of fiscal expenditure to regional GDP. Urbanization is measured by the share of the urban population in the total population.

The sample covers 30 Chinese provinces, autonomous regions, and municipalities from 2012 to 2022. Tibet, Hong Kong, Macao, and Taiwan are excluded. The data come mainly from the China Statistical Yearbook, China Population and Employment Statistics Yearbook, Finance Yearbook of China, the Peking University Digital Financial Inclusion Index, and provincial statistical yearbooks. We supplement a small number of missing observations with publicly available statistical sources and winsorize continuous variables at the 1% tails. Table 1 reports the descriptive statistics.

Table 1. Descriptive Statistics (N = 330)

Variable	Mean	Std. Dev.	Min	Max
Empstr	0.580	0.109	0.314	0.845
nfdi	5.445	1.751	0.188	9.412
Stru	0.514	0.087	0.354	0.844
Openup	0.265	0.269	0.008	1.354
Edu	9.329	0.909	7.470	12.780
Public	0.255	0.109	0.105	0.749
Urban	0.607	0.117	0.363	0.896
DigFin	2.634	0.922	0.615	4.607

5. Empirical Results

5.1. Baseline Results

Table 2 reports the baseline estimates. Column (1) includes only the core explanatory variable, nfdi. Columns (2)–(5) add the control variables sequentially. The coefficient on nfdi is significantly negative in every specification. This result indicates that FDI impedes the shift of employment toward the tertiary sector. The sign and significance of the coefficient remain stable after the controls are added, which supports H1. Industrial structure and government expenditure have significant positive effects on employment structure. Service-sector development and fiscal support therefore help increase the tertiary-sector employment share.

Table 2. Baseline Regression Results

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Empstr	Empstr	Empstr	Empstr	Empstr
nfdi	-0.026*	-0.012*	-0.016***	-0.013***	-0.012**
	(0.013)	(0.007)	(0.006)	(0.004)	(0.005)
Stru		-1.085***	-1.019***	-0.681***	-0.821***
		(0.095)	(0.086)	(0.102)	(0.096)
Openup			-0.202***	-0.144**	-0.120**
			(0.057)	(0.059)	(0.054)
Edu				0.074***	0.052***
				(0.014)	(0.012)
Public					0.411***
					(0.086)
Constant	0.719***	1.205***	1.243***	0.347**	0.513***
	(0.070)	(0.057)	(0.050)	(0.167)	(0.143)
Province fixed effects	Yes				
N	330	330	330	330	330
R^2	0.059	0.611	0.664	0.721	0.747

Notes: Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$. The same convention applies to the tables below.

5.2. Robustness Tests

We use three approaches to assess the robustness of the baseline results. First, we exclude observations from 2020, when the COVID-19 pandemic caused substantial disruption. Second, we add urbanization to the baseline model to reduce potential omitted-variable bias. Third, we winsorize continuous variables at the 1% tails to limit the influence of extreme values. Table 3 shows that the coefficient on nfdi remains significantly negative in all three tests, consistent with the baseline results.

Table 3. Robustness Tests

	(1)	(2)	(3)
VARIABLES	Excluding 2020	Additional control	Winsorization
nfdi	-0.011**	-0.013***	-0.012**
	(0.004)	(0.004)	(0.005)
Controls	Yes		
Urban		0.499***	
		(0.168)	
Constant	0.511***	0.310**	0.513***
	(0.147)	(0.137)	(0.143)
Province fixed effects	Yes		
N	300	330	330
R^2	0.736	0.779	0.747

5.3. Threshold Effects

Following Hansen [20], we test whether digital financial inclusion generates a threshold effect. Table 4 shows that the single-threshold effect is statistically significant, whereas the double- and triple-threshold effects are not. The estimated threshold is 2.562.

Table 5 reports the panel threshold estimates. When DigFin is no greater than 2.562, the estimated coefficient on nfdi is -0.017. When DigFin exceeds 2.562, the coefficient is -0.012. Both coefficients are significantly negative, but the adverse effect of FDI becomes noticeably smaller once digital financial inclusion crosses the threshold.

This finding suggests that digital financial inclusion eases financing constraints and information frictions in labor markets. It strengthens the capacity of domestic firms to absorb technological spillovers from FDI and gives workers additional routes into entrepreneurship and flexible employment. During the sample period, however, this mitigating effect was not strong enough to reverse the direction of the employment-structure effect of FDI.

H2 is supported.

Table 4. Threshold-Effect Tests for the Impact of FDI on Regional Employment Structure under Digital Financial Inclusion

Threshold variable	No. of thresholds	Threshold estimate	F-statistic	p-value	Bootstrap replications	Critical values		
						1%	5%	10%
Digital financial inclusion index	Single threshold	2.562	33.42	0.030	300	37.947	30.342	24.831
	Double threshold	3.0383	8.79	0.550	300	28.080	19.819	16.946
	Triple threshold	3.094	10.78	0.500	300	26.491	21.931	19.223

Table 5. Panel Threshold Estimates for the Impact of FDI on Regional Employment Structure under Digital Financial Inclusion

Variable	Threshold estimate	$I(DigFin_{it} \leq \eta_1)$	$I(DigFin_{it} > \eta_1)$	No. of periods	No. of provinces
FDI	2.562	-0.017*** (0003)	-0.012*** (0.003)	11	30

5.4. Regional Heterogeneity

Chinese regions differ markedly in their industrial foundations, human capital, and digital financial conditions. The effect of FDI on employment structure may therefore vary across regions. Following the regional classification used in previous research [21], we divide the 30 provinces into eastern, central, western, and northeastern groups and estimate the model separately for each group.

Table 6. reports the regional heterogeneity estimates.

	(1)	(2)	(3)	(4)
VARIABLES	Eastern	Central	Western	Northeastern
nfdi	0.003	0.003	-0.014**	-0.027*
	(0.006)	(0.005)	(0.006)	(0.008)
Constant	0.857***	0.328	0.726**	0.101
	(0.177)	(0.266)	(0.265)	(0.262)
Controls	Yes			
Province fixed effects	Yes			
N	110	66	121	33
R^2	0.851	0.746	0.765	0.882

The estimated coefficient on nfdi is positive but statistically insignificant in eastern and central China. It is significantly negative in western and northeastern China, and its absolute magnitude is larger in the northeast.

These differences may reflect the sectoral destination of FDI and regional absorptive capacity. Heavy and chemical industries account for a large share of the northeastern economy, so foreign investment is more likely to concentrate in technology-intensive manufacturing. Automated production lines can replace traditional jobs, while the local tertiary sector and vocational training system may not absorb displaced workers quickly enough. Western China also faces weak industrial support networks and skill mismatches, making an adverse effect on employment structure more likely.

Overall, the effect of FDI on employment structure is insignificant in eastern and central China but significantly negative in western and northeastern China. Regional industrial foundations, human capital, and digital financial conditions shape how FDI inflows translate into changes in employment structure.

H3 is supported.

6. Conclusions and Policy Implications

Using panel data for 30 Chinese provinces from 2012 to 2022, this study examines the effect of FDI on employment structure and tests both the threshold role of digital financial inclusion and regional heterogeneity. The main findings are as follows.

First, FDI significantly impedes the upgrading of employment structure, measured by the tertiary-sector employment share. The result remains robust across several alternative tests.

Second, digital financial inclusion weakens the adverse effect of FDI. Once DigFin crosses the estimated threshold, the absolute value of the negative coefficient on nfdi declines, although its sign does not change.

Third, the effect of FDI on employment structure varies across regions. It is insignificant in eastern and central China but significantly negative in western and northeastern China, with a stronger adverse effect in the northeast.

These findings show that the employment-structure effect of FDI depends on the characteristics of foreign-invested projects and on each region's industrial linkages, human capital, and digital financial conditions. Policies for attracting FDI should therefore consider investment quality, job creation, and regional absorptive capacity at the same time.

Based on these findings, we propose the following policy recommendations.

First, governments should improve the sectoral allocation and quality of inward FDI. Local authorities should place less emphasis on investment volume alone and steer more foreign investment

toward producer services and labor-intensive services. They should assess the job-creation potential and skill requirements of foreign-invested projects and limit the displacement of low-skilled workers by capital-intensive projects.

Second, governments should strengthen digital financial infrastructure. Central, western, and northeastern China should extend mobile payment and digital credit services to underserved areas. These regions should broaden access to finance for micro, small, and medium-sized enterprises and self-employed workers. Digital financial services should also be integrated with entrepreneurship support, vocational training, and employment-information platforms. This integration can provide job-transition and flexible-employment opportunities for workers displaced by FDI.

Third, policymakers should adopt region-specific strategies for attracting FDI. Eastern and central China should deepen the links between foreign-invested projects, producer services, and digital industries. Western and northeastern China should be cautious about capital-intensive projects with a high potential to substitute for labor. Fiscal support, an expanded service sector, and vocational skills training can strengthen the capacity of local labor markets to absorb displaced workers.

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