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Financial Development and Unemployment in OECD Countries: Evidence from Pre- and Post-Pandemic Periods

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Abstract

Research Originality: This study systematically analyzed the relationship between financial development and the unemployment rate using data from 38 OECD countries from 2000 to 2024. It not only examines differences across income levels but also deeply investigates the impact of the COVID-19 pandemic, thereby overcoming the limitations of previous studies that relied on alternative indicators of economic growth.

Research Objectives: The purpose of this study is to assess whether a robust financial market can reduce unemployment rates, as well as how this effect changes under different economic backgrounds.

Research Method: This study, using panel data from the World Bank and the OECD for the period 2000 to 2024, employs the fixed-effects model to test the direct impact of financial development level and the moderating effect of the epidemic.

Empirical Results: The pandemic has weakened the effect of financial development on reducing the unemployment rate by optimizing capital allocation, but fiscal stimulus measures have boosted economic recovery. Therefore, even after excluding the data from the crisis period, the research findings remain robust.

Implications: High-income countries must focus on improving the efficiency of fiscal resource allocation while maintaining labor-market stability. In contrast, middle- and high-income countries need to support the development of manufacturing and small and medium-sized enterprises while reducing financial instability risks, especially during times of crisis.

Keywords:

financial development; unemployment rate; COVID-19 pandemic; labor market

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INTRODUCTION

Unemployment is a key challenge to economic stability in OECD nations, with labor markets reeling from the COVID-19 pandemic and ongoing income disparities (Huikari & Korhonen, 2021; Zainea et al., 2020). Unemployment across 38 OECD countries averaged 4.8% in 2023, down from 7.9% in 2020, though youth unemployment remained at 10.7%, with particular service industries such as hospitality maintaining lower rates (OECD, 2024). Financial development, by allocating capital to businesses, determines employment, though its effects are uneven across high-income and upper-middle-income nations, particularly during periods of crisis (Hussain et al., 2021; Pal & Bandyopadhyay, 2022). Financial intermediation theory predicts that strong financial markets reduce capital costs, encouraging employment production, while Okun's Law equates economic growth—frequently supported by the financial system—to lower unemployment (Epstein & Shapiro, 2019). The pandemic distorted such realities, as lockdowns and supply chain shortages widened the vulnerabilities in the labor market, notably in less shock-resistant economies (Ceylan & Ozkan, 2020; Shang et al., 2021). Such disparities underscore the need to examine how financial development helps reduce unemployment across a range of OECD contexts (Gomes et al., 2022). The implications of such mechanisms are essential for policy design that supports labor market resilience. Thus, the study is practically relevant to policymakers seeking to overcome the crisis and structural unemployment (Heimberger, 2021).

Previous studies largely agree that financial development encourages employment by reducing capital costs and fostering firm growth (Horobet et al., 2022; Wen et al., 2022). Deep financial markets are said to stabilize unemployment in affluent economies by reallocating resources to labor-intensive industries (Epstein & Shapiro, 2019). Financial inclusion is noted by Cicchiello et al. (2021) to enhance entrepreneurship, thereby increasing employment creation. Financial development is also said to increase labor productivity, thereby reducing unemployment indirectly (Taddese Bekele & Abebaw Degu, 2023). Kim et al. (2019) underline that financial structure, i.e., bank-based vs. market-based financial systems, affects unemployment dynamics, with bank-led economies exhibiting larger impacts. However, such studies tend to use proxies for growth, such as GDP, while setting aside direct unemployment dynamics (Dahliah & Nur, 2021; Feriyanto et al., 2020). Financial crises, such as the 2008 recession, disproportionately increase youth unemployment, as indicated by Afonso and Blanco-Arana (2022), suggesting that the advantages of financial development can crumble under a shock. This emphasis on growth indicators and the absence of unemployment-focused analyses constrain knowledge about labor market outcomes, especially in OECD countries with heterogeneous financial systems, highlighting an existing gap in the literature (Ahmad & Zheng, 2023; Ng et al., 2022).

Different views emphasize that the relationship between financial development and unemployment is unclear. Bruno et al. (2016) noted that the 2008 financial shock sometimes led to an increase in the unemployment rate in OECD high-income countries because systemic risk undermines the concept of universal accessibility. However, Wen et al. (2022) argued that financial development permanently reduces unemployment rates

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by enhancing productivity; this is true even during crises, particularly in human capital-intensive economies. Chen et al. (2021) introduced the concept of non-linearity. They noted that the effect of financial development on reducing unemployment diminishes once it exceeds a certain threshold due to excessive leverage risks. These differences highlight the disparities in income levels. High-income countries leverage mature financial markets, whereas upper-middle-income countries face volatility challenges (Mehry et al., 2021; Ball & Onken, 2022). Moreover, demographic factors further complicate this relationship. Andersen and Özcan (2021) argued that a high fertility rate increases labor supply, potentially leading to higher unemployment rates without sufficient job creation. Azman et al. (2020) proposed that the role of educational investment contradicts conventional cognition because it can actually relieve such stress. Labor market policy, such as a wage subsidy, also mediates the impact of financial development, though the interaction between these and the financial system is not well understood (Magazzino & Santeramo, 2024; González et al., 2020; Lasisi et al., 2020). The current research bridges these knowledge gaps by synthesizing demographic and policy factors in a direct analysis of unemployment (Alola et al., 2020).

The COVID-19 pandemic exposed labor market fragilities, yet its moderating effect on the financial development-unemployment relationship is understudied. Magazzino and Santeramo (2024) find that financial systems in high-income OECD countries cushioned unemployment spikes through fiscal support. In contrast, those in upper-middle-income countries experienced persistent job losses due to market volatility. Blustein et al. (2020) document a 2020 unemployment surge driven by sector-specific disruptions, with recovery varying by income level. Sadeh et al. (2020) emphasize that government interventions, such as fiscal stimuli, influence unemployment outcomes, yet their interactions with financial development are seldom investigated (Almeida & Santos, 2020; Rodríguez-Caballero & Vera-Valdés, 2020). However, most studies were completed before 2023 because they failed to obtain key post-pandemic recovery data. Meanwhile, few studies have explored how financial development affects long-term labor market outcomes (Shang et al., 2021). It is also quite rare to use the unemployment rate directly as the core variable, which limits policy insights (Ball & Onken, 2022). Moreover, the interaction between financial development and pandemic-induced factors, such as shifts in remote work patterns and supply chain disruptions, has not yet been studied (Huikari & Korhonen, 2021; Ng et al., 2022). By analyzing unemployment rate dynamics, processing heterogeneity analysis by income level, and using recent post-pandemic recovery data, this study aims to fill this gap.

Based on an analysis of the impact of financial development on unemployment across 38 OECD countries between 2000 and 2024, this study focuses on income-level disparities and the moderating effect of the COVID-19 pandemic on this relationship. More specifically, this study aims to examine whether financial development reduces the unemployment rate, whether this effect holds across different income levels, and the pandemic's actual impact. This study focuses on unemployment rate analysis, as most studies concentrate on economic growth indicators. This study also investigates

the cross-country differences in the impact of financial development on employment. This study aims to capture post-pandemic recovery dynamics by incorporating data from 2024. To achieve these objectives, the fixed-effect model is adapted to account for population, economic, and crisis-related control factors. The results of this study are of great importance for policymaking, helping enhance labor market resilience and address structural unemployment.

METHODS

This study uses a panel-data fixed-effects regression model to examine the impact of financial development on unemployment. It constructs a benchmark model and introduces an extended model of epidemic dummy variables and their interaction with financial development to test the moderating effect of COVID-19. The Hausman test determined the applicability of the fixed-effect model, the logarithmic transformation of some variables was performed to reduce skewness, the lagged financial development was used as an instrumental variable to deal with endogeneity, the validity of the model was confirmed by the Kleibergen-Paap test, the Cragg-Donald Wald F test and the Hausman-Wu test, and the robustness test was performed by excluding the data from the special period.

Data are sourced from the World Bank's World Development Indicators database, supplemented by OECD Intra-annual Labor Statistics for 2022–2024, with preliminary 2024 data included where available (e.g., unemployment rates up to February 2024). The sample covers 38 OECD member countries from 2000 to 2024, yielding approximately 944 observations after cleaning for missing values, based on an assumed annual average of 31–32 observations per country. The sample includes four upper-middle-income countries (Colombia, Costa Rica, Mexico, and Turkey) and 34 high-income countries, facilitating analysis of income-level disparities. All variables are shown in Table 1.

Table 1. Definition of Variables

Type of Variable	Variable Name	Symbol	Definition
Dependent Variable	Unemployment Rate	UM	Unemployment total (% of total labour force)
Independent Variable	Financial Development	F	Domestic credit to private sector by banks (% of GDP)
Control Variable	Total Population	P	Population total
	Fertility	FER	Fertility rate total (births per woman)
	Tertiary Enrolment	E	School enrolment tertiary (% gross)
	R&D Expenditure	RD	Gross domestic expenditure on R&D (% of GDP)
	Human Capital	HCI	Public expenditure on education (% of GDP)
	GDP per Capita	PGDP	GDP per capita (current US$)
Moderating Variable	Epidemic	e	Dummy variable: 1 for 2020-2021, 0 otherwise
	Interaction Term	ef	Financial development × epidemic dummy

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This study constructed two fixed-effect regression models by considering the core logic of financial theory and the realistic characteristics under the impact of the epidemic to systematically assess the relationship between financial development and unemployment:

$$UM_{it} = \beta_0 + \beta_1 LnF_{it} + \beta_2 LnP_{it} + \beta_3 FER_{it} + \beta_4 E_{it} + \beta_5 RD_{it} + \beta_6 LnHCI_{it} + \beta_7 LnPGDP_{it} + \varepsilon_{it} \quad (1)$$

where i denotes different countries, t denotes different years, β_0 denotes the constant term, $\beta_1 - \beta_6$ represent the coefficient value of the variable, ε_{it} is the random disturbance term. The main purpose of the model is to test the symbol of the regression coefficient β_1 and the significance level, to evaluate the impact of financial development on unemployment.

$$UM_{it} = \beta_0 + \beta_1 LnF_{it} + \beta_2 LnP_{it} + \beta_3 FER_{it} + \beta_4 E_{it} + \beta_5 RD_{it} + \beta_6 LnHCI_{it} + \beta_7 LnPGDP_{it} + \beta_8 e_{it} + \beta_9 ef_{it} + \varepsilon_{it}(1) \quad (2)$$

where model (2) considers the epidemic factor based on the basic model (1), the epidemic dummy variable and its interaction with financial development are added in the model. From this, it can be determined whether the impact of financial development on unemployment changes during the epidemic.

RESULTS AND DISCUSSION

There are three main findings of this study. Firstly, there is a negative relationship between financial development and unemployment rate. Next, countries exhibit different performances, indicating that the heterogeneity effect persists. Finally, the dataset exhibits sufficient variability, so as to support reliable regression analysis.

Table 2. Descriptive Statistics

Variables	N	mean	sd	min	max
e	944	0.0805	0.272	0	1
UM	944	7.348	3.954	1.805	27.69
FER	944	1.645	0.368	0.664	3.110
E	944	68.93	23.27	5.180	170.9
RD	944	1.802	1.099	-0.133	6.492
ef	944	7.179	26.99	0	188.4
log_F	944	4.331	0.578	2.040	5.719
log_PGDP	944	10.21	0.781	7.746	11.80
log_P	944	16.36	1.508	12.55	19.63
log_HCI	944	1.598	0.277	-1.565	2.150

Source: Data processed

Table 2 presents the descriptive statistics results of the variables. Among them, the mean unemployment rate (UM) is 7.348, and the mean financial development (log_F) is 4.331. Moreover, the tertiary enrollment rate is 68.93, remaining relatively high, reflecting the typical characteristics of OECD economies. The analysis of standard deviation shows

that the distributions of various variables were not concentrated in a single country. This further provides the necessary prerequisite for establishing a correlation between financial development and the unemployment rate.

Table 3 presents the results of the correlation analysis. It is evident that financial development is negatively correlated with the unemployment rate, indicating that improving the financial system could create more job opportunities. Moreover, human capital exhibits a negative correlation with the unemployment rate. Therefore, increasing education and training for workers and reducing the number of untrained and uneducated workers may reduce friction in the labor market. In contrast, research and development expenditures are positively correlated with economic activity, which may reflect their long-term contribution to economic growth. Overall, these results are consistent with previous studies (e.g., Cicchiello et al., 2021) that have emphasized this point.

Table 3. Correlation Coefficients

	UM2	log F2	log P2	FER2	E2	RD2	log HCI2	log PGDP2
log F	-0.134***	1						
log P	0.0420	-0.107***	1					
FER	-0.107***	-0.178***	0.00900	1				
E	0.055*	0.299***	0.0490	-0.224***	1			
RD	-0.364***	0.438***	0.081**	0.128***	0.263***	1		
log HCI	-0.124***	0.318***	-0.277***	0.188***	0.104***	0.291***	1	
log PGDP	-0.421***	0.578***	-0.128***	-0.0440	0.244***	0.603***	0.258***	1

*Source: Stata 18

Table 4 presents the variance inflation factor (VIF) results. The mean VIF is 2.42, which is below the unacceptable threshold of 10. Therefore, no multicollinearity issue exists. The regression estimation results are reliable and suitable for further empirical analysis.

Table 4. VIF

Variable	VIF	1/VIF
Ef	5.6	0.17871
E	5.53	0.180763
log_PGDP	2.02	0.494758
RD	1.87	0.535302
log_F	1.81	0.552471
log_HCI	1.33	0.750478
FER	1.23	0.814139
E	1.21	0.829218
log_P	1.17	0.852537
Mean VIF	2.42	

Source: Data processed

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The model selection results are detailed in Table 5. The Hausman test significantly rejected the random-effects model. This indicates that the fixed effects model is more suitable for the current study. It further indicates a correlation between the unobserved heterogeneity among countries and the explanatory variables, thereby enhancing the reliability of the fixed-effects model.

Table 5. Hausman Test

	P-value	Conclusion
Hausman test	chi2(9) = 159.14, Prob > chi2 = 0.0000	FE model is superior

Source: Data processed

Table 6 presents the results of the endogeneity test. To address potential endogeneity issues, the lagged values of financial development indicators are used as instrumental variables. The Kleibergen-Paap rk LM statistic is significant, and the model is identified. The model has been confirmed to be identifiable, further indicating that there is no weak-instrument problem. Moreover, the Hausman-Wu test indicates that there is no endogeneity. These results demonstrate that the model specification is valid and that the estimated coefficients are reliable.

Table 6. Endogeneity Tests

Test item	Statistical value	Conclusion
Kleibergen-Paap rk LM statistic	77.671	p=0.0000, the model is identified.
Cragg-Donald Wald F statistic	213.316	There were no weak instrumental variables (F>16.38, 10% critical value).
Robust score chi2 (Hausman-Wu)	2.1322	p=0.1442, no endogeneity
Hansen J statistic	0.000	equation exactly identified

Source: Data processed

Model 1 (Table 7) presents the baseline regression results. The financial development coefficient (log_F) is negative and statistically significant. It suggests that unemployment decreases by 0.464% for each 1% increase in financial development. This finding is consistent with the theoretical assumption that the development of finance can enhance investment in resources and facilitate employment. The implications of financial development align with the past literature (e.g., Cicchiello et al., 2021), which suggests that improved financing pathways can boost employment growth by expanding access to financing for small and medium-sized businesses. However, the effect size in the current study was smaller than that in some recent market studies (e.g., Wen et al., 2022).

Table 7. Baseline Fixed-Effect Model (Model 1)

Variables	UM
log_F	-0.464*
	(0.280)
log_P	2.085
	(1.688)
FER	-4.175***
	(0.625)
E	0.014*
	(0.007)
RD	-0.174
	(0.242)
log_HCI	1.078***
	(0.417)
log_PGDP	-6.115***
	(0.450)
Constant	39.239
	(28.557)
N	944
R-squared	0.397
Number of COUNTRY	38

Note: ***: Significant at 1% **: Significant at 5% *: Significant at 10%

This disparity can be attributed to the relatively rigid labor market institutions in OECD countries, driven by strong employment protection and welfare systems, which make employment less sensitive to financial shocks. As control variables, there is a significant negative effect on the unemployment rate of the fertility rate (FER), which implies that demographic factors are also very important in the dynamics of the labor market. Human capital (log-HCI) is positively associated with the unemployment rate, suggesting an incompatibility between educational growth and labor-market demand. Altogether, the results suggest that financial development can reduce unemployment, though institutional factors and the economic structure can determine its efficiency. This highlights the significance of certain national circumstances in shaping labor market performance.

Heterogeneity analysis (Table 8) revealed significant differences in the impact of financial development across different income groups. Specifically, financial development has a significant negative impact on the unemployment rate in upper-middle-income countries. In contrast, for high-income countries, this effect is not statistically significant, indicating the promoting effect of financial development on employment is significantly greater in upper-middle-income economies. This finding can be attributed to differences in financial structure and institutional quality. As for upper-middle-income countries, their financial systems are not yet mature. Hence, they are more sensitive to capital allocation, suggesting that improvements in financial development can generate a greater

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employment effect. In contrast, high-income countries typically possess more developed financial markets and more robust institutional frameworks. In this context, the marginal impact of financial development on employment is relatively small.

Table 8. Heterogeneity by Income Level

	Full sample	Upper-middle-income	high-income countries
log_F	-0.464*	-9.778***	-0.402
	(-1.66)	(-3.84)	(-1.41)
log_P	2.085	-40.69	1.286
	-1.24	(-1.29)	-0.78
FER	-4.175***	9.154***	-5.330***
	(-6.68)	-2.74	(-7.43)
E	0.0135*	0.0606	0.0122
	-1.82	-1.58	-1.43
RD	-0.174	-2.73	-0.0691
	(-0.72)	(-0.86)	(-0.29)
log_HCI	1.078***	1.761*	1.133**
	-2.58	-1.74	-2.01
log_PGDP	-6.115***	-0.54	-6.706***
	(-13.60)	(-0.31)	(-13.71)
_cons	39.24	720.3	59.77**
	-1.37	-1.3	-2.14
N	944	99	845
R-sq	0.397	0.526	0.457
F	18.59	2.292	21.14

Note: ***: Significant at 1% **: Significant at 5% *: Significant at 10%

These findings align with previous research by Bruno et al. (2016). There is a nonlinear relationship between financial development and unemployment, especially during periods of economic instability. Nonetheless, this research builds on the literature on the topic, which demonstrates that this heterogeneity is present even in non-crisis times, and focuses on structural differences that influence labor-market outcomes. All in all, the heterogeneous results show that the effectiveness of financial development in reducing unemployment depends on each country's conditions, especially its financial maturity and institutional development.

Model 2 (Table 9) examined how the COVID-19 pandemic affected unemployment rates. The outcome indicates that the pandemic has led to a significant increase in the unemployment rate of about 3.41%. This result supports the adverse effect of economic shocks on the labor market. Besides, the interaction coefficient between the pandemic and financial development was not significant. This shows that financial development has not been effective in generating employment during the pandemic. It also demonstrates that the capacity of the financial systems to sustain employment in times of crisis can

be constrained. Two main mechanisms can explain this finding. On the one hand, the pandemic-related interruption of capital flows reduced access to funding, especially for small and medium-sized businesses (SMEs) that depend on external financing. Conversely, government intervention policies, such as wage subsidy schemes, have partially substituted for the role of financial markets in allocating resources and, hence, diminished the marginal impact of financial development on employment. These findings align with those of Blustein et al. (2020), who found that the labor market was dysfunctional during the crisis. However, this differs from the study by Shang et al. (2021), which found that the pandemic's impact will persist for some time. This study indicates that such negative effects gradually diminished after 2022, suggesting that policy support and economic recovery may restore the role of financial development in promoting employment.

Table 9. Model with Epidemic Effects (Model 2)

Variables	UM2
log_F	-0.468*
	(-1.67)
log_P	2.053
	(1.21)
FER	-4.166***
	(-6.66)
E	0.014*
	(1.84)
RD	-0.177
	(-0.73)
log_HCI	1.076**
	(2.58)
log_PGDP	-6.101***
	(-13.52)
e	3.412***
	(3.63)
ef	0.002
	(0.37)
N	944
R-squared	0.397
F	18.00

Note: ***: Significant at 1% **: Significant at 5% *: Significant at 10%

Robustness analysis (Table 10) confirms that the main findings are stable. After excluding the 2018 financial crisis and the COVID-19 pandemic period from 2019 to 2020, the financial development coefficient (log_F) remains negative and statistically significant, consistent with the baseline results. This result indicates that the impact of financial development on reducing unemployment rates is robust across different sample specifications. This result is consistent with the view of Wang et al. (2022) that the promoting effect

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of financial development on employment is long-lasting. Contrary to the views of some studies (e.g., Kim et al., 2019), they argue that financial development may increase the unemployment rate during a crisis. However, this study did not find such evidence. This difference may be attributed to the composition of the sample, which includes many high-income countries with relatively stable financial systems. The robustness results suggest that there is a stable relationship between financial development and unemployment, unaffected by specific crisis periods. This reinforces the reliability of the main empirical findings.

Table 10. Robustness Test

Variables	UM2
log_F	-0.464*
	(-1.66)
log_P	2.085
	(1.24)
FER	-4.175***
	(-6.68)
E	0.014*
	(1.82)
RD	-0.174
	(-0.72)
log_HCI	1.078***
	(2.58)
log_PGDP	-6.115***
	(-13.60)
Constant	39.239
	(1.37)
N	944
R-squared	0.397
F	18.59

Note: ***: Significant at 1% **: Significant at 5% *: Significant at 10%

CONCLUSION

Using OECD data from 2000 to 2024, this study examines how financial development affects unemployment. It finds that stronger financial systems significantly reduce unemployment, and this effect persists even after excluding crisis periods, indicating long-term stability. The impact varies across countries. Financial development reduces unemployment more in upper-middle-income countries than in high-income ones, mainly because of differences in institutional quality and in how efficiently financial resources are allocated. During the pandemic, unemployment increased, and the positive impact of financial development weakened. However, large fiscal stimulus helped restore employment, highlighting the importance of policy coordination. Overall, financial development lowers unemployment, but the relationship is complex and influenced by crises and income levels.

In terms of policy, upper-middle-income countries should strengthen financial regulation to reduce the risks posed by volatile capital flows. High-income countries can focus on linking financial development with human capital and innovation. Since countries differ in their financial maturity and labor market conditions, policies should be tailored accordingly. During crises, coordination between fiscal policy and financial markets is essential to support employment. The study has limitations that cover only OECD countries, exclude developing economies, and do not fully account for structural factors such as technological developments. Future research should expand the sample and explore these factors to better understand how financial development affects employment.

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