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Do Finance and Investment Drive Employment? Empirical Evidence from Asian Countries

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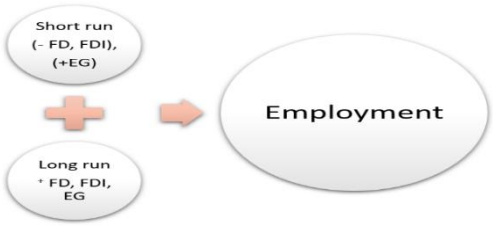
Abstract

Employment generation continues to be a major concern for many Asian economies, where high economic growth has not consistently resulted in adequate job creation. Factors such as financial sector development and foreign direct investment (FDI) play an important role in shaping labor market outcomes by enhancing access to capital, improving productivity, and promoting industrial expansion. However, the impact of these factors differs across countries and time periods. This study contributes to the literature by applying the Pooled Mean Group (PMG) Autoregressive Distributed Lag (ARDL) model to simultaneously analyze both short-run and long-run dynamics between financial development, FDI, economic growth, and employment, offering comparative insights that remain underexplored. The study focuses on four Asian economies—Bangladesh, India, Pakistan, and Sri Lanka—covering the period from 1990 to 2022. It empirically examines the interrelationships among financial development, FDI inflows, economic growth, and employment rates. The PMG ARDL approach is employed to capture long-term equilibrium relationships as well as short-term adjustments, while unit root tests account for mixed levels of stationarity among variables. The empirical findings indicate that, in the long run, financial development, FDI inflows, and economic growth positively influence employment levels. However, in the short run, financial development and FDI exhibit a negative effect on employment, whereas economic growth continues to have a positive impact. To validate these results, robustness checks using Fully Modified OLS (FMOLS) and Dynamic OLS (DOLS) were conducted, confirming the consistency of the estimated relationships. These findings offer important policy implications for addressing unemployment challenges in Asian economies.

Keywords: *Employment rate, Economic growth, FDI, financial development, ASIAN countries*

JEL Code; *C23; E24; F21; O16; O47;*



Abstract Figure1,

1. Introduction

Employment generation is a critical development priority for Asian economies, where economic expansion has not always translated into adequate job creation. Financial development plays a central role in shaping employment outcomes because an efficient financial system supports capital accumulation and facilitates optimal resource allocation, ultimately fostering productive investment and job creation. This issue is particularly relevant for Asian countries, where recent financial reforms and market expansion require a deeper assessment of their implications for labor markets. Addressing employment challenges therefore calls for an integrated policy approach that promotes investment, enhances productivity,

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strengthens skills, and supports sustainable growth. However, weak capital allocation toward labor-intensive sectors such as real estate, rising economic uncertainty, and declining export performance have constrained productive investment and aggravated unemployment across the region (Rahman et al., 2019; Farooq et al., 2024). Foreign direct investment (FDI) has emerged as another important engine of growth and structural transformation in Asian countries. The inflow of foreign capital stimulates investment, facilitates technology transfer, and improves productivity, all of which potentially influence employment dynamics. Understanding these linkages is essential for designing policies that not only attract FDI but also channel it toward sectors that maximize employment benefits. Consistent with endogenous growth theory, FDI acts as a vehicle for technological diffusion from developed to developing economies, enhancing human capital, productivity, and employment opportunities (Rehman et al., 2019). Many emerging economies have thus introduced reforms in financial markets, trade policy, and institutional frameworks to encourage FDI inflows (Fon et al., 2021). Since the 1990s, increased investment across Sub-Saharan Africa, SAARC, ASEAN, and Central Asia has contributed to export growth, managerial upgrading, job creation, and economic diversification (Kucera and Roncolato, 2018). In recent years, global unemployment pressures have intensified, particularly following the COVID-19 pandemic (Chanana & Sangeeta, 2021; Farooq et al., 2024). The South Asian Association for Regional Cooperation (SAARC) region, despite its large labor force, continues to struggle with limited employment opportunities, posing challenges for social stability and inclusive growth. Structural weaknesses including skills mismatches, limited industrial diversification, and shrinking export capacity — further complicate the employment landscape. Recent empirical studies highlight the potential role of FDI inflows, export performance, and financial development in improving labor-market outcomes (Khan et al., 2022; Kim & Go, 2022; Kananurak & Sirisankanan, 2020; Farooq et al., 2024). Persistent unemployment imposes broader social costs by intensifying poverty, crime, and instability (Lee, 2018), underscoring the importance of understanding how economic growth interacts with employment. Although growth is often assumed to generate jobs, its effects vary widely across sectors and national contexts, particularly in Asia. The economies of Bangladesh, India, Pakistan, and Sri Lanka have undergone major structural shifts over recent decades, yet employment challenges remain central. Achieving sustainable and inclusive job creation is essential for strengthening social cohesion and promoting long-term growth. While financial development, FDI inflows, and economic growth are widely recognized as determinants of employment, the complex interactions among these variables — especially in Asian economies — remain insufficiently explored. This gap limits policymakers' ability to design coordinated strategies that simultaneously enhance growth and employment outcomes. To address this gap, the present study employs a panel Auto Regressive Distributed Lag (ARDL) framework to examine the dynamic relationships among financial sector development, FDI inflows, economic growth, and employment across Asian economies. By capturing both short and long-run effects, the analysis provides more comprehensive empirical evidence than many earlier studies that relied on simpler approaches. The findings are expected to support policymakers in formulating strategies aimed at strengthening employment generation while sustaining economic growth. The remainder of the paper is organized as follows. Section 1 introduces the research problem and motivation. Section 2 reviews relevant literature on financial development, FDI, growth, and employment. Section 3 describes the methodology, data sources, and econometric techniques. Section 4 presents and discusses the empirical findings. Section 5 concludes with policy recommendations and directions for future research.

2. Review of Literature

2.1. Financial Development and Employment nexus

The relationship between financial development and employment has long been a focus of extensive research, particularly in exploring how a robust financial sector influences job creation and supports economic growth. Financial development, which

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encompasses the depth, efficiency, and stability of financial institutions and markets, is considered essential in enhancing resource allocation, fostering entrepreneurship, and stimulating investment, all of which can contribute to higher employment levels. Beck and Demirgüç-Kunt (2006) emphasize that a well-developed financial sector improves capital distribution, which in turn drives business activities and creates job opportunities. The empirical evidence on this relationship, especially within individual Asian countries, has yielded varied findings. In Pakistan, for example, Khan and Qayyum (2007) observed a positive correlation between financial development and employment, suggesting that improvements in the financial sector can facilitate job growth. Similarly, Rehman et al. (2023a) reported that financial sector advancements positively impacted employment in Bangladesh. In both cases, an increase in financial development—through access to credit, investment growth, and improved financial services—appears to have fostered economic activity and employment. Conversely, the relationship between financial development and employment in other Asian economies like India and Sri Lanka seems more complex, influenced by structural barriers and inefficiencies in financial systems. Research indicates that, in these countries, limitations within the financial sector may impede the expected positive effects on employment. Edirisuriya (2007) points out that these constraints can disrupt the process by which financial development typically supports job creation, as they reduce the sector's capacity to efficiently mobilize resources and drive investments that lead to sustainable employment growth. Issues such as inadequate financial infrastructure, regulatory barriers, and limited access to financing in rural areas may hinder the financial sector's ability to contribute meaningfully to job creation in these economies. This diverse set of findings underscores the need for a deeper examination of the underlying conditions that shape the relationship between financial development and employment. It suggests that while financial development generally holds potential for positive employment impacts, the extent of these effects depends on the unique structural and institutional characteristics of each economy. Factors like regulatory quality, access to financial services, and the presence of supportive policies significantly influence whether financial development will translate effectively into employment growth. To address these complexities and contribute to the existing literature, the current study proposes a hypothesis to test the nature and direction of the relationship between financial development and employment across Asian economies. By doing so, it seeks to clarify whether financial development can consistently stimulate employment or if its effects vary based on country-specific factors and institutional conditions. Understanding this relationship better may offer insights into potential reforms or policy interventions that can enhance the role of financial development in promoting employment.

H1. The influence of financial development on the employment rate is significantly positive.

2.2. Foreign Direct Investment and Employment nexus

Foreign direct investment (FDI) inflows are widely regarded as catalysts for economic growth and job creation, especially in emerging economies like those in the Asian region. FDI is viewed as instrumental for these economies because it provides not only an influx of capital but also channels that foster employment and enhance productivity. The literature on FDI's impact on employment outlines multiple pathways through which FDI can positively affect job dynamics. Key mechanisms include the transfer of technology, enhancement of workforce skills, increased competition, and the development of local supply chains. These elements often help to stimulate job creation and economic activity, which can have broad, positive implications for the host country's labor market. Numerous studies have documented the favorable association between FDI inflows and employment in Asian countries. For example, research by Abraham et al. (2004), Baranwal (2019), and Malik (2019) found that FDI inflows have led to job growth, particularly in sectors that benefit from foreign expertise, investment, and production capacity. These studies suggest that FDI can play a critical role in improving employment rates by creating new jobs, filling gaps in domestic industries, and fostering economic

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diversification. In many cases, foreign companies establish new facilities or joint ventures, which necessitate hiring local labor, thereby directly supporting employment growth. On the other hand, some researchers have raised concerns about the quality, stability, and long-term sustainability of the jobs created through FDI. Acharyya (2009), Bakhsh et al. (2017), and Luo et al. (2022) argue that while FDI inflows may initially increase job opportunities, these positions are sometimes low-wage, temporary, or vulnerable to external market shifts. In certain cases, the influx of foreign companies can also lead to increased competition that puts local businesses under strain, potentially resulting in job losses for domestic workers. Additionally, foreign-owned firms may prioritize high-tech or capital-intensive operations, which may not always require extensive local labor, limiting the impact on local employment. Furthermore, the impact of FDI on employment varies widely across different sectors and depends on factors like the host country's technological capabilities, labor market conditions, and absorptive capacity. For instance, Blomström et al. (1994), and Rehman et al. (2023b) emphasize that sectors with higher technological sophistication tend to create jobs that require specific skill sets, which may not always align with the existing workforce's skills in the host country. Therefore, countries with flexible labor markets and robust training programs are better equipped to capitalize on FDI's potential for job creation, as these features enable a smoother integration of foreign technologies and processes. Considering the varied empirical evidence in the literature, this study aims to clarify the nuanced effects of FDI on employment in Asian economies by examining how factors like sectoral focus, labor market flexibility, and the host economy's absorptive capacity influence the FDI-employment relationship. This approach will help to identify whether FDI consistently contributes to sustainable job creation or if its impact fluctuates based on local economic conditions and sector-specific factors. Consequently, the following hypothesis is proposed to test the strength and nature of the FDI-employment nexus within the context of Asian economies.

H 2. FDI inflow exhibits a positive and statistically significant association with employment rate.

2.3. Economic Growth and Employment nexus

The link between economic growth and employment remains a core issue in development policy discussions. Although economic growth is typically linked with increased employment opportunities, the inclusiveness and nature of this growth are of paramount importance. Research emphasizes that the quality and equitable distribution of jobs created across different population groups are essential factors (ILO, 2018). Studies on Asian economies underline the critical roles of structural transformation, productivity advancements, and labor market policies in ensuring that economic growth leads to substantial employment outcomes (Ghose, 2004; Okada, 2012; Sasikumar, 2015; Rodgers, 2020). Additionally, informal employment, which is still widespread in these regions, has received growing attention, with researchers advocating for policies that encourage formalization and social protection (Chen and O'Keefe, 2012; Kucera and Roncolato, 2018). While much of the literature has examined the individual relationships among financial development, FDI inflows, economic growth, and employment, there is a growing recognition of the need to explore the interplay among these factors comprehensively. Several studies have adopted a more integrated approach, analyzing how changes in one factor influence the others and their combined effect on employment dynamics. For example, Alfaro et al. (2009), Federici and Caprioli (2009), Muhammad (2011), and Padhi (2024) explored the interactive effects of financial development and FDI on employment in India, underscoring the importance of coordinated policy approaches to maximize these benefits. Similarly, Hussain and Haque (2016), Noor et al. (2016), Begum et al. (2018), Haque and Amin (2018), Reza et al. (2018), Sarker and Khan (2020), and Siddikee and Rahman (2021) analyzed the combined influence of economic growth and FDI on employment in Bangladesh, highlighting the need for structural reforms to enhance the employment potential of foreign investments.

H3. Economic growth exhibits a significantly positive association with employment rate.

This study uniquely investigates how financial development, FDI, and economic growth jointly

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influence employment across Asian economies using a comprehensive panel ARDL framework. Unlike earlier studies, it captures both short- and long-run dynamics, providing clearer policy insights on employment-led growth strategies.

3. Data and Methods

3.1. Data

To achieve the study's objectives, an empirical analysis was conducted covering 33 years (1990-2022) using data from Bangladesh, India, Pakistan, and Sri Lanka. These countries were chosen due to their high unemployment rates, limited financial development, and insufficient FDI inflows, making them relevant for policy discussions. The period of 1990-2022 was selected to account for the impact of the COVID-19 pandemic on employment. Data were collected annually, as key variables like employment, financial development, and FDI show gradual changes. The data came from the World Development Indicators (WDI), ensuring consistency and reliability, with details provided in Table 1 and Figure 2.

Table 1. Variables of study.

Types	Acronym	Variable Titles	Measurements and Data Sources	Data Availability	Reference
Outcome	EMP	Employment rate	Labor force participation rate, total (% of total population ages 15–64) (modeled ILO estimate)	1990-2022	(Khan et al., 2022; Kim & Go, 2022; Sevencan, 2023)
Input	FSD	Financial sector development	Domestic credit to private sector by banks (% of GDP)	1990-2022	(Fonseca & Doornik, 2022; Iheonu et al., 2020)
	FDI	Foreign direct investment inflow	Foreign direct investment, net inflows (% of GDP)	1990-2022	Agudze & Ibhagui, 2021; Khan et al., 2022)
	ECG	Economic growth	GDP per capita growth (annual %)	1990-2022	(Khan et al., 2022)
Control	GCF	Gross capital formation	Gross capital formation (% of GDP)	1990-2022	(Yasmeen et al., 2021)
	EPO	Export volume	Exports of goods and services (% of GDP)	1990-2022	(Kim & Go, 2022
	PGR	Population Growth rate	Population growth (annual %)	1990-2022	(Denham, 2021)
	INF	Inflation	Inflation, consumer prices (annual %)	1990-2022	Epstein, & Yeldan, (2008).
	TO	Trades Openness	Trades as a percentage of GDP)	1990-2022	(Asaleye, et. al., 2017)

Note: This table shows the measurement and source of variables.

Source: Previous studies.

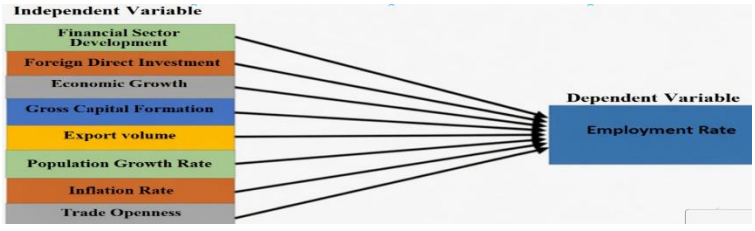

Figure 2. Theoretical Framework

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3.2. Empirical model

The relationship among financial development, foreign investment, economic growth, gross capital formation, export volume, population growth rate, inflation, trade openness, and employment rate can be represented functionally in Equation 1 as shown below.

$$\mathrm{EMP} = f(\mathrm{FSD}, \mathrm{FDI}, \mathrm{GCF}, \mathrm{ECG}, \mathrm{EPO}, \mathrm{PGR}, \mathrm{INF}, \mathrm{TO}) \quad (1)$$

Initially, we calculate the multiple linear regression models, which can be represented as follows.

$$\mathrm{EMP}_{it} = \beta_0 + \alpha_1 \mathrm{FSD}_{it} + \alpha_2 \mathrm{FDI}_{it} + \beta_1 \mathrm{GCF}_{it} + \beta_2 \mathrm{ECG}_{it} + \beta_3 \mathrm{EPO}_{it} + \beta_4 \mathrm{PGR}_{it} + \beta_5 \mathrm{INF}_{it} + \beta_6 \mathrm{TO}_{it} + \mu_j + \omega_t + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots \quad (2)$$

Equation (2) represents a multiple linear regression model, where EMP denotes the employment rate vector, FSD refers to financial sector development, and FDI represents foreign direct investment inflows. The other variables are as follows: GCF for gross capital formation, ECG for economic growth, EPO for export volume, PGR for population growth, INF for inflation rate, and TO for trade openness. The control variable coefficients are denoted by α, while the explanatory variable coefficients are represented by β. The symbols μ and ω represent cross-section and time-fixed effects, respectively, while εit stands for the error term.

3.3. Methods of Estimation

Panel data approach is applied because earlier research examining the links among financial development, FDI inflows, economic growth, and employment often suffered from methodological limitations. Since these indicators are typically recorded annually, the available observations for each country are limited, reducing the reliability of time-series estimates. Panel data, however, combine information across both countries and time, improving estimation accuracy and consistency. Therefore, this study analyzes panel data from emerging economies and follows a structured five-step procedure to empirically evaluate Equation (2).

3.4 The Slope Homogeneity Test

The slope heterogeneity test proposed by Pesaran and Yamagata (2008) is applied to evaluate whether the coefficients across countries in the panel are homogeneous. This test offers an advantage over alternative heterogeneity tests because it accounts for cross-sectional dependence (CD), as emphasized by Khan et al. (2020). Examining slope homogeneity is essential in panel data analysis, particularly because Asian economies differ substantially in their social, economic, and geographic structures. Therefore, it is reasonable to expect meaningful variation across countries. The mean slope heterogeneity test developed by Pesaran and Yamagata (2008) is expressed through the following equations:

$$\hat{\Delta}\mathrm{SH} = N^{\frac{1}{2}} 2K^{-\frac{1}{2}} \left(\frac{1}{N}\hat{S} - K\right) \ldots\ldots\ldots\ldots\ldots 3$$

$$\hat{\Delta}\mathrm{ASH} = N^{\frac{1}{2}} \left(\frac{2k(T-k-1)}{T+1}\right)^{-\frac{1}{2}} \left(\frac{1}{N}\hat{S} - K\right) \ldots\ldots\ldots\ldots\ldots 4$$

3.5. Cross-Sectional Dependence Test

Cross-sectional dependence was examined using the CD test proposed by Pesaran (2015). This test evaluates whether shocks affecting one country also influence others within the panel. The corresponding test statistics are defined as follows:

$$CSD = \sqrt{\frac{2T}{N(N-1)N}} \left(\sum_{i=1}^{N=1} \sum_{K=i+1}^{N} \widehat{Corr}_{i,t}\right) \ldots\ldots\ldots\ldots\ldots 5$$

3.6. Panel Unit Root Test

Traditional unit root procedures such as the Augmented Dickey–Fuller (ADF), Phillips–Perron, Breitung, Maddala, and Hadri tests are widely applied in econometric analysis. However, these approaches are often unsuitable when the dataset exhibits cross-sectional dependence (CSD) and slope heterogeneity (SH), conditions that can reduce the reliability of their outcomes. To overcome these limitations, Pesaran (2007) introduced enhanced panel unit root techniques—the Cross-Sectionally Augmented Dickey–Fuller (CADF) and Cross-Sectionally Augmented IPS (CIPS) tests. These methods are specifically designed to assess the

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stationarity of panel variables while explicitly accounting for both cross-sectional dependence and slope heterogeneity. In the CIPS framework, Equation (6) emphasizes the inclusion of cross-sectional means, which form an integral part of the testing process by helping identify stationarity under such conditions.

$$\text{CIPS} = \frac{1}{N}\sum_{i=1}^{N} ti\,(N,T) \ldots\ldots\ldots\ldots\ldots 6$$

The Cross-Sectionally Augmented Dickey–Fuller (CADF) test is commonly applied in empirical research to manage issues such as cross-sectional dependence (CSD) and heterogeneity. The procedure starts with a standard unit root assessment to establish the null hypothesis. When the results indicate that a variable becomes stationary at level I(1), a cointegration test is subsequently conducted before estimating model parameters. The CADF framework also provides the basis for computing statistics used in the CIPS test. Furthermore, Equation (6), representing the CADF specification, can be written as follows:

$$\Delta Y_{it} = \varphi_i \textstyle\prod_{k=1}^{n} A_k + \zeta_i Y_{t,t-1} + \delta_i \tilde{Y}_{t-1} + \sum_{j=0}^{P} \delta_{ij}\,\tilde{Y}_{t-1} + \sum_{j=1}^{P} \lambda_{ij}\,\Delta Y_{i,t-1} + \varepsilon_{it} \ldots..7$$

$$G_a = \frac{1}{n}\sum_{i=1}^{N} \frac{a'_i}{SE(a'_i)} \ldots\ldots\ldots\ldots..8$$

$$G_t = \frac{1}{n}\sum_{i=1}^{N} \frac{Ta'_i}{a'_i(1)} \ldots\ldots\ldots\ldots\ldots 9$$

In panel data analysis, group mean statistics (denoted as **Gt** and **Ga**) and panel mean statistics (**Pt** and **Pa**) serve distinct purposes in evaluating relationships among variables. Under the null hypothesis, it is assumed that the variables are independent, while the alternative hypothesis suggests the existence of co-integration. These test statistics are employed to determine whether the data support co-integrating relationships or uphold the null of no association. They are therefore essential in assessing both the strength and significance of potential long-run connections among the variables. In this study, the robustness of

This specification forms the foundation of the CADF testing approach, enabling the computation of statistics used in the CIPS procedure. In the equation, Y_{t-1} represents the level form of the series (I(0)), while $\Delta Y_{i,t-1}$ captures its first-difference representation (I(1)) for each cross-sectional unit.

3.7. Cointegration Test

Examining cointegration is essential in econometric analysis because many economic relationships operate over the long run. This study therefore investigates whether a stable long-term association exists among the integrated variables. To properly address cross-sectional dependence, we apply the approach of Pesaran and Yamagata (2008), which has been shown to yield robust and consistent results (Pesaran, M. H., 2015). In particular, the Westerlund (2008) test demonstrates superior performance under cross-sectional dependence and benefits from the use of a bootstrap procedure, making it especially suitable for such panels. Furthermore, Pesaran and Yamagata (2008) introduced a second-generation framework consisting of four equations (Equations (8)–(11)), which provides the basis for cointegration testing in panels characterized by dependence across units, heterogeneity, and non-stationarity.

$$P_t = \frac{a'_i}{SE(a'_i)} \ldots\ldots\ldots\ldots\ldots 10$$

$$P_a = Ta' \ldots\ldots\ldots\ldots 11$$

results derived from the PMG-ARDL approach was validated using FMOLS and DOLS estimations. Furthermore, panel causality tests were conducted to explore the directional causal links between the variables. Furthermore, to certify the robustness of the findings, this study employs the fully modified OLS and dynamic OLS models which is used in earlier studies by Shahbaz, 2009; Priyankara, 2018; Khan et al., 2019; Olofin et. al., 2019; Olorogun, 2023; Ramirez, 2023; Alhasim, et.a., 2024; Chisty, et al., 2025 These models also allow for the estimation of long-run coefficients, which strengthens the credibility of our results.

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4. Empirical findings and discussions

4.1. Empirical findings

Table 2 shown the mean employment rate is 56.46 percents, with a median of 56.95 percents. Employment rates range from 49.28 percents to 62.94 percents, by means of a standard deviation of 3.18 percents. The distribution of employment rates is slightly negatively skewed (-0.44), indicating that the data is skewed towards higher employment rates. The value of kurtosis (2.24) suggests that the distribution of its data has more peaked and heavier tails than a normally distribution. The mean economic growth rate is 5.05 percent, with a median of 5.35 percent. Economic growth rates range from -7.82 to 9.05 percent, and its standard deviation is 2.63 percent. The distribution of economic growth data is significantly negatively skewed (-1.96), indicating a substantial skewness towards lower growth rates. The value of kurtosis (9.30) advocates a distribution by heavy tails and highly peaked shape. Furthermore, the mean export value is 62.81 percent, with a median of 55.31 percent. Export values range from 5.15 percent to 147.57 percent, with a large standard deviation of 39.92 percent. The distribution of data for export values is a little positively skewed by 0.15, demonstrating a small skewness towards high level export values. The value of kurtosis is 1.61, suggests that data distribution is slightly more peaked than a normal distribution. The mean foreign direct investment is 0.56 percent, with a median of 0.41 percent. FDI values range from -0.04 percent to 2.85 percent, with a standard deviation of 0.59 percent. The distribution of FDI values is positively skewed (0.99), indicating a skewness in the direction of higher FDI inflows values. The value of kurtosis is 3.49, suggests a data distribution by fatter tails as well as a additional peaked shape. The mean foreign direct investment is 29.98 percent, with a median of 28.48 percent.

Table 2. Descriptive analysis

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
EMP	56.46	56.95	62.94	49.28	3.18	-0.44	2.24
ECG	5.05	5.35	9.05	-7.82	2.63	-1.96	9.30
EPO	62.81	55.31	147.57	5.15	39.92	0.15	1.61
FDI	0.56	0.41	2.85	-0.04	0.59	0.99	3.49
FSD	29.98	28.48	54.57	8.80	11.94	0.35	2.07
GCF	5.97	7.13	29.77	-24.90	7.71	-0.83	5.36
INF	8.07	7.03	49.72	2.01	5.35	4.01	29.63
PGR	1.52	1.38	3.30	0.11	0.68	0.56	2.94
TO	40.81	36.49	88.64	15.51	17.46	1.00	3.14

abbreviations: ECG, economic growth; EMP, employment rate; EPO, export volume; FDI, foreign direct investment inflow; FSD, financial sector development; GCF, gross capital formation; PGR, population growth, TO, Trade Openness, INF, Inflation rate

FSD values range from 8.80 percent to 54.57 percent, by 11.94 percent standard deviation. The data distribution of FSD values is positively skewed (0.35), demonstrating skewness upwards. The value of kurtosis is 2.07 proposes that data distribution is more peaked as compare to a normal distribution. The mean gross capital formation is 5.97 percent, with a median of 7.13 percent. GCF values range from -24.90 percent to 29.77 percent, with standard deviation by 7.71 percent. The data distribution of GCF is negatively skewed (-0.83), indicating a skewness towards lesser values of GCF. The value of kurtosis is 5.36 submits a data distribution through heavy tails as well as very peaked shape. The mean inflation rate is 8.07%, with a median of 7.03%. Inflation rates range from 2.01% to 49.72%, by 5.35% standard deviation. The data distribution of inflation rates is positively skewed (4.01), indicating a significant skewness towards higher inflation rates. The value of kurtosis 29.63 suggests that data distribution is extremely weighty tails as well as vastly peaked shape. The mean population growth rate is 1.52%, with a median of 1.38%.

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Population growth rates range from 0.11% to 3.30%, with a standard deviation of 0.68%. The distribution of population growth rates is slightly positively skewed (0.56), indicating a slight skewness towards higher growth rates. The value of kurtosis is 2.94 advocates that data distribution is slightly more peaked as compare to the normal distribution. The mean trade openness is 40.81 percent, with a median of 36.49 percent. Trade openness values range from 15.51 percent to 88.64 percent, with a standard deviation of 17.46 percent. The distribution of trade openness values is positively skewed (1.00), indicating a skewness towards higher trade openness values. The value of kurtosis is 3.14 suggests a data distribution is slightly more peaked as compare to the normal distribution.

Furthermore, Table 3 reports the outcomes of correlation analysis. The outcomes of correlation analysis indicate that there is no issue of multicollinearity as most values are less than 0.70 (a benchmark value for the existence of multicollinearity)

Table 3. Correlation analysis.

	EMP	ECG	EPO	FDI	FSD	GCF	INF	PGR	TO
EMP	1.00								
ECG	0.21	1.00							
EPO	-0.21	-0.03	1.00						
FDI	0.48	0.15	0.19	1.00					
FSD	0.12	0.09	0.50	0.41	1.00				
GCF	0.23	0.69	-0.14	0.08	0.05	1.00			
INF	-0.07	-0.34	0.03	0.15	-0.05	-0.39	1.00		
PGR	-0.58	-0.03	-0.46	-0.67	-0.51	-0.04	-0.04	1.00	
TO	0.33	0.07	0.13	0.72	0.27	-0.02	0.22	-0.58	1.00

In this study, we examine cross-sectional dependence among selected Asian economies by applying all nine CD tests. We also address the risk of biased or misleading estimates that may arise when assuming slope homogeneity in the presence of slope heterogeneity. To overcome this issue, we employ the slope homogeneity test developed by Pesaran and Yamagata (2008). Table 3's results show that the null hypothesis of slope homogeneity was rejected at the 1% significance level, showing the presence of slope heterogeneity in the datasets.

Table 3. The slope heterogeneity test.

Test Statistics	**Statistics**	***p*-Value**
Δtest	2.72 *	0.08
Δadj	4.31 ***	0.00

The symbols *, **, and ***, respectively, indicate levels of significance at 10%, 5%, and 1%, and the values in parentheses contain the *p*-values.

Table 4 summarizes the outcomes of the cross-sectional dependence (CSD) tests. For reliable regression estimation, Chudik and Pesaran (2015) emphasize the importance of testing for cross-sectional dependence alongside conventional unit root procedures. Recent research (e.g., [61]) further notes that ignoring this issue can introduce bias in large-sample corrections, as also discussed by Pesaran and Yamagata (2008). Pesaran (2015) applies the CD test and confirms the presence of cross-sectional dependence in the panel. Consequently, it becomes necessary to adopt methods that explicitly account for both cross-sectional dependence and slope heterogeneity. To address these concerns, this study applies second-generation panel unit root and cointegration techniques, particularly those proposed by Pesaran (2015, 2007) and Levin et al. (2002).

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Table 4. Cross-sectional dependence.

Variables	CD Statistics	*p*-Value		Decisions
EMP	3.21 ***	0		Cross-sectional dependency
FSD	16.85 ***	0		Cross-sectional dependency
FDI	5.51 ***	0		Cross-sectional dependency
ECG	17.89 ***	0		Cross-sectional dependency
GCF	9.32 ***	0		Cross-sectional dependency
EPO	6.88 ***	0		Cross-sectional dependency
PGR	11.32 ***	0		Cross-sectional dependency
TO	6.78 ***	0		Cross-sectional dependency

The symbols *, **, and ***, respectively, indicate levels of significance at 10%, 5%, and 1%, and the values in parentheses contain the *p*-values.

The subsequent stage of the analysis involves verifying the appropriate integration order of the variables before proceeding with estimation. Table 5 reports the results of the CIPS, CADF, and Levin panel unit root tests. The findings show that some variables are stationary at level, I(0), while others become stationary after first differencing, I(1), indicating mixed integration orders. Because of this, both linear and nonlinear ARDL cointegration approaches are applied. Accordingly, the study employs several unit root tests, including the Im, Pesaran, and Shin W-stat (Im et al., 2003) and the Augmented Dickey–Fuller (ADF) test developed by Dickey and Fuller (1979). The unit root test outcomes, summarized in Table 5, confirm that certain series are stationary at level I(0), whereas others achieve stationarity at first difference I(1).

Table 5. Outcomes of Unit root tests.

(Im, Pesaran and Shin W-stat)					(ADF—Fisher chi-square)				
Variable	Level		First difference		Level		First difference		
	t-statistics	Prob.	t-statistics	Prob.	t-statistics	Prob.	t-statistics	Prob.	Decision
EMP	0.59	(0.72)	-4.46***	(0.00)	6.04	(0.64)	35.97***	(0.00)	I (I)
FSD	0.40	(0.65)	-4.05	(0.00)	4.82	(0.77)	32.35***	(0.00)	I (I)
FDI	-2.65***	(0.00)	-5.17***	(0.00)	27.01***	(0.00)	46.71***	(0.00)	I (0)
ECG	-2.91***	(0.00)	-9.62***	(0.00)	26.86***	(0.00)	83.13***	(0.00)	I (0)
GCF	-4.76***	(0.00)	-8.87***	(0.00)	38.08***	(0.00)	76.02***	(0.00)	I (0)
EPO	3.22	(0.99)	-7.38***	(0.00)	0.96	(0.99)	61.61***	(0.00)	I (I)
PGR	1.66	(0.95)	-4.41***	(0.00)	4.64	(0.79)	37.11***	(0.00)	I (I)
TO	-0.64	(0.26)	-5.19***	(0.00)	6.61	(0.57)	41.51***	(0.00)	I (I)
INF	-2.14	(0.01)	-7.32***	(0.00)	17.95**	(0.02)	61.75***	(0.00)	I (I)

Note: ***, **, * report the significance level at 1%, 5%, and 10%, relatively.

After conducting the panel unit root analyses, the subsequent step is to determine whether the variables share a long-run cointegrating relationship. The cointegration results obtained using the procedure proposed by Pesaran (2007) are reported in Table 6. As shown, the statistics more frequently reject the null hypothesis of no cointegration at the panel level than at the individual-country level,

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indicating the existence of a stable long-term association among the variables. Once cointegration is established, it becomes necessary to estimate the long-run effects of the explanatory variables. For this purpose, the PMG-ARDL approach is employed to evaluate how renewable energy consumption, technological innovation, export diversification, financial development, and trade openness influence economic growth over time. The choice of the PMG-ARDL estimator is justified by the relatively small sample size, as it yields consistent and reliable long-run estimates. The empirical results from the PMG-ARDL analysis are presented in Table 7.

Table 6. Westerlund (2007) cointegration test.

Statistics	Value	Z-value	*p*-Value	Outcomes
Gt	4.07 ***	3.09 **	0.01	Cointegration
Ga	−2.12 **	−3.70 **	0.02	Cointegration
Pt	−5.33 **	−6.43 **	0.04	Cointegration
Pa	-2.07 ***	−3.51 ***	0.0	Cointegration

The Gt and Ga statistics test cointegration for each cross-section, while the Pt and Pa statistics test cointegration in the panel under the null hypothesis of no cointegration. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The regression analysis for the ARDL model is presented in Table 6 while the regression outputs for FMOLS and DOLS are presented in Table 7. In Table 6, the estimated coefficient values reveal that FSD has a positive and statistically significant value of 0.165, indicating that a one-unit increase in FSD can uplift employment by 16.5% in long-run mode. Similarly, the coefficient value of FDI is 0.004, demonstrating the significant role of FDI inflow in enhancing the employment level in the host country. The GCF, ECG, and EPO have statistically significant and positive coefficient values of 0.128, 0.534, and 0.341 relatively while PGR has a negative value of 2.069. These values state that the GCF, ECG, and EPO enhance employment while PGR diminishes employment opportunities. As shown in Table 7, this specific relationship of explanatory variables with employment rate remains consistent even after employing the FMOLS and DOLS models.

4.3. Pooled Mean Group–Autoregressive Distributed Lag (PMG-ARDL) Analysis

The analysis shown in Table 6 reveals a positive correlation between financial sector development and employment opportunities. A well-established financial sector fosters entrepreneurship and accelerates industrial growth, which in turn boosts employment rates. A strong financial sector is essential for an economy as it enables smoother economic operations by providing affordable financing to the private sector, encouraging production expansion, and increasing workforce participation. Studies (Omri, 2020; Farooq et al., 2024) confirm this view. Industries often depend on external financing, such as bank loans or equity issuance, to sustain operations, and a developed financial sector facilitates this, thus supporting business activities and enhancing employment.

Research (Fonseca and Doornik, 2022; Farooq et al., 2024) further indicates that a developed financial sector contributes to the skill intensity of the labor force, creating new job opportunities. Additionally, there is a positive relationship between FDI inflows and employment rates. Statistical analysis shows that FDI significantly boosts employment, as foreign investors expand or establish industrial operations that require additional labor (Khan et al., 2022). This suggests that FDI inflows lead to greater employment opportunities, a finding supported by studies (Adegboye et al., 2020; Rong et al., 2020; Farooq et al., 2024).

The coefficient for economic growth (ECG) is positive (0.96), indicating a positive, though marginally significant, relationship with employment (t-statistic = 1.49, p-value = 0.10). Economic growth fosters employment by efficiently utilizing resources like land, labor, and capital, which leads to the increased deployment of human capital. This correlation between economic growth

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and employment is also supported by Khan et al. (2022).

Regarding the control variables, the statistical analysis suggests that gross capital formation (GCF) positively impacts employment levels. GCF, which represents government investment, stimulates the country's production framework. Infrastructure projects funded by the government increase demand for industrial materials, such as cement and iron, which drives industrial activities and results in the creation of more jobs.

Table 6. PMG ARDL Anaysis

Long Run Equation				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
FSD	0.67**	0.24	-2.96	0.01
FDI	12.36***	3.06	4.04	0.00
ECG	0.96*	0.64	1.49	0.10
EPO	0.29***	0.07	4.16	0.00
GCF	0.45**	0.22	-2.01	0.05
INF	-0.97*	0.49	1.97	0.06
PGR	-23.46***	2.22	10.55	0.00
TO	0.33***	0.10	3.13	0.00
Short Run Equation				
COINTEQ01	-0.01***	0.03	0.22	0.00
D(ECG)	0.09	0.13	0.70	0.49
D(EPO)	0.01	0.02	0.31	0.76
D(FDI)	-0.98	0.72	-1.36	0.18
D(FSD)	-0.09	0.03	-2.52	0.02
D(GCF)	-0.02	0.03	-0.80	0.43
D(INF)	0.00	0.03	0.16	0.87
D(PGR)	-3.46	3.03	-1.14	0.26
D(TO)	0.02	0.02	0.82	0.42

***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

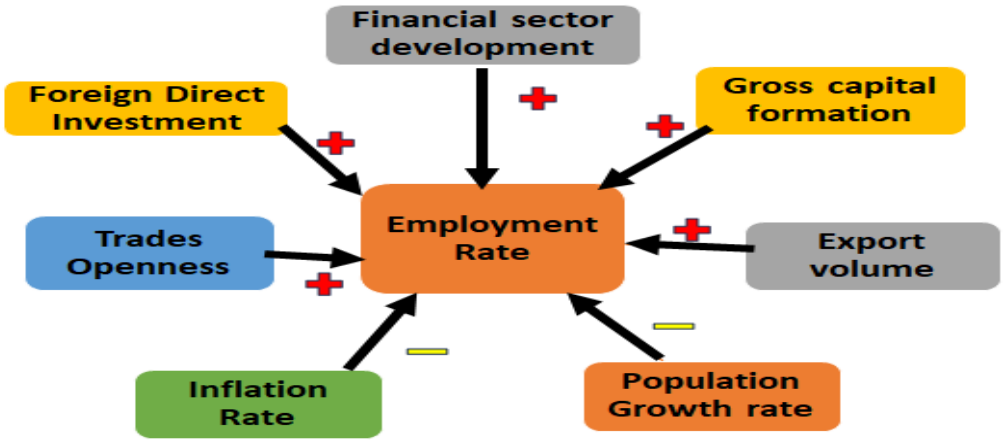

Figure 3. Summary of results

The increase in demand for industrial goods amplifies industrial activities, leading to the creation of more job opportunities. Gross capital formation (GCF) plays a crucial role in boosting employment by requiring substantial labor for project execution. This positive impact of GCF on employment is

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supported by Yasmeen et al. (2021), who emphasize its role in enhancing employment levels. Similarly, a positive correlation exists between export volume and employment rates. Higher export volumes indicate efficient industrial sector operations and surplus production beyond domestic needs, driving greater human capital engagement. Additionally, increased exports strengthen the financial stability of domestic industries, encouraging them to hire more workers. High export volumes also help reduce the government's fiscal deficit, enabling it to provide subsidies to support industrial growth, further improving employment levels (Canh & Thanh, 2022). Kim and Go (2022) also support this notion, citing that higher export volumes increase local employment in South Korea.

In contrast, the population growth rate negatively impacts employment rates. Rapid population growth strains the job market and the government, worsening the employment-population ratio. As the population rises, more individuals enter the workforce, intensifying the gap between job seekers and available positions, which leads to a decline in the employment ratio. Khan et al. (2022) provide similar evidence on this relationship. The inflation rate also has an inverse relationship with employment, as observed by N'guessan (2018) and Angelov (2023), showing a negative association in the short term but a positive one in the long term, with variations across different labor market sectors.

Trade openness, however, has a significantly positive effect on employment, with a coefficient of 0.33 (t-statistic = 3.13, p-value < 0.01). This indicates that higher trade openness is associated with greater employment opportunities, supporting the findings of Njikam (2016). Diagnostic tests reveal the following: the Jarque-Bera (J-B) normality test shows an F-statistic value of 0.34 and a probability value of 0.45, suggesting the model is likely normally distributed. The Breusch-Godfrey Serial Correlation LM test shows an F-statistic value of 0.54 with a probability of 0.58, indicating no serial correlation in the model. The Heteroscedasticity Test (ARCH) shows an F-statistic value of 0.05 with a probability value of 0.80, implying no heteroscedasticity.

As illustrated in Figure 3, our analysis finds that financial development, foreign investment, and economic growth positively affect employment. Gross capital formation (GCF), export volume, and trade openness also show positive impacts, while population growth and inflation rates negatively affect employment opportunities. These relationships are significant in the long term, though most variables show insignificant effects in the short term (as seen in Table 6). Robustness checks using the FMOLS and DOLS methods confirm the validity of our findings, as reported in regression Table 7.

Table 7. Robustness analysis

FMOLS			**DOLS**	
Variable	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
ECG	1.16	0.13	0.54**	0.03
EPO	0.07*	0.09	0.02	0.77
FDI	3.92**	0.02	-1.38**	0.04
FSD	0.27**	0.04	0.21***	0.00
GCF	0.29**	0.07	0.13***	0.00
INF	0.56**	0.06	0.23***	0.00
PGR	12.01***	0.00	-0.29	0.69
TO	0.27**	0.01	-0.09*	0.1
R-squared		0.658		0.764
Adjusted R-squared		0.636		0.686
SE of regression		1.92		1.792
Long-run variance		10.52		11.2

Note: ***, **, * report the significance level at 1%, 5%, and 10%, relatively.

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5. Conclusions and policies suggestions

5.1. Conclusions of the study

This study aims to explore the impact of financial development, foreign investment, and economic growth on employment rates in ASIAN economies from 1990 to 2022. Additionally, it investigates how factors such as gross capital formation, inflation, export volume, trade openness, and population growth rate affect employment. The study employs various econometric techniques, including the Im, Pesaran, and Shin W-stat and ADF Fisher chi-square unit root tests, to assess the stationarity of the data. The results show a mixed stationarity trend, with some variables stationary at level I(0) and others at first difference I(1). Panel ARDL is then used to estimate both short- and long-run elasticities. The ARDL findings indicate that all the key variables have a significantly positive effect on employment rates in the long run, while inflation and population growth rates negatively impact employment. In the short run, financial development, foreign investment, gross capital formation, and population growth rate show an insignificantly negative effect on employment, while economic growth, export volume, inflation, and trade openness have an insignificantly positive impact.

5.2 Policy suggestions

The employment dynamics in ASIAN countries are influenced by a range of factors, including financial sector development, FDI inflows, economic growth, inflation, gross capital formation, trade openness, population growth, and export value. Understanding and managing these factors is essential for policymakers to tackle unemployment and promote sustainable economic development.

To increase employment opportunities, policymakers should focus on strengthening the financial sector. This can be achieved by promoting the development of the financial sector through advancements in digital technologies and modernization. A regulatory framework that encourages competition, innovation, and transparency within the financial system can stimulate economic activity and create jobs.

Attracting foreign direct investment (FDI) is another vital strategy for boosting employment. Policymakers should work to create an investment-friendly environment by offering tax incentives, simplifying regulations, and ensuring transparency. Increased FDI can foster industrial growth, stimulate economic development, and provide employment opportunities for the local workforce.

Additionally, controlling inflation is crucial, as high inflation can negatively affect employment. Policymakers should implement sound monetary policies to keep inflation in check while supporting economic growth. Encouraging gross capital formation through government investments in infrastructure projects can also drive economic activity, create demand for goods and services, and generate jobs.

Promoting trade openness and increasing export volumes are also important for boosting employment. Policymakers should focus on reducing trade barriers, facilitating international trade, and diversifying export markets. Expanding export-oriented industries can create jobs, drive economic growth, and decrease dependency on imports.

Lastly, addressing population growth is critical for managing employment dynamics. Policymakers should introduce measures such as family planning programs, education, and healthcare services to manage population growth. Properly managing population growth can reduce pressure on job markets and support sustainable economic development.

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DATA AVAILABILITY

World Bank Data and World Development Indicator data used in this study are publicly available from the website (https://data.worldbank.org). Additional data can be made available upon reasonable request to the corresponding author.

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