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nisar, ghania

Institute of Business Administration, University of the Punjab,
Lahore, Pakistan

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Banking Sector Development and FDI in Emerging Markets: Evidence from the SCO using a CCE-PMG Approach

Ghania Nisar⁺

Institute of Business Administration, University of the Punjab, Lahore, Pakistan

Abstract This study investigates the relationship between domestic banking development and Foreign Direct Investment (FDI) in nine Shanghai Cooperation Organization (SCO) economies, including Pakistan, India, Iran, China, Russia, Tajikistan, Kyrgyzstan, Kazakhstan, and Uzbekistan, from 2000 to 2023. Using a panel econometric framework that combines the Pooled Mean Group (PMG) estimator with Pesaran's Common Correlated Effects (CCE) approach, the results show a positive long-run association between banking sector development and FDI. Granger causality analysis provides evidence of a unidirectional relationship, indicating that the development of the banking sector statistically precedes and is strongly associated with foreign investment. The positive long-run association highlights the crucial role of robust banking systems as domestic anchors for investment and as key components of regional economic resilience. The results yield two principal policy implications. First, strengthening domestic banking institutions is an important national strategy for enhancing attractiveness to foreign capital. Second, coordinated efforts among SCO countries are necessary to manage shared economic vulnerabilities and to improve the bloc's collective investment appeal.

Keywords: *Banking Sector Development, Bank Credit, FDI, Emerging Economies, SCO, Panel ARDL, Common Correlated Effects*

I. Introduction

Emerging and transition economies, particularly in India, Central Asia, and China, have become increasingly attractive destinations for Foreign Direct Investment (FDI), reflecting their rising geo-economic importance. At the same time, persistent global uncertainties, geopolitical tensions, sanctions, conflicts, and the risk of escalating trade barriers have created

⁺ **Corresponding Author:** Ghania Nisar
Institute of Business Administration (IBA), University of the Punjab, Lahore, Pakistan.
E-mail: ghanianisar5555@gmail.com

a volatile investment environment both within these regions and globally (Hufbauer & Jung, 2020). These external shocks spill across borders through trade linkages, financial and geopolitical channels, amplifying regional instability and challenging policymakers (Khudaykulova et al., 2022).

Within this landscape, domestic financial systems play a central role in shaping FDI inflows. Well-developed banking sectors mobilize savings, reduce information asymmetries, and facilitate foreign firms' access to local credit markets, enhancing a country's ability to absorb technological and managerial spillovers (Alfaro et al., 2004). Yet empirical evidence on the banking development–FDI nexus remains mixed. Studies such as Hermes and Lensink (2003), Soumaré and Tchana (2015), and Tang (2017) report a positive relationship between banking development and foreign investment, while others (Kaur et al., 2013; Tahir & Alam, 2020) document negative or inconclusive results in emerging regions. This divergence suggests the relationship is not universal but shaped by institutional and regional contexts.

The Shanghai Cooperation Organization (SCO) provides a compelling and underexplored context for re-examining the banking sector development and FDI relationship. These countries exhibit high economic interconnectedness through trade, energy partnerships, and coordinated development initiatives, which facilitate regional spillovers in financial conditions and FDI flows (Dexue, 2021). SCO economies are more susceptible to external shocks than advanced economies (Gnangnon, 2021). Despite its growing relevance, no prior study has systematically examined how domestic banking development affects FDI inflows within the SCO or accounted for shared shocks in this setting.

This study addresses this gap by analyzing the relationship between banking sector development and FDI inflows across nine SCO economies from 2000 to 2023. Methodologically, it applies Pesaran's Common Correlated Effects–Pooled Mean Group (CCE–PMG) estimator to control for cross-sectional dependence and unobserved shocks, while Granger causality tests clarify sequencing between financial development and FDI. To our knowledge, no prior study estimates the banking sector development-FDI nexus in the SCO while explicitly controlling for common unobserved shocks and cross-sectional dependence. The paper contributes in three ways: (i) It provides the first systematic evidence for the banking sector development-FDI nexus within the SCO, an important and underexplored regional bloc; (ii) it is the first to apply the CCE–PMG framework in this context, yielding consistent estimates by disentangling domestic banking effects from common unobserved shocks; (iii) it offers policy-relevant insights on banking reforms and regional coordination to attract sustainable FDI.

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The remainder of the paper is structured as follows: Section 2 reviews the literature, Section 3 describes the data and methodology, Section 4 presents results, Section 5 reports robustness checks, Section 6 discusses findings, and Section 7 concludes with policy implications.

II. Literature Review

The relationship between financial development and Foreign Direct Investment (FDI) is grounded in well-established theoretical frameworks. Modern FDI theory emphasizes that FDI represents more than a simple capital flow (Kindleberger, 1969) encompasses international business activities through which multinational corporations (MNCs) establish or acquire production capacity in host countries (Piggott & Cook, 2015). Well-functioning financial markets facilitate this process by providing a robust institutional environment for foreign firms and enhancing the host country's capacity to absorb FDI benefits, including technological spillovers, global trade integration, and enhanced competitiveness (Alfaro et al., 2004).

The theoretical literature identifies financial depth, commonly proxied by domestic credit to the private sector, as both a precondition for attracting FDI and a mechanism for amplifying its economic impact. A developed banking sector can facilitate foreign affiliates' access to local credit markets, improve capital allocation efficiency, and provide the institutional infrastructure necessary for complex international business operations (Alfaro et al., 2004). This dual role suggests that banking sector development should positively influence FDI inflows while simultaneously enabling host economies to maximize the developmental benefits from foreign investment.

Despite strong theoretical foundations, empirical studies present conflicting evidence on the banking sector development and FDI relationship, with findings varying significantly across regions and institutional contexts. Several studies document a positive relationship between banking sector development and FDI inflows. Hermes and Lensink (2003) and Soumaré and Tchana (2015) find that efficient financial systems attract FDI and stimulate economic growth. Similarly, Hussain and Kimuli (2012) demonstrate that both financial depth and macroeconomic stability are crucial factors in attracting FDI to emerging markets while (Tang, 2017) reports a positive association between bank credit and FDI in Central European countries.

However, other research reveals negative or ambiguous relationships. (Kaur et al., 2013) find that increased bank credit correlates negatively with FDI in the BRICS region, while Tahir

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and Alam (2020) report similar negative relationships in SAARC countries. These authors propose that greater credit availability to domestic firms may intensify local competition, potentially reducing the profitability and attractiveness of foreign operations. This competition channel suggests that the banking sector development and FDI relationship may be contingent on market structure, the degree of competition between domestic and foreign firms, and the specific channels through which foreign investors access local markets.

The direction of causality between FDI and financial development remains a subject of ongoing debate, with important implications for policy design. Alassera and Soydemir (2010) find unidirectional causality running from banking development to FDI in Latin America, supporting the view that financial development is a prerequisite for attracting foreign investment. Conversely, Pham et al. (2022) reveal bidirectional causality between FDI and banking sector development in developing Asian countries, suggesting mutual reinforcement, where FDI inflows stimulate banking sector growth while simultaneously being attracted by financial development.

This dynamic relationship implies that the banking sector development-FDI nexus may evolve over time and across different stages of economic development, with the relative importance of each causal direction potentially varying with institutional quality, market structure, and the degree of financial system sophistication.

A growing strand of literature emphasizes that the quality and health of banking institutions significantly influence FDI dynamics. Ushijima (2011) demonstrates that banks' financial condition substantially affects FDI behaviour. During Japan's banking crisis in the 1990s, the collapse of major Japanese banks curtailed the country's outward FDI illustrating how banking sector health affects not only inward investment attraction but also a country's capacity to engage in international investment activities (Klein et al., 2002). This example highlights the systemic importance of banking sector stability for overall international capital flows.

Banking sector reforms have also proven instrumental in creating FDI-friendly environments. Schmitz (2011) notes that comprehensive banking sector reforms in Central European countries during their transition periods were crucial for fostering increased FDI inflows, suggesting that institutional improvements in the financial sector can serve as important policy tools for enhancing investment attractiveness.

Overall, the literature reveals no consensus on the relationship between banking sector development and FDI, with findings varying by region, methodology, and institutional context. This ambiguity underscores the importance of region-specific analyses that capture both domestic fundamentals and common unobserved shocks. For integrated blocs such as the SCO,
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where financial and trade linkages create spillover effects, empirical strategies that explicitly account for cross-sectional dependence are essential to produce consistent and policy-relevant evidence.

III. Methodology

This study investigates the relationship between foreign direct investment (FDI) and banking sector development using a panel dataset covering nine Shanghai Cooperation Organization (SCO) countries: Pakistan, India, Iran, China, Russia, Tajikistan, Kyrgyzstan, Kazakhstan, and Uzbekistan, from 2000 to 2023. The selection of these countries is based on their inclusion of major global economies as well as emerging and transition economies that are central to Eurasian economic development and integration. This regional focus provides a natural experiment for analysing the dynamics of FDI and financial intermediation within an economically integrated context.

A. Data and Variables

The data were obtained from the World Bank World Development Indicators (WDI) database. All variables are log-transformed to correct for distributional skewness, enable elasticity-based interpretation, and reduce heteroscedasticity.

The dependent variable, FDI inflows (\ln_fdi), is measured as foreign direct investment net inflows as a percentage of GDP, log-transformed to address distributional skewness and enable elasticity interpretation. This standardized metric serves as a proxy for an economy's attractiveness to foreign capital (Pham et al., 2022). The key explanatory variable, bank credit (\ln_bank), represents domestic credit to the private sector by banks as a percentage of GDP, log-transformed, and serves as a proxy for the depth and activity of the banking sector within each country's financial system.

Two control variables are included to address potential confounding factors. GDP per capita (\ln_gdp) is measured as GDP per capita in constant 2015 US dollars, log-transformed, and controls for economic development levels that affect both FDI attractiveness and banking sector sophistication. Inflation ($\ln_inflation$) captures consumer price inflation as an annual percentage, log-transformed, to control for macroeconomic stability, as high inflation reduces FDI attractiveness and impairs banking sector efficiency (Aibai et al., 2019; Kaidi et al., 2019; Khan et al., 2019a).

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The theoretical framework proposes that banking sector development influences FDI through several mechanisms: facilitating domestic investment that complements foreign capital, providing financing for FDI projects, and signaling institutional quality. To address cross-sectional dependence, cross-sectional averages are used as proxies for unobserved common factors, including regional shocks, spillovers from large economies, or global events such as financial crises (Pesaran, 2006a).

B. Econometric Strategy

The empirical design proceeds in four steps: (i) preliminary diagnostics, (ii) unit root and cross-sectional dependence tests, (iii) long-run estimation using CCE-augmented ARDL models, and (iv) robustness checks.

1. Preliminary Data Analysis

Descriptive statistics were computed. Optimal lag length was determined using Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan–Quinn Criterion (HQ), with a lag of one selected for parsimony (Appendix).

2. Unit Root Testing

Stationarity was assessed using the Cross-sectionally Augmented IPS (CIPS) test (Pesaran, 2007), which allows for mixed integration orders and explicitly accounts for cross-sectional dependence. This approach overcomes the bias of first-generation unit root tests that ignore cross-sectional linkages.

3. Addressing Cross-sectional dependence

Cross-sectional dependence (CSD) was tested using the Breusch–Pagan LM test (Breusch & Pagan, 1980). A significant test result indicates correlation across country residuals, consistent with unobserved common shocks such as global crises or spillovers from large SCO economies. Slope homogeneity tests were also conducted to determine whether coefficients are constant across countries.

$$LM = \sum_{i=1}^{N-1} + \sum_{j=i+1}^N TP_{ij}^{\wedge 2}$$

Where P_{ij}^{\wedge} represents pairwise correlation of residuals between countries i and j , T is the time dimension, and N is the number of cross-sections. The null hypothesis assumes that there

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is no cross-sectional dependence. A significant LM statistic ($p < 0.05$) indicates the presence of CSD necessitates the use of econometric strategies to mitigate these effects.

4. Common Correlated Effects Panel ARDL Estimation

Given evidence of CSD, we estimated a panel Autoregressive Distributed Lag (ARDL) model using the Pooled Mean Group (PMG) estimator (Pesaran, Shin, & Smith, 1999), augmented with Common Correlated Effects (CCE) (Pesaran, 2006b). This specification accommodates mixed integration orders, captures both short-run dynamics and long-run equilibrium relationships, and corrects for bias from *common unobserved shocks*.

The PMG estimator allows for heterogeneity in short-run coefficients and adjustment speeds across countries while imposing homogeneity on long-run parameters. This assumption is partly justified for SCO economies through several convergence mechanisms: (1) institutional convergence via SCO frameworks promoting policy coordination, (2) trade integration through bilateral agreements and reduced barriers, (3) financial cooperation through development banks and currency arrangements, and (4) infrastructure connectivity through initiatives such as the Belt and Road Initiative. Nevertheless, we acknowledge that this is a strong assumption given the economic and institutional diversity of SCO members.

The CCE-ARDL error-correction form is

$$\Delta y_{it} = \phi_i (y_{it} - \theta'_{xit} - \gamma'_{i} cs_x_t) + \sum_{j=1}^{p_i-1} \lambda_{ij} \Delta y_{i,t-j} + \sum_{j=0}^{q_i-1} \delta_{ij} \Delta x_{i,t-j} + \mu_i + \epsilon_{it}$$

where ϕ_i measures the country-specific speed of adjustment, θ captures long-run effects of banking sector development on FDI, γ captures the influence of *common unobserved shocks*. Following Pesaran (2006), the cross-sectional averages cs_it proxy unobserved common factors such as global financial crises, commodity price swings, or regional crises. Including these ensures that the domestic coefficients (θ) are consistently estimated after purging the influence of unobserved shocks.

Equation for our study,

$$\begin{aligned} \Delta(\ln FDI_{it}) = & \phi_i \left[\ln \left(FDI_{i,t-1} - \theta_1 \ln(\text{tBank Credit}_{i,t-1}) \right. \right. \\ & - \theta_2 \ln(GDP\ Cap_{i,t-1}) - \theta_3 \ln(\text{inflation}_{i,t-1}) - \gamma_1 cs_ \ln(FDI_{it}) \\ & - \gamma_2 cs_ \ln(\text{Bank Credit}_{it}) - \gamma_3 cs_ \ln(GDP\ cap_{it}) \\ & \left. \left. - \gamma_4 cs_ \ln(\text{inflation}_{it}) \right) \right] + \sum_{j=1}^{p_i-1} \lambda_{ij} \Delta(\ln FDI_{it}) + \sum_{j=0}^{q_i-1} \delta_{ij} \Delta x_{i,t-j} + \mu_i + \epsilon_{it} \end{aligned}$$

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For robustness, we also estimated the Common Correlated Effects Mean Group (CCE-MG) estimator (Chudik & Pesaran, 2013), which relaxes the homogeneity restriction and allows long-run coefficients to vary across countries. Consistency between the CCE-PMG and CCE-MG specifications strengthens confidence in the robustness of our findings. Monte Carlo evidence (Bailey, et al., 2015; Pesaran, 2006b) further suggests that these estimators perform well even in panels with relatively small cross-sections and time dimensions, provided that unobserved common factors are adequately controlled.

5. Cointegration Testing

The Westerlund (2007) error-correction-based cointegration tests examine long-run relationships among variables. These tests are suitable for heterogeneous panels with cross-sectional dependence.

6. Dumitrescu and Hurlin Panel Granger Causality Test

To examine the direction of causality between banking sector development and FDI, we employ the Dumitrescu and Hurlin (2012) Panel Granger Causality Test

$$Y_{it} = \alpha_i + \sum_{k=1}^K \gamma_{ik} Y_{i,t-k} + \sum_{k=1}^K \beta_{ik} X_{i,t-k} + \varepsilon_{it}$$

$$\ln(FDI_{it}) = \alpha_i + \sum_{k=1}^K \gamma_{ik} \ln(FDI_{i,t-k}) + \sum_{k=1}^K \beta_{ik} \ln(\text{Bank Credit}_{i,t-k}) + \varepsilon_{it}$$

where Y_{it} represents FDI and X_{it} represents bank credit.

For each country i and time period t , the test is based on a regression model in which the dependent variable, Y_{it} (for instance, FDI), is regressed on its own past values and the past values of the independent variable, X_{it} (e.g., bank credit). The model includes a country-specific intercept, α_i to account for individual heterogeneity. The coefficients on the lagged terms of the dependent variable are represented by γ_{ik} , while the coefficients on the lagged terms of the independent variable are denoted β_{ik} , both of which are specific to each country. The test examines two hypotheses:

1. H_0 : Bank Credit does not Granger-cause FDI
2. H_0 : FDI does not Granger-cause Bank Credit

IV. Results

This section presents the empirical analysis results, progressing systematically through descriptive statistics, preliminary econometric tests, main CCE-PMG estimation results, causality analysis, and robustness checks.

A. Descriptive and Preliminary Analysis

1. Cross-Sectional Dependence and Unit Root Testing

The Pesaran CD test results ($p = 0.000$ for all variables) confirm the presence of strong cross-sectional dependence, emphasizing the need for second-generation panel methods that account for common factors and spillover effects.

Subsequently, Pesaran CADF (CIPS) unit root tests were conducted to determine integration orders. The results indicate a mixed integration pattern: FDI, GDP per capita, and inflation are stationary at levels $I(0)$, while bank credit is non-stationary at levels but becomes stationary after first differencing, indicating $I(1)$ behavior. This combination of $I(0)$ and $I(1)$ variables justifies the use of a panel ARDL framework, which is designed to accommodate mixed integration orders. The optimal lag length for the ARDL model is set to 1, based on the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Hannan–Quinn Criterion (HQ), balancing model fit and parsimony given the sample size constraints. The Pesaran and Yamagata Pesaran and Yamagata (2008) slope homogeneity test results ($\Delta = 7.529$, $p = 0.000$) strongly reject the null hypothesis of overall slope homogeneity, confirming significant parameter heterogeneity across countries in short-run dynamics. This outcome supports the application of the CCE–PMG approach, which permits heterogeneous short-run parameters while maintaining homogeneous long-run relationships.

B. Cointegration Test

The Westerlund (2007) test provides evidence of long-run equilibrium relationships. The G_t (-4.002 , $p = .000$) and P_t (-8.869 , $p = .002$) statistics strongly reject the null of no cointegration. Although the G_a and P_a statistics show weaker evidence, these are less reliable in small, heterogeneous panels (Persyn & Westerlund, 2008). Overall, the results confirm the existence of cointegration, justifying the use of the ARDL estimation approach.

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Table 1. *Westerlund (2007) Test*

Statistic	Value	Z-Value	P-Value
Gt	-4.002	-5.629	0.000
Ga	-8.310	1.133	0.871
Pt	-8.869	-2.940	0.002
Pa	-4.085	1.544	0.939

C. CCE-PMG ARDL Estimation Results

The CCE-PMG panel ARDL results reveal a stable and significant long-run relationship between FDI and banking sector development. Bank credit emerges as the only significant long-run determinant of FDI. The coefficient (0.168, $p < 0.001$) implies that a 1% increase in bank credit raises FDI inflows by 0.168%. This supports the view that deeper banking systems attract foreign investment by improving capital allocation, lowering transaction costs, and signaling institutional strength.

The error correction term (ECT) is -0.881 ($p < 0.001$), indicating rapid convergence toward equilibrium: about 88% of any short-run disequilibrium is corrected within one year across SCO countries.

By contrast, GDP per capita ($p = 0.102$) and inflation ($p = 0.192$) are insignificant in the long run. This suggests that once financial development is accounted for, macroeconomic size and stability do not independently explain FDI inflows. Their influence may be absorbed by common regional shocks, or financial depth may simply dominate as the key long-run driver of FDI in SCO economies.

All short-run coefficients are insignificant, indicating that adjustment occurs primarily through the error correction mechanism rather than immediate changes in regressors. This reinforces the importance of long-run equilibrium relationships in shaping FDI patterns in the region.

Finally, the significance of the cross-sectional averages confirms the presence of unobserved common shocks. This validates the CCE specification, which controls for global crises, commodity price swings, or systemic spillovers from large SCO economies, ensuring consistent long-run estimates (Pesaran, 2006b).

Overall, these results highlight banking sector development as the dominant long-run driver of FDI in SCO economies, while other macro fundamentals play a secondary role once financial depth is taken into account.

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Table 2. *Panel ARDL (PMG) Long-Run and Short-Run Results*

Category	Values
Long Run	
Bank Credit (ln_bank_credit)	0.168, p = 0.000
GDP per Capita (ln_gdpcapita)	0.085, p = 0.102
Inflation (ln_inflation)	0.041, p = 0.192
Short Run	
Bank Credit (ln_bank_credit)	0.073, p = 0.217
GDP per Capita (ln_gdpcapita)	0.131, p = 0.649
Inflation (ln_inflation)	0.005, p = 0.924
Error Correction (EC)	-0.881, p = 0.000

D. Granger Causality Analysis

To assess the direction of the relationship between banking sector development and FDI, we applied the Dumitrescu & Hurlin (2012) panel Granger causality test. The results indicate unidirectional causality running from banking sector development (proxied by bank credit) to FDI ($\bar{Z} = 5.86$, $p < .001$). In contrast, the reverse relationship is insignificant ($\bar{Z} = 0.13$, $p = .891$), meaning we fail to reject the null hypothesis that FDI does not Granger-cause banking sector development.

These findings support the banking sector development-led FDI hypothesis, which argues that robust domestic banking systems create the conditions necessary for foreign investment, rather than FDI driving financial deepening. The evidence of statistical precedence suggests that in SCO countries, reforms aimed at strengthening banking systems are more effective for attracting sustainable FDI than policies that assume foreign capital will automatically stimulate domestic financial development.

Table 3. *Panel Granger Causality Test*

Direction	W-bar	Z-bar	P-value	Conclusion
Bank Credit → FDI	5.91	5.86	0.0000	Reject H ₀ → Bank credit Granger-causes FDI
FDI → Bank Credit	2.09	0.13	0.8910	Fail to reject H ₀ → FDI does not Granger-cause bank credit

V. Robustness check

To ensure the robustness of our findings, we re-estimated the model using the cross-sectionally augmented ARDL (CS-ARDL) framework with the common correlated effects mean group (CCE-MG) estimator. This approach explicitly accounts for cross-sectional dependence while allowing full parameter heterogeneity across countries. The results validate our main conclusions with one important refinement. The contemporaneous effect of banking sector development (proxied by bank credit) is insignificant ($p = .262$). However, the lagged bank credit variable remains positive and significant (coefficient = 0.211, $p = .005$), implying that a 1% increase in bank credit in the previous year raises FDI inflows by about 0.21%. This highlights the dynamic nature of the banking sector development-FDI relationship, where improvements in financial systems affect FDI with a temporal lag rather than instantaneously. The persistence of this lagged effect across both CCE-PMG and CCE-MG estimators considerably strengthens confidence in our central conclusion: banking sector development precedes and facilitates FDI inflows in SCO countries.

Table 4. *Robustness – CS-ARDL (CCE Mean Group) Estimates*

Variable	Coefficient	Std. Error	z	p-value	95% CI (Lower)	95% CI (Upper)
ln_bank_credit	0.2193	0.1955	1.12	0.262	-0.1639	0.6025
ln_gdpcapita	0.4812	0.4844	0.99	0.321	-0.4682	1.4305
ln_inflation	0.1081	0.0898	1.20	0.228	-0.0678	0.2840
L.ln_fdi_gdp	-0.0286	0.1373	-0.21	0.835	-0.2977	0.2405
L.ln_bank_credit	0.2106	0.0742	2.84	0.005**	0.0652	0.3560
L.ln_gdpcapita	-0.0391	0.1631	-0.24	0.810	-0.3588	0.2805
L.ln_inflation	-0.0120	0.0866	-0.14	0.889	-0.1817	0.1576

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VI. Discussion

This study confirms a significant long-run relationship between banking sector development and FDI in nine SCO economies from 2000 to 2023. A 1% increase in domestic bank credit is associated with a 0.168% rise in FDI inflows. Neither GDP per capita nor inflation has a significant long-run effect, and no short-run effects are observed, suggesting that the impact of financial development materializes primarily through long-run equilibrium adjustment. The highly significant and negative error correction term (ECT= -0.881) indicates a rapid speed of adjustment toward long-run equilibrium. This implies that approximately 88% of any disequilibrium between FDI and its determinants is corrected within a single year. This remarkably fast adjustment underscores the responsiveness of FDI inflows in the SCO region to changes in fundamental conditions, particularly the development of the banking sector.

The Dumitrescu–Hurlin panel Granger causality test reveals unidirectional causality running from banking sector development to FDI ($\bar{Z} = 5.86, p < .001$). This result supports the view that banking sector development tends to precede and is strongly associated with FDI inflows.

Our findings are broadly consistent with Hermes and Lensink (2003), Soumaré and Tchana (2015), and Tang (2017), who document a positive banking sector development–FDI nexus in other developing regions. However, they diverge from results in BRICS countries (Kaur et al., 2013) and SAARC economies (Tahir and Alam, 2020), where the relationship is weak or negative. In BRICS, expanded bank credit may have intensified competition for foreign firms, lowering their relative profitability. In SAARC, institutional weaknesses and underdeveloped regulatory frameworks have limited the ability of banks to efficiently channel credit toward supporting foreign operations. By contrast, in the SCO, integration mechanisms such as policy dialogues, trade and energy partnerships, and the Belt and Road Initiative may amplify the positive spillovers of financial depth, producing a clearer banking sector–led FDI dynamic. The unidirectional causality we observe also mirrors findings in Latin America (Alasser and Soydemir, 2010), but contrasts with the bidirectional causality reported in developing Asia (Pham et al., 2022). These comparisons highlight the context-specific nature of the banking sector development–FDI nexus.

This study makes three contributions. First, it provides one of the most comprehensive panel analyses of the SCO bloc, a strategically important but underexplored region. Second, it applies second-generation econometric methods (CCE-PMG and CCE-MG) that correct for cross-sectional dependence and heterogeneity, delivering more robust results than first-generation

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estimators. Third, it contributes to policy debates by providing empirical support for prioritizing banking sector development as a tool to attract FDI in emerging and transition economies.

Despite these strengths, some limitations remain. Although cross-sectional averages proxy unobserved common shocks, they may not capture all complex or time-varying external influences, potentially leaving residual dependence. Moreover, using domestic credit to the private sector as the sole proxy for banking development overlooks other dimensions, such as bank stability, capital market depth, and institutional quality. Future research should incorporate these measures to provide a more holistic view of financial development.

VII. Conclusion and Policy Recommendations

This study provides novel empirical evidence on the banking sector development–FDI nexus in the SCO region. Two key findings stand out. First, we identify a dominant, positive long-run relationship between banking depth and FDI inflows, with the error correction coefficient (-0.881) indicating that reforms in domestic financial systems yield relatively rapid benefits by correcting short-run deviations from equilibrium. Second, Granger causality analysis shows that banking sector development statistically precedes FDI, underscoring that robust financial institutions are a prerequisite for attracting foreign investment—not a consequence of it.

For policymakers, these findings highlight that domestic financial reforms are central to sustaining FDI attraction. Importantly, the benefits emerge through long-term equilibrium adjustments rather than short-term interventions. The regional dimension further suggests that coordinated financial strategies can create positive spillovers across SCO members, making collective action both strategic and necessary. Based on this analysis, three interconnected policy recommendations emerge:

1. **Strengthen domestic banking systems.** Reforms should prioritize improving credit allocation, reducing non-performing loans, and reinforcing capitalization. Complementary deepening of capital markets would expand financing options for both local and foreign investors.
2. **Coordinate macroeconomic policies.** Given the bloc’s shared vulnerability to external shocks, unilateral stabilization efforts are insufficient. SCO members should establish permanent monetary policy dialogue platforms among central banks to mitigate risks and enhance resilience.

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3. **Leverage international partnerships.** Collaboration with institutions such as the World Bank and Asian Development Bank can provide technical expertise and financial resources to modernize financial sectors, ensuring more effective implementation of reforms.

By combining national reforms, regional cooperation, and international partnerships, SCO members can build more resilient financial ecosystems, attract sustainable FDI, and enhance the bloc's collective economic appeal.

Appendix

1. Descriptive Table

Variable	Mean	Std. Dev.	Min	Max	Skewness
ln_fdi_gdp	1.9783	0.4136	-1.9300	3.0970	-3.33
ln_bank_credit	3.3665	0.8064	1.3251	5.2713	0.19
ln_gdpcapita	7.6462	1.1079	4.9194	9.6767	0.10
ln_inflation	2.2897	0.6095	0.2375	3.8412	-0.27

Variable	VIF	1/VIF
ln_bank_credit	2.53	0.394
ln_gdpcapita	1.80	0.556
ln_inflation	1.43	0.698
Mean VIF	2.05	

2. Cross-sectional Dependence Test (Pesaran CD Test)

Variable	CD-test	p-value	Corr	Abs(Corr)
ln_fdi_gdp	6.88	0.000	0.234	0.315
ln_bank_credit	5.31	0.000	0.181	0.417
ln_gdpcapita	26.69	0.000	0.908	0.908
ln_inflation	3.51	0.000	0.119	0.258

3. Pesaran's CADF (CIPS) Unit Root Test

Variable	t-bar	Z[t-bar]	P-value	Stationarity
ln_fdi_gdp	-2.355	-1.841	0.033	I(0) at 5%
ln_bank_credit	-1.462	0.923	0.822	Non-stationary
ln_gdpcapita	-2.569	-2.501	0.006	I(0) at 1%
ln_inflation	-3.112	-4.181	0.000	I(0) at 1%
Δ ln_bank_credit	-2.621	-2.663	0.004	I(0) at 1%

4. Lag Selection

Lag 1 is selected as optimal by AIC, SC, and HQ, and shows a significant improvement in fit based on the Likelihood Ratio (LR) and a minimal FPE.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-250.0190	NA	0.113553	3.500264	3.541512	3.517025
1	-5.966764	477.9357	0.004048	0.166205	0.289947	0.216487

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2	-0.361303	10.82165	0.003959	0.143907	0.350144	0.227710
3	-5.530151	0.410124	0.003857	0.117637	0.406369	0.234961
4	6.791431	2.364892	0.004007	0.155675	0.526901	0.306520
5	8.427289	0.317953	0.004124	0.188510	0.642221	0.372877
6	10.37133	3.537081	0.004263	0.217065	0.753281	0.434953
7	12.41973	3.670045	0.004300	0.244170	0.862382	0.495580

5. Testing For Slope Heterogeneity

(Pesaran, Yamagata. 2008. Journal of Econometrics)

H0: slope coefficients are homogenous

	Delta	p-value
	7.529	0.000
Adj.	8.462	0.000

6. Arellano-Bond test for autocorrelation

Test	Statistic	p-value	Interpretation
AR(1) in first differences	z = -1.02	0.310	No first-order autocorrelation issue
AR(2) in first differences	z = 0.54	0.592	No second-order autocorrelation issue

[Type here]

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