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The Impact of Financial Complexity on the Host's FDI Inflow in Selected Asian Countries

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ABSTRACT

Foreign investment can be considered as a leverage to help countries in achieving higher growth and development. Foreign investment inflow into a country can be used as a key factor for development. In order to increase foreign investment, its determinants factors should be clarified and a right policy decision should be taken. This paper aims to examine the impact of financial complexity as an effective factor on the host's FDI inflow in 15 Asian countries for 2010 to 2021. At first, we determined the amount of financial complexity for investigated countries. For this, we developed a novel method to calculate the financial complexity by McCabe's number. For explain the relationship between FDI factors and host country's FDI inflow, we estimate a model and consider FDI as dependent variable and financial complexity, and also exchange rate, GDP growth, interest rate and trade openness as independent variables, to examine the relationship between them. Results indicate that FDI is positively sensitive to host country financial complexity, indicating the higher financial complexity lead to higher FDI inflow.

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1. Introduction

Globalization has amplified the significance of **foreign direct investment (FDI)** as a catalyst for economic growth and development. Economic theories widely recognize FDI as a key driver, facilitating the transfer of technology, knowledge, and capital across borders (Chenaf & Rougier, 2016). However, despite extensive research on FDI determinants such as trade openness, market size, and institutional quality, the role of **financial complexity** remains largely unexplored. FDI inflows consist of **equity investments, reinvested earnings, and debt instruments** (Kosztowniak, 2019). These components are sensitive to both **corporate strategies** and **local economic conditions,** making investment decisions highly dependent on the financial environment of the host country. Notably, research comparing FDI performance across financial systems reveals that **market-based economies (e.g., US, UK) experience greater volatility** in FDI flows than **bank-based economies (e.g., Germany, Japan) (Zhang et al., 2014).** This underscores the importance of financial structures in shaping investment dynamics. One of the method for analyzing a network is to examine it from the approach of interconnectedness or complexity (Pourabdollah and Makiyan, 2025). **Financial complexity defined as the interconnectedness of financial institutions, markets, and instruments has not been systematically studied as an FDI determinant**. High financial complexity can either **increase systemic risk** or **reflect a well-developed financial infrastructure**, influencing investor confidence. Understanding this dual effect is particularly crucial for **Asian economies**, which exhibit diverse financial systems ranging from **highly integrated markets (e.g., Singapore, South Korea) to emerging financial sectors (e.g., Pakistan, Vietnam)**. Salim et al. (2023) investigated the interrelationship between financial data in the capital market using the network model. For this purpose, the statistics of the United States stock market for the years 2002-2019, and the method of principal component

analysis (PCA) and Granger causality have been used. According to their research, the correlation coefficient for the studied stock returns is significant indicating the initial relationship and common movement in the studied market. Li et al. (2022) investigated the effect of financial network complexity on financial stability. Due to the difficulty of modeling the real financial network, random matrices were used as the financial network matrix. Espinosa-Vega et al. (2020) developed a theoretical model to investigate the relationship between the entanglement of financial institutions, systemic financial crises and long-term recessions. The financial institutions examined in this research are banks, and the relationship between banks is defined only through the transfer of assets. Tang et al. (2018) studied two major markets of China and the United States of America from the point of view of network analysis. According to the results of this research, the characteristics of the network and hierarchical structures are different for the two stock markets. Zhang and Lei (2013), investigates how heterogeneous firms choose their lenders when they raise external finance for foreign direct investment (FDI) and how the choice of financing structure affects FDI activities. They establish an asymmetric information model to analyze why certain firms use private bank loans while others use public bonds to finance foreign production. Sabir et al. (2019), studied the impact of institutional quality on foreign direct investment (FDI) inflows using panel data for low, lower-middle, upper-middle and high-income countries for the sample period of 1996–2016 using the system Generalized Method of Moments (GMM). They prove that institutional quality has a positive impact on FDI in all group of countries. Many studies in FDI conclude that FDI inflows into developed and developing countries are sensitive, to various degrees, to corporate income taxation and fiscal incentives (Goodspeed et al., 2011), but none of them contribute the impact of financial complexity on FDI. This study uses a **quantitative measure** of financial complexity using **McCabe's cyclomatic number**, which introduce for the first time in Iran by Pourabdollah and Makiyan (2025), allowing for a precise evaluation of its

role in FDI attraction. Calculation time series of financial complexity across 15 Asian economies using a comprehensive methodology from 2010 to 2021, assessment of its direct impact on FDI inflows and focus on Asian economies, which present a distinct mix of financial structures, regulatory frameworks, and capital market developments are our novelty. Given the **heterogeneous financial environments** of these economies, studying the interaction between financial complexity and FDI inflows provides valuable insights into investment decision-making patterns. This paper aims to clarify whether **higher financial complexity enhances or hampers FDI attraction**, offering **policy recommendations for improving FDI investment** in emerging and developed financial systems alike.

The remainder of this paper is structured as follows: Section 2 presents the theoretical framework, Section 3 outlines the methodology, Section 4 discusses empirical findings, and Section 5 concludes with policy implications.

2. Theoretical Literature and Research Background

The term **complexity**, derived from the prefix "com-" (meaning **together**), signifies interconnected and often unpredictable behavior within a system (Chan, 2001). Economic complexity applies this concept to various domains, including **growth, technological change, and inequality** (LaverdeRojas et al., 2023; Antonelli, 2016; Lee & Wang, 2021). Market structure studies conducted from a network perspective can significantly enrich the traditional perspective adopted in economics. In network science, the structure of networks plays an essential role in directing micro-events to macro-phenomena. It will become worse when there is a high correlation between different parts of the market. In other words, the behavior of networks is influenced by their structure. To analyze the intricate structure of complex and real-world networks, such as economic systems, it is essential to develop accurate models that capture their underlying dynamics. In the case of the financial sector, the strong potential of network analysis has recently been pointed out a tool to better understand economic systems and financial

markets. A financial system consists of institutions and markets that **do not operate independently**; their activities influence one another dynamically. The degree of interconnection **varies across economies**, shaping financial complexity. In network science, these connections affect risk propagation and market behavior (Caccioli et al., 2018). Increasing financial complexity can **boost efficiency and innovation** while **raising systemic risk**, requiring sophisticated risk assessment mechanisms. In terms of economics concept of the study, the traditional neoclassical growth model claims that differences in countries' per capita incomes are due to differences in their capital accumulation, which are in turn due to their differing saving rates. Therefore, differences in capital accumulation are due to differences in countries' saving rates (Solow, 1956; Koopmans, 1965). Certainly, low levels of savings and investments create savings-investment gaps that have negative impacts on economic growth and development (Sabir et al., 2019). Foreign direct investment (FDI) helps to fill the gap between savings and required level of investment (Sabir & Khan, 2018). FDI can directly and indirectly reduce unemployment (Lipsey, 2001) and increases productivity by improving the skills and knowledge of workers in the host country that lead to economic growth. Also, productivity growth lays the foundation for improvements in the standard of living. Higher interconnectedness in financial systems means more financial complexity. While more complexity can introduce systemic risk, can reduce investment attracting, also, higher complexity can show advanced financial infrastructure, efficient capital flows, and diverse financial instruments, making a country more attractive to foreign investors. So, the effect of financial complexity in countries vary by their structure of financial system. Traditional economic models link FDI inflows to **market size, macroeconomic stability, and institutional quality** (Dunning, 1998). Countries with sound economic policies and transparent financial structures attract greater FDI. This study positions **financial complexity as a crucial determinant of FDI**, incorporating its role alongside

conventional factors such as GDP growth and trade openness. So, we can algebraically write this relationship as:

FDI = *f*(Market size, macroeconomic stability, Institutions)

Where, FDI is foreign direct investment, market size is an important determinant of FDI in the host country and is proxied with GDP per capita and macroeconomic stability indicates the economic situation of the host country that affects FDI measured by financial complexity. Financial complexity indicates the internal economic tension and ability of the central bank and government to control the money and capital markets (Schneider & Frey, 1985; Buchanan et al., 2012).

Following the mentioned relationship between FDI and explanatory variables, in this study we employ the financial complexity index to reflect the macroeconomic stability in financial economics, and the variables of trade openness, market size, exchange rate and interest rate are used to represent the macroeconomics and institutions status of the countries that are under investigation.

3. Methodology and Data

This study examines **the impact of financial complexity on FDI inflows** across 15 Asian economies, China, India, Indonesia, Iran, Japan, South Korea, Malaysia, Pakistan, Russia, Saudi Arabia, Singapore, Thailand, Turkey, UAE, and Vietnam, over the period 2010–2021. Given the nature of the data **both cross-sectional (countries) and time-series (years)** a **panel data approach** was selected for capturing both country-specific and time dynamics, controlling for unobserved heterogeneity and improving efficiency and precision. Panel data can be analyzed using **fixed effects (FE) or random effects (RE) methods**, depending on the relationship between independent variables and unobserved country-specific factors and also results of the necessary tests. To evaluate the relationship between FDI and financial complexity, the following panel regression model was estimated:

FDI=*f* (Financial Complexity, Exchange Rate, GDP Growth, Interest Rate, Trade Openness)

For estimating this regression 3 steps should be Key steps in the analytical process:

1. **Calculate Financial Complexity:** Using McCabe's cyclomatic number, a novel complexity index was constructed.
2. **Data Preprocessing:** Annual data from the World Bank database (2010–2021)[1] was standardized to ensure consistency across countries.
3. **Panel Estimation:** F-limer (chow) and the Hausman Tests will conducted to determine whether pool or panel analysis and also fixed effects or random effects are more appropriate.
4. **In this study we do not apply Panel GMM.** This is because Generalized Method of Moments is particularly useful in a dynamic models Panel Data, where dependent variable is dependent on lagged variables. The variables studied here do not exhibit lag dependencies.

3-1. Financial Complexity Calculation

Increasing complexity in the financial system on one hand leads to higher efficiency, faster economic growth, as well as the ease and speed of financial transactions which can leads to more efficiency in financial markets and also it reflect more innovation and creativity in financial economics. On the other hand, it makes the financial system more vulnerable and fragile, and raises the possibility that an event at the company level could trigger severe instability or collapse an entire industry or economy, that is called systematic risk. This creates challenges and raises the cost of identifying and evaluating risks, which may ultimately effects on domestic and foreign investment. For this, quantify the financial complexity is very important in all countries. So, it is necessary to calculate the financial complexity for analyzing the effect

1. The year 2021 is the last year of existence of date in d World Bank data base.

of financial complexity on foreign direct investment (FDI). To quantify financial complexity, we employ a **four-step methodology**:

1. **Variable Selection**: We use **22 financial development indicators** (from the categories of, financial depth, stability, efficiency) to characterize each country's financial system (Appendix 1).
2. **Correlation Matrix Construction**: We compute **Pearson correlation coefficients** (equation no. 1) between financial variables is computed to assess linkages.

$$\rho_{i,j}(\Delta t)=\frac{(r_i r_j)-(r_i)(r_j)}{\sqrt{(r_i^2-(r_i)^2)(r_j^2-(r_j)^2)}} \quad (1)$$

3. **Adjacency Matrix Formation**: We establish connections between variables based on significant correlations. An adjacency matrix is defined by equation 2. If the correlation of two variables is significant, the number 1 and otherwise 0 is placed in the matrix.

$$A_{N\times N}[i,j]=\begin{Bmatrix}1 & if(V_i,V_j)\in E\\ 0 & otherwise\end{Bmatrix} \quad (2)$$

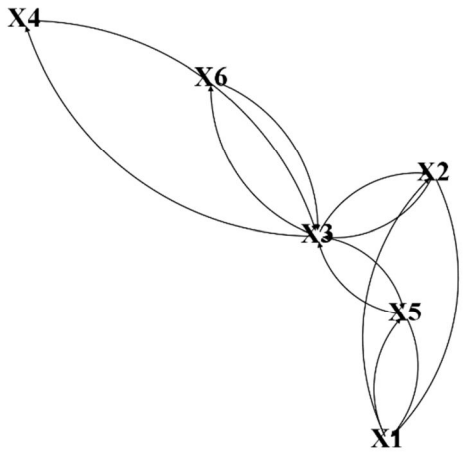
4. **Complexity Computation Using McCabe's Number**: This metric captures the system's interconnectedness, providing a numerical measure of financial complexity. The complexity of a network or graph is usually calculated based on various characteristics such as the number of nodes, the number of edges, the degree of nodes, and the distance between nodes. One of the most widely accepted indicators of graph complexity is called McCabe's cyclomatic number, which is suitable for directed graphs (Gong & Schmidt, 1985). In a strongly connected graph, the cyclomatic number is equal to the maximum number of linearly independent flows (McCabe, 1976) complexity is calculated according to equation 3:

$$V(G) = E - N + 2 \quad (3)$$

Where E is the number of relations between variables, N is the number of variables under investigated. V(G) represents the financial complexity. For example, if we have 6 variables which are correlated, there would be an adjacency matrix for them as showed in table 1. Also, the graph for this matrix can be observed in figure 1. In this example N equal to 6 and E is 7. So, the calculated financial complexity for these variables (the example) is, V(G) = 7-6+2 = 3

Table 1: Hypothetical Example of Adjacency Matrix for 6 Variables

	X1	X2	X3	X4	X5	X6
X1	0	1	0	0	1	0
X2	1	0	1	0	1	0
X3	0	1	0	1	1	1
X4	0	0	1	0	0	0
X5	1	1	1	0	0	0
X6	0	0	1	0	0	0



Graph 1: A Network of 6 variables

The amount of complexity can be calculated in all systems. We use this for financial system in studied countries. Financial complexity in this method is defined as correlation and interconnectedness among components of financial system and high number of complexity indicates the high interconnectedness in the financial system including; institutions such as banks, insurance companies and financial markets such as; stock market and OTC markets. Direct linkages between banks are an important channel of contagion across financial institutions (Allen & Babus, 2009) which can be named interconnectedness. Interconnectedness is driven mainly by bank diversification, less by bank size or overall loan market size. Financial interconnectedness is positively correlated with different bank-level of innovations and development (Cai, et al., 2018) and, thus, there would be financial complexity. Cai et al, find a positive and significant correlation between bank-level interconnectedness measure and banks development. However, in this study we examine the correlation between financial complexity and FDI. Additional determinants considered include exchange rate stability, GDP growth, interest rates, and trade openness, as expressed as follow;

3.2. Exchange Rate

Exchange rate distortions can lead to a decrease in the value of assets invested by foreign investors, especially in the context of green field FDI or the development of production facilities in other countries (Asamoah et al., 2016). A stable exchange rate makes doing business in a foreign country easier because the return on investment can be determined. However, fluctuations in exchange rates can destabilize the investment decisions, thus making absolute and relative profits are unpredictable (Asamoah et al., 2016).

3.3. GDP Growth (Market Size)

MNCs[1] will choose countries with large and fast-growing markets for their products (Safari et al., 2020). The motive of MNCs to select large and developing markets is categorized by Carbaugh, 2013), as a demand factor. Investors are driven to find new markets to increase a company's profit as their final goal. Countries with extensive emerging markets will attract investors to invest in the country in response to market searches for their products. We hypothesize that the relationship between GDP growth and FDI net inflow is positive.

3.4. Interest Rate

Investments will be carried out if the invested capital's return rate is greater or equal compared to the interest rate. If the interest rate increases, it will reduce the investor`s tendencies to invest (Marsela, 2014). Investors must increase their expenditure to finance their investment funds so that in general, the profits they get will be reduced. Dewi and Triaryati (2015) found that a higher interest rate will have a negative relationship with FDI net inflow in the host country. The higher the interest rate value, the lower the FDI inflow in the host country will be. When the interest rate decreases, FDI inflow in the host country will increase.

3.5. Trade Openness

Trade openness is measured using the net quantities of imports and exports of goods and services which is measured as a percentage of GDP. This variable describes the level of trade openness of a country. The greater the value of trade openness illustrates; the more open a country's economy is (Chandra & Handoyo, 2020). Investors prefer to invest in countries with more open economies because trade barriers result in higher transaction costs associated with exports (Jardhav, 2012). This behavior made an openness of the country's economy will lead to more FDI net inflow

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attraction. In the estimated model, the FDI is applied as a dependent variable (DV), while the financial complexity, exchange rate, GDP growth, interest rate and trade openness used as independent variables (IVs).

$$FDI = f(Fco, Ex, G, Int, Tr) \quad (4)$$

While, FDI is foreign direct investment (% of GDP), Fco represent the financial complexity, Ex is real effective exchange rate index (2010 = 100), G is GDP growth as proxy (annual %), Int is lending interest rate (%) and Tr is trade openness (% net export/GDP).

4. Empirical Analysis and Estimation Results

4-1. Financial Complexity Trends

Our **Python-based complexity model** calculates financial complexity scores for each country during the study period. Results (see Table 2) indicate significant variation, with **Indonesia and Vietnam exhibiting the highest complexity**, while **Malaysia and Japan remain relatively stable**.

Table 2. Financial Complexity Numbers: 2010-2021

	Country	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1	China	42.0	42.0	27.0	23.0	25.0	24.0	20.0	23.0	26.0	32.0	40.0	47.0
2	India	52.0	52.0	56.0	56.0	54.0	57.0	66.0	66.0	64.0	66.0	58.0	70.0
3	Indonesia	106.0	108.0	113.0	113.0	112.0	113.0	114.0	122.0	129.0	134.0	137.0	145.0
4	Iran	102.0	102.0	102.0	103.0	103.0	103.0	102.0	110.0	111.0	112.0	111.0	109.0
5	Japan	22.0	22.0	24.0	28.0	26.0	23.0	26.0	23.0	22.0	30.0	40.0	48.0
6	Korea	50.0	50.0	46.0	43.0	42.0	41.0	38.0	35.0	21.0	32.0	36.0	40.0
7	Malaysia	5.0	6.0	5.0	4.0	2.0	8.0	9.0	12.0	15.0	16.0	23.0	22.0
8	Pakistan	64.0	66.0	60.0	59.0	57.0	50.0	51.0	53.0	48.0	50.0	47.0	52.0
9	Russia	80.0	80.0	81.0	80.0	78.0	83.0	94.0	96.0	97.0	88.0	91.0	120.0
10	SA	56.0	56.0	54.0	56.0	56.0	48.0	43.0	43.0	36.0	41.0	49.0	72.0
11	Singapore	60.0	60.0	52.0	44.0	43.0	39.0	42.0	40.0	35.0	39.0	39.0	48.0
12	Thailand	78.0	76.0	70.0	69.0	67.0	64.0	56.0	48.0	39.0	34.0	29.0	35.0
13	Turkey	62.0	65.0	76.0	79.0	78.0	74.0	71.0	66.0	61.0	52.0	49.0	43.0
14	UAE	81.0	81.0	86.0	88.0	91.0	75.0	81.0	81.0	91.0	97.0	98.0	102.0
15	Vietnam	92.0	91.0	88.0	86.0	83.0	81.0	82.0	84.0	87.0	95.0	101.0	118.0

Source: Research Finding

4-2. Descriptive Analysis

Summary statistics (Table 3) reveal that **exchange rate variability** is the most prominent factor affecting FDI flows, followed by market size and trade openness. Notably, **financial complexity** exhibits a positive correlation with FDI, suggesting that investors perceive highly interconnected financial systems as advanced rather than risky.

Table 3. Descriptive Statistics (N = 95)

	FDI	FCO	EX	G	INT	TR
Mean	4.22	48.55	105.39	3.69	6.60	96.87
Median	1.16	42.00	103.80	3.73	5.38	50.36
Maximum	31.62	120.00	152.99	14.52	18.00	379.10
Minimum	-0.04	2.00	69.42	-5.46	0.99	24.70
Std. Dev.	7.54	28.55	17.02	3.18	3.66	100.06

Source: Research Finding

The correlation matrix revealed in table 4 indicates that correlation between Fco (financial complexity), EX (exchange rate), G (economic growth), TR (trade openness) and FDI (foreign direct investment) as dependent variable is positive, while, Int (lending interest rate) and FDI was negatively correlated (see column FDI in table 4). Correlation measures the statistical relationship between two variables separately. So, FDI and the variables Fco, EX, G and TR move in same direction, i.e. if the amounts of Fco, EX, G and TR increase, FDI also increase and vice versa. While negative correlation means that FDI and the variable Int move in opposite directions. As Int increase, FDI decrease.

Table 4. Correlation Matrix Results

	FDI	FCO	EX	G	INT	TR
FDI	1					
FCO	0.08	1				
EX	-0.02	0.02	1			
G	0.18	0.23	0.14	1		
INT	-0.15	0.71	-0.13	-0.09	1	
TR	0.93	0.21	0.04	0.15	-0.23	1

Source: Research Finding

4-3. Estimation Findings

The empirical results of estimating the panel model with random effect are presented in table 5. Regarding the unit root test, it is usually relevant only for panel data with a number of years greater than 15 years, so the unit root test was not performed. Therefore, the co-integration test is also not necessary (Baltagi, 2021). In the context of panel data analysis, the F-Limer test (also known as the Chow test) serve to find out that the pool or panel data method is appropriate for analyzing the data. The P- value of our test which is less than 0.05 (0.0000, F = 208.39) shows that the panel data is suitable for the estimation of model.

Table 5. Hausman Test Results

Chi-Sq. Statistic	1.668931		Prob.	0.8928

Source: Research Finding

The Hausman test is used to determine whether a random effects or a fixed effects method is more appropriate for panel data analysis. In this study the Chi-Square statistic is 1.668931. The p-value (Prob.) is 0.8928, which is much larger than typical significance levels (e.g., 0.05 or 0.10). Since the p-value is high, we fail to reject the null hypothesis (fixed effect). This suggests that the random effect is preferred over the fixed effect method. So, the random effects model is likely the best fit for this dataset. The test favored random effects, supporting the assumption that country specific factors are significantly correlated with FDI determinants.

Table 6. Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FCO	0.03	0.008	4.17	0.00
EX	-0.0001	0.00	-4.27	0.00
G	0.14	0.06	2.42	0.01
INT	-0.03	0.048	-0.71	0.47
TR	0.06	0.002	26.73	0.00
C	-5.03	0.61	-8.17	0.00

Source: Research Finding

Table 7. Other Results of the Model

R-squared	0.82	Mean dependent var.	3.31.22
Adjusted R-squared	0.82	S.D. dependent var.	5.83
S.E. of regression	2.44	Akaike info criterion	4.66
Sum squared reside	963.81	Schwarz criterion	4.77
Log likelihood	-383.33	Hannan-Quinn criteria	4.70
F-statistic	156.90	Durbin-Watson stat	1.95
Prob. (F-statistic)		0.0000	

Source: Research Finding

The results of classical assumptions for the model were proper, i.e., the mean of error term which was zero, and its value is normally distributed with constant variance, and uncorrelated. Also, cross-dependency of the countries was not observed in the estimated model. The **random-effects panel regression** confirmed significant relationships between FDI and key explanatory variables. Model diagnostics confirm strong explanatory power (**$R^2 = 0.82$**), indicating the robustness of findings. Relationship between FDI and financial **complexity is positive. It means the** higher complexity correlates with increased FDI inflows. Financial complexity reflects the **interconnectedness** of financial institutions, markets, and instruments. Higher complexity can signal **advanced financial infrastructure, efficient capital flows**, and **diverse financial instruments**, making a country more attractive to foreign investors. However, excessive complexity can introduce **systemic risk**, uncertainty, and regulatory challenges, potentially deterring investment. In this study, **financial complexity is positively correlated with FDI inflows**, suggesting that investors perceive sophisticated financial systems as **beneficial** rather than risky. Exchange rate volatility **reduces FDI**, complicating investmentprediction. Exchange rate stability is crucial for foreign investors, as it determines the **value of returns** on their investments. Exchange rate volatility increases **uncertainty**, making capital intensive projects riskier and less attractive. Depreciation of the host country's currency can make assets **cheaper** for foreign investors,

potentially increasing FDI inflows. However, frequent fluctuations undermine predictability. The model finds a **negative correlation** between exchange rate and FDI inflows, meaning unstable exchange rates **reduce investor confidence and deter investments. GDP growth (Market Size) has positive impact on FDI.** Economies with larger markets attract more FDI. A **large and growing economy** offers greater opportunities for revenue creation, attracting multinational corporations seeking expansion. Higher GDP growth signals **strong consumer demand, business opportunities**, and a **stable macroeconomic environment**. Foreign firms prefer investing in countries with sustained economic growth, as this **reduces market entry risks** and **enhances profit potential**. The study finds a **positive correlation** between GDP growth (market size) and FDI inflows, confirming that investors target **fast growing economies with strong demand potential**. **Interest Rate has no significant effect on FDI.** Interest rates influence **borrowing costs** for businesses. High interest rates **increase financing costs**, making investments less attractive for foreign firms seeking **low-cost expansion opportunities.** This study finds **no significant relationship** between interest rates and FDI inflows, suggesting that **foreign investors rely more on their funding** rather than borrowing from domestic markets.Countries with **liberal trade policies** attract foreign investors by **reducing market entry barriers** and **lowering transaction costs**. Trade openness facilitates **export-driven FDI**, where firms establish operations to **leverage international trade**. Restrictive trade policies increase uncertainty and regulatory burdens, discouraging FDI investment. The study finds a **positive correlation** between trade openness and FDI inflows, indicating that **investors prefer open economies with low trade restrictions.**

5. Conclusion and Policy Recommendations

This study provides a **groundbreaking perspective on financial complexity** as a determinant of FDI inflows. Being able to attract foreign direct investment is an important part of the growth strategies of developed

and developing countries. The main objective of this paper is to estimate the impact of host countries' financial complexity on its stock of FDI. To do this a panel data set for 15 countries during the period of 2010 to 2021 are used. The innovation of this study is using a novel method to calculate the financial complexity. The method which used to calculate the financial complexity is the McCabe`s cyclomatic number. Also we have generated and applied a software to calculate the financial complexities of studies countries by McCabe`s method in a time series at chosen times. We, of course, control other well-known determinants of FDI, such as; exchange rate, GDP growth (market size), interest rate, and trade openness. The results show that **financial complexity** helps attraction of FDI by signaling **market sophistication.** Unlike traditional assumptions linking complexity to systemic risk, **our findings suggest that complexity enhances financial dynamism**, making economies more attractive to investors. In terms of exchange rate (stable currency), GDP growth, and trade openness with their positive sign support foreign investment. The study fund **no significant relationship** between interest rates and FDI inflows

The authors of study suggest for the Iran's economy, governments can **enhance FDI attractiveness** through financial market development promoting **financial innovation** and diversified instruments for developing financial market and also stabilize currency fluctuation and expand openness of markets.

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All authors had contribution in preparing this paper.

Conflicts of interest

The authors declare no conflict of interest

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Appendix1: Financial Development Variables

Row	Variable	Index Name	Description	Symbol
1	**Financial Depth**	Private credit by deposit money banks to GDP(٪)	The financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.	**DI.01**
2	**Financial Depth**	Deposit money banks' assets to GDP(٪)	Total assets held by deposit money banks as a share of GDP. Assets include claims on domestic real nonfinancial sector which includes central, state and local governments, nonfinancial public enterprises and private sector. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.	**DI.02**
3	**Financial Depth**	Deposit money bank assets to deposit money bank assets and central bank assets(٪)	Total assets held by deposit money banks as a share of sum of deposit money bank and Central Bank claims on domestic nonfinancial real sector. Assets include claims on domestic real nonfinancial sector which includes central, state and local governments, nonfinancial public enterprises and private sector. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.	**DI.04**
4	**Financial Depth**	Liquid liabilities to GDP(٪)	Ratio of liquid liabilities to GDP. Liquid liabilities are also known as broad money, or M3. They are the sum of currency and deposits in the central bank (M0), plus 5 transferable deposits and electronic currency (M1), plus time and savings deposits, foreign currency transferable deposits, certificates of deposit, and securities repurchase agreements (M2), plus travelers checks, foreign currency, time deposits, commercial paper, and shares of mutual funds held by residents.	**DI.05**
5	**Financial Depth**	Central bank assets to GDP(٪)	Ratio of central bank assets to GDP. Central bank assets are claims on domestic real nonfinancial sector by the Central Bank.	**DI.06**
6	**Financial Depth**	Financial system deposits to GDP(٪)	Demand, time and saving deposits in deposit banks and other financial institutions as a share of GDP.	**DI.08**
7	**Financial Depth**	Life insurance premium volume to GDP(٪)	Ratio of life insurance premium volume to GDP. Premium volume is the insurer's direct premiums earned or received during the previous calendar year.	**DI.09**

Row	Variable	Index Name	Description	Symbol
8	**Financial Depth**	Nonlife insurance premium volume to GDP(/)	Ratio of nonlife insurance premium volume to GDP. Premium volume is the insurer's direct premiums earned (if Property/Casualty) or received (if Life/Health) during the previous calendar year.	**DI.10**
9	**Financial Depth**	Private credit by deposit money banks and other financial institutions to GDP(/)	Private credit by deposit money banks and other financial institutions to GDP.	**DI.12**
10	**Financial Depth**	Domestic credit to private sector (% of GDP)	Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises.	**DI.14**
11	**Financial Depth**	Stock market capitalization to GDP(/)	Total value of all listed shares in a stock market as a percentage of GDP.	**DM.01**
12	**Financial Depth**	Stock market total value traded to GDP(/)	Total value of all traded shares in a stock market exchange as a percentage of GDP.	**DM.02**
13	**Efficiency**	Stock market turnover ratio(/)	Total value of shares traded during the period divided by the average market capitalization for the period.	**EM.01**
14	**Efficiency**	Credit to government and state owned (/) enterprises to GDP	Ratio between credit by domestic banks to the government and state-owned enterprises and GDP.	**EI.08**
15	**Stability**	Bank credit to bank deposits(/)	The financial resources provided to the private sector by domestic money banks as a share of total deposits. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits. Total deposits include demand, time and saving deposits in deposit money banks.	**SI.04**
16	**Other**	(/)Bank deposits to GDP	The total value of demand, time and saving deposits at domestic deposit money banks as a share of GDP. Deposit money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits.	**OI.02**
17	**Other**	External loans and deposits of reporting banks vis-à-vis the banking sector (% of domestic bank deposits)	Percentage of loans and deposits of reporting banks vis-à-vis the banking sector to the domestic bank deposits.	**OI.10**

Row	Variable	Index Name	Description	Symbol
18	**Other**	External loans and deposits of reporting banks vis-à-vis the nonbanking sectors (% of bank deposits)	Percentage of loans and deposits of reporting banks vis-à-vis the nonbanking sectors to the domestic bank deposits.	**OI.11**
19	**Other**	External loans and deposits of reporting banks vis-à-vis all sectors (% of bank deposits)	Percentage of loans and deposits of reporting banks vis-à-vis all sectors to the domestic bank deposits.	**OI.12**
20	**Other**	Remittance inflows to GDP(/)	Workers' remittances and compensation of employees comprise current transfers by migrant workers and wages and salaries earned by nonresident workers. Data are the sum of three items defined in the fifth edition of the IMF's Balance of Payments Manual: workers' remittances, compensation of employees, and migrants' transfers.	**OI.13**
21	**Other**	Consolidated foreign claims of BIS (/)reporting banks to GDP	The ratio of consolidated foreign claims to GDP of the banks that are reporting to BIS. Foreign claims are defined as the sum of cross-border claims plus foreign offices' local claims in all currencies. In the consolidated banking statistics claims that are granted or extended to nonresidents are referred to as cross-border claims. In the context of the consolidated banking statistics, local claims refer to claims of domestic banks' foreign affiliates (branches/subsidiaries) on the residents of the host country (i.e. country of residence of affiliates)	**OI.14**
22	**Other**	Ratio of global leasing GNP(/)volume to	Ratios calculated by White Clarke Global Leasing Report.	**OI.17**

Reference: World Bank Report