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Analysing the impact of macroeconomic stability of India on FDI

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Abstract
The present study focuses on exploring the key determinants of foreign direct investment (FDI) inflows into India using ordinary least-square (OLS) regression based on monthly observations from January 2008 to December 2022. The results bring out that the Indian interest rate (INT_d), foreign inflation (PPI), foreign money supply (MS_f), foreign exchange reserves (FEX) and economic growth of India (IIP) are positively associated with FDI inflows into India. However, foreign interest rate (INT_f) and host country's inflation (CPI) as well as its money supply (MS_d) are negatively associated with FDI inflows. The findings imply that the government of India should allocate more funds to further raise the economic growth and foreign exchange reserves and should also emphasise on opening up of sectors such as defence and real estates for FDI inflows.

Keywords: FDI inflows, interest rate, inflation, economic growth

Introduction

It has been observed from the past few decades that developing nations all around the globe have an upward trend in foreign direct investment (FDI) inflows till 2021. These developing economies require more capital inflows for strengthening of their economies. Further, globalisation and financial liberalisation have made it possible for the foreign investors to make investments in these emerging market economies. These economies offer attractive opportunities of revenue generation for the overseas investors and simultaneously the FDI inflows are the main source of foreign capital inflows for these countries. Thus, these FDI inflows are vital for the developing nations on account of several reasons. For instance, the majority of developing nations are not technologically so sound and FDI inflows are a means of providing new technology to recipient economies and thus contribute in bridging the technological gap between emerging and advanced nations. It brings out essential paths for the global adoption of modern technologies (Blomstrom, 1989) [4]. Also, it contributes to the GDP of recipient nation through increase in per capita income and stimulates research and development by generation of more job opportunities in the host nation.

Foreign direct investment inflows have been considered as the main driving force contributing towards remarkable growth of emerging market economies. In fact, India could attract substantial FDI inflows by parting away from its trade protectionist policies to trade promoting policies after the introduction of new economic reforms in 1991. Moreover, several other factors supported India as a favourite destination for FDI inflows such as economic growth, higher interest rates, lower production costs, lesser inflation, stable financial system and reformed exchange rate system. In the present study, the primary focus is on exploring the variables that attract capital inflows with special reference to FDI inflows.

Review of Literature

In order to have an idea regarding determinants of FDI for the host nation, it is pertinent to conduct a review of literature already existing. A handful studies analysing the FDI determinants are being presented in the chronological order:

Carkovic and Levine (2002) [5] explored the relationship between FDI and economic growth in 72 developing nations spanning 1960-95 using dynamic panel model. It has been discovered that FDI does not cause GDP growth in the sample nations and the relationship between both FDI and GDP is influenced by the host nation's microeconomic conditions such as its corporate culture and unique competitive advantage.

Ali and Guo (2005) [2] focus on finding the vital determinants of FDI inflows in China based on primary data collection and structured questionnaires and 5-point Likert scale. The responses of the foreign investors of 22 MNCs operating in China were collected and analysed. The results revealed that market size of China is the most significant determinant which motivates foreign investors especially the US investors.

Kok and Ersoy (2009) [9] delved into the factors that influence inward FDI flows based on panel data set from 1983-2005 of twenty-four developing nations using cross-section SUR *viz*., seemingly unrelated regression and fully modified ordinary least square (FMOLS) model. The study discovered that each factor taken under consideration has a substantial impact on FDI of these nations except inflation.

Ahmad *et al*. (2015) [1] scrutinised the impact of key macroeconomic variables on total portfolio investment inflows in China based on annual dataset spanning 2001 to 2010. The results confirmed that the most significant factors driving FPI in China are the external debt, population growth, exchange rate, foreign direct investment and economic growth.

Kumari and Sharma (2017) [10] investigated the key determinants that influence the FDI inflows in 20 developing nations of South, East and South East Asia using panel data set spanning 1990 to 2012. The findings explored that market size, interest rate, human capital yield and trade openness are the most significant explanatory factors which make FDI inflows more attractive in these nations.

Huang *et al*. (2021) [7] emphasised the significance of the financial and economic indicators of a host nation for stimulating foreign portfolio investment and economic growth by taking 545 MNCs working in Malaysia over the period 2009-2018. The findings highlighted that the outward foreign direct investment of emerging nations' firms serve more to short-term performance of the overall portfolios.

Based upon the above review of literature, an effort is being made in the present paper to explore the drivers of FDI inflows in India.

Objectives of the Study

1. To explore the relationship between the Indian foreign direct investment inflows and selected macroeconomic factors.
2. To observe the influence of selected macroeconomic indicators on FDI investment in India.

Data Description

For analysing the objectives of the study, foreign direct investment (FDI) inflows into India (host country) has been taken as dependent (explained) variable which is in terms of US $ millions. Additionally, eight explanatory variables are considered which include the Indian interest rate (INT_d) or host country's interest rate, foreign interest rate (INT_f), host country's inflation (CPI), foreign inflation (PPI), host country's money supply (MS_d), foreign money supply (MS_f), foreign exchange reserves (FEX) and economic growth which is symbolized as IIP. Here, the foreign country considered is US. The data for GDP is not available in monthly frequency so index for industrial production (IIP) has been used as a proxy for economic growth. The study employed secondary data based on monthly observations spanning January 2008 to December 2022 which has been compiled from the official website of RBI under the head Database on Indian Economy and the website of US federal Reserve of St. Louis. The variables are transformed into logarithmic form to normalise the data series.

Econometric Models

Augmented Dickey Fuller (ADF) Test for Unit Root

Examining the variables for stationarity or unit root presence is preliminary while performing the analysis of time series data. Thus, for ascertaining whether a unit root exists or not, this study considers the conventional Augmented Dickey Fuller (ADF) test given by Dickey and Fuller (1979) [6]. The equation for the same is being specified as below

$$\Delta Y_t = \alpha_1 Y_{t-1} + \sum_{m=1}^{n} \beta_m \Delta Y_{t-m} + \varepsilon \dots\dots\dots\dots\dots (1)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{m=1}^{n} \beta_m \Delta Y_{t-m} + \varepsilon \dots\dots\dots\dots (2)$$

where, Δ symbolises first difference operator, α_0 stands for intercept, Y_t is a time factor, *n* signifies optimum lag length for dependent variables and ε implies residual term which is pure white noise. The equation (1) represents that the model is without intercept but equation (2) is with intercept.

OLS Regression Model

For assessing the influence of considered macroeconomic factors on FDI inflows into Indian economy, ordinary least square (OLS) regression methodology has been applied. Following is the model specification with the expected signs:

$Y_t = \beta_0 + \beta_1 INT_d - \beta_2 INT_f - \beta_3 CPI + \beta_4 PPI - \beta_5 MS_d + \beta_6 MS_f + \beta_7 FEX + \beta_8 IIP + \varepsilon$.(3)

where, Y_t = Foreign direct investments (FDI) i.e., dependent variable

CPI = Indian or Host country's inflation

PPI = Foreign inflation

MS_d = Host country's money supply

MS_f = Foreign money supply

FEX = Foreign exchange reserves

IIP = Indian economic growth

β_0 = Intercept term

ε = Disturbance term.

Analysis and findings

Stationarity Verification Test

To begin with, Augmented Dickey-Fuller unit root test has been considered to formally assess the stationarity levels and verify the order of integration of nine time series.

Table 1: Stationarity Tests through ADF Unit Root Test

Series	Model Used	Data Level	p-value	Conclusion
FDI	Only Intercept	Level	0.000***	Stationary I(0)
		First Difference	0.000***	Stationary I(0)
	With Trend and Intercept	Level	0.000***	Stationary I(0)
		First Difference	0.000***	Stationary I(0)
INT_d	Only Intercept	Level	0.132	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
	With Trend and Intercept	Level	0.164	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
INT_f	Only Intercept	Level	0.110	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
	With Trend and Intercept	Level	0.352	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
CPI	Only Intercept	Level	0.090*	Stationary I(0)
		First Difference	0.000***	Stationary I(0)
	With Trend and Intercept	Level	0.474	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
PPI	Only Intercept	Level	0.723	Non- Stationary I(1)

		First Difference	0.000***	Stationary I(1)
	With Trend and Intercept	Level	0.625	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
MS_d	Only Intercept	Level	0.000***	Stationary I(0)
		First Difference	0.056*	Stationary I(0)
	With Trend and Intercept	Level	0.961	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
MS_f	Only Intercept	Level	0.831	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
	With Trend and Intercept	Level	0.429	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
FEX	Only Intercept	Level	0.012**	Stationary I(0)
		First Difference	0.000***	Stationary I(0)
	With Trend and Intercept	Level	0.729	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
IIP	Only Intercept	Level	0.238	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)
	With Trend and Intercept	Level	0.226	Non- Stationary I(1)
		First Difference	0.000***	Stationary I(1)

Note: All series are in log transformation form.
***, **, and * show 1%, 5%, and 10% levels of significance respectively.

Table 1 indicates the results of ADF unit root test. It is clear that the foreign direct investment (FDI), foreign exchange reserves (FEX), host country's inflation (CPI) and money supply (MS_d) is integrated of order zero, *viz*., I(0) while the remaining variables are integrated of order one, *viz*., I(1). Having confirmed the degree of integration of each data series, subsequently ordinary least-square regression method is being applied to identify FDI determinants for India.

To figure out whether the explanatory variables are significant, the considered macroeconomic indicators are regressed upon FDI of India using the ordinary least square regression based on equation (3) and the results are depicted in Table 2. First of all, a significant impact of both host and foreign country's interest rate has been observed at 10% and 5% level of significance respectively. It has been found that the Indian interest rate (INT_d) affects FDI positively which signifies that a rise in Indian interest rate would lead to more FDI inflows into the host country's economy. On the contrary, negative and significant sign of foreign interest rate (INT_f) highlights that an increase in foreign interest rate causes capital outflows from India leading to withdrawal of FDI.

Table 2: Estimated OLS parameters for FDI and Other Macroeconomic Factors

Variables	Coefficient	Std. Error	t-Statistic	P-value.
C	5.934	41.93	0.141	0.887
INT_d	0.008*	1.137	0.007	0.094
INT_f	-0.490**	0.235	2.083	0.038
CPI	-2.667*	2.696	-0.989	0.082
PPI	2.658**	1.277	-2.080	0.039
MS_d	-3.583	2.237	-1.601	0.111
MS_f	4.181	2.790	1.498	0.135
FEX	2.092**	0.945	2.213	0.028
IIP	1.218***	0.404	-3.011	0.003
R-squared	0.673	AIC		2.366
Adj. R-squared	0.661	SBC		2.526
F-statistic	2.286	HQC		2.431
Prob.(F-stats.)	0.023	Durbin-Watson (DW) value		1.820

***, **, and * show 1%, 5%, and 10% levels of significance respectively.

The results further highlight that host country's inflation i.e., CPI is adversely and significantly associated with FDI which is as expected and in consonance with earlier literature. It clearly highlights that if there is a rise in Indian inflation rate, FDI inflows decrease and thus lower inflation of the host country attracts more FDI. The main reason being that higher prices lead to reduction in profitability of domestic businesses which in turn discourages foreign investors to invest in the country with high inflation. These results are similar with the findings of Schneider and Frey (1985) [11] and Kalirajan and Singh (2010) [8]. However, foreign inflation *viz*., PPI leads to rise in foreign direct investment inflows into India as higher rate of foreign country's inflation induces foreign investors to invest in a country with low inflation rate which eventually brings larger profits for the investors.

Moving on, Indian money supply (MS_d) is negatively while foreign money supply (MS_f) is positively associated with FDI but this relation is slightly insignificant. The negative sign of domestic money supply (MS_d) indicates that FDI tends to decrease with higher money supply in India since excessive monetary expansion may result in long-term macroeconomic instability and devaluation of local currency. In contrast, a hike in foreign country's money supply (MS_f) contributes to higher FDI inflows into the host country i.e., India.

Further, foreign exchange reserves (FEX) and economic growth of India (IIP) is positively and significantly related with FDI at 5% and 10% level of significance respectively. This implies that a rise in Indian foreign exchange reserves lead to hike in FDI inflows since the elevated foreign exchange reserves reflect the country's strength regarding its external payment settlements and thus aids in boosting the confidence of potential foreign investors. Likewise, the positive and significant sign of IIP implies that improvement in Indian economic growth rate promotes the efficient utilisation of resources which eventually brings economies of scale and makes FDI more attractive. These finding are in accordance with Azam and Lukman (2010) [3]. Further, the values of R^2 and adjusted R^2 is 0.67 and 0.66 which signifies that the estimated model is good fit and around 66% of variations in FDI inflows are captured by the undertaken macroeconomic indicators. The DW statistic is near to 2, i.e., 1.82 which confirms the absence of autocorrelation in the model.

Moving on, to evaluate the robustness and unbiasedness of the derived coefficients through the OLS model, few residual diagnostic tests have been applied namely, the Breusch-Godfrey Serial Correlation LM test, Heteroskedasticity test i.e., Breusch-Pagan-Godfrey Test and Jarque-Bera test for normality checking.

Table 3: Residual Diagnostic Test

Residual Test	F-statistic	p-value
Normality test (Jarque-Bera)	4.398	0.180
Breusch-Godfrey Serial Correlation LM Test	0.780	0.332
Breusch Pagan Godfrey Heteroscedasticity Test	1.792	0.414

From the perusal of Table 3, it has been verified that the estimated parameters through OLS approach are unbiased, linear and efficient since the p-value of the F-statistic in each of the three instances is higher than 0.05. Accordingly, the specification of the model is accurate.

Conclusion

The study focuses on analysing the impact of macroeconomic stability of India on FDI inflows based on monthly observations of the selected data series spanning January 2008 to December 2022 using ordinary least-square (OLS) regression. The explanatory variables taken into account are Indian interest rate (INT_d), foreign interest rate (INT_f), Indian inflation (CPI), foreign inflation (PPI), Indian money supply (MS_d), foreign money supply (MS_f), foreign exchange reserves (FEX) and economic growth (IIP). The study is evaluating the FDI inflows in India (host country) and US (foreign country). Having determined the mixed order of integration for the data series through ADF unit root test, subsequently OLS approach has been applied to evaluate the impact of selected macroeconomic indicators on FDI.

The findings of the analysis unveil that Indian interest rate (INT_d), foreign inflation (PPI), foreign money supply (MS_f), foreign exchange reserves (FEX) and economic growth of India (IIP) are positively associated with FDI which indicates that a rise in these variables would lead to more FDI inflows into the host country's economy i.e., India. In contrast, foreign interest rate (INT_f), host country's inflation (CPI) and its money supply (MS_d) are negatively related with FDI implying that a hike in these three factors causes a decline in FDI inflows to India. Further, the values of R^2 and adjusted R^2 signify that the estimated model is good fit and around 66% of variations in Indian FDI inflows are captured by selected macroeconomic indicators. In addition, the robustness of estimated parameters has been verified by means of residual diagnostic tests which confirm that model is free from heteroscedasticity, autocorrelation and non-normality.

The findings offer few policy implications, for instance, the Indian government ought to allocate funds for GDP growth and foreign exchange reserves which would further open the economy and should also emphasise on opening up sectors like defence and real estates that are currently closed to FDI investments. It should also aim to reassure investors that FDI inflows are always advantageous to them as well as to the recipient economy.

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