

# The Effect of Exchange Rate Volatility on Foreign Direct Investment - Comparison of India and China

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**Abstract:** India and China are two Emerging Countries in World of 2020. Especially in this pandemic COVID 19, two economies which will have positive growth rate are the China and India. Hence this study was conducted to examine the relationship between two factors Foreign Direct Investment (FDI) and Exchange rate of two emerging economies, India and China. Both countries are having, to a certain degree, similarity in terms of economic status, the manner in which they are approached by other foreign countries and exchange rate playing an important role whether it will be lucrative to invest in that country, adds more significance to this study. For analysing impact of exchange rate on FDI, statistical tests such as correlation and regression analysis have been conducted along with ANOVA testing. We found that there is a radical surge in the FDI of both countries from 1982 to 2018 and there is positive correlation between FDI and exchange rate of India as well as China.

**Key Words:** FDI, Growth rate, Exchange Rate, Economies, COVID 19.

## 1. INTRODUCTION:

One of the parameters to measure the extent of development in a developing country is Foreign Direct Investment. A foreign direct investment (FDI) is an investment made by a firm or individual in one country into business interests located in another country. Generally, FDI takes place when an investor establishes foreign business operations or acquires foreign business assets in a foreign company. There are various factors affecting FDI such as, Exchange rate, Labour skills, wage rate, Tax rates, Size of economy, Transport and infrastructure, Political stability. In this study, we attempt to find the effect of changes in exchange rate on Foreign Direct Investment in context of India and China over a span of 37 years (1982-2018). India and China are economies with most common demography and thus are used in this study. Using data of Exchange rate and FDI while performing statistical tests, it has been observed that change in Exchange rate has a positive impact on FDI.

## 2. LITERATURE REVIEW:

**Vikrant Kulkarni** observed in his paper titled *Exploring the FDI Impact on Currency Devaluation* published in 2018 he focused on the impact of FDI on currency devaluation, that is, to determine whether the flow of FDI is a responsible factor for currency devaluation or not by analysing bilateral FDI flows between 265 countries during 1965-2015. The countries were divided into three parts high, middle and low income. He found that FDI has a negative impact on exchange rate volatility in cases of High-Income Countries.

**Marek Hanusch and others** shared their observation in the research paper titled *Exchange Rate Volatility and FDI Inflows: Evidence from Cross-Country Panel Data* published in the year 2018. In this paper the authors have studied data collected from 80 countries for the period of 1990 to 2015. In this study they have analysed that the relationship between exchange rate volatility and foreign direct investment inflows. The results revealed a negative relationship between exchange rate volatility and FDI.

In the article titled *The Relationship between Exchange Rate Volatility and Foreign Direct Investment in Turkey: Toda and Yamamoto Causality Analysis* by **Zerrin Kiliçarslan** published in *International Journal of Economics and Financial Issues* in 2018, the author addressed the volatility in exchange rates as a problem as it bore uncertainty on the flow of FDI in a country. In this study, the relationship between exchange rate volatility and FDI in Turkey for the period 2005Q4-2018Q1 was analysed, they have used Real effective exchange rate here. The research was based on a unique model for analysing the data.

In the paper by **Silvia Dal Bianco and Nguyen Cong** titled *FDI Inflows, Price and Exchange Rate Volatility: New Empirical Evidence from Latin America*, published in 2017 examined the impact of price and real exchange rate volatility on FDI inflows in a panel of ten Latin American and Caribbean countries, observed between 1990 and 2012. Both price and exchange rate volatility series were estimated through the Generalized Autoregressive Conditional

Heteroscedasticity model (GARCH). The outcomes found, confirm so far as a statistically significant negative effect of exchange rate volatility on FDI was found. Price volatility, instead, turned out to be positive but insignificant.

**Dr. VB Khandare** shared observations of the study titled *Impact of exchange rate on FDI: A comparative study* published in 2014, article has kept its focus on two developing countries only India and China. The data analyzed is from the period of 1991 to 2014. The impact of exchange rates on FDI is measured using correlation and other statistical tools. It is found that there is positive correlation between FDI and exchange rate in India. For China the correlation between FDI and exchange rate is negative.

**Mayuresh S. Gokhale and J.V. Raman Raju** in the paper titled *Empirical Analysis of the Causal Relationship between Nominal Exchange Rate and Foreign Direct Investment in India using VAR* tried to establish a causal relationship between the nominal exchange rate and foreign direct investment in India using a time series data between 1992 and 2010 in. In their research they have used unit root test and Johansen cointegration test and The Vector Auto regression (VAR) model. Their research had as its null hypothesis that FDI decisions are not influenced by the host country's nominal exchange rate. The exchange rate fluctuation essentially does not impair the quantum of foreign direct investment.

**Sreelata Biswas and Byasdeb Dasgupta** observed the impact of foreign capital inflows in India on the real exchange rate examined using quarterly data for the period 1994-95Q1 to 2009-10Q4 in the article published in Int. Journal of Economics and Management in 2012. The Johansen multivariate co-integration test was used to establish a link between the real exchange rate and relevant macroeconomic variables. The result suggested that Foreign Direct Investment (FDI) and workers' remittances affect real exchange rate positively in India. The paper empirically finds that the increasing capital inflows in terms of inward FDI and remittances appreciate the equilibrium real exchange rate in India during 1994-95Q1 to 2009-10Q4.

**Dharmendra Dhakal and others** examined in their paper titled *Exchange Rate Volatility And Foreign Direct Investment: Evidence From East Asian Countries* using panel data the effect of exchange rate uncertainty on foreign direct investment in China, Indonesia, Malaysia, the Philippines, South Korea, and Thailand—countries that have continued to attract considerable FDI inflows, while also experiencing a great deal of volatility in exchange rates. The overall estimation results were consistent with theoretical predictions. They found that exchange rate volatility has a favourable effect on foreign direct investment in their sample countries.

In a paper titled *Exchange Rate Expectations and Foreign Direct Investment Flows* by **Rajesh Chakrabarti and Barry Scholnick** shared the given observations. It is based on expectancy of exchange rates by analysing the FDI inflows. They studied FDI data to find indirect evidence on the formation of exchange rate expectations by international investors. They used several panel data estimation techniques on data comprising exchange rate movements and FDI flows from the United States to 20 countries over a period of 14 years (most of the 1980s and the first half of the 1990s). They found that average devaluation in the preceding year does not have a robust positive impact on FDI flows.

### 3. OBJECTIVES:

Other than its core objective, to discover the effect of exchange rates on FDI in both countries India and China, this research serves purpose for these objectives too.

- To study the trends in exchange rate and FDI in India and China during 1982 to 2018.
- To observe if there are any similarities in both the countries with reference to both of the factors.
- To compare the empirical analysis of exchange rate and FDI of India and China.

### 4. METHOD:

This study is mainly based on secondary data collected from 1982 to 2018. The data regarding exchange rate and foreign direct investment was collected from the website of World Bank. The amount of FDI is taken at end of financial year. Causal Descriptive research design has been considered as a suitable methodology for present study and for data analysis. Here, the study is conducted using a Hypothesis. Two variable Correlation tests and One-way ANOVA tests have been used to justify the said hypothesis.

#### 4.1. RESEARCH HYPOTHESIS:

H0: Exchange rate has no impact on foreign direct investment in India and China.

H1: Exchange rate has positive impact on foreign direct investment in India and China.

### 5. DISCUSSION AND ANALYSIS:

Table no. 1 presents the trends in foreign direct investment and exchange rate in India and China during 1982 to 2018. Foreign direct investment in India was US \$72 million in 1982 which goes up to US \$42,117 million in 2018 and on an average the FDI in India was US \$13,288million. The exchange rate of Indian rupee in US \$ was Rs. 9.6660 which goes up to Rs. 69.9229 with average exchange rate of Rs. 38.3969 from 1982 to 2018. Foreign direct investment in China was US \$430 million in 1982 which goes up to US \$ 20,3492 million in 2018 and on an average the FDI in

China was US \$ 90,917 million. The exchange rate of Chinese Yuan in US \$ was 1.8925 which goes up to 6.6160 with average exchange rate of 6.2804 from 1982 to 2018.

**Table 1. FDI Detail of INDIA and CHINA**

Year	INDIA	Column1	CHINA	Column2
	Official exchange rate (LCU per US\$, period average)	FDI (in \$)	Official exchange rate (LCU per US\$, period average)	FDI (in \$)
1982	9.666	72080000	1.8925	430000000
1983	10.34	5640000	1.9757	636000000
1984	11.8886	19240000	2.32	1258000000
1985	12.2349	106090000	2.9367	1659000000
1986	12.7782	117730000	3.4528	1875000000
1987	12.9658	212320000	3.7221	2314000000
1988	14.4817	91250000	3.7221	3194000000
1989	16.6492	252100000	3.7651	3393000000
1990	17.9428	236690000	4.7832	3487000000
1991	24.4737	73537638.39	5.3234	4366000000
1992	30.6488	276512439	5.5146	11156000000
1993	31.3655	550370024.9	5.762	27515000000
1994	31.3986	973271468.7	8.6187	33787000000
1995	33.4498	2143628110	8.3514	35849200000
1996	35.4999	2426057022	8.3142	40180000000
1997	37.1648	3577330042	8.2898	44237000000
1998	42.0706	2634651658	8.279	43751000000
1999	43.3327	2168591054	8.2783	38753000000
2000	45.6844	3584217307	8.2785	42095300000
2001	47.6919	5128093562	8.2771	47053000000
2002	48.3953	5208967106	8.277	53073618897
2003	45.9516	3681984671	8.277	57900937467
2004	44.9315	5429250990	8.2768	68117272181
2005	44.2735	7269407226	8.1943	104108693867.09
2006	45.2495	20029119267	7.9734	124082035618.51
2007	40.2607	25227740887	7.6075	156249335203.20
2008	45.9933	43406277076	6.9487	171534650311.57
2009	47.4433	35581372930	6.8314	131057052869.50
2010	45.5626	27396885034	6.7703	243703434558.18
2011	47.9229	36498654598	6.4615	280072219149.94
2012	54.4099	23995685014	6.3123	241213868161.42
2013	60.5019	28153031270	6.1958	290928431467.00
2014	61.1436	34576643694	6.1434	268097181064.34
2015	65.4685	44009492130	6.2275	242489331627.40
2016	67.072	44458571546	6.6445	174749584584.05
2017	64.4549	39966091359	6.7588	166083755721.65
2018	69.9229	42117450737	6.616	203492014029.27
AVG	38.3969	13288000699	6.280362162	90917349102

## 6. CORRELATION ANALYSIS:

Table no. 2 indicates the correlation between foreign direct investment and exchange rate in India and China. Correlation used for analyze relationship between two or more variables and its range between - 1 to +1 and the significant level is 0.01 to 0.05 percent more than 0.05 significant value shoes insignificant relationship between two variables. The -1 correlation value shows perfect negative relationship and in the opposite + 1 correlation value shows perfect positive relationship between two variables

**Table 2: Correlation Analysis (Exchange rate and FDI):**

Country	Correlation	Observations	Significance level	
India	0.7767	37	95%	One-tail
China	0.2933	37	95%	One-tail

From the above it is reflected that, India’s correlation coefficient is 0.7767 which is nearer to 1, which shows that in India Exchange Rate and FDI are significantly positively related with a significance level of 95% or  $\alpha = 0.05\%$ . It is a **strong correlation**. China’s correlation coefficient is 0.2933 which is nearer to 0, which shows that in India Exchange Rate and FDI are insignificantly positively related with a significance level of 95% or  $\alpha = 0.05\%$ . It can be said that for China, factors other than Exchange rate would impact FDI as their correlation is less than 0.5 i.e. it is insignificantly related. It is a **weak correlation**.

## 7. REGRESSION ANALYSIS:

Table no. 3 shows the regression result of FDI and exchange rate in India and China. The regression analysis has been used to show the accuracy between dependent and independent variables. Here, the independent variable is Exchange rate and dependent variable is FDI.

**Table 3: Regression Analysis (Exchange rate and FDI)**

Country	Multiple R (or Correlation)	Regression (R Square)	Std. Error of the Estimate	Adjusted R Square
India	0.776702298	0.603	10531351527	0.592
China	0.293341822	0.086	92466688914	0.060

From the table, it can be said that India’s regression coefficient value is 0.603. It is found that the independent variable exchange rate affects by 60.3 percent on dependent variable foreign direct investment in India. For China, it can be said that regression coefficient value is 0.086. That is, one unit of change in independent variable exchange rate will cause 8.6% change in dependent variable FDI. R-squared—also known as the coefficient of determination—is a statistical analysis tool used to predict the future outcome of dependent variable upon certain change in independent variable. The adjusted R-squared is a modified version of R-squared for the number of predictors in a model. **One main difference** between R square and the adjusted R square: R square assumes that every single variable explains the *variation in the dependent variable*. The adjusted R square tells you the percentage of *variation explained by only the independent variables that actually affect the dependent variable*. Std. Error of the Estimate is a measure of the accuracy of predictions. In a regression line, the smaller the standard error of estimate is, the more accurate the predictions are.

## 8. ANOVA ANALYSIS:

In the ANOVA setting, the observed variance in a particular variable is partitioned into components attributable to unusual sources of variation. In its simplest form, ANOVA provides a statistical test of whether or not the means of several groups are equal, and therefore generalizes the t-test to more than two groups. One-way ANOVA uses **F-test** to test the validity of a particular hypothesis. In the analysis of Anova, the F value is mostly considered with significant level of 0.01 to 0.05 percent. The significant level 0.01 to 0.05 percent shows the reliable effect on dependent variable. In this study, the **significance level** or  $\alpha$  is considered at **0.05%**.

**Table 4: ANOVA (INDIA)**

Groups	Count	Sum	Average	Variance
<b>EXCHANGE RATE (in \$)</b>	37	1420.6858	38.39691351	316.3060862
<b>FDI (Million \$)</b>	37	4.91656E+11	13288000699	2.71791E+20

Source of Variation	SS	df	MS	F	P-value	F critical
<b>Between Groups</b>	3.26656E+21	1	3.26656E+21	24.03732642	5.65659E-06	3.973896992
<b>Within Groups</b>	9.78447E+21	72	1.35895E+20			
<b>Total</b>	1.3051E+22	73				

From the above table, it can be seen that F calculated value –24.03732642 is more than the F crit Tabulated value-3.973896992. So **Alternate Hypothesis is accepted** and Null Hypothesis is rejected. It can be inferred that Exchange rate has significant **positive impact** on foreign direct investment in India. **Another measure for ANOVA is the p-value.** If the p-value is less than the alpha level selected, which it is, in this study 5.65659E-06 is less than 0.05 so Null Hypothesis is to be rejected.

**Table 5: ANOVA ANALYSIS (CHINA)**

Groups	Count	Sum	Average	Variance
<b>EXCHANGE RATE (in \$)</b>	37	232.3731864	6.28035639	4.215140599
<b>FDI (Million \$)</b>	37	3.36394E+12	90917349102	9.09524E+21

From the above table, it can be seen that F calculated value –33.62646983 is more than the F crit Tabulated value-3.973896992. So **Alternate Hypothesis is accepted** and Null Hypothesis is rejected. It can be inferred that Exchange rate has significant **positive impact** on foreign direct investment in China. **Another measure for ANOVA is the p-value.** If the p-value is less than the alpha level selected, which it is, in this study is 1.64693E-07 less than 0.05 so Null Hypothesis is to be rejected.

Source of Variation	SS	df	MS	F	P-value	F crit
<b>Between Groups</b>	1.5292E+23	1	1.5292E+23	33.62646983	1.64693E-07	3.973896992
<b>Within Groups</b>	3.27428E+23	72	4.54762E+21			
<b>Total</b>	4.80349E+23	73				

**9. FINDINGS :**

India’s FDI has increased exponentially in years after 1991 and thus, rapid growth has been observed in sectors such as retail, infrastructure, etc. as they received FDI in highest amounts. On the other hand, Exchange rate of India has rapidly depreciated over the time indicating decrease in value of rupee as against dollar. Period of 1998 to 2011 was a period in which India had maintained its exchange rate in range of approx. 42 to 47 Rs. But at the same time, FDI increased almost 10 times. Whereas for China, FDI was already booming in the economy and thus experienced stable growth over the span of 1982 to 2018. China’s Exchange rate rapidly depreciated over 1994 to 2005 but it has recovered from 2006 onwards and has then been effective enough to maintain a stable decline in currency against dollar. According to ANOVA Analysis, since F calculated is greater than F critical, Null Hypothesis is rejected and Alternate Hypothesis is accepted. It implies that, Exchange rate has significant **positive impact** on foreign direct investment in India. According to ANOVA Analysis, since F calculated is greater than F critical, Null Hypothesis is rejected and Alternate Hypothesis is accepted. It implies that, Exchange rate has significant **positive impact** on foreign direct investment in China.

**10. CONCLUSION:**

India and China are the emerging economies in the world. These two countries have about 37.5 percent population of the World. This study was conducted to examine the impact of exchange rate on foreign direct investment in India and China. The main factors that affect foreign direct investments are wages rate, labor skills, tax rates, transport and infrastructure, size of economy (potential for growth), political stability (Property rights), commodities, access to free trade areas and exchange rate. But in this study, all other factors have been isolated and only impact of Exchange rate upon FDI is considered so as to ascertain whether it affects FDI or not and if yes, up to what extent. Here, the independent variable is Exchange rate while the dependent variable is FDI. India and China both have experienced immense growth. Therefore, a time period of 1982-2018 i.e. 37 years has been taken to get a long-term view on both aspects i.e. Exchange rate and FDI. Correlation, Regression and ANOVA Analysis have been used to test the hypothesis under study. Based on facts and figures and the results from such tests, it can be concluded that Exchange rate has a significant positive impact on FDI in India as well as China. Thus, it can be concluded that change in exchange rate will yield a positive impact on FDI.

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