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## Foreign Exchange Rate

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### ABSTRACT

In this paper with the help of mathematical tools, I will analyse how the Foreign Exchange Rate of India and USA have fared over the span of 3 years from March 2017 to February 2020. The tools will help to forecast the future value of the foreign exchange rate but the values forecasted do not consider any external factors and is based on the previous values. We will also use time series tools like moving averages to find the general trend of the rate.

**Keywords— Foreign Exchange Rate, Trendline, Moving Average**

### 1. INTRODUCTION

A foreign exchange rate is the price of the domestic currency stated in terms of another currency. Since standardized currencies around the world float in value with demand, supply, and consumer confidence, their values change relative to each other over time. Foreign Exchange Rate in India is based on US Dollars.

### 2. DATA

Table 1: Data

Month	Date	Rate (Y)	5 Monthly Moving Average	X = Month - 18.5	Y^(Trendline)
1	Mar-17	65.61984		-17.5	63.79635327
2	Apr-17	64.53096		-16.5	64.04643411
3	May-17	64.42152	64.69218034	-15.5	64.29651496
4	Jun-17	64.4455	64.35228059	-14.5	64.5465958
5	Jul-17	64.44309	64.3325142	-13.5	64.79667665
6	Aug-17	63.92034	64.46583075	-12.5	65.04675749
7	Sep-17	64.43213	64.54865242	-11.5	65.29683834
8	Oct-17	65.0881	64.50198033	-10.5	65.54691918
9	Nov-17	64.85961	64.44601913	-9.5	65.79700003
10	Dec-17	64.20973	64.44920272	-8.5	66.04708087
11	Jan-18	63.64053	64.44086772	-7.5	66.29716172
12	Feb-18	64.44804	64.60558606	-6.5	66.54724256
13	Mar-18	65.04643	65.26862847	-5.5	66.79732341
14	Apr-18	65.6832	66.09792167	-4.5	67.04740425
15	May-18	67.52494	66.94110177	-3.5	67.2974851
16	Jun-18	67.787	67.84246387	-2.5	67.54756594
17	Jul-18	68.66395	69.12489054	-1.5	67.79764678
18	Aug-18	69.55324	70.33735441	-0.5	68.04772763

19	Sep-18	72.09534	71.13723841	0.5	68.29780847
20	Oct-18	73.58726	71.54837712	1.5	68.54788932
21	Nov-18	71.78642	71.76740292	2.5	68.79797016
22	Dec-18	70.71964	71.59059263	3.5	69.04805101
23	Jan-19	70.64836	70.78948166	4.5	69.29813185
24	Feb-19	71.21129	70.31436867	5.5	69.5482127
25	Mar-19	69.5817	70.12389383	6.5	69.79829354
26	Apr-19	69.41085	69.8780496	7.5	70.04837439
27	May-19	69.76726	69.38505837	8.5	70.29845523
28	Jun-19	69.41914	69.69374772	9.5	70.54853608
29	Jul-19	68.74633	70.07248071	10.5	70.79861692
30	Aug-19	71.12515	70.31932652	11.5	71.04869776
31	Sep-19	71.30452	70.73062475	12.5	71.29877861
32	Oct-19	71.00149	71.21590088	13.5	71.54885945
33	Nov-19	71.47563	71.24379152	14.5	71.7989403
34	Dec-19	71.17271	71.2996537	15.5	72.04902114
35	Jan-20	71.2646		16.5	72.29910199
36	Feb-20	71.58383		17.5	72.54918283
	FORECAST			18.5	72.79926368
				19.5	73.04934452
				20.5	73.29942537

### 3. ANALYSIS

#### 3.1 Moving Averages

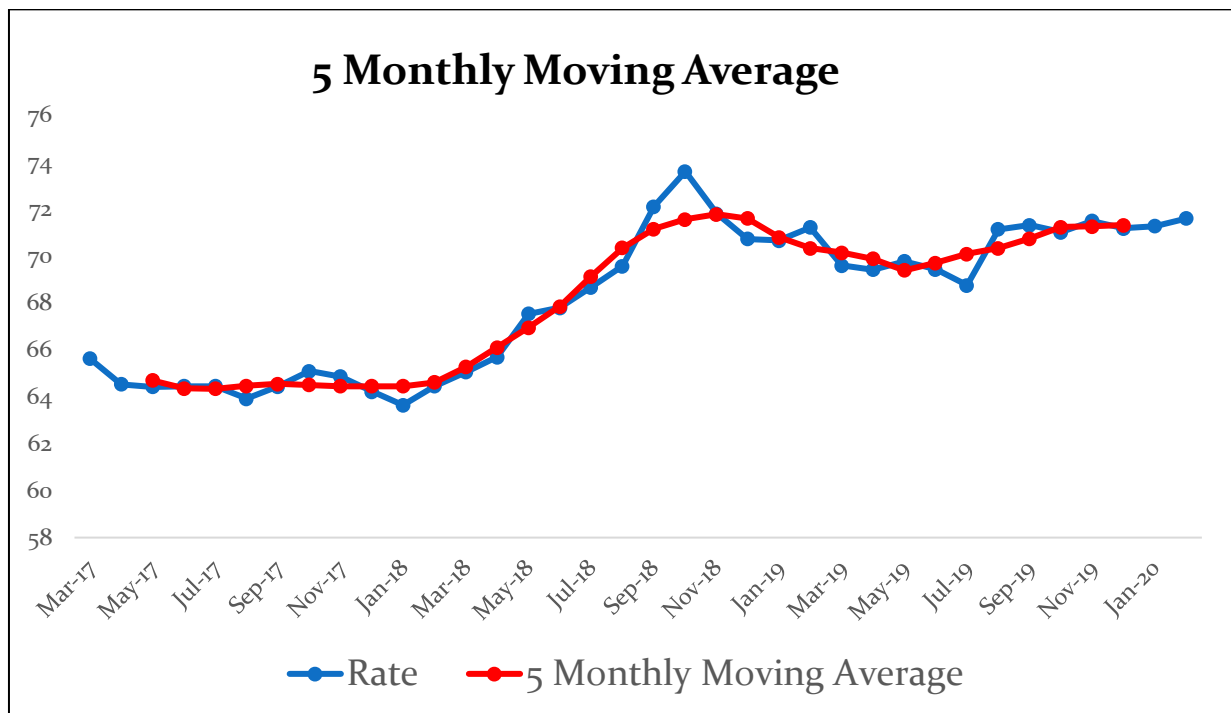


Fig. 1: Moving average graph

The graph indicates moving average of 5 months of Foreign Exchange Rates from March 2017 to Feb 2020. The rates were very similar in 2017 but started to rise in 2018. This shows that Dollar grew by a high amount in 2018. There were some fluctuations in 2019. The rate fell in 2019 as compared to 2018. The rates do not have a lot of fluctuations.

3.2 Trend Line

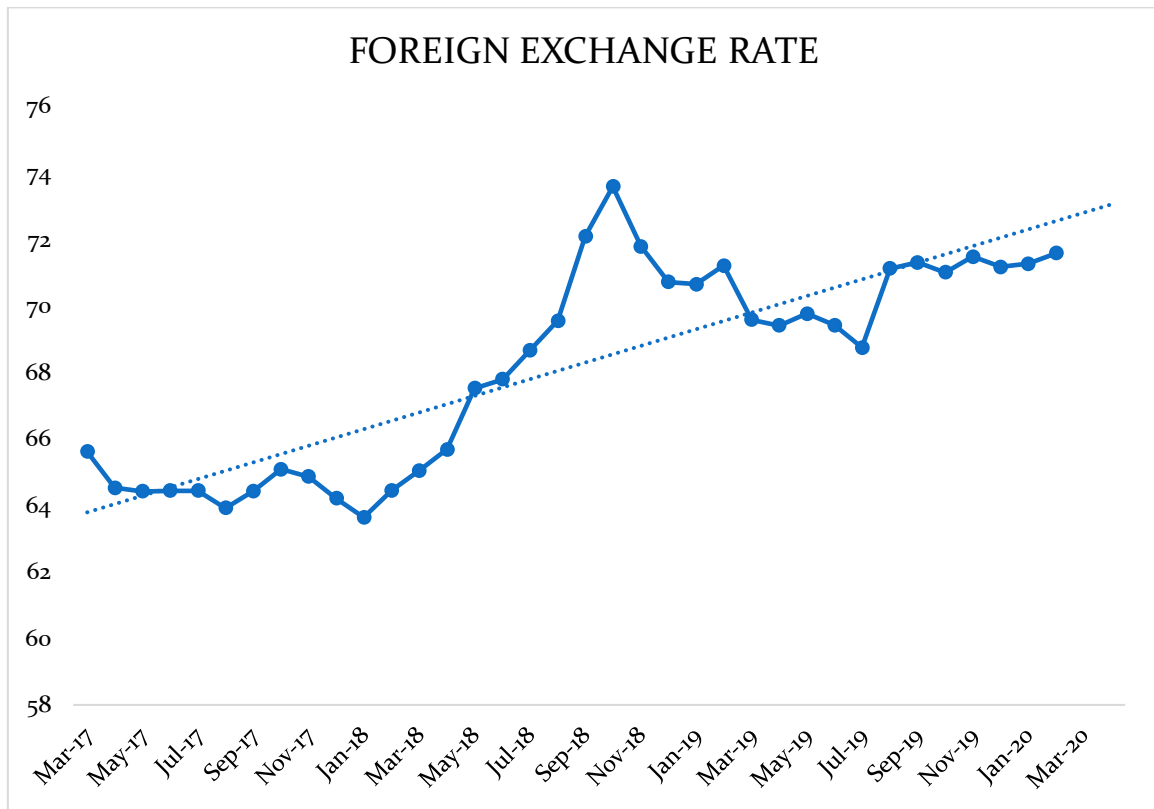


Fig. 2: Trend line graph

A trendline is a line drawn over pivot highs or under pivot lows to show the prevailing direction of price. Trendlines are a visual representation of support and resistance in any time frame. The trendline forecasts the foreign exchange rate to rise in the long term. The general trend seems to be secular and rising.

FINDING THE TREND LINE USING LEAST SQUARE METHOD

SUMMARY OUTPUT								
Regression Statistics								
Multiple R	0.84758094							
R Square	0.71839345							
Adjusted R Square	0.7101109							
Standard Error	1.67369638							
Observations	36							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	242.9695661	242.96957	86.73583	6.98457E-11			
Residual	34	95.24282533	2.8012596					
Total	35	338.2123914						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	68.1727681	0.278949396	244.39117	9.31E-57	67.60587468	68.73966	67.60587	68.73966
X Variable 1	0.25008084	0.02685228	9.3132071	6.98E-11	0.195510447	0.304651	0.19551	0.304651

4. CONCLUSION

To conclude, the paper analysed how the Foreign Exchange Rate have fluctuated over the years but maintained a general predictable trend. The simple mathematical tools of moving averages and trendline have been used to predict the future value. These do not consider any external factors and are just based on the previous trends.