IMPACTS OF EXCHANGE RATE ON ECONOMIC GROWTH OF CHINA (1982 TO 2018)

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Abstract - This article examines the impact of the exchange rate, foreign direct investment, exports, and imports on the economic growth of China, China is mostly accused of dumping RMB's exchange rate for increasing exports and economic growth. Thus the relationship among RMB's exchange rate, Foreign direct investment, exports, imports as independent variables, and gross domestic product per capita income as a dependent variable is analyzed by using time series data for the period of 1982 to 2018, ARDL (Autoregressive-Distributed Lag) and VECM (Vector Error Correction) models were executed for finding relationships among variables.
In conclusion, it was found that there is a significant and negative relationship between gross domestic product per capita income and exchange rate for instance with a 1% increase in exchange rate GDP per capita is decreased by 1.2% in long run. However, foreign direct investment and export have a significant and positive relationship with GDP per capita income, with a 1% increase in FDI and exports the GDP per capita is augmented by 1.4% and 0.26%.

Keywords - Exchange rate, Economic Growth, ARDL & VECM Models, FDI, Export.

I. INTRODUCTION

The exchange rate is defined as it is the price of one currency in terms of obtaining another country or economic zone currency in a specific period. Exchange rate regimes are adopted by a country's monetary authority generally and monetary authority (The Central Bank) has the power to adopted the exchange rate regime that is according to the economic strategy, monetary policy, economic situation, and benefits of that country.
According to Policonomics (2017), each exchange rate regime has its pros and cons, it is not easy work to find out the most suitable exchange rate system for a country because the economy of that country is hugely affected by the exchange rate system selection and exchange rate for instance import, export, GDP, etc. can be affected very much by the decision.
There are many exchanges rate regimes, and most known exchange rate regimes are floating and fixed exchange rate regimes, although many other exchange rate regimes exist that are elaborated as under;

1. Monetary Union: A country has low independence over it, like Eurozone.
2. No Separate Legal Tender: It is a situation where the currency of another country is used in another country and they have very low independence over the exchange rate of that currency.
3. Currency Board: It is a clear contract on a stable exchange rate between two or more countries.
4. Target Zone Agreement: This is a situation where the exchange rate can increase or decrease but within certain limitations.
5. Crawling Peg: It is an exchange system that limits the fluctuation of the currency mainly defined characteristics such as the fixed exchange rate of the currency are often reviewed and adjusted because of market elements such as inflation and a group of other rates.
6. Managed floating: This is an exchange rate that is elastic but with government intervention in the Market.
7. Free/floating Exchange Rate: The exchange rate is determined by the market (Policonomics, 2017).

Based on another article by Ahmad (2013) the exchange rate is a vital economic factor, and economists are interested in the effect of the exchange rate on economic growth. The exchange rate means with how many units of the domestic currency we can buy how many units of external currency. If we omit inflation from the exchange rate it is called the exchange rate if we don't omit inflation from the exchange rate, then it is called a nominal exchange rate. If the exchange rate is controlled by the government, it is called the Controlled exchange rate, and if it is not controlled it is called a floating exchange rate and in the middle, it is called a managed floating exchange rate which is the semi-controlled exchange rate.
According to The New York Times "The Trump administration labeled China a currency manipulator on Monday after China allowed the value of its currency to fall" it is mostly observed that the US has accused the government of China of dumping its currency Swanson (2019). According to the economists, the dumping policy is followed for decreasing exporting products price in the US and Europe markets that will lead to a high economic growth rate in China.
It is beneficial for import oriented countries to keep their currencies exchange rate high because they

importing products will be at reasonable price or cheap although for export-oriented countries that are exporting more and exporting technological and capital assets they need to keep their low exchange rate is better for enhancing their exports in the international market plus and keeping their products demand high, compare to other countries products.

In this article, we aim to find whether the fall or rise of RMB's exchange rate impacts economic growth or the relationship between the exchange rate and the economic growth of China for the period of 1982 to 2018 will be investigated.

II. LITERATURE REVIEW

Officially the People's Republic of China is the largest country, economy, exchange reserve, and exporter in the world with a $14.34 trillion gross domestic product (GDP) and1.4 billion population, an unemployment rate of 3.62%, inflation rate of 2.9%, an exchange rate of RMB (Renminbi) 6.91/$, a current account balance of 141.3 billion USD, the trade balance of 165 billion USD, export 2.5 trillion U.S. dollars, import 2.08 trillion U.S. dollars at the end of 2019. The economy of China has experienced amazing economic growth in the last few decades that has captured the title of the second-largest economy in the world. In 1978 when China launched the economic reform program the country ranked 9th in nominal GDP and 35 years later it jumped to the 2nd biggest economy in the world (Export Entreprises SA, 2021).

Based on a research paper by (Thorbecke, 2009), China's exports increase by about 22% in the year 2005 to 2008 and its current account surplus surpassed 9% of GDP in 2006 and 11% of GDP in 2007. Its economic growth is 10% more than every year between 2004 and 2007. Quite a few economists think that China's balance of payment (BOP) is in disequilibrium and China must let the RMB exchange rate appreciate. On the other hand, the Chinese government has rejected suggestions for the quicker rise of RMB's exchange rate, due to unfavorable effects of RMB appreciation on the reduction of labor-intensive exports of China and will lead to the ruining of those industries across China.

Based on a study that analyzed the growth shocks and China RER (price exchange rate) in long run, it shows that with the decline of the labor force of China in the long run the real exchange rate will have increase, and in the short-run financial capital, inflows are effective in RMB's exchange rate (Tyers, 2007). In another paper the possibility of RMB's reform and RMB becoming the regional trading currency in the region plus stable exchange rate important for China. Secondly, the reasons affecting RMB's exchange rate in long run have been analyzed (Hokroh, 2013).

A research paper regarding effects of the appreciation of RMB's exchange rate on social and economic factors in 29 provinces of China from 1987-2008 by using GMM method forecasting has conducted and resulted from research shows that an increase in the exchange rate of RMB has a negative result over GDP growth and employment in those provinces (HUA, 2011).

According to Su (2017) research paper that analyzed the RMB and real Gross domestic productions relationship of China three-time phases such as 1952-1979, 1979-1993, and 1993-2014 by using the Vector error correction model, the result shows that in the first period it has no significant effect on GDP and after RMB's exchange rate reform shows that there is a positive and significant correlation in this time from 1979 to 1993 between RMB's exchange rate depreciation and GDP growth and lastly in 1993-2014 there is a negative relationship between RMB's exchange rate appreciation and GDP growth for example with an increase in RMB's exchange rate the GDP is negatively affected.

In an empirical study regarding the panel study of countries from 1978-2007 regarding the RER and economic growth, In this study quantile regressions method have been used and resulted that in long run it is very efficient, effective and lead to economic growth and development if countries have a stable and competitive real exchange rate (Missio, 2015).

The Chinese government is worried that the RMB exchange rate increase will decrease labor-intensive exports. It is investigated by Thorbecke (2009) that an increase in the exchange rate of RMB will lead to a decrease in China's exports of labor-intensive products such as furniture, clothing, footwear, etc.

As per research regarding the impact of nominal exchange rate on economic development of Kuwait by Paul (2019), by using time-series data from 1975 to 2015 and Least Square method and BG test. The result approves that the exchange rate plays a vital role in the economic development of Kuwait. The study expresses that an increase in the nominal exchange rate leads to a significant and positive impact on economic growth. Consequently, it is suggested that Kuwait should devaluate its currency to increase its exports. It is also suggesting that Kuwait should increase nonpetroleum export due to the non-renewability characteristic of petroleum, plus it will absorb an enormous amount of foreign direct investment in the country, therefore, an increase in nonpetroleum products will highly affect the economic growth and development in Kuwait.

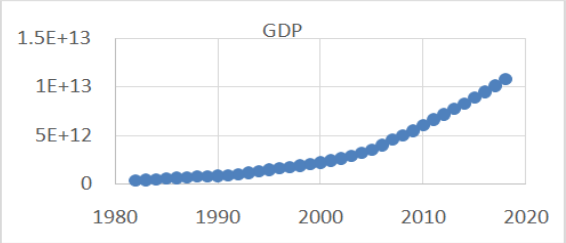
On the other hand, a study by Ahmad, (2013), regarding the impact of inflation, nominal exchange rate, foreign direct investment (FDI), and capital stock on the economic development of Pakistan with time-series data from 1975 to 2011 by using the OLD method. The resulted of the investigation shows that the exchange rate and inflation have a negative impact on economic growth, for instance, a percent increase in the exchange rate will reduce the GDP by 0.55 and a percentage increase in inflation will

decrease GDP by 0.29 percent. Furthermore, a percentage increase in FDI will increase the GDP by 0.37 percent although capital stock does not significantly affect GDP.

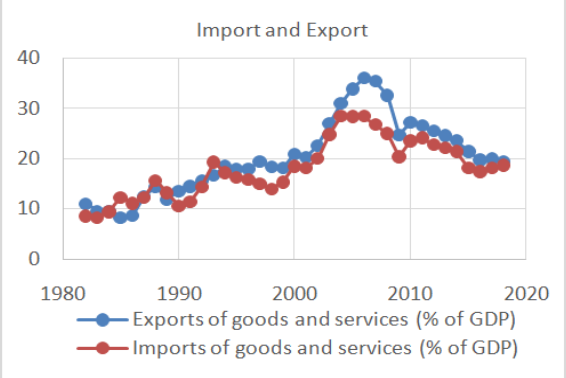
Hence, the article by Ahmad (2013) regarding the Pakistan exchange rate suggests that due to a higher increase in the exchange rate of Pakistan for instance Pakistani currency has lost its value from 1980, 1 dollar equal to 10 Rupees to 90 Rupees in 2011. Thus, Pakistan mostly exports raw materials and agricultural products but importing costly products for example machinery petrol, and technology products and that's why Pakistan's balance of trade remained negative for a long time. Therefore, it's suggested for policymakers to adopted an exchange rate system that could result in the economic development of Pakistan. For instance, the devaluation of Pakistani Rupees can lead to an increase in export and effecting the imports negatively thus people will buy domestic products and this mechanism will lead to economic growth and development.

Graphical Representation of China's Economy from 1982 to 2018.

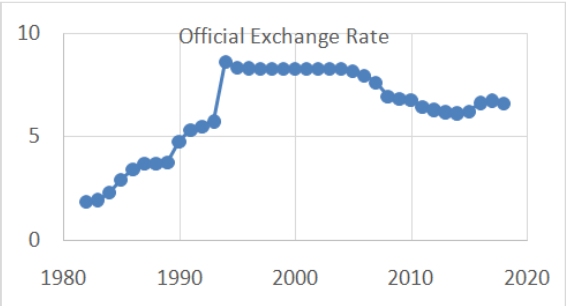
Graph 1: Gross domestic product of China



Graph 2: Import and export of China



Graph 3: Official exchange rate of China



The above graphs are the authors' work; data is taken from World Bank Data Bank Development indicators.

Many have commended the appreciation of RMB by 20% against the dollar, although RBM has depreciated by 35% against Euro during September 2008. This decision of appreciation against dollar and depreciation against Euro has been very beneficial for China due to the fact that the crowding of exports like furniture and footwear of China in European markets which made European officials upset regarding this decision of China and will respond regarding the absence of floating exchange rate system in China thus this policy will negatively effect on free trade in the world (Thorbecke, 2009).

According to Thorbecke (2009) due to the surplus of both current and capital account of China, it's appropriate to appreciate RMB's exchange rate but the Chinese government has rejected the appreciation of RMB faster because that will negatively affect labor-intensive exports of China and Chinese government fears that they will lose the competitiveness with other exporting nations in the international market due to appreciation of RMB.

According to recent studies, researchers suggest that the RMB undervaluation should take place up to 10-30% because the revaluation during 2005 is assumed insufficient to affect China's BOP disequilibrium. Inside China, there is the existence of massive concerns regarding the adverse effect of exchange rate revaluation on employment mostly in the labor-intensive exporting sector. In this paper, the researcher has aimed and analyzed the structural effect of exchange rate evaluation on the current account surplus by 4% using a 17 sector quantifiable Chinese economies equilibrium model.

A study by Willenbockel (2006) finds out that there are several requests for the RMB's revaluation both by the international Tang l community and internal observers, according to internal observers that they are expressing regarding a substantial ambiguous situation and suggest that rearrangement of the exchange rate belongs to the Chinese government and their interest.

According to a study by Tang (2008) which have studied the impact of exchange rate and Economic growth in China using the CVAR model, resulted in contrast to many other pieces of research that China has not benefited from the exchange rate of RMB, and there no direct relationship between exchange rate and economic growth of China in the long-time. Remarkably, it expresses the massive economic growth of China is due to export and inflow of foreign capital based on analyses of this study and also proposes that the long-run exchange rate is mutually recognized by the foreign reserves, FDI, and foreign trade. Additionally, the 2005 RMB appreciation did not adversely impact the China economy, though as an alternative it has led to the stable economic growth of China. China might

maintain a managed floating exchange rate policy creating partial changes to the RMB's daily floating limits in reply to the requests from international communities.

III. RESEARCH METHODOLOGY AND DATA

The analyzed data regarding this research paper is secondary data time series data it's taken from the World Bank data bank, variables such as GDP Per capita income as a dependent variable and foreign direct investment (FDI), export, import are considered as independent variables and the period of research study is from 1982-2018. According to the Augmented Dicky Fuller Test of Unit root test of variables, and stationary level the ARDL model (Autoregressive-Distributed Lag model) is applied and the statistical model for our research is below (Ahmad, 2013).

$$Ln(EGt)=\beta0+\beta1ln(FDIt)+\beta2ln(ERt)+\beta3ln(NXt)+\varepsilon t$$

Where

EG=Economic Growth= GDP Per Capita income

FDI=Foreign Direct Investment

ER= Exchange Rate

NX= (Export-Import)

Ɛt=Stochastic Error Term

Where, β0, β1, β2, β3, β4 are the respective parameters.

To find out the Unit Root of Variables we use the Augmented Dickey-Fuller test of the variables so that it can be estimated what technique is appropriate for our model. The results of the unit-roots test are given in table 1 below;

Lag length criteria for our variables are below Using VAR model to find optimal lag length Criteria for our variables.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-347.85	NA	1334.2	21.38	21.612	21.46
1	-216.31	215.2	2.136	14.92	16.28*	15.38
2	**-177.18**	**52.17***	**1.014***	**14.07**	**16.565**	**14.9***

Table 2: VAR Lag Length Test

Based on VAR Lag order selection criteria 2 lag is considered as an optimal lag, and as a result of Unit Root Test and Peseran and Shin (2003) research on the ARDL model, it is optimum to execute the ARDL model. Bounds test is done to see if there is a long-run relationship between our variables or not.

Test Statistic	Value	k
F-statistic	10.97706	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06
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Table 3: ARDL Bound Test

As per the above analysis of the ARDL Bound Test, the value of F-statistic is higher than the Lower and upper bound (I0 and I1) thus we can reject the Null hypothesis and which means there is, the existence of a long-run relationship between variables.

Variable	Coeffi	Std. Err	t-Statisti	Prob.
D(GDP_PCGR	0.5590	0.10657	5.24613	0.0000
D(FDI)	0.1864	0.28729	0.6488	0.5232
D(EXCHANG)	-2.7419	0.6025	-4.5507	0.0002
D(IM)	-0.5311	0.17440	-3.0454	0.0059
D(IM(-1))	0.86517	0.18246	4.7414	0.0001
D(X)	0.13786	0.16493	0.83586	0.4122
D(X(-1))	-0.481	0.12146	-3.9678	0.0007
CointEq(-1)	-0.7155	0.10475	-6.8309	0.0000

Cointeq = GDP_PCGR - (1.6775*FDI -1.3257*EXC -0.3102*IM+0.1678*X + 15.1648)

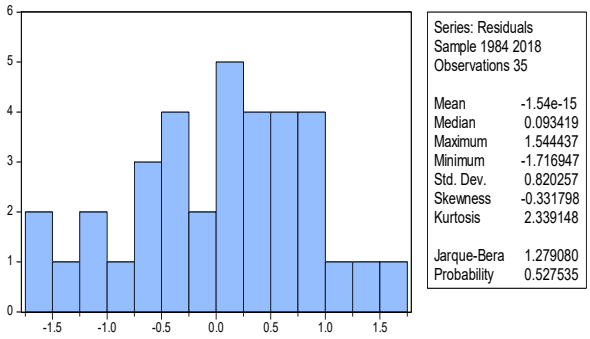
Long Run Coefficients

Variable	Coeffici	Std. Err	t-Statist	Prob.
FDI	1.67745	0.37191	4.51027	0.0002
EXCHANGE	-1.3257	0.33641	-3.9406	0.0007
IM	-0.3102	0.3153	-0.9838	0.3359
X	0.1677	0.2375	0.7062	0.4875
C	15.1647	1.95951	7.73904	0.0000

Table 4: ARDL Cointegrating and Long-Run Model

According to the above ARDL Cointegration model, equation, and probability value, the result is robust and Cointegration Equation (-1) = -0.715586 and 5% probability value we can express that the test is significant, besides the equilibrium time is 1.4 years. After finding the ARDL result we are bound to test the below tests to see the normality and serial correlation, and VECM for finding the correlation between variables.

Graph 5: Histogram Normality Test



According to the above test and Jarque-Bera Probability value which is more than 5%, the Null hypothesis is rejected and it is concluded that the executed ARDL model is robust, for furthermore robustness of ARDL model result, Heteroskedasticity test is performed as below.

F-statistic	1.0018	Prob. F(12,22)	0.4786
Obs*R-sqd	12.367	Pro.Chi-sq(12)	0.4166
Scld SS	3.2717	Pro.ChiSq(12)	0.9933

Table 5: Heteroskedasticity Test: Breusch-Pagan-Godfrey

Based on the above analyses Null Hypothesis is rejected as per P-value which is more than 5% in Prob. F (12,22) 47% thus there is not Heteroskedasticity in our model and analyses.
Furthermore, for finding out whether variables have serial correlation or not, the Breusch-Godfrey Serial Correlation LM Test is executed.

F-statistic	0.2826	Pro. F(2,20)	0.7567
Obs*R-squared	0.9622	Pro.Chi-Sq(2)	0.6181

Table 5: Breusch-Godfrey Serial Correlation LM Test:

As per the above test result, the Null Hypothesis is rejected because the value of P is more than 5% in Prob. F (2,20) 75%, thus there is no serial correlation in the model. According to the above tests, it is concluded that the model and analyses are significant, meaningful, have no Serial Correlation, Heteroskedasticity and it is normal.
Therefore, Cointegration for a long-run relationship test is executed, thus Vector Error Correction Model (VECM) test is performed.

	Coefficint	Std. Error	t-Statistic	Prob.
C(1)	-0.408084	0.123928	-3.292915	0.0013
C(2)	0.409623	0.148003	2.767670	0.0064
C(4)	0.702022	0.202663	3.463993	0.0007
C(9)	0.078516	0.033582	2.338060	0.0208
C(12)	0.336292	0.114759	2.930419	0.0040
C(13)	-0.087211	0.043266	-2.015704	0.0457
Equ1:D(LGDP)=C(1)*(LGDP_PC-1.206*RER-0.53247*IMP+1.491*FDI+0.2676*X+16.3498)+ C(2)*D(LGDP_PCGR(-1))+C4IMP(-1)				
R-squared	0.638355	Mean dependent var		0.066471
Adjusted R-squared	0.560860	S.D. dependent var		2.487331
S.E. of regression	1.648296	Sum squared resid		76.07259
Durbin-Watson stat		2.024939		
Equ2: D(RER)=C(9)*D(LGDP_PC(-1))+C(10)*D(RER(-1))+C(11)*D(IM(-1))+C(12)*D(FDI(-1))+C(13)*D(X (-1				

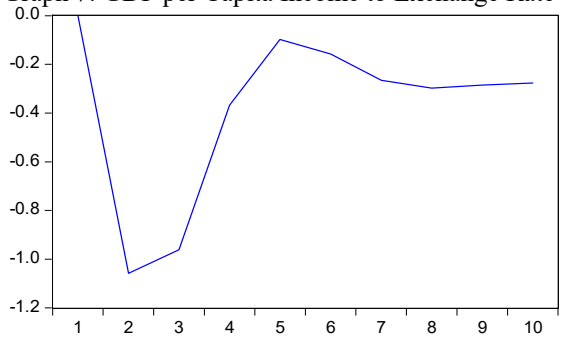
Table 7: Vector Error Correction Model (VECM)

Based on the above Victor Error Correction Model analyses and Probability value of less than 5%, the result for long term relationship is significant and it is expressed as below:

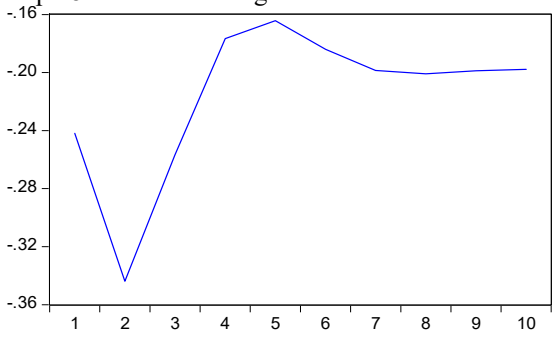
1. Based on Equation number 2 there is a long-run and meaningful relationship between GDP, Exchange Rate, Foreign Direct Investment, and Export but import has no meaningful relationship.
2. The exchange rate and GDP per capita income have a long-run and negative relationship, for instance, a percentage increase in RMB's exchange rate will lead to a 1.2 percent negative effect on the GDP Per capita income of Chinese people.
3. Foreign Direct Investment and GDP Per capita income have a positive and significant relationship for example for a percentage increase in FDI will lead to a 1.4 percent increase in GDP per capita income.
4. Export and GDP Per capita income has a positive and significant relationship, for instance, a percentage increase in Export will lead to a 0.26 percent increase in GDP per capita income.

After VECM analyses, the long-run impulse response of the variables on each other is tested, which means in 10 years how each variable affects another variable.

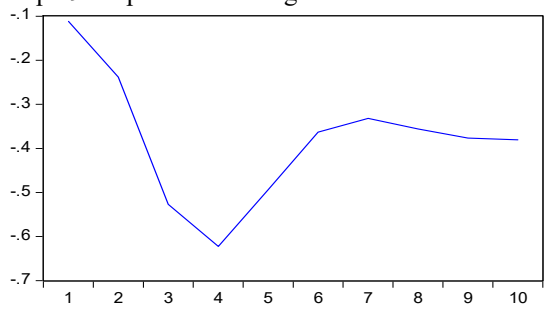
Graph 7: GDP per Capita Income to Exchange Rate



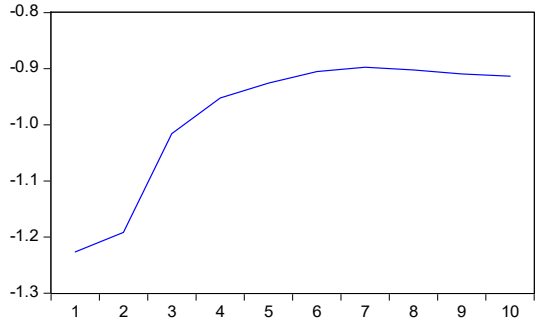
Graph 8: FDI to Exchange Rate



Graph 9: Export to Exchange Rate



Graph 10: Imports to Exchange Rate



As per the above Impulse response analyses of variables for 10 years, it can be explained as below:

1. Response of GDP per capita income to exchange rate; As per Graph 7, it is clear that the response of GDP per capita income to exchange rate in 2

starting years negative up to 1.1% and later on it has an upward trend but as a whole, the increase in RER will impact negatively on the GDP per capita income.

2. The response of FDI to exchange rate: Response of FDI to exchange rate in according to graph 8 is a downtrend in the first two years but later on, it has an uptrend and positive.
3. The response of Export to Exchange Rate: Exports have a downtrend up to 4thyear and later on, it is an upward trend but it is still it has a negative effect on the long run on the exports of China.
4. The response of Imports to Exchange rate: As per graph 10 on the response of Imports to exchange rate, there is a positive impact of imports with the increase in the exchange rate for instance an upward trend from -1.2 to -0.9 which means import will increase by an increase in the exchange rate.

IV. CONCLUSION

As it was several times requested and demanded that the Chinness government should appreciate its currency but the government of China has resisted doing so the reasons behind its resistance are the multiple negative effect RMBs' exchange rate revaluations on macro-economic factors. The data analyses of our study which is driven from the World bank data bank from 1982-2018 for 37 years and based on executed ARDL and VECM models, we have reached a vital result regarding this research concerning the impact of RMB's exchange rate on GDP Per capita income and other macroeconomic factors like FDI, Export, and Import that there is a long-run and meaningful relationship between GDP per capita, exchange rate, foreign direct investment, and export but import has no meaningful relationship. Exchange rate and GDP per capita income have long-run and negative relationships, for instance, a percentage increase in RMB's exchange rate will lead to a 1.2 percent negative effect on the GDP per capita income of Chinese people.

Foreign direct investments, exports, and GDP per capita income have a positive and significant relationship, for example, a percentage increase in FDI will lead to a 1.4 percent increase in GDP per capita income, besides a percentage increase in export will lead to a 0.26 percent increase in GDP per capita income.

The impulse response of GDP per capita income to exchange rate in long term (10 years) shows that in first two years it is negatively affected up to 1.1% and later on it has an upward trend but as whole the trend is negative. The impulse response of FDI to the exchange rate for the first two years has a deep downtrend but after that, it has an upward trend. Moreover, the response of export to exchange rate is downtrend until 4th year and after that, it is uptrend but still in the negative region.

The result of this investigation shows that there is a significant and negative relationship between exchange rate and GDP per capita for 1982-2018 years based on ARDL and VECM model.

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