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Analysis of Indian Rupee Depreciation using SWOT-AHP Method

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Abstract: *The year 2013 saw the collapse of the Indian rupee to a record low owing to a combination of several causes ranging from a widening current account deficit to stagnant political reforms.Here the depreciation of the Indian rupee is studied using the SWOT-AHP method. Strength, Weakness, Opportunity and Threat (SWOT) analysis is used to identify both the internal factors (strengths, weaknesses) and the external factors (opportunities, threats) that affect the exchange rate of the Indian rupee. The Analytic Hierarchy Process is used to rank the factors affecting the value of the Indian rupee.*

Keywords: *Analytic hierarchy process, SWOT, Exchange rate, Indian rupee*

1. INTRODUCTION

The value of a currency depends on numerous factors that affect the economy such as imports and exports, inflation, employment, interest rates, growth rate, trade deficit, performance of equity markets, foreign exchange reserves, macroeconomic policies, foreign investment inflows, banking capital, commodity prices and geopolitical conditions. As with other commodities, market forces of demand and supply are the major determinants of the value of the rupee against the dollar. In a scenario when the demand for dollar witnesses an uptrend, the value of rupee in its respect depreciates, which consequently lowers the purchasing power of the rupee.

When Ben Bernanke, the chairman of the Federal Reserve, first announced plans to step down Quantitative Easing in May 2013, it sent shockwaves through the global market and India suffered more than most economies. Foreign Institutional Investors (FII) began to sell equities and withdraw from the country. Consequently, the Reserve Bank of India (RBI), India's central banking institution, recorded the fall of the rupee to its lowest value of 68.36 against the USD on August 28, 2013.Here, the various factors that led to the depreciation of the INR are listed and ranked in order of importance using SWOT and AHP.

SWOT analysis is a method that is used to identify all the positive and negative elements of a situation. SWOT analysis begins with establishing the objective of the project. After establishing the objectives, the various internal and external factors that have a desirable or undesirable effect on achieving the objectives are identified. These factors are categorized into the following four sets

1) Strengths: (internal factors) elements that are considered positive
2) Weaknesses: (internal factors) elements that are considered negative
3) Opportunities: (external factors) elements that are considered positive
4) Threats: (external factors) elements that are considered negative

SWOT analysis is important because they give information on what the positives and negatives will be to achieve an objective. This analysis facilitates evaluation of various alternatives and thus it makes the decision making process easier.

Analytic Hierarchy Process (AHP) is a structured multiple criteria decision making technique that is used to analyze complex decisions. It was developed by Thomas L. Saaty in the 1970s and has been extensively studied and refined since then. The Analytic Hierarchy Process (AHP) is widely used method for multi-criteria decision making. One of the main reasons for its popularity is that it allows the usage of qualitative as well as quantitative criteria in evaluation. The (AHP) approach achieves pairwise comparisons among factors or criteria in order to prioritize them using the eigenvalue calculation.

AHP is a structured technique which is used with complex decision-making. The goal is to find out the most valuable decision. While doing so, one looks at a method that would be the most adequate and useful to the users. AHP offers a rational and a sensible method or framework for structuring the problem and quantifying the elements that constitute the problem. The technique used here puts together all these elements and evaluates all the alternatives thereby directing us towards the most efficient solution.

The first step is to construct a hierarchy that would break down the problem statements into different elements. The top most level of the hierarchy is the goal or the problem we are looking to solve. Following this, the second level would have all the criteria that have influence over the objective. Each criterion will have elements that would constitute that particular criterion as sub-criteria.

Once the hierarchy is created, the next step is the relative ranking of all the criteria with respect to one another using the scale shown in Table 1. Similarly, all the sub-criteria under each criterion are also ranked with respect to one another using this same scale. As a result both qualitative and quantitative information can be weighed and compared so as to rank them in order of priority.

Table 1: Pairwise comparison scale (Gorener et al. 2012)[5]

INTENSITY OF IMPORTANCE	DEFINITION
1	Equal importance
2	Medium importance
3	Strong importance
4	Very strong importance
5	Absolute importance
Reciprocal of the above non-zero numbers	If activity i has one of the above non-zero numbers assigned to it when compared with activity j, then j has the reciprocal value when compared with i

Let $C = \{Cj\}\ j = 1, 2 \ldots n\}$ be the set of criteria or sub-criteria. Once the pairwise ranking is done, the results can be formed into an (n x n) matrix where every element is the weight of the criteria i in comparison to j.

$$A = (a_{ij})_{nxn} = \begin{pmatrix} a_{11} & a_{12} & \cdots & \cdots & a_{1n} \\ a_{21} & a_{22} & \ldots & \ldots & a_{2n} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ a_{n1} & a_{n2} & \ldots & \ldots & a_{nn} \end{pmatrix} \quad (1)$$

Once the matrix A is obtained, it is normalized column-wise and the priority vector (X) is formed which is computed as the average of each row.

Using the equation,

$$A.X = \lambda_{max}.X \quad (2)$$

λ_{max} is calculated. Also, using the equation below, the value of Consistency Index (CI) is computed.

$$CI = \frac{\lambda_{max} - n}{n - 1} \quad (3)$$

The value of the random index (RI) is obtained from the table given below and using this value, the value of Consistency Ratio (CR) is computed.

$$CR = \frac{CI}{RI} \quad (4)$$

If the value of CR is less than or equal to 0.1, it is acceptable. If the value is greater, the procedure has to be repeated again to improve consistency.

Table 2: Random Index (Gorener et al. 2012)[5]

n	1	2	3	4	5	6	7	8	9	10
RI	0.00	0.00	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

SWOT analysis generally provides an idea for planning but does not take the relative importance of various elements into consideration. AHP method gives a very structured and quantitative approach to the problem. The SWOT – AHP model combines both these aspects thereby making the whole process of decision making more meaningful. As in the AHP, the first stage of the hierarchy is the objective whereas the second stage here in the SWOT-AHP model are the criteria- Strength, Weakness, Opportunity and Threat. Further, each of these criteria has their own sub-criteria.

2. LITERATURE REVIEW

Fang and Miller (2002)[1] used a bivariate GARCH-M model in order to study the negative relationship between currency depreciation and stock market returns in five Asian emerging economies after the Asian financial crisis of ’97-99. They were able to prove conclusively that currency depreciation significantly affected stock market returns in these countries. Ogawa and Kudo (2007) [2] studied the effects of the depreciation of the US dollar in East Asian currencies. Their work suggests that different East Asian currencies will respond to different levels to the sudden depreciation of the USD, depending on their level of linkage with it. Ali and Anwar (2011)[3] examined the supply-side effects of induced currency depreciation. They suggested that the effects of currency depreciation included inflation, a better balance of trade and a decrease in output. They concluded that the depreciation of the currency has a positive effect on output but a negative effect on the balance of trade, subject to the fulfilment of the Marshall–Lerner conditions.

Kurttila et al. (2000)[4] utilized analytic hierarchy process (AHP) linked with SWOT in order to avoid some of the weaknesses of the latter. They concluded that the hybrid method of SWOT and AHP improves the information basis of strategic planning processes while providing an effective framework for learning in strategic decision support in numerous situations. It can also be used as a tool in decision making processes where multiple decision makers are involved. Gorener et al. (2012) [5] applied a combination of SWOT and AHP for a case study on a manufacturing firm. They were able to rank each of the SWOT factors based on priority within the group as well as the overall priority of the

factors and thus determined the significance of each strategic factor to the manufacturing firm.

Kahraman et al. (2007)[6] worked on the prioritization of e-Government strategies using SWOT-AHP analysis. Their work presents the possibility of making sensitivity analysis. They suggest that the changes in the importance of main factors can be seen by plotting sensitivity graphs. Wickramasinghe and Takano (2009) [7] applied the combined SWOT and AHP technique for tourism revival strategic marketing planning. Their proposed hybrid method is a unique decision making tool because of the simplicity of the procedure, limited data requirement and transparency of the final outcome. Seker and Ozgurler (2012) [8] performed an analysis on a Turkish consumer electronics firm using SWOT-AHP method. They were able to make pairwise comparisons with the judgment of experts and thus obtain priority scales for SWOT factors.

3. UNDERSTANDING THE EXCHANGE RATE

The correct exchange rate is usually determined by the market, using the asset market approach where the value of the exchange rate is conditional upon the inflow and outflow of capital into and from the domestic economy.

4. SWOT FACTORS

4.1 Strengths

4.1.1 Increase in exports

The most effective strategy used to counter the economic instability (depreciation of currency) in the emerging markets is the increase in exports. By making use of the depreciating value of the currency the exports of a country can be increased due to the enhanced appeal of their products. As per India's Foreign Trade report by the Ministry of Commerce & Industry (2013) [9]**,** Indian exports have increased by 5.86% from November 2012(USD 23250.94 million) to November 2013 (USD 24613.29 million).

4.1.2 Lowering NRI rate limits

When Non Resident Indians earn foreign currency and remit the same in India, the value of their earnings will be more due to the depreciating value of the rupee. This factor will encourage NRIs to increase their investments in India. Understanding this, the RBI eased some of the rate limits for deposits for the NRIs to attract more investments.

4.1.3 Increased tax on Gold imports

Gold imports are one of the main causes of the current account deficit. Gold imports are responsible for nearly 30% of the trade deficit during 2009-10 to 2011-12. In an attempt to narrow the burgeoning CAD, the government has raised import duty on gold by ten percent (Report of the Working Group to Study the Issues Related to Gold Imports and Gold Loans NBFCs in India, RBI, 2013[10]). As a result of this, the import of gold is expected to decrease during 2013-14.

4.1.4 Restrictions on investments abroad

The Liberalized Remittance Scheme (LRS) was introduced by the RBI to simplify and liberalize foreign exchange facilities available to resident Indians. Because of the financial stress, the RBI has restricted the overseas direct investment by Indian individuals and corporates from USD 200000 per year to USD 75000 per year. The RBI has also abolished the acquisition of immovable property outside India using LRS. (Liberalised Remittance Scheme for Resident Individuals- Reduction of limit from USD 200,000 to USD 75,000, RBI, 2013 [11]) This action by the RBI was in response to the increasing overseas investment by Indians. Thus, the RBI prevented excess outflow of dollars from the country.

4.2 Weaknesses

4.2.1 Demand for US dollars

Owing to the withdrawal of foreign investments, the inflow of dollars has reduced drastically, while the demand for dollars in India has remained the same. This demand for USD is mainly because it is the standard for payment in the purchase of any import, most importantly, of gold and oil. This net decrease in the amount of dollars in India depreciated the value of the rupee.

4.2.2 Widening CAD

Current Account Deficit (CAD) occurs when a country's total imports of goods, services and transfers are greater than the country's total export of goods, services and transfers. For a developing country like India whose imports are always greater than its exports, a deficit is always to be expected. India had a current account balance of -4.8% of its GDP during the fiscal year 2012-2013 and this CAD has been steadily increasing during the first quarter of the fiscal year 2013-2014 (Macroeconomic and Monetary Developments Second Quarter Review, RBI, 2013-14 [12]) thus, bringing India's economy down to a weak and fragile state.

4.2.3 Weak economy

India's economy has suffered because it has a CAD. But a frail rupee will add fuel to the rising import bill of the country and thereby increase its CAD which will destabilize its economy. India's CAD for the first quarter of the fiscal year 2013-2014 is at 4.9% of its GDP which is higher than the previous fiscal year (Macroeconomic and Monetary Developments Second Quarter Review, RBI, 2013-14 [12]). This state combined with the fact that there have been no strong resolutions by the government has driven away potential investors.

4.2.4 Food security Bill

The Food Security Bill which was recently passed by the Lok Sabha (Lower House of the Parliament of India) has been another major reason for the decline of the rupee. The cost of implementation of the bill will represent an increase of INR 238 billion over the current expenditures (Indian Cabinet Approves National Food Security Bill, USDA, 2013 [13]). This has led to fears that the government will not be able to reign in the fiscal deficit to the target set for this year.

4.2.5 Court imposed mining ban

The decline in the value of the rupee is also attributed to particular problems like the court imposed mining bans. The mining ban was imposed to restrict the illegal mining that had increased in the wake of large amounts of ore exports. Due to these mining bans, the mining industry which was once a major contributor of Indian exports is now crippled.

4.2.6 Inflation

Inflation in India has led to a huge increase in the cost of raw materials and assets which in turn increases the cost price of Indian products. As a result of this increase, the demand for these products has gone down. In India, inflation is gradually increasing and now it stands at 6.46% for the year 2013-2014 (Wholesale Price Index and Rates of Inflation, Annexure-I, Ministry of Commerce & Industry, 2013 [14]). While other countries relieve their financial stress by using the increase in the demand of their products, inflation in India is damaging the recovery process.

4.2.7 Shrinking factory activities

With the decrease in the total number of new orders, factory activities have reduced. This decrease in new orders can be attributed to the fragile economic conditions in India and also to the increase in competition on the global stage. Due to the shrink in the amount of manufactured products, the export business is affected which takes a toll on the value of the Indian rupee.

4.3 Opportunities

4.3.1 Foreign Direct Investment (FDI)

FDI (Foreign Direct Investment) is when a foreign company invests in India directly by setting up a wholly owned subsidiary or getting into a joint venture, and conducting their business in India. The government's support for FDI will lead to strengthening India's economy and bring in the much needed inflow of dollars.

4.3.2 Foreign Institutional Investors (FII)

FII is when foreign investors invest in the shares of a company that is listed in India or in bonds offered by an Indian company. Due to FII being short term investments, they do not worry about the country's economic status over the long run and can thus help weather the storm during times of a weak and fragile economy.

4.3.3 Oil from Iran

India's largest outflow of dollars comes from the import of oil. In November 2013, oil imports where valued at USD 12964.8 million (India's Foreign Trade, Ministry of Commerce & Industry, 2013 [9]). However as far as the purchase of oil from Iran is concerned, the transaction is done by payment in INR. As a result, our foreign exchange reserves remain intact.

4.3.4 Infrastructure development by Japan

Even as far as developing countries goes; India has very low exports because of a lack of proper infrastructure. Since India has a CAD that is 4.9% of its GDP, the country cannot significantly invest in infrastructure without damaging its economy further. However, countries like Japan invest in the infrastructure of other countries. So Japan investing in India will give a huge boost to its exports.

4.4 Threats

4.4.1 Tapering of bond buying program

As a result of the financial crises, the US Federal Reserve Bank introduced the bond buying program in order to arrest the fall of the US economy. However, as of May 2013 when the US Fed Chairman indicated that the US central bank may start tapering off its bond buying program by the end of the year as it expects a recovery of the economy. This led to foreign investors pulling out their investments from emerging countries like India and investing it back in the US, thus leading to a shortage of dollars in the emerging countries.

4.4.2 Growing US Economic Momentum

As a result of the rise in the dollar index, there are signs that the US economy is improving. This has a similar effect to that of the tapering bond buying program, wherein the investors in emerging markets begin to pull out and will invest back in the US and there will also be a fall in the number of future investors.

4.4.3 US military action in Syria The fall in the rupee has been largely attributed to the sell-off in all emerging market currencies due to the concern that the US may resort to military action in Syria. The rising concern over the conflict in Syria and its impact in the region affected the oil markets, creating uncertainty over future supplies and leading to the shooting up of prices of crude oil to USD 115 per barrel which affects the economy of the growing nations (Short-Term Energy Outlook Market Prices and Uncertainty Report, U.S. Energy Information Administration, 2013 [15]).

5. METHODOLOGY AND APPLICATION

Here, an AHP based SWOT Analysis is performed on the various factors that affect the value of the Indian rupee. The factors are first classified as either strengths, weaknesses, opportunities or threats. The priority vectors for each of the factors are determined and then the overall priority is calculated, thus enabling us to judge which factors play a more significant role in determining the value of the rupee.

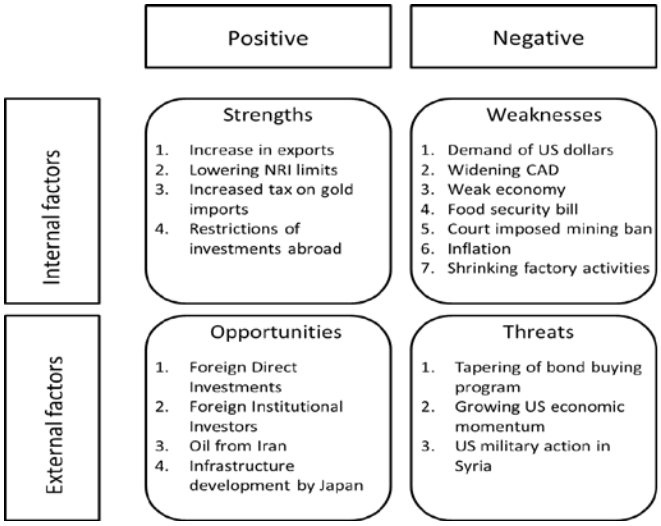

Fig. 1: SWOT Matrix

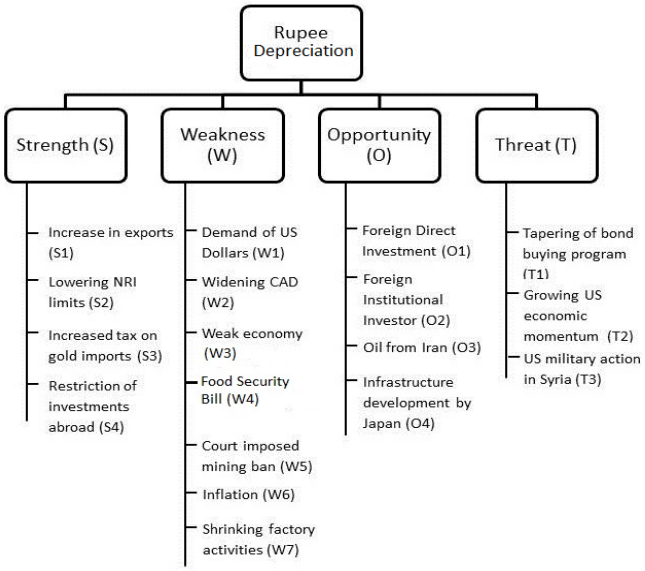

Fig. 2: Hierarchical structure of SWOT Matrix

SWOT Groups	S	W	O	T	Priority Vector
(S) Strengths	1	0.25	0.5	0.33	0.0959
(W) Weaknesses	4	1	3	2	0.4659
(O) Opportunities	2	0.33	1	0.5	0.161
(T) Threats	3	0.5	2	1	0.2772
					∑ = 1

C.I = 0.01019, R.I = 0.9, C.R = 0.0113

Strengths	S1	S2	S3	S4	Priority Vector
(S1) Increase in exports	1	5	2	3	0.4759
(S2) Lowering NRI rate limits	0.2	1	0.25	0.5	0.0813
(S3) Increased tax on Gold Imports	0.5	4	1	2	0.2884
(S4) Restriction of investments abroad	0.33	2	0.5	1	0.1544
					∑ = 1

C.I = 0.006957, R.I = 0.9, C.R = 0.0077

Weaknesses	W1	W2	W3	W4	W5	W6	W7	Priority Vector
(W1) Demand of US Dollars	1	2	5	3	3	2	4	0.2986
(W2) Widening CAD	0.5	1	4	2	2	1	3	0.1809
(W3)Weak economy	0.2	0.25	1	0.33	0.33	0.25	0.5	0.0421
(W4) Food security bill	0.33	0.5	3	1	1	0.33	2	0.1004
(W5)Court imposed mining ban	0.33	0.5	3	1	1	0.33	2	0.1004
(W6) Inflation	0.5	1	4	3	3	1	4	0.2159
								∑ = 1

C.I = 0.0233, R.I = 1.32, C.R = 0.0177

Opportunities	O1	O2	O3	O4	Priority Vector
(O1) Foreign Direct Investment (FDI)	1	0.33	0.25	2	0.1296
(O2) Foreign Institutional Investor (FII)	3	1	0.5	3	0.2887
(O3) Oil from Iran	4	2	1	5	0.4959
(O4) Infrastructure development by Japan	0.5	0.33	0.2	1	0.0858
					∑ = 1

C.I = 0.0188, R.I = 0.9, C.R = 0.0209

Threats	T1	T2	T3	Priority Vector
(T1) Tapering of bond buying program	1	2	3	0.5389
(T2) Growing U.S economic momentum	0.5	1	2	0.2973
(T3) U.S military action in Syria	0.33	0.5	1	0.1638
				∑ = 1

C.I = 0.00442, R.I = 0.58, C.R = 0.0076

Table 3. Overall priority of SWOT factors

SWOT Groups	Group Priority	SWOT Factors	Factor Priority	Overall Priority
Strengths	0.0959	**Increase in exports**	**0.4759**	**0.045639**
		Lowering NRI rate limits	0.0813	0.007797
		Increased tax on Gold Imports	0.2884	0.027658
		Restriction of investments abroad	0.1544	0.014807
Weaknesses	0.4659	**Demand of US Dollars**	**0.2986**	**0.139118**
		Widening CAD	0.1809	0.084281
		Weak economy	0.0421	0.019614
		Food security bill	0.1004	0.046776
		Court imposed mining ban	0.1004	0.046776
		Inflation	0.2159	0.100588
		Shrinking factory activities	0.0617	0.028746
Opportunities	0.161	Foreign Direct Investment (FDI)	0.1296	0.020866
		Foreign Institutional Investor (FII)	0.2887	0.046481
		Oil from Iran	**0.4959**	**0.07984**
		Infrastructure development by Japan	0.0858	0.013814
Threats	0.2772	**Tapering of bond buying program**	**0.5389**	**0.149383**
		Growing U.S economic momentum	0.2973	0.082412
		U.S military action in Syria	0.1638	0.045405

Table 3: Overall priority of SWOT factors

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Strengths	0.0959	Increase in exports	0.4759	0.045639
		Lowering NRI rate limits	0.0813	0.007797
		Increased tax on Gold Imports	0.2884	0.027658
		Restriction of investments abroad	0.1544	0.014807
Weaknesses	0.4659	Demand of US Dollars	0.2986	0.139118
		Widening CAD	0.1809	0.084281
		Weak economy	0.0421	0.019614
		Food security bill	0.1004	0.046776
		Court imposed mining ban	0.1004	0.046776
		Inflation	0.2159	0.100588
		Shrinking factory activities	0.0617	0.028746
Opportunities	0.161	Foreign Direct Investment (FDI)	0.1296	0.020866
		Foreign Institutional Investor (FII)	0.2887	0.046481
		Oil from Iran	0.4959	0.07984
		Infrastructure development by Japan	0.0858	0.013814
Threats	0.2772	Tapering of bond buying program	0.5389	0.149383
		Growing U.S economic momentum	0.2973	0.082412
		U.S military action in Syria	0.1638	0.045405

6. CONCLUSION

In this paper, SWOT analysis combined with Analytic Hierarchy Process is used to understand the recent trend of the exchange rate of the Indian rupee. We can develop strategies to counter act the rupee depreciation from the factors of the SWOT analysis, while the AHP gives us the sequence in which the strategies are to be implemented to have the best effect. From the study, the following are the SWOT group priorities: Strengths (9.59%), Weaknesses (46.59%), Opportunities (16.1%) and Threats (27.72%). Looking at individual factors, according to the SWOT analysis "Tapering of bond buying program" (Overall priority 0.149383) from the threats group has the greatest effect on the exchange rate. Other important factors that affect the exchange rate are Demand of US dollars (0.139118), Inflation (0.100588), Widening CAD (0.084281), Growing US economic momentum (0.082412) and Oil from Iran(0.07984). Thus, from this study, the factors contributing to the recent depreciation of the Indian rupee are analyzed and the factors that might help strengthen the Indian rupee value were also identified.

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