India's Exchange Rate (INR/USD) Movement during the Post Reform Period

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Abstract: India's exchange rate regime has evolved along with international monetary system. It has been successfully using the existing managed float regime to achieve its economic objectives. This study chronologically analyses India's exchange rate movement with focused emphasis after the economic reforms of 1991. It is observed that while endogenous factors such as financial discipline and current account deficit influenced exchange rate movement, the role of exogenous influences are vivid in the economy with each passing year. Major episodes such as-Mexican contagious crises, East Asian crises, 9/11 attack, Global financial crises, Tapering tantrum and COVID-19 pandemic have been discussed along with the policy initiatives taken to tackle these adversities have been analysed . The study concludes with a recommendation of judicial policy mix to the RBI in days ahead.

Keywords: Exchange rate regime, India, International Monetary System.
Jel Classification: F310, O530, F330.

1. INTRODUCTION

The roots of foreign exchange rate system go back to 'Barter system' when commodities were exchanged with coincidence of wants. However, with invention of money that secured the storage value, eventually invited an establishment of common market and international monetary system to facilitate exchange of different currencies. Global economy has come a long way transiting from par value system to gold standard, war periods, Bretton woods system and currency regimes of fixed, floating and intermediate; practiced in the recent times.

Exchange rate regimes can possibly aid three policy objectives: export promotion contributing to macroeconomic stability, price level shocks and development of financial markets. (Goyal, 2010) The nature of regime adopted by countries/region depend on their economic characteristics. However, *de-jure* (regime announced by a central bank) often differs from *de-facto* (actual regime that is practiced) as many countries deliberately influence exchange rate movement to their favor or shift the regime unannounced; depending on their economic objectives, trade position, capital movement and availability of reserves.

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As international monetary systems evolved; India too has been evolving as per the dynamism of global arrangements. India, like many other emerging countries, abandoned its pegged regime in the 90's when twin deficit persistent from the 80's indicated an imperative policy shift to evade crisis.

However, pegged regime alone was not responsible for currency crises witnessed in many developing economies. It was to do with large fiscal deficits (Mexico, Brazil Argentina and Russia), poor financial infrastructure (Indonesia, Thailand, Korea and Malaysia), large current account deficit and speculative attack. (Reserve Bank of India, 2004). India's policymakers transited economy "right before the storm" with several economic reforms. One such reform was a shift of exchange rate regime from pegged to managed float, such that exchange rate is determined by market forces and the RBI intervention curtailed only to curb excess volatility and not influence the rate towards any specific direction. It can be stated that the regime is deployed largely to India's favor till date.

There have been numerous studies undertaken in relation to exchange rate such as analyzing the short run and long run movement; factors pertaining to its volatility and measurement; forecasting and predictability; determination of fair value; influence of exchange rate on economic growth and stability; endogenous relationship with other economic variables and so on. However, a gap is observed in a literature in terms of descriptive analysis of exchange rate movement especially after the adoption of new regime in the early 90's. Further, the discussion of major episodes of volatility oc-

curred due toglobal economy is perhaps not analysed chronologically. Thus, this paper aims to provide a bird-eye view of India's exchange rate evolution in line with changes in international monetary systems and further undertake analysis on quarter- ly exchange rate movement. Major episodes of movement have been highlighted along with a brief mention on the RBI's intervention, both qualitative policy measures and quantitative influx and mop.

The paper is divided into five sections. Section 2 reviews some existing wisdom available in areas of exchange rate movement and section 3 details on historical development of international monetary system. Further, section 4 analyses exchange rate movement in three sub-sections, taking a decade of 90's, 2001 to 2010 and 2011 to recent times while section 5 concludes with some policy recommendation.

2. REVIEW OF EXISTING LITERATURE

Exchange rate movement is matter of concern in both short and long run depending on different stakeholders such as households, fund managers, investors, businesses and policymakers. Thus, the movement of exchange rate is analysed differently across time horizon depending on the motive (Dahal & Raju, 2022). While in short run, microstructure principles such as bid-ask spread and speculative behavior of players govern the movement; in the long run it is explained by macroeconomic shifts also known as asset approach. (Evans & Lyons, 1999) Exchange rate movement in long runcan be explained with bilateral macroeconomic changes and trade and capital flows over time. (Chinn, 2012).

The early studies of Marshall-Lerner condition talked about sum of elasticities of import and export demand as determining factor of exchange rate movement. Building further on theoretical understanding, seminal work on IS-LM-BP model known as Mundell-Fleming model stated that an economy, small yet open with perfect capital mobility, witnesses that its exchange rate movement is determined by current and capital flows given its static price level and exogenous interest rate influence. (Fleming, 1962; Mundel, 1963). Many studies thereon explain the exchange rate movement categorized as monetary exchange rate models (Frenkel, 1976; Dornbush, 1976; Mussa, 1976; Frankel, 1979; Bilson 1978), portfolio balance models (Dornbusch and Fischer, 1980; Isard, 1980; Branson, 1983) and real exchange rate models (Balassa, 1964; Samuelson, 1964; Lucas, 1982; Rogoff, 1996). These models emphasized on factors such as demand and supply of money stock, interest rate differential, sticky and flexible nature of price level, bond price differential, sovereign risk premium, factor productivity, output, international trade, currency convertibility, role of non- substitute goods and economic policies in explaining bilateral exchange rate movement.

The post-Keynesian economists often criticized monetary exchange rate models for its contradictory stance of capital flows[1] and even argue that it may not work in all the circumstances as different market players adopt different model as per dynamic expectation. (Frankel & Froot, 1995; Harvey, 1991). Further, many studies show that these models are not consistent with different datasets, methodologies and time periods and differ even in case of application to datasetsfrom developed and developing economies. Thus, there is no single scientific approach that discovered and explained consistently the reason for exchange rate movement in last five decades. (Sharma & Setia, 2015).

There are numerous studies undertaken to understand India's nominal and real exchange rate movement. Large number of studies use one or more econometric techniques to empirically establish time-bound, directional and causal relationship between exchange rate movement one or more economic variables. Studies conclude that India's exchange rate movement is explained by individual or combined variables such as interest differentials, productivity differentials, money supply, foreign exchange reserves, oil prices, foreign institution investment, government expenditure, current account surplus and/or capital market movements.(Dua & Sen, 2006; Kumar, 2010; Mallick, 2010; Dua & Rajan, 2010; Raju & Sharma, 2013; Tiwari, Dar, & Bhanja, 2013; Monica & Santhiyavalli, 2017). However, many of these studies have not taken structural breaks into account thus, invites questions on econometric validity. (Hegwood & Nath, 2014) undertake annual data from 1960 to 2010 discover that Indian data has gone through several structural breaks. Taking structural breaks into account, India's exchange rate has a strong interest rate linkage and thus can be taken as an effective policy tool. (Sharma & Setia, 2015).

There have been other similar studies undertaken in areas of exchange rate forecasting, understanding the regime, exchange rate pass-through, effectiveness of central bankintervention, and so on. However, a literature gap was perceived in areas of research, where simple chronological qualitative understanding of India's nominal exchange rate movement was analysed in a single study. Especially after the reforms, major episodes on excessive fluctuation of exchange rate and the RBI's policy measures required a discussion to understand growing dynamism of India's exchange movement.

3. EVOLUTION OF INTERNATIONAL MONETARY SYSTEM

International monetary system is classified according to exchange rate regimes adopted by nations and by international reserves categorization. The international monetary system prior to 1870 was 'Bimetallism' such that the value of monetary system was traditionally determined with fixed quantity of silver and gold. This was also known as the 'Double standard' which was followed by 'Gold standard' (1870-1914). The latter system typically quoted prices and wages in a fixed quantity gold in an essentially free market. Though it started as a domestic commitment mechanism, eventually became an international rule when it worked successfully for major economies like U.K, U.S. and France. Central banks maintained gold parity in such a way that the price of each

[1]While monetary model state that higher income result in strong currency and higher interest rate induces weak currency; it is contradictory to static MF model that states higher income induces weaker currency due to excessive import and higher interest rate induces stronger currency due to capital inflow.

country's currency was defined in gold quantity. This aided the central bank's commitment to buy or sell gold at that stated price. Thus, the exchange rate between two countries were the ratio of gold which was also referred to as 'mint parity'. (Burange & Ranadive, 2011).

The First World War (1914-1918) resulted in violation of 'mint parity' which could not be established in subsequent years. The interwar years witnessed three exchange rate regimes, general floating (1919-1925), gold exchange standard (1926-1931) and managed float (1932-1939). However, after the Second World War, Bretton woods system came into existence in 1948 and the monetary system was revised slightly different from gold standard. Under this arrangement, U.S. maintained a fixed gold price at $35 per ounce and facilitated unlimited convertibility of gold as against the US dollar. In tandem, other countries pegged their currency with the US dollar and were allowed to intervene in the foreign exchange market to maintain the exchange rate up to 1 percent deviation. In terms of large persistent disequilibrium in balance of payment, the change in par value was allowed with consultation from IMF. (Salvatore, 2013).

The stability of Bretton woods began to tremble with US-Vietnam war in 1965 and populist Great Society Program, both leading to upsurge of inflation and fiscal deficit. The situation aggravated further when the UK sterling was devalued in 1967. The US dollar was speculated to devalue soon with soaring inflation and high deficit. This intensified further as the Federal Reserve and European banks started selling large quantities of gold. The two-tier gold market was created by central banks, where on one side, gold was allowed to fluctuate as per market forces and in on the other side, central banks traded gold at official $35 per ounce. This skepticism of sustainability of $35 per ounce turned out to be the turning point of the collapse of Bretton woods system. On August 15, 1971, President Nixon announced the suspension of convertibility of US dollar and imposed 10 percent surcharge on imports with price and wage controls.

Bretton woods was again tried to revive with 'Smithsonian agreement' in December 1971 by devaluing US dollar and revaluing other major currencies such as Japanese Yen and German Mark. Moreover, the bandwidth for fluctuation was increased from 1 percent to 2.25 percent. (International Monetary Fund, 1973) However, the speculative attack and subsequent devaluation of US dollar and floating regime of Japanese Yen and European countries currencies against US dollar led to the eventual collapse of pegged Bretton woods system in March 1973. Critics argue that the undercurrent issue of Bretton woods was that of adjustment, liquidity and credibility. (Bordo, 1993) Since, exchange rate regime evolved at de facto dollar peg, it demanded US dollar to maintain price stability. However, since greenback, a nominal anchor, exercised inflationary monetary policy, it could not play a role of an international reserve currency.

After Bretton woods, the Jamaican accord (1976) envisaged the path for more stable exchange rate system. The accord sought to promote regime that establishes stability as per underlying economic and financial condition and discourages erratic disruptions. This inaugurated the path towards flexible exchange rate system, an alternative arrangement to address issues of inflation, low economic growth and persistent inconsistency in balance of payment. This required IMF to ratify Article IV such that each member could choose their own regime and abolish official price of gold and its trade with member countries. (Cooper, 1976).

As nations adopted regime of their choice, some nations with flexible exchange rate regime faced economic instability due to volatile exchange rate movement. Thus, in order to curb the volatility and thus stabilize economic growth, a Lourve accord (1987) was agreed by G-7 (the U.S., the U.K., West Germany, Japan, France, Italy and Canada) counties to intervene or managed the float (also called the dirty float) to achieve stability and co-ordinate macroeconomic policies with stable exchange rate movement. In recent times, each nation adopts regime based on their economic stance in the world economy.

4. ANALYSIS OF EXCHANGE RATE MOVEMENT BETWEEN INR AND US$ BEHAVIOUR POST REFORMS

4.1. Evolution of India's Exchange Rate Regime

India has been member of the IMF since its inception in 1946. Thus, it followed par value system as per Bretton woods such that INR was fixed at 4.15 grain of fine gold in 1947. The RBI maintained this par value and was permitted to fluctuate within ±1 percent using pound sterling as an intervening currency. From 1947 to 1971 INR was devalued twice in September 1949 and June 1966 when the par value was revised to 2.88 and 1.83 grains of fine gold respectively.

The fallout of Bretton woods in 1971 created uncertainties amidst adoption of new exchange rate regime and India was no exception. In 1971, rupee was pegged to pound sterling for next four years. However, in order to address vulnerabilities and to overcome the threat associated with a single currency peg, INR was pegged to basket of currencies. In the initial phases, it was linked to a basket of 14 currencies which got reduced to 5 currencies with respect to major trading partners of India. Though the RBI declared the basket, weight of each currency in the basket was kept confidential to avoid speculation. This system continued through 1980s, though the exchange rate was allowed to fluctuate in a wider range and to depreciate modestly with the view to maintain competitiveness.

The decade from 'eighties to early 'nineties showed early warning signal of balance of payment difficulties. Persistent twin deficit, with fiscal deficit (financed mainly with external borrowings) hovering around 10 percent GDP and trade deficit widening above 3 percent of GDP, reserves soon started depleting. Similarly, the rise in oil prices, reduced remittance inflow from gulf region and breakdown of India's largest trading partner, the Soviet Union, further widened trade deficit. Amidst all this, the need for adjusting the exchange rate became urgent in the face of the Balance of Payments crisis of 1991.

4.2. Balance of Payment (BoP) Crises and Reforms

India's faced severe BoP crises caused by the twin deficit. On one side, it exercised expansionary fiscal policies with early reform measures without an overarching framework;

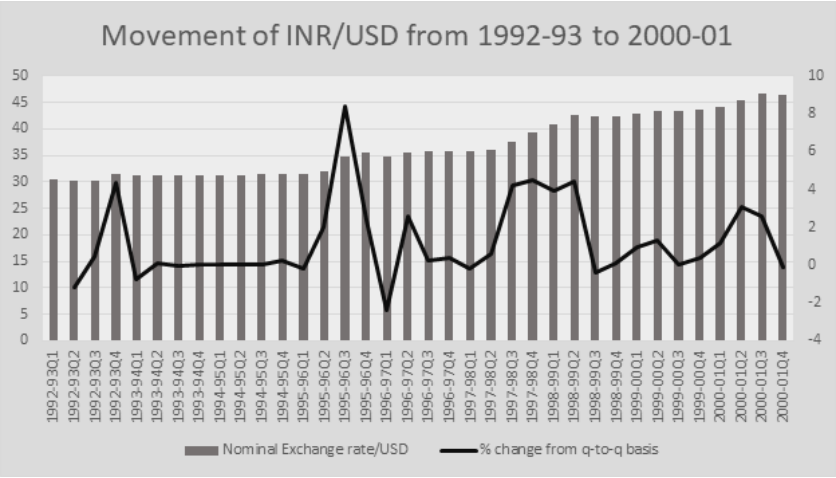

Fig. (1). INR/USD movement from April 1992 to March 2001 (Quarterly).

though the reform stimulated economic growth in 'eighties, eventually led to macroeconomic distortions due to poor fiscal discipline. On the other side, rising of crude oil prices, loss of remittance impacted by the Gulf war, poor inflow of NRI deposit, erosion of trade competitiveness due to ballooning inflation and slowdown of export due to geopolitical tensions within trading partners such as Soviet Union and Germany, impacted the current account adversely. In an economy with prevailing huge fiscal deficit, rapid growth of monetary liquidity not aligned with economic growth, leads to severe demand pressure that in turn accelerates the inflation. This imbalance gets translated in the external sector in the form of unsustainable current account deficit that further increases public debt, both internal and external. Moreover, the changing composition of external debt with a shift towards commercial more so of a short-term nature contributes directly to external imbalances.

Thus, Fiscal deficit rose from around 9 percent in 'eighties to 12.7 percent of GDP in 1990-91. Since, deficit was financed by external borrowings, it rose from 35 percent in mid 'eighties to 53 percent in 1990-91. Further, inflation rose to 12 percent due to rise in money growth. Despite of purchasing$1.8 billion in January 1991, India's total foreign reserves were $5.8 billion in March end, 1991 sufficient to finance imports for mere 1.3 months. (The Reserve Bank of India, 1991). This was further drained by half in June 1991, leaving in a position to afford hardly 3 weeks of essential imports. Though a sizable deduction of fiscal deficit was planned in 1990-91, it could not be worked upon. The bank credit to government increased rapidly and external current account deficit increased to 3 percent of GDP. The condition was dreadful, as economy was just few weeks away from bankruptcy. The situation demanded strong measures of fiscalcorrection, inflation control and enhancing export competitiveness to improve current account position.

Amidst all these, government took 4-pronged strategy in areas of industrial policy, trade policy, public sector reforms and fiscal correction. This led to many fundamental changes as suggested by a high-level committee established to policy suggest possible ways to address distortions. In lieu of BoP crises, India needed deeper structural reforms to addresspersistent problems of slow growth as against East Asian countries and March towards its growth potential. Thus reforms embarked, and one of the first and bold decision was to move towards realistic exchange rate regime.

India's exchange rate was a concern right from 1987 as it had been depreciating in real terms. However, during 1990-91 the real effective exchange rate (REER) appreciated by 2 percent due to wider inflation differentials between India and major industrialized countries. Further, nominal effective exchange rate (NEER) decreased only by 2.5 percent from February 1991 to June 1991 as inflation differentials continue to widen. This all led to eroding of India's trade competitiveness. Thus, as a first measure to make export competitive and correct the overvalued INR, exchange rate was adjusted. A sharp decline of the exchange rate change i.e., 18 percent was taken on by the Reserve Bank of India (RBI) in two stages that are on July 1 and July 3, 1991. It was done is 2 phases in orderto observe market reaction to the shock. This proved to be a pre-cursor to move from pegged exchange rate regime to floating exchange rate regime. As a transition, a dual exchange regime was adopted which was called Liberalized Exchange Rate Management System (LERMS). Under this arrangement, the RBI purchased 40 percent of proceeds of exports and inwards remittance at official exchange rate while 60 percent was allowed to be exchanged at market determined rate.

4.3. Movement From 1992-93 to 2000-01

Fig (**1**) depicts quarterly average of nominal ex- change rate (indicated by bar graphs with left hand side leg- end) and rate of change (indicated in a line chart with right hand side legend) from quarter-to-quarter from 1992-93 to 2000-01. While the positive rate of change explains exchange depreciation, negative explains appreciation of India's exchange rate movement.

After the adoption of LERMS in March 1992, a dual exchange rate regime was adopted for a year. Subsequently, in March 1993, the dual exchange rate system was replaced by unified exchange rate system. As seen in the graph above, the spike of 1992-93Q4 can be explained as a mark-up of devalued Indian rupee that was further depreciated by 4.34 percent from a previous quarter and stood at Rs. 31.59/$ as

against Rs. 30.28 in the previous quarter. Abolition of foreign exchange budgeting were the initial steps of current account convertibility which was achieved in August 1994. (Pyne & Roy, 2009). This was achieved by exchange control regulation and liberalization of invisible transactions.

From mid-1993 to as economy opened-up, though exchange rate *de-jure* was a market determined floating regime; it was tightly managed to ensure both of favorable trade and capital flows. With capital inflows, exchange rate showed tendency to appreciate, however, in order to combat nearly nil reserves condition and a voluminous external borrowing lurking over nation's head, India could not have afforded any adverse impact dueto adverse exchange rate movement. Further, with huge current account deficit and inflation in double digits, influencing exchange rate to its favor was but a logical next step to an economy that faced near-bankruptcy. This absorption of excess flow helped favorably to build reserves however, inflation soared due to unsterilized purchase and led to appreciation of realeffective exchange rate of INR.

An open markets operations were performed partly to sterilize the expansionary impact on liquidity. Further, this was also a period for RBI to build reserves which rose from $6.4 billion in March 1993 to $20.8 billion by March 1995 sufficing import cover for 7 months.

Contagion of Mexican Crises

The INR showed an equitable stability within mid- 1995 but showed volatility from August 1995 on account of contagion effect due to Mexican Crises. Mexico encountered sharp devaluation of peso in December 1994 due to drastic slowdown of capital inflows resulted from large current ac- count deficit and incongruity in macroeconomic fundamen- tals. This had a contagion effect on Indian rupee which de- preciated by 8.43 percent and reached Rs 34.75/$ in 1995-96 Q3 as against Rs 31.41/$ in 1994-95 Q3. This was the one of the first exogenous reasons for Indian rupee's volatility in- spite of stable domestic macroeconomic conditions. The real GDP growth rate was accelerating from 5.7 percent in 1993- 94 to 7.3 percent in 1994-95 and the fiscal deficit reduced significantly from 12.7 percent in 1990-91 to 5.05 percent in 1995-96. Similarly, the current account deficit well within thelimit at 1.6 percent of GDP, yet depreciation occurred triggered by weak market sentiment and slowdown of capital flows to emerging markets amidst skepticism due to credit risk.

The RBI intervened heavily both in spot and well forward market to curb this excess volatility. Foreign currency asset that was $19 billion in August 1995, declined to $15.9 billion by Feb 1996. Similarly, RBI's obligation of cumulative sales in forward market was $2.3 billion by March 1996. Further some administrative measures such as increase in interest rate of import finance, relaxation on external commercial borrowing and remittance, discontinuation of post-shipment export credit denominated in USD etc. were undertaken. As a result, exchange rate appreciated by 2.38 percent in 1996-97 Q1 but soon reversed and stabilized in the next quarter. Indian rupee remained nearly stable thereafter for another 15 months till 1997-98 Q2.

One major concern India faced during that time period was persistent high inflation. As it was much higher than its major trading partners, the overvaluation of real exchange rate played a disconcerting role in competitive advantage time and again.

East Asian Crises

Indian rupee again experienced volatility for nearly 15 months from August 1997 to October 1998 as a bandwagon effect due to East Asian crises that started from the collapse of Thai baht in July 1997. Indian rupee depreciated by 4.25 percent on a quarterly average basis from 1997-98Q2 to Q3. In a span of a year from August 1997 to August 1998, along with contagion effect of East Asian crises, Political uncertainty amidst prime-minister's resignation in November 1997, economic sanctions posed to India after nuclear explosion in *Pokhran* in May 1998 and downgrading of India's sovereign ratings had adverse impact of INR/USD exchange rate. In a year, exchange rate saw a huge fall of 16 percent from Rs 35.92/$ in August 1997 to Rs 42.76/$ in August 1998.

The downward pressure on rupee was in concurrence with weak macroeconomic fundamentals. From 1996-97 to 1997-98, GDP growth reduced from 8 percent to 4.3 percent, fiscal deficit rose from 4.8 percent to 5.8 percent and current account deficit rose from 1.2 percent to 1.4 percent. In order to bring stability and retain systematic market condition, RBI actively intervened all spot, forward and swap markets. From November 1997 to July 1998, RBI sold $3.1 billion. Similarly, RBI forward liabilities increased from 40 million to $3.2 billion from August 1997 to January 1998 but quickly reversed as the depreciation pressure eased. Other policy response RBI exercised from its toolkit were increase in CRR, raise in repo rate to neutralize arbitrage opportunity in forex market, interest surcharge on bank credit lending for imports, floating of resurgent (RIBs) etc.

India was successful in managing the neighborhood effect of crises well with timely significant intervention and appropriate policy response. This success was a spillover of adopting to appropriate regime post Balance of Payment crises and subsequent stability of exchange rate. The RBI could aggressively intervene market and insulate economy to maximum extent on account of sufficient foreign exchange reserves to cover import over seven months, low current account deficit, low level of short terms debts and assertive capital controls.

Indian rupee showed stability from September 1998 owing to RBI's policy response. Moreover, India's REER (Real effective exchange rate) appreciated due to high inflation differential between major trading partners. However, after seven months, in April 1999, INR started depreciating marginally but gradually on a backdrop of Indo-Pak tension in Kagril region. The INR that stood at an annual average of Rs 42.07/$ in 1998-99 stood at Rs 43.33/$ for 1999-2000. In May 2000, INR started depreciating again on account of reduced capital inflow and high imports resulting in change in perception about the currency. The foreign exchange market was affected considerably leading to 6.96 percent depreciation in a year in March-end 2001 with INR closing at Rs 46.62/$ as against Rs. 43.60/$ in March-end 2000.

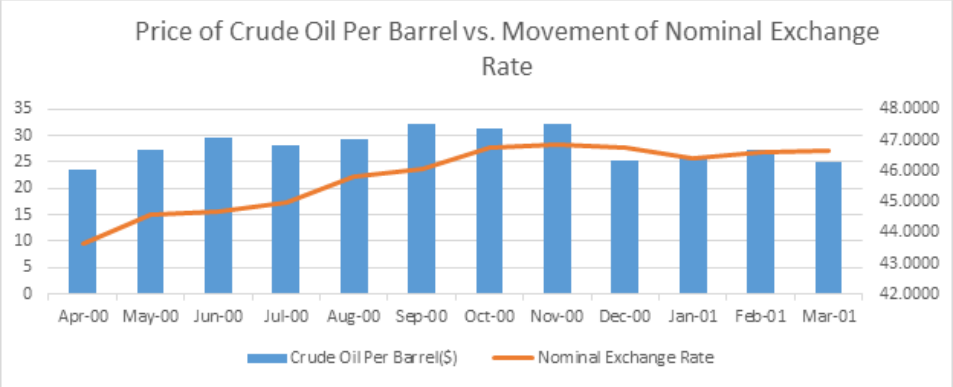

Fig. (2). Crude price per barrel and INR/US$ exchange rate from April 2000 to March 2001 (Monthly).

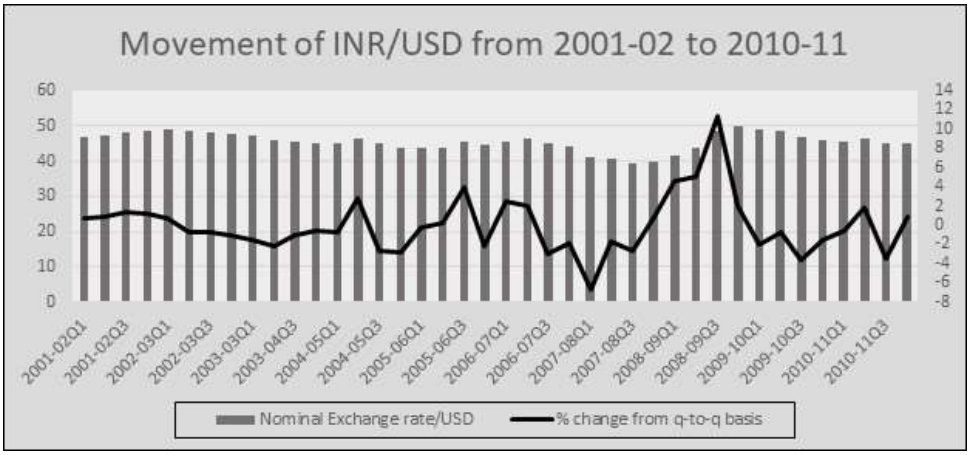

Fig. (3). Movement of INR/US$ from April 2001 to March 2011 (Quarterly).

Influence of Oil Prices on India's Exchange Rate

Crude oil which is the largest commodity in India's import basket, remained volatile in 2000-01 as OPEC (Organization for thePetroleum Exporting Countries) with other oil exporting countries decided to curtail on the production in early 2000. The price of crude oil nearly hovered from year low of $23.91 per barrel to year high of $37.22 per barrel in 2000. This had a direct impact on trade deficit and was thus ex-facto reflected in the nominal exchange rate as depicted in the Fig (**2**). In the graph, nominal exchange rate movement and price per crude oil is nearly linear. As, oil price escalated, nominal exchange rate depreciated and stabilized as oil prices corrected.

The rise in US interest rate in May 2000 further led to depreciation of INR due to capital outflow as interest rate differential narrowed. The RBI increased CRR and further sterilized domestic liquidity created through reserve accumulation by selling government bonds. Increasing the short-term interest rates usually was an immediate measure post East- Asian Crises. Post tranquil period from October 2000 to February 2001, the Bank Rate was steadily brought down from 7.5 percent for industrial revival which did not disturb exchange rate significantly.

Exchange rate in mid 'nineties was kept in a narrow band was intervened heavily. Further, export promotion and import liberalization coined with relatively favorable exchange rate not only enhanced efficiency, but also contributed to faster industrial growth. Competitive exchange rate proved out to be an important pre-requisite export growth especially after Chinese growth strategy and East Asian Crises.

4.4. Movement from 2001-02 to 2010-11

Exchange rate remained nearly tranquil on a quarterly average basis from 2000-01 to 2004-05 as depicted in Fig (**3**). However, some occurrences such as 9/11 attack in the US, put entire world economy to a shock. Along with another currencies, Indian rupee was no exception which experienced volatility in mid- September 2001. INR showed tendency to depreciate post twin tower attack and reached Rs. 48.03/$ on September 21, 2001 from Rs. 47.33/$ in 11 days September 10, 2001. This depreciation on nearly 1.5 percent. RBI immediately intervened forex market with sale of 894 million US dollar to ensure adequate supply of greenback. Apart from this, the RBI relaxed sectoral cap of FII, reduced interest rate on ex- port credit, reiterated to keep interest rate stable and assured supply of US dollars to meet any unusual demand/ supply gap.

From 2003 onwards, nominal exchange rate began two-way movement. Exchange rate was deliberately depreciated to keep the real exchange rate fixed, however INR saw an appreciating tendency for the first time in 2003. (Goyal, 2010) The INR showed appreciating tendency from 2003 February till 2004 April. In order to make export competitive and let capital inflow continue, the RBI actively intervened the

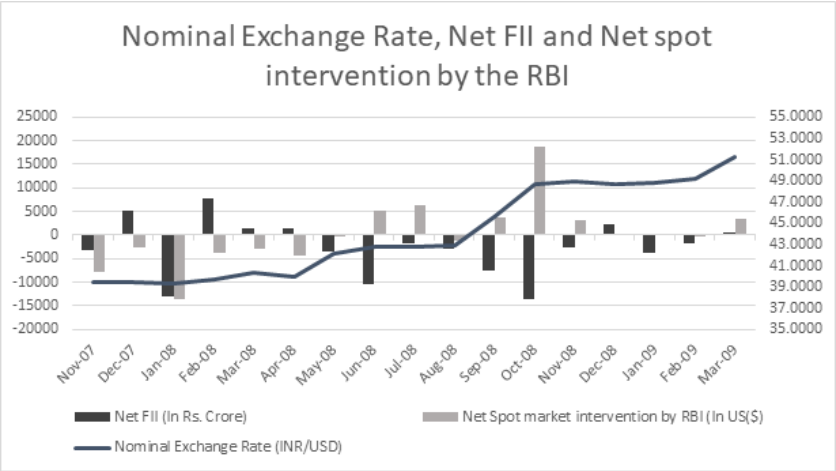

Fig. (4). INR/US$ rate, net spot market intervention and net FII from Nov 2007 to Mar 2009.

forex market with net sales of $42.08 billion. Indian fi- nancial market was in a growth stage, thus the net FII inflow from 2003-04 to 2005-06 was whopping $134.06 billion. However, this capital remained "hot and volatile" and remained sensitive to exogenous factors. For instance, in 2004 from May to July exchange rate depreciated by 2.83 percent against US dollar and similarly with all other currencies, predominantly influenced by withdrawal of portfolio funds. (Raju & Sharma, 2013).

A Question on Regime

A nation's de-jure exchange rate often differs from de-facto. There have been numerous studies to understand nation's de-facto regime. Among these, some academic literature has done assessment on India's exchange rate regime and argued that, though India had a de-jure exchange rate regime with no predetermined path, de-facto exchange rate regime behaved a pegged with US dollar for a significant time even under managed float regime. (Sengupta and Patnaik, 2021). Though government announced market determined floating regime in 1993, currency flexibility determined as per volatility of reserves, exchange rate and interest rate remained the same from 1979-1999, indicating unchanged de-facto. (Calvo and Reinhart, 2002). Thus, India's regime was "pegged to US dollar" from August 1991 to June 1995 and "crawling peg" to US dollar July 1995 to December 2001. (Reinhart and Rogoff, 2004). However, from the time IMF has started classifying de-facto and de-jure exchange rate[2], India has been categorized under de-facto of managed floating with no predetermined path of movement. (Patnaik, 2005, 2007; Zeileis et al, 2010 and Patnaik and Shah, 2009).

Exchange rate remained stable to the large extent in 2005 and 2006. Another major episode of fluctuation was observed over next several years consisted of global financial crises. Exchange rate being an extremely sensitive variable, had an impact in all phases of crises. In 2007, Indian economy at its peak performance; with high capital inflows, GDP nearly touching double digit for two consecutive years, current account deficit below 1.5 percent and inflation less than 5 percent (4.7 percent in 2007-08). India's foreign exchange market grew at the fastest rate among other world market. (Prakash, 2012).

Global Financial Crises

The preset of global financial crises in 2007-08 witnessed large reversal of FII flows, trade credit and external commercial borrowings from India. Especially after the collapse of Lehman Brothers in mid-September 2008, the crises invited deleveraging and credit squeeze. Indian equity market saw massive outflow leaving sharp depreciation of INR. Net capital inflows reduced by $99 billion from $106 billion in 2007-08 to only $7 billion in 2008-09. For the first time in several years, RBI had to let rupee depreciate as against intervening to not let appreciate for several years prior to 2008.

Fig (**4**) displays net foreign institution investment, net spot market intervention by RBI (proxy with net sales/purchases of US dollars by the RBI in Indian forex market) from November 2007 to March 2009, period of maximum impact during the global financial crises. India's nominal exchange rate depreciated from Rs 39.44/$ to Rs 51.23/$ during this period of 17 months. In the graph, negative net spot market intervention (net sales) indicates RBI's effort to inject US dollar and not let rupee depreciate further and vice versa. Similarly, net investment in positive figure indicates higher investment inflows than outflows thus resulting in tendency for currency to appreciate. In Jan 2008, India faced huge capital outflow of Rs 13,601 Crores (equivalent approx. to $3,450 million), RBI intervened and injected$13,051 million to stabilize INR. However, in subsequent months there is anomaly in exchange rate movement, pattern of foreign exchange flow and RBI's intervention owing to turbulent times during crises. For instance, the pattern of Net FII flow is volatile during the entire period with net inflow of Rs 7784 crores (equivalent approx. to $1959.22 million) in February 2008 and net outflow of Rs 13,461 crores (equivalent approx. to $2766.91 million) in October 2008.

One peculiar pattern on asymmetric intervention by the RBI is observed. In periods when exchange rate has possible ten-

[2]As per IMF Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER), exchange rate regime was classified as per de-facto and de-jure only in 2006.

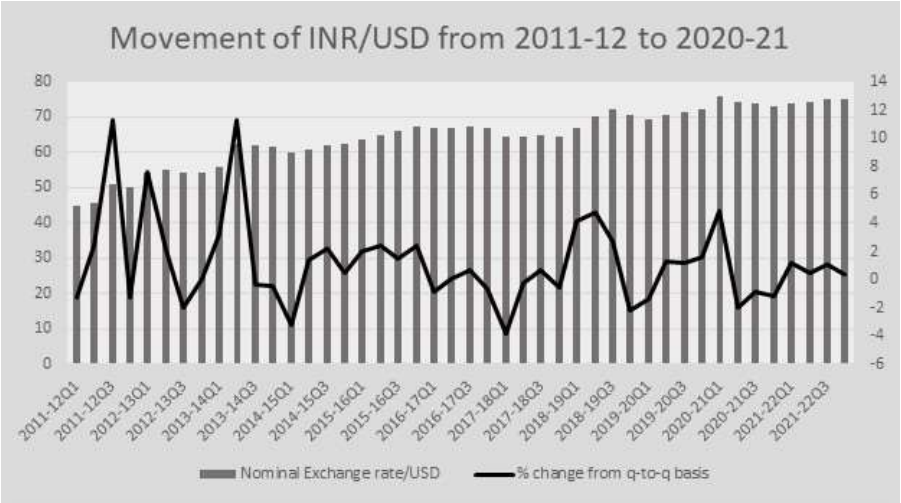

Fig. (5). INR/US$ movement from April 2001 to March 2022 (Quarterly).

dency to appreciate, RBI's intervention is vivid to stabilize and yet, when exchange rate faces tendency to depreciate RBI lets exchange rate absorb the same. (Patnaik & Sengupta, 2021) Due to this, irrespective of FII flow, RBI intervention perhaps has not been consistent towards curbing the volatility alone at per the de-jure regime. This can be observed during Feb, June and October 2008. One possible reason for this could be, RBI's conservative approach to utilize foreign exchange reserves amidst uncertainties. Another possible reason could be to keep the rate within predetermined band to ensure trade competitiveness. It can be observed that from August to October 2008, when exchange rate faced acute pressure to depreciate, RBI has not intervened the market heavily and allowed exchange rate to absorb this pressure. However, in October 2008, exchange rate showed tendency to appreciate with reduction of trade deficit due to oil price crash by nearly $60 a barrel from June 2008. During this period, RBI mopped huge amount of $18,666 million from the market to ensure that exchange rate does not appreciate.

During the global financial crisis, exogenous factors created tenacious movement of exchange rate. To India, huge accumulated reserves helped reduce risk perceptions from external stakeholders, due to which outflows were quickly reversed right after the storm. However, to policymakers, crises clearly left an indication that full float with free capital movement may not necessarily suit for India in an existing pattern of hot money inflow. While in a normal circumstance, when excessive capital outflow occurs, depreciated exchange rate makes export competitive thus resulting in increased output and contributing to stabilization. However, in case capital outflow coined with exchange rate appreciation driven by exogenous factors, may be misaligned to domestic conditions and quizzical for policy comprehension. (Goyal, 2010).

In 2010, Greek government debt scare influenced depreciation of exchange rate due to capital outflow and further aggravated inflationary pressures resulting in rise of both WPI and CPI. The rate hovered around Rs 44-47 throughout the period with downward pressure to in August 2010, it reached Rs 47.07/$. However, in the later months of 2010 and in 2011, the momentum of appreciation was witnessed with weakening of the US dollar in international market, increase in India's export and, better capital inflow. These resulted in appreciation of annual exchange rate from Rs 47.44 to Rs 45.56/$.

4.5. Movement From 2011-12 to 2021-22

In 2011-12, INR appreciated slightly till July, followed by volatile two-way movements in August and September as depicted in Fig (5). From October 2011, INR started to depreciate continuously and reached a low of Rs 54.23/$ in December 15 in contrast to high of Rs 43.94 on July 27, a depreciation of 19 percent. Main reasons for a weakening of INR were strengthening of the US dollar due to safe haven status of the US treasury, slowdown of FIIs causing imbalance in foreign exchange market, US sovereign rating, escalating impact of euro area crises in emerging markets causing deleveraging and heightened risk aversion, increase in current account deficit resulting in imbalanced foreign exchange market and high inflation. The exchange rate closed at Rs 51.16/$ in March-end, 2012 with annual average rate of Rs 47.92. RBI intervenedin the market by selling $20.14 billion in 2011-12 alone, to reduce the excess volatility and destabilizing speculation. Apart from this, several policy initiatives such as revision in all-in-cost ceiling for trade credit, relaxation in External Commercial Borrowings (ECBs), FIIs and NRI deposits were taken to increase the supply of foreign exchange. Similarly, a number of measures were taken by the RBI that aimed at curbing speculative behavior of players in the market.

In 2012-13, INR has witnessed high volatility such that it depreciated to Rs 57.22/$ on June 27, 2012 but appreciated again to Rs 51.62/$ on October 05, 2012. The monthly average however, for most of the months remained between Rs 54-56 per dollar except for April and October. This was due to prevailing issues of the past such as, decline in exports on account of Euro zone crises, resilient high price oil and gold imports resulting in widened trade account deficit. Moreover, the vulnerability in INR and currencies of other emerging markets became evident in May 2013 as a result of announcement by US fed about the tapering its asset purchases.

Tapering Tantrum

After the global financial crises of 2007-09, the US central bank, Fed began its bonds buying program, quantitative easing, to inject liquidity for economic expansion. In May 2013, the chairman of Fed at a congressional hearing updated that 'tapering' of the policy on quantitative easing could happen over subsequent months. This followed the fall in bond prices resulting in higher yield on US treasuries. As a result, emerging countries that received half of global flows from 2009 to 2012, witnessed massive withdrawal of investment. The 'fragile five'[3] were impulsively impacted, as these economies received significant foreign investment that is unstable in nature.

INR depreciated sharply from May to August 2013 nearly by 5 percent month-on-month basis, as a consequence of large withdrawal from FII debt segment and increased current account deficit. INR weakened by 14.7 percent from Rs 54.38 in April to Rs 63.75/$ in September 2013. However, itstabilized and appreciated to Rs 61.62/$ in October 2013 due to policy measures taken by the government to boost foreign capital inflows and initiatives to reduce persisting high current account deficit. However, INR remained resilient when the US Fed taper happened subsequently.

India's Exchange rate in 2014-15 remained fairly stable with huge inflow of both FDI and FII, and depreciated marginally from Rs 60.50 in 2013-14 to Rs 61.14/$ in 2014-15 on an annual rate. The resilience of INR was visible in comparison to other currencies such as Russian Ruble and Brazilian Real that depreciated significantly during the Fed taper. It subsequently depreciated further from Rs 61.14 in 2014-15 to 65.47/$ in 2015-16 on an annual rate. INR depreciation was largely due to strengthening of US dollar against all the major currencies owing the growth of US economy and, deteriorated growth and currency developments in China, which signaled risk aversions against emerging markets. This in addition to with domestic issues like contraction of exports as the INR appreciated against Chinese Yuan and, FIIs outflows.

In 2016-17, INR moved in a narrow range largely due to inflows of FII and, positive signals generated by narrow current account deficit. On account of US Presidential election results and tightening of monetary policy by the Fed, INR depreciated slightly from Rs 65.47/$ in 2015-16 to Rs 67.07/$ in 2016-17, on an annual rate, due to strengthening of the US dollar. However, it appreciated from Rs 67.07/$ in 2016-17 to Rs 64.45/$ in 2017-18, mainly due to improved macroeconomic conditions and reforms initiated such as Insolvency and Penal Code, 2016, that resulted in significant inflows of both FDI and FII. Even as other emerging currencies were highly volatile, INR was one of the resilient emerging market currencies, moving narrowly from highest of Rs 63.63/$ to lowest Rs 65.76/$ at the daily rate in 2017-18.

The year 2018-19 witnessed a severe downward pressure of the INR/USD exchange rate from April to October 2018. During this time, INR depreciated by 14.6 percent from Rs 64.92/$ in April to Rs 74.38/$ in October 2018. The primary reason for depreciation of INR was the widening of current account deficit due to rise in crude oil prices. The price of crude oil per barrel rose from $66.45 in March 2018 to $80.47 in October 2018. Similarly, the tightening of financial conditions by the Fed resulting in increase in Federal funds rate and, slowdown of world output resulting in a fall of export-GDP ratio were the other reasons for weakening of INR. However, after October 2019, it recovered gradually on account of decline in price of crude oil and, softer monetary policy stance across major economies resulting in FII inflows. INR annual exchange rate remained Rs 69.92/$ for 2018-19. In order to discourage speculative activity and curb excess volatility, RBI intervened in the foreign exchange market every month, with cumulative sales of $25.86 billion from April to October 2019 and, purchased highest amount foreign currency equivalent to $9.05 billion in March 2019.

In 2019-20, INR was stable and with narrow movements Rs 68.43/$ to Rs 69.91/$ from April to July 2019. However, in August, there was a downward pressure and INR reached to the lowest of Rs 72.18/$, becoming the worst performing currency in Asia. On an annual rate, it depreciated only marginally, from Rs 69.92/$ in 2018-19 to Rs 70.90/$ in 2019-20. Some causes that weakened INR were, slowdown of India's economic growth, foreign capital withdrawal and,rising trade tensions between the US and China. However, after August 2019, INR remained stable and hovered around Rs 72-73/$ till February 2020.

COVID-19 Pandemic

In March, INR again faced a downward pressure and reached all time low to Rs 76.15/$ on March 23, 2020 due to continuous FPI withdrawal amidst the uncertainties of COVID-19 pandemic. In March 2020 alone US$ 15.92 billion FPI outflow occurred as against cumulative inflow of US$1.42 billion in January and February 2020. INR remained at Rs 75.38/$ in March-end 2020, amidst the nation-wide lockdown in India and major parts of the world, due to the outbreak of Corona-virus. INR appreciated subsequently due to weakening of dollar and FPI inflows in equity markets.

FPI withdrawal continued at a decelerated pace for till November 2020, however the RBI came out will several tools to stabilize financial markets condition. As economic activities started resurging right after abating effects of COVID pandemic, most of advanced economies thrusted large stimulus ensuing quick reversal of capital to India towards end of 2020. Apart from current account surplus resulted due to restricted imports in first half of 2020, the FPI and FII inflows towards later months resulted in huge reserves accumulation. Foreign exchange reserves of India were all time high at $586.1 billion on January 8, 2021. Exchange rate showed tendency to appreciate on one hand, while on other hand sterilizing reserved would lead to increase inflation which was already above policy band 4+/-2 percent. The RBI faced a classic policy trilemma as per Mundell-Fleming model to choose any two among accumulating foreign exchange reserves, stabilize appreciating exchange rate and addressing inflation through monetary autonomy. The RBI chose to accumulate reserves and intervene in foreign ex-

[3]Phrase coined by Morgan Stanley Company that constituted high 'hot money' receiving nations such as Brazil, India, Indonesia, South Africa and Turkey.

change market to stabilize appreciation as inflation owed largely to supply side disruptions and expected to stabilize over time. (Ministry of Finance, 2020).

India's exchange rate against US$ depreciated by 3.4 percent in December 2021 in com- parison to March 2021 showcasing movement in both the directions. However, 2022 has been a challenging year in the external front to perhaps most of the countries. Global issues like Russia-Ukraine conflict, rise of food prices glob- ally, persisting inflation, low demand prompting many economies towards recession, the Fed's effort to monetary normalization and domestic issues like widening current account deficit due to rise in oil prices FPI outflows resulting in depletion of foreign reserves by nearly $100 billion y-o-y basis has impacted nominal exchange rate movement considerably. INR/US$ also saw depreciation of 8.3 percent in December 2022 as against August 2022 is likely to depreciate further on account of widened current account deficit.

5. CONCLUSION AND POLICY RECOMMENDATION

India has successfully managed the managed float regime for nearly 3 decades. Economy has come a long way since the BoP crises where exchange rate has been impacted both by endogenous as well as exogeneous factors. The Mexican contagion crises, East Asian Crises, 9/11 attack, global financial crises, Eurozone meltdown, Tapering Tantrum, US-China trade tensions, COVID-19 pandemic and the most recent Russia-Ukraine political disturbance are some of the major episodes that have exogenously impacted in India's exchange rate movement. Further, poor fiscal discipline, widening of current account deficit due to ballooning of trade imports, impact of monetary policy stance and diligence to tackle excessive hot money flows are some of the internal factors that affect exchange rate.

In this paper, we have not done any econometric modelling to understand behaviour but rather focused exclusively on chronology of events. Understanding the magnitude of any variable in a given episode can be undertaken as future research.

As India is integrating more and more with global economy with each passing year, the role of exogenous factors have been a game changer. These can only be tackled by developing a robust financial infrastructure such to absorb adverse effects in challenging times. The three toolkits of the RBI namely monetary policy, forex market intervention and capital control should have a judicious mix. The RBI needs to be in comfortable position in terms of reserves for orderly correction and stabilize the external sector.

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