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Major Episodes of Volatility in the Indian Foreign Exchange Market in the Last Two Decades (1993-2013): Central Bank's Response

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Indian foreign exchange market has gone through a process of gradual liberalization during the past two decades. With the adoption of market-determined exchange rate in 1993, the rupee has faced episodes of heightened volatility, the latest being post May 22, 2013 volatility on fears of tapering of quantitative easing by the US Fed. Excessive exchange rates volatility imposes real costs on the economy through its effects on international trade and investment and could also complicate the conduct of monetary policy. In view of this, there is a greater interest among the policymakers and academia in exploring the policy space available to EMEs to deal with any sharp volatility in the financial markets. Particularly, central bank responses to episodes of volatility in the foreign exchange markets have come into sharper focus. Against this backdrop, the paper analyses six major phases of volatility in Indian forex market during the period from 1993 to 2013, caused either by exogenous or endogenous factors, or a combination of both and RBI's response to contain the volatility. The analysis reveals that there has been a significant increase in exchange rate volatility in the aftermath of the global financial crisis, signifying the greater influence of volatile capital flows on exchange rate movements. An important aspect of the policy response in India to the various episodes of volatility has been market intervention combined with monetary and administrative measures to meet the threats to financial stability, while complementary or parallel recourse has been taken to communications through speeches and press releases. Availability of sufficient tools in the toolkit of a central bank is also a necessary condition to manage crisis. The paper concludes that the structural problems present in India's external sector, especially the persistence of large trade and current account deficits, will need to be addressed for a sustainable solution to the problem.

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Introduction

Foreign exchange (forex) markets play a critical role in facilitating cross-border trade, investment, and financial transactions. These

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markets allow firms making transactions in foreign currencies to convert the currencies or deposits they have into the currencies or deposits of their choice. The importance of foreign exchange markets has grown with increased global economic activity, trade, and investment, and with technology that makes real-time exchange of information and trading possible. In a market determined exchange rate system, excessive exchange rates volatility, which is out of line with economic fundamentals, can impose real costs on the economy through its effects on international trade and investment. Moreover, at times, pressures from foreign exchange markets could complicate the conduct of monetary policy.

Indian foreign exchange market has gone through a process of gradual liberalization during the past two decades. It has indeed come a long way since its inception in 1978 when banks in India were allowed to undertake intra-day trade in foreign exchange (Reddy, 1999). However, it was in the 1990s that the Indian foreign exchange market witnessed far reaching changes along with the shifts in the currency regime in India from pegged to floating. The balance of payments crisis of 1991, which marked the beginning of the process of economic reforms in India, led to introduction of Liberalized Exchange Rate Management System (LERMS) in 1992, which was introduced as a transitional measure and entailed a dual exchange rate system. LERMS was abolished in March 1993 and floating exchange rate regime was adopted. With the introduction of market-based exchange rate regime in 1993, adoption of current account convertibility in 1994, and gradual liberalization of capital account over the years, essential underpinnings were provided for the foreign exchange market to flourish in India. Today, it constitutes a significant segment of the Indian financial markets with reasonable degree of integration with money market, government securities market and capital market, and plays an important role in the Indian economy. The conduct of exchange rate policy of Reserve Bank of India (RBI) has mainly been guided by the objective of maintaining orderly conditions in the foreign exchange market, to prevent the emergence of destabilising and self-fulfilling speculative activities, and allowing the exchange rate to reflect the macroeconomic fundamentals. The alternating phases of exchange market pressure have been dealt with appropriate policy measures by the RBI partly to 'lean against the wind' against speculative attacks and also to 'lean with the wind' in order to ensure soft landings of the exchange rate in the face of the perceived need for correcting overvaluation (Patra & Pattanaik, 1998).

In the aftermath of the global financial crisis and the Euro zone debt crisis, emerging market economies (EMEs) have faced enhanced uncertainty. Capital flows to EMEs have become extremely volatile with excessive capital inflows to EMEs in search of better yields followed by sudden stops and reversals. Many major EM currencies, including the Indian rupee, witnessed significant depreciation in the recent period owing to the 'announcement effect' of the likely tapering of quantitative easing (QE) by the US Federal Reserve (Fed). The tightening in the overall financial market conditions started from May 22, 2013 following the testimony by Fed Chairman Ben Bernanke about the possible reduction in the bond purchases undertaken as quantitative easing (QE). Typically, those EMEs with large current account deficits (CAD) and relatively weaker macroeconomic conditions were worst affected (like India, South Africa, Brazil, Turkey and Indonesia), though currencies of countries with current account surplus (*e.g.,* Malaysia, Russia) were also been affected. As cited in the October 2013 Global Financial Stability Report (GFSR), it was found that the currencies that depreciated most were those that the 2013 *Pilot External Sector Report* had assessed as overvalued. At the same time, the high foreign exchange volatility raised the concern about the risk of overshooting which could weigh negatively on investment and growth in the affected economies. With the postponement of the tapering announced by the US Fed on September 18, 2013, the markets recovered to a large extent. The commencement of tapering by the US Fed starting from January 2014 and the subsequent announcements about the increase in its pace has not affected the stability of the rupee, which indicates that the markets have generally shrugged off QE tapering fears. The rupee has remained relatively stable as compared to other major EME currencies in the recent period.

In view of the heightened volatility in the forex market discussed above, there is a greater interest among the policymakers and academia in exploring the policy space available to EMEs to deal with any sharp volatility in the financial markets. Particularly, central bank responses to episodes of volatility in the foreign exchange markets have come into sharper focus. Against this backdrop, the paper attempts to identify the major episodes of volatility in Indian forex market in the past two decades, caused either by exogenous or endogenous factors, or a combination of both. It tries to bridge the gap in the existing literature in documenting the central bank measures in forex market, which have hitherto focused more on empirical assessment of central bank interventions for controlling volatility. However, besides intervention, the central bank takes a number of monetary, administrative, moral suasion and other kinds of measures, which are equally, if not more, important in managing volatility. In view of the above, this paper attempts to capture the broad gamut of measures the Reserve Bank has taken to effectively manage various episodes of volatility in the past two decades. It is a descriptive documentation of each episode of forex market volatility with elaborate description of the backdrop, detailed account of the central bank measures and enumeration of the major outcomes. The information has been collected from various RBI publications as well as internal notes. This format of presentation is able to bring out clearly the various factors behind central bank actions including the macro-financial conditions, such as, CAD, fiscal deficit, level of forex reserves, inflation rate, *etc*., various measures taken by the Reserve Bank and how effective were the measures in controlling various episodes of volatility.

The period from 1993 to 2013 has been divided into six phases. Accordingly, the paper has been organized in the following eight sections. Section I provides measurement of daily annualized volatility during various episodes of exchange market pressure. Section II sets out the details of the first phase covering the period 1993-95 when the rupee witnessed appreciating pressure on the back of surge in capital inflows in post-exchange rate unification period. Section III documents the second phase covering the period 1995-96 when the rupee witnessed the first major episode of volatility in the Indian forex market resulting from the contagion effect of Mexican Crisis. Section IV focuses on the third phase covering the episodes of volatility during 1997-98 under the impact of East Asian crisis. Section V captures fourth phase covering specific instances of volatility in the pre-crisis phase during the period 1998-2008, while Section VI captures the fifth phase covering volatility during the global financial crisis of 2007-08 and also details lessons learnt from the various past episodes of crises. The sixth phase covering the recent episode of volatility following Chairman Bernanke's testimony of May 22, 2013 and the way forward are presented in Section VII. Finally, Section VIII incorporates some concluding observations.

Section I
Measurement of Volatility: 1993-2013

Volatility in exchange rate refers to the amount of uncertainty or risk involved with the size of changes in a currency's exchange rate. Volatility in the rupee-dollar exchange rate during various episodes of heightened volatility in the forex market in the past two decades have been computed using standard deviations of daily forex market returns, which have been annualised. The rupee-dollar exchange rate data for volatility computation have been sourced from Bloomberg. An analysis of volatility in various phases of exchange rate pressures shows that volatility in rupee-dollar exchange rate has exhibited mixed trends in the past two decades of market determined exchange rate (Chart 1, Table I). After the first major episode of volatility in 1995-96 in the

Chart 1: Rupee-Dollar Exchange Rate Movements: 1993-2013

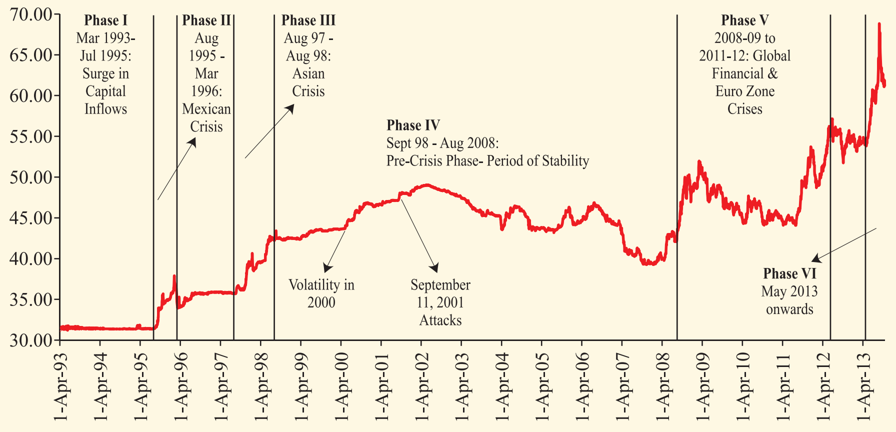


Table I: Annualised Daily Volatility in Rs-$ Exchange Rate during various Episodes of Volatility (1993-2014)

(Per cent)

Period	Volatility
September-October 1995	12.58
end-January to February 1996	13.94
August 1997 to January 1998	7.91
May to August 1998	7.63
September to November 2008	13.37
May 23 to September 4, 2013	17.14
September 4, 2013 to April 2, 2014 (after Governor Rajan took over)	9.15
Monthly Volatility during the Recent Episode	
May 2013	4.47
June 2013	14.75
July 2013	10.38
Aug 2013	25.68
Sept 2013	18.71
Oct 2013	8.26

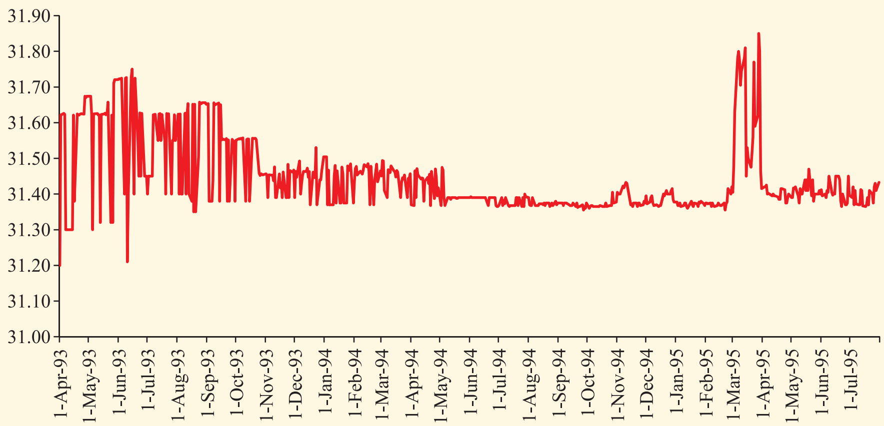
wake of Mexican crisis when volatility touched the level of around 13-14 per cent, volatility remained relatively subdued, even during the East Asian crisis of 1997-98. However, there has been a significant increase in exchange rate volatility in the aftermath of the global financial crisis, signifying the greater influence of volatile capital flows on exchange rate movements. EMEs like India, which have large current account deficit, are particularly vulnerable to the vagaries of international capital flows where a surge in capital flows in search of better yield is invariably followed by reversals/sudden stops on sudden change in risk appetite of international investors, thereby imparting significant volatility to the EME financial markets. Volatility has increased significantly in the post May 22, 2013 phase after Chairman Bernanke's testimony about the possibility of QE tapering. Among various episodes of volatility, the annualized daily volatility was maximum at around 17.14 per cent during the period from May 23 to September 4, 2013. However, it declined to 9.15 per cent during the period September 4, 2013 to April 2, 2014. In terms of month-wise exchange rate volatility during the post May 22, 2013 phase, despite a sharp increase in volatility in June 2013 *vis-à-vis* May 2013, measures announced in July 2013 had a dampening impact on volatility. However, despite RBI's measures, August 2013 witnessed intense exchange market pressure with the volatility in rupee-dollar exchange rate touching an all time high. But the measures announced in September and October 2013 after Governor Rajan assumed office on September 4, 2013 have clearly led to a significant decline in volatility from a high of 25.7 per cent in August 2013 to 18.7 per cent in September 2013 and further to 8.3 per cent in October 2013. This bears testimony to the efficacy of RBI's measures in controlling the recent episode of volatility though other positive developments, both external as well as internal, have also buoyed the market sentiment and contributed to the strength of the rupee.

Section II
Post-Exchange Rate Unification Period (March 1993 to July 1995): Surge in Capital Flows

A. **Backdrop:** The first phase of the post-exchange rate unification period, spanning from March 1993 to July 1995, was marked by a surge in capital inflows on account of liberalization in the capital account and a move to a market determined exchange rate. As against FDI and Portfolio flows of US$ 341 million and US$ 92 million respectively, in 1992-93, the corresponding figures in 1993-94 were US$ 620 million and US$ 3490 million. Though the CAD increased from 0.4 per cent of GDP in 1993-94 to 1.6 per cent of GDP in 1995-96, the surplus on the capital account (3.8 per cent of GDP in 1993-94) on account of the large capital inflows more than compensated for the CAD, leading to large accretion to forex reserves. The WPI inflation which stood at 8.4 per cent in 1993-94 accelerated to 12.6 per cent in 1994-95 contributing significantly to the overvaluation of the rupee as the rupee was essentially range-bound during the period. The GFD which stood at around 7 per cent of GDP in 1993-94 declined to around 5 per cent of GDP in 1995-96. The GDP growth accelerated from 5.7 per cent in 1993-94 to 7.3 per cent in 1995-96.

B. **Actions Taken**: To maintain the external competitiveness of exports and stability of the rupee, which is a prerequisite for capital inflows, RBI, under Governor Rangarajan, intervened in the spot

Chart 2: Stable Exchange Rate Movements during March 1993 - July 1995



market and purchased dollars and, thereafter, conducted Open Market Operations to partly sterilize the expansionary impact on domestic liquidity. The focus of exchange rate policy in 1993-94 was on preserving the external competitiveness of the rupee at a time when the economy was undergoing a structural transformation coupled with building up of the forex reserves.

C. Outcome: As a result of RBI's intervention, India's forex reserves increased from US$ 6.4 billion at the end of March 1993 to US$ 20.8 billion as at the end of March 1995, representing over 7 months of import cover. There was a prolonged period of stability in the rupee-dollar exchange rate from March 1993 to July 1995 (the USD/Rupee rate remained range bound within Rs.31.37 and Rs 31.65 per US dollar), which was followed by a period of volatility or reversal of the gains made by the rupee (Chart 2).

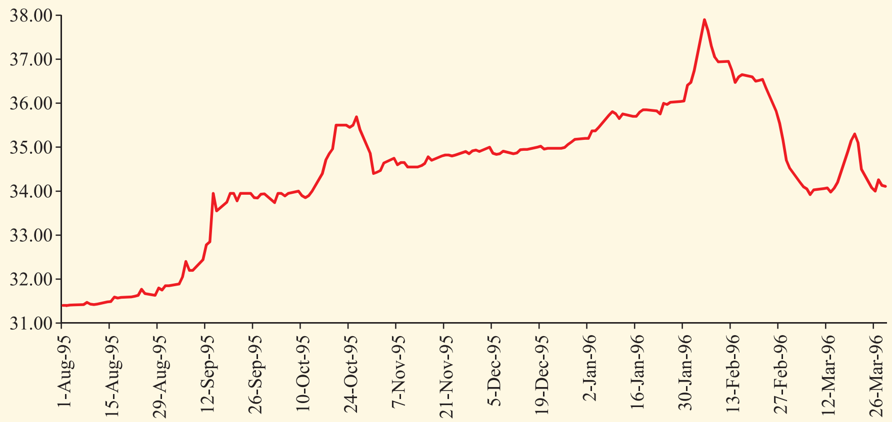
Section III
Impact of Mexican Crisis (August 1995 to March 1996)

The period from August 1995 to March 1996 has been divided into two phases. In the first phase spanning from August to December 1995, as a result of RBI's actions, stability was restored by October 1995 with rupee moving in range bound manner during the period October-December 1995. However, renewed bout of volatility surfaced in January 1996 on the back of weak market sentiments and demand-supply mismatch, which has been covered separately.

I. August-December 1995: Contagion of Mexican Crisis

A. **Backdrop:** The second phase spanning from August 1995 to March 1996 was marked by intense volatility in the forex market, which was mainly on account of the spread of the contagion of the Mexican currency crisis in 1994, which entailed sharp devaluation of the Mexican peso in December 1994 on account of inappropriate policies, large CAD and weak macro-economic fundamentals, leading to sharp slowdown in capital inflows, and certain endogenous factors, which had accentuated the demand for dollar. The exchange rate of rupee, which stood at 31.40 per US dollar at end-July 1995 depreciated to 33.96 by end-September 1995 and further to 36.48 by end-January 1996 (Chart 3). It may be pointed out that the sharp depreciation of the rupee was despite the benign macroeconomic scenario at that time with real GDP growth accelerating from 5.7 per cent in 1993-94 to 7.3 per cent in 1995-96. CAD as percentage of GDP, though quite sustainable, increased from 1.0 per cent of GDP in 1994-95 to 1.6 per cent in 1995-96 mainly because of increase in imports. GFD as a percentage of GDP also moderated from around 6.96 per cent in 1993-94 to 5.05 per cent in 1995-96. However, the annual average WPI inflation rate (base 1993-94=100) was quite high at 12.6 per

Chart 3: Forex Volatility August 1995 - March 1996



cent during 1994-95, which contributed significantly towards the overvaluation of the rupee in real terms, though in nominal terms the rupee had remained mostly range bound for a substantial period of time before the volatility episode.

B. **Actions Taken:** As the rupee was overvalued in REER terms, the RBI allowed the rupee to depreciate but intervened in the market to ensure that the market corrections were calibrated and orderly. The RBI intervened in the second fortnight of October 1995 to the tune of US$ 912.5 million. Further, certain administrative measures were initiated to reduce the leads and lags in import payments and export realization and to improve inflows. Some of the major administrative/monetary measures taken by the RBI under Governor Rangarajan in October/November 1995, *inter alia,* included:

- Imposition of interest surcharge on import finance with effect from October 1995,
- Tightening of concessionality in export credit for longer periods,
- Easing of CRR requirements on domestic as well as non-resident deposits from 15.0 per cent to 14.5 per cent in November 1995,
- Foreign currency denominated deposits like FCNR(B) and NR(NR)RD were exempted from CRR requirements, and
- Interest rates on NRE deposits were increased.

C. **Outcome:** The decisive and timely policy actions brought stability to the market and the rupee resumed trading within the range of Rs.34.28 – Rs. 35.79 per US dollar in the spot segment during the period, October 1995 to December 1995.

II. January-March 1996: Renewed Volatility on Weak Sentiments

A. **Backdrop:** Yet another bout of sharp depreciation of the rupee was witnessed towards the end of January 1996 and in the first week of February 1996, when the rupee touched a low of Rs.37.95 in the spot market while the three-month forward premia rose to around 20 per cent. As already mentioned in the previous section, the sharp depreciation in the exchange rate of the rupee took place despite benign macro-economic fundamentals like GDP growth accelerating to 6.4 per cent in 1994-95 from 5.7 per cent in the previous year, low CAD of 1.0 per cent in 1994-95 and reduction in GFD to 5.7 per cent of the GDP in 1994-95 from around 7 per cent in the previous year. However, the WPI inflation was quite high at 12.6 per cent. The depreciation was triggered by weak market sentiment coupled with demand-supply mismatch resulting from buoyant imports on the back of acceleration in economic activities and slowdown in capital flows to EMEs on a reassessment of the credit risks involved in the wake of the Mexican crisis.

B. Actions taken: In order to curb the volatility in the spot as well as forward market, spot sales followed by buy-sell swaps were undertaken on several occasions. In addition, direct forward sales were also resorted to. As at the end of March 1996, the RBI's cumulative forward sales obligations were to the tune of US$ 2.3 billion, spread over the next six months. As a result of the RBI's intervention operations to contain volatility in the forex market, RBI's foreign currency assets, which stood at 19.0 billion at end-August 1995, declined to US$ 15.9 billion by end-February 1996. Apart from the intervention efforts, a number of administrative measures were also initiated on February 7, 1996 to encourage faster realization of export proceeds and to prevent an acceleration of import payments, *i.e.*, to reduce the lags and leads.

The measures, *inter alia*, included:

- Increase in interest rate surcharge on import finance from 15 to 25 per cent,
- discontinuation of Post-Shipment Export Credit denominated in US dollars (PSCFC) with effect from February 8, 1996,
- Weekly reporting to the RBI of cancellation of forward contracts booked by ADs for amounts of US$ 1,00,000 and above.
- Other measures included relaxation in the inward remittance of GDR proceeds, relaxation in the external commercial borrowing (ECB) norms, freeing of interest rate on post-shipment export rupee credit for over 90 days and upto 180 days, etc.

C. **Outcome:** These measures enabled the rupee to stage a strong recovery in March-April 1996 and thereafter upto June 1996, the rupee generally remained range-bound within Rs.34 – Rs.35. The forward premia also declined and by the end of June 1996, the premia were well within the 10-11 per cent range, reflecting the interest rate differentials. Thus, the active intervention by the Reserve Bank in spot, forward and swap markets during the period did have an impact on the exchange market and domestic liquidity situation and helped in smoothening the volatility rather than propping up the exchange rate. The period from May 1996 to mid-August 1997 was a period of stability with the rupee trading in a narrow range of 35 - 36 per US dollar. As a result of substantial capital inflows, forex assets of the RBI increased from US$ 17.0 billion at the end of March 1996 to US$ 22.4 billion at the end of March 1997 and to around US$ 26.4 billion as at the end of August, 1997.

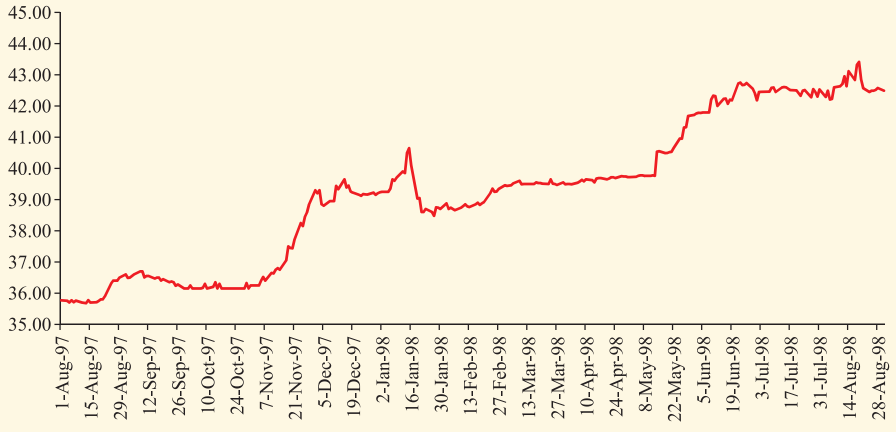
Section IV
Impact of East Asian Crisis (August 1997 to August 1998)

The period from August 1997 to August 1998 has been divided into two phases. In the first phase spanning from August 1997 to April 1998, as a result of RBI's actions, stability was restored by March 1998 with rupee experiencing moving in a range-bound manner during March-April 1998. However, renewed bout of volatility surfaced in May 1998 on the back of enhanced uncertainties emanating from spread of the crisis, which has been covered separately.

I. August 1997 to April 1998: Volatility in the Wake of Outbreak of Asian Crisis

A. **Backdrop:** The third phase spanning from mid-August 1997 to August 1998, posed severe challenges to exchange rate management due to the contagion effect of the South-East Asian crisis, economic sanction imposed by many industrialized nations after the nuclear explosion in Pokhran (India) in May 1998 and the downgrading of the sovereign rating of India by certain international rating agencies. The monthly average Rs-$ exchange rate, which was quite stable prior to the onset of the crisis and stood at 35.92 per US dollar in August 1997, depreciated continuously during the crisis period and reached a low of 42.76 per US dollar in August 1998, i.e., a depreciation of 16 per cent during the period (Chart 4). This sharp depreciation took place against the backdrop of worsening macroeconomic fundamentals, which was reflected in significant deceleration in GDP growth to 4.3 per cent in 1997-98 from 8.0 per cent in 1996-97. GFD increased sharply from 4.8 per cent of GDP in 1996-97 to 5.8 per cent in 1997-98. The CAD, which stood at around 1.2 per cent of GDP during 1996-97, increased marginally to 1.4 per cent of GDP in 1997-98. However, WPI inflation was low at 4.4 per cent during 1997-98 (4.6 per cent in 1996-97). It may be pointed out that the relative stability in exchange rate for a prolonged period of time prior to the crisis led to some complacency on the part of market participants who kept their oversold or short position unhedged and substituted some domestic debt with foreign currency borrowings to take advantage of interest rate differential. However, in the wake of developments in South East Asia and changed perception of a depreciating rupee, there was a rush to cover un-hedged positions by the market participants in the latter part of August 1997, which resulted in the rupee coming under pressure and the forward premia firming up in the first week of September 1997.

Chart 4: Forex Volatility August 1997-August 1998



B. Actions Taken: In order to restore stability, the RBI intervened in the spot, forward and swap markets. In September 1997 alone, RBI was net seller in the forex market to the tune of US$ 978 million, while during the period November 1997 to July 1998, RBI was net seller to the tune of US$ 3.1 billion. As a result of RBI's intervention in the forward market to manage expectations and bring forward premia down, RBI's forward laibilities increased from US$ 40 million in August 1997 to a peak of US$ 3.2 billion in January 1998 but came down subsequently as normalcy returned to the market. Apart from intervention operations, the RBI also initiated stringent monetary and administrative measures to stem the unidirectional expectation of a depreciating rupee and curb speculative attacks on the currency**.** Some of the important measures taken by the RBI under Governor Rangarajan (upto November 22, 1997) and subsequently under Governor Jalan during the period from August 1997 to April 1998 are set out below:

- With a view to reducing arbitrage opportunities between forex market and the domestic rupee markets, and thereby reducing the demand for dollars, the interest rate on fixed rate 'repos' was raised to 5 per cent from 4.5 per cent,
- The CRR requirement of scheduled commercial banks was raised by 0.5 percentage point.
- Incremental CRR of 10 per cent on NRERA and NR(NR) deposits were removed with effect from the fortnight beginning December 6, 1997.
- The interest rate on post-shipment export credit in rupees for periods beyond 90 days and up to six months was raised from 13 per cent to 15 per cent,
- In respect of overdue export bills, a minimum interest rate of 20 per cent per annum was prescribed,
- An interest rate surcharge of 15 per cent on lending rate (excluding interest tax) on bank credit for imports was introduced..

On Jan 6/16, 1998, more measures were taken, which included

- Raising of cash reserve ratio requirement for banks from 10 per cent to 10.5 per cent,

- Raising Bank Rate from 9 per cent to 11 per cent,
- Raising interest rate on fixed rate repos from 7 per cent to 9 per cent,
- Reducing access of banks to export and general refinance facility from RBI and
- Prohibiting banks from taking any overnight currency position from January 6, 1998.

C. **Outcome:** As a result of these measures, stability returned in the foreign exchange market and more importantly, the expectations of the market participants about further depreciation in the exchange rate of rupee were contained and also reversed to a certain extent. The exchange rate of rupee, which had depreciated to Rs. 40.36 per US dollar as on January 16, 1998, appreciated to Rs. 39.50 per dollar on March 31, 1998. The exchange rate moved in a narrow range around Rs.39.50 per US dollar in March-April 1998. The six month forward premia, which reached a peak of around 20 per cent in January 1998, came down to 7.0 by the end of March 1998. Forward liabilities of the Reserve Bank declined from a peak of US $ 3.2 billion at the end of January 1998 to US $ 1.4 billion by April 1998.

II. May-August 1998: Renewed Volatility due to Spread of Asian Crisis

A. **Backdrop:** In May 1998 there were again uncertainties in market expectations due to the spread of the South –East Asian crisis to Brazil and Russia, nuclear weapon testing in Pokhran (India), which resulted in economic sanctions being imposed by the US and certain other industrialized countries, suspension of fresh multilateral lending (except for certain specified sectors), downgrading of country rating by international rating agencies and reduction in investment by Foreign Institutional Investors (FIIs). As a result of these developments, the forex market experienced increased pressure during the period May-August 1998. The exchange rate of the rupee, which was Rs 39.74 at the end of April 1998, depreciated to Rs 41.50 by the end of May 1998 and further to around Rs 42.47 by the end of June 1998, and continued to remain at these levels till mid August 1998 when it crossed Rs 43 mark for a brief period prompting RBI to take certain measures.

B. Actions taken: Some important measures announced by the RBI during the period have been set out below:

- Export credit denominated in foreign currency was made cheaper and banks were advised to charge a spread of not more than 1.5 per cent above LIBOR as against the earlier norm of not exceeding 2-2.5 per cent over LIBOR.
- Exporters were also allowed to use their balances in EEFC accounts for all business related payments in India and abroad at their discretion,
- Withdrawal of the facility of rebooking of cancelled forward contracts for trade related transactions including imports, etc.
- As a measure of abundant precaution and also to send a signal to the world regarding the intrinsic strength of the economy, India floated the **Resurgent India Bonds (RIBs)** in August 1998, which was very well received by the Non Resident Indians(NRIs)/ Persons of Indian Origin (PIOs) and subscribed to the tune of US$ 4.2 billion.

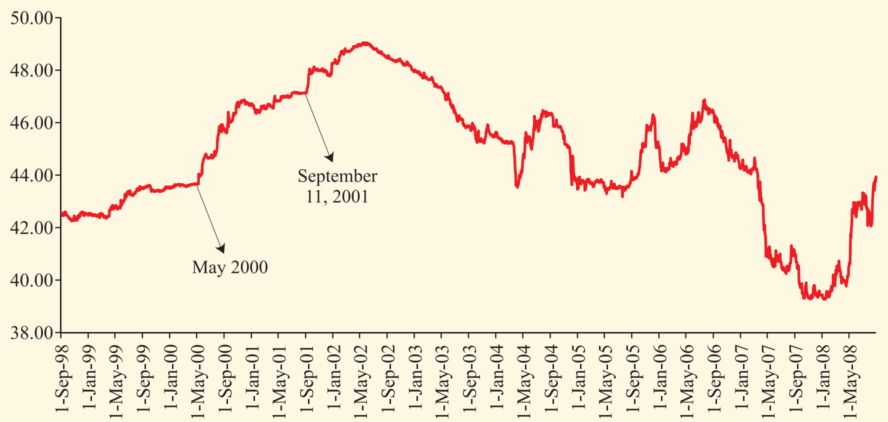
C. Outcome: As a result of the measures announced by the RBI in August 1998, the rupee, which crossed Rs 43 mark for a brief period in August 1998, climbed back to Rs 42.50 level by end-August 1998. The rupee remained range bound after that and hovered around 42.50 per US dollar up to March 1999 but depreciated a bit and crossed the Rs. 43 per US dollar mark in the subsequent months.

D. Lessons learnt from the Asian Crisis: On hindsight, one could say that India was successful in containing the contagion effect of the Asian crisis due to swift policy responses to manage the crisis and favourable macroeconomic conditions. During the period of crisis, India had a low CAD, comfortable foreign exchange reserves amounting to import cover of over seven months, a market determined exchange rate, low level of short-term debt, and absence of asset price inflation or credit boom. Apart from prudent policies pursued over the years, sound capital controls also helped in insulating the economy from contagion effect of the East Asian crisis. Thus, sound macro-economic fundamentals, especially sustainable level of CAD, and prudent capital controls helped India to escape from the contagion effect of the Asian crisis

Section V
The Pre Crisis Phase (September 1998 till August 2008)

In the fourth phase, starting from September 1998 onwards (i.e., till the advent of global financial crisis in 2008), the forex markets generally witnessed stable conditions with brief phases of volatility caused due to certain domestic and international events like the Indo-Pak border tension in June 1999, terrorist attack on the World Trade Centre, New York on September 11, 2001 and the attack on Iraq by America which resulted in a oil price shock, etc. (Chart 5) The periods of volatility were managed mainly by intervention in the spot and swap markets, floatation of the India Millennium Deposit (IMD) in September/October 2000, which helped in mobilizing US$ 5.5 billion, and appropriate monetary /administrative measures. Due to continuous excess supply of dollars in the period from April 2002 to May 2008 and intervention by RBI to maintain the stability and external competitiveness of the rupee, the

Chart 5: Pre Crisis Phase Sept 1998-Aug 2008



foreign currency assets of the RBI rose from US$ 51.0 billion as at end-March 2002 to US$ 305 billion as at end-May 2008.

Two specific instances of volatility (i) during 2000 on higher imports and reduced capital flows and (ii) after the terrorist attack at World Trade Centre (WTC) on September 11, 2001 and RBI's response have been detailed below:

I. Episode of Volatility in 2000: Higher imports and Reduced Capital Flows

A. **Background:** The stability in the foreign exchange market exhibited during the latter part of 1999 was carried over to the month of April 2000 with the rupee hovering within a narrow band of 43.4 – 43.7 per US dollar. However, there was a sudden change in market perception on the rupee from the second week of May 2000 due to higher import payments and reduced capital inflows. The exchange rate depreciated from Rs.43.64 per US dollar during April 2000 to Rs.44.28 on May 25, 2000 as the market was characterised by considerable uncertainty.

B. **Actions taken:** Apart from intervention (net sales of US$ 1.9 billion during May-June 1998), the RBI under Governor Jalan took a number of administrative measures to contain volatility in the forex market, which had a salutary impact. The measures taken on May 25, 2000 included:

    (i) an interest rate surcharge of 50 per cent of the lending rate on import finance was imposed with effect from May 26, 2000, as a temporary measure, on all non-essential imports,

    (ii) it was indicated that the Reserve Bank would meet, partially or fully, the Government debt service payments directly as considered necessary;

    (iii) arrangements would be made to meet, partially or fully, the foreign exchange requirements for import of crude oil by the Indian Oil Corporation;

    (iv) the Reserve Bank would continue to sell US dollars through State Bank of India in order to augment supply in the market or intervene directly as considered necessary to meet any temporary demand-supply imbalances;

(v) banks would charge interest at 25 per cent per annum (minimum) from the date the bill fell due for payment in respect of overdue export bills in order to discourage any delay in realisation of export proceeds;

(vi) authorised dealers acting on behalf of FIIs could approach the Reserve Bank to procure foreign exchange at the prevailing market rate and the Reserve Bank would, depending on market conditions, either sell the foreign exchange directly or advise the concerned bank to buy it in the market; and

(vii) banks were advised to enter into transactions in the forex market only on the basis of genuine requirements and not for the purpose of building up speculative positions.

Subsequently, the exchange rate of the rupee, which was moving in a range of Rs. 44.67-44.73 per US dollar during the first half of July 2000 touched a low of Rs 45.07 per US dollar on July 21, 2000, the day on which RBI announced certain monetary measures, which have been set out below:

- Raising of CRR by 0.5 percentage points to 8.5 per cent from 8.0 per cent;
- Raising of bank rate by one percentage point from 7 per cent to 8 per cent and
- Reduction of 50 per cent in refinance facilities including collateralised lending facility available to the banks.

C. Outcome: As a result of these measures, stability was restored with the forex market remaining relatively quiet during September-October 2000. During the months of November and December 2000, the exchange rate of the rupee displayed appreciating trend in the midst of positive sentiments in the foreign exchange market created by inflows coming from India Millenium Deposits (IMDs). After opening the month of November 2000 at Rs. 46.85 per US dollar, the rupee appreciated to the levels of Rs.46.53 per US dollar before closing the month at Rs. 46.84 per US dollar, almost close to the opening level of the month. The rupee closed the month of December 2000 at Rs. 46.67 per US dollar. The orderly conditions in the forex market continued in the last quarter of 2000-01 as well.

II. Episode of Volatility in 2001: September 11, 2001 Terrorist Attacks

A. Background: The stability in the forex market witnessed during the first five months of financial year 2001-02 (April-August) with the rupee depreciating marginally from 46.64 at end-March 2001 to 47.15 per US dollar at end-August, 2001 could not be sustained in September 2001. The unprecedented attacks by terrorists at strategic locations in New York and Washington on September 11, 2001 brought international financial markets into turmoil. The Indian financial markets also experienced repercussions of the horrifying events. As a result, the exchange rate of Indian rupee, which stood at 47.41 per US dollar on September 11, 2001 touched the level of 48.43 on September 17.

B. Actions Taken: The Reserve Bank tackled the situation through quick responses in terms of net sales in the forex market to the tune of US$ 894 million in September 2001 and package of measures, which have been set out below:

The measures taken by the Reserve bank under Governor Jalan included:

- Reiteration by the Reserve Bank to keep interest rates stable with adequate liquidity;
- Assurance to sell foreign exchange to meet any unusual supply-demand gap;
- Opening a purchase window for select Government securities on an auction basis;
- Relaxation in FII investment limits upto the sectoral cap/statutory ceiling;
- A special financial package for large value exports of six select products;
- Reduction in interest rates on export credit by one percentage point, etc.

C. Outcome: The above measures coupled with announcement of the mid-term review of monetary and credit policy on October 22, 2001, which brought in easy liquidity conditions and softer interest rate regime and aided the market sentiment, helped in restoring stability to the forex market quickly. During the last quarter of 2001 (October-December), the forex market generally witnessed stable conditions with the exchange rate of the rupee hovering around Rs. 48 per US dollar amidst steady supply of dollars and modest corporate demand. The benign macroeconomic environment also helped in achieving stability quickly with GDP growth accelerating from 4.3 per cent in 2000-01 to 5.5 per cent in 2001-02. The current account was in surplus at 0.7 per cent of the GDP. WPI inflation was also quite low at 3.6 per cent in 2001-02 (7.2 per cent in 2000-01). However, GFD increased from 5.7 per cent in 2000-01 to 6.2 per cent in 2001-02.

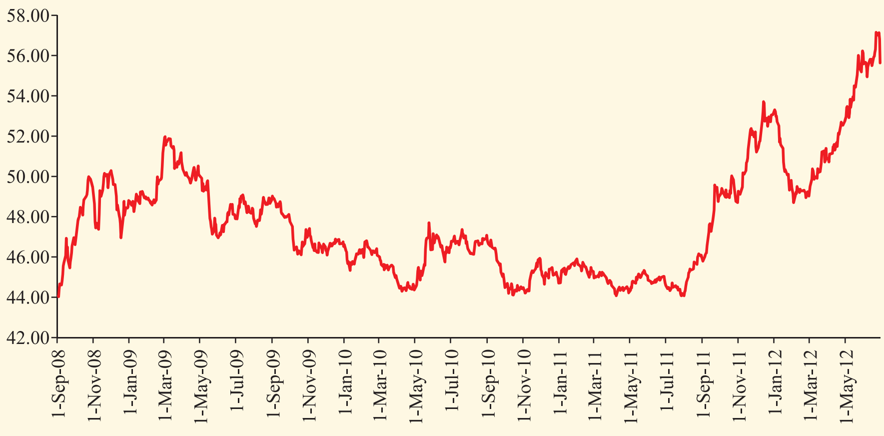
Section VI
The Global Financial Crisis (2008-09 To 2011-12)

I. Volatility in 2008-09: Collapse of Lehman Brothers

A. Background: Prior to the advent of global financial crisis in 2008, external sector developments in India were marked by strong capital flows, which resulted in the exchange rate of the Indian rupee witnessing appreciating trend up to 2007-08. The robust macro-economic environment with GDP expanding at over 9 per cent during 2006-07 and 2007-08, CAD standing at 1.3 per cent of GDP in 2007-08 (1.0 per cent in 2006-07) and WPI inflation standing at a comfortable 4.7 per cent during 2007-08 also facilitated strong capital inflows. However, there was a sudden change in the external environment following the Lehman Brothers' failure in mid-September 2008. The global financial crisis and deleveraging led to reversal and/ or modulation of capital flows, particularly FII flows, ECBs and trade credit. Large withdrawals of funds from the equity markets by the FIIs, reflecting the credit squeeze and global deleveraging, resulted in large capital outflows during September-October 2008, with concomitant pressures in the foreign exchange market across the globe, including India.

After Lehman's bankruptcy, the rupee depreciated sharply from around Rs. 48 levels, breaching the level of Rs.50 per US dollar on October 27, 2008 (Chart 6). The Reserve Bank scaled up its intervention operations

Chart 6: Global Financial Crisis Sept 2008-June 2012



during the month of October 2008 (record net sales of US$ 18.7 billion during the month). Despite significant easing of crude oil prices and inflationary pressures in the second half of the year, declining exports and continued capital outflows led by global deleveraging process and the sustained strength of the US dollar against other major currencies continued to exert downward pressure on the rupee. With the spot exchange rates moving in a wide range, the volatility of the exchange rates increased during this period.

B. Actions Taken: The Reserve Bank under Governor Subbarao took a number of measures to control volatility, which included:

- Announcement in mid-September 2008 by the Reserve Bank about its intentions to continue selling foreign exchange (US dollar) through agent banks to augment supply in the domestic foreign exchange market or intervene directly to meet any demand-supply gaps.
- A rupee-dollar swap facility for Indian banks was introduced with effect from November 7, 2008 to give the Indian banks comfort in managing their short-term foreign funding requirements. For funding the swaps, banks were also allowed to borrow under the LAF for the corresponding tenor at the prevailing repo rate. The forex swap facility, which was originally available till June 30, 2009, was extended

up to March 31, 2010; however, this was discontinued in October 2009.

- The Reserve Bank also continued with Special Market Operations (SMO) which were instituted in June 2008 to meet the forex requirements of public sector oil marketing companies (OMCs), taking into account the then prevailing extraordinary situation in the money and foreign exchange markets; these operations were largely (Rupee) liquidity neutral.
- Finally, measures to ease forex liquidity also included those aimed at encouraging capital inflows, such as, an upward adjustment of the interest rate ceiling on foreign currency deposits by non-resident Indians, substantially relaxing the ECB regime for corporates, and allowing non-banking financial companies and housing finance companies to access foreign borrowing.

C. **Outcome:** As a result of the Reserve Bank's actions in the foreign exchange market, the pressure eased from December 2008 as liquidity conditions in the foreign exchange market returned to normal. With the return of some stability in international financial markets and the relatively better growth performance of the Indian economy, the rupee generally appreciated against the US dollar during 2009-10 on the back of significant turnaround in FII inflows, continued inflows under FDI and NRI deposits, better-than expected macroeconomic performance in 2009-10 and weakening of the US dollar in the international markets. The volatility in the foreign exchange market declined after the introduction of the forex swap facility. Additionally, the outcome of the general elections, which generated expectations of political stability, buoyed market sentiment and contributed towards the strengthening of the rupee, especially from the second half of May 2009. As a result of these developments, the rupee, which depreciated sharply by 21.5 per cent from 39.99 as at end-March 2008 to 50.95 at end-March 2009 in the aftermath of the global financial crisis, staged a smart turnaround and appreciated by around 12.9 per cent in 2009-10 to 45.14 per US dollar as at end-March 2010.

II. Volatility in 2011-12: Deepening of Euro Zone Debt Crisis & Weak Fundamentals

A. **Background:** After being largely range bound in the first four months of the financial year 2011-12, rupee depreciated by about 17 per cent during August to mid-December of 2011, reflecting global uncertainties and domestic macro-economic weakness. The S&P's sovereign rating downgrade of the US economy, deepening euro area crisis and lack of credible resolution mechanisms led to enhanced uncertainty and reduced risk appetite in global financial markets for EME assets, which resulted in a flight to US dollar, as it was considered a safe asset *vis-à-vis* the riskier EME assets by investors, notwithstanding the economic woes of the US, as US dollar is considered numero uno currency at the time of uncertainty and crisis. With US dollar appreciating as a result, most currencies, including the Indian rupee came under pressure.

B. **Actions Taken:** Considering the excessive pressures in the currency markets, the Reserve Bank under Governor Subbarao intervened in the foreign exchange market through dollar sale. It also took several capital account measures to stabilise rupee that included:

- Deregulation of interest rates on rupee denominated NRI deposits and enhancing the all-in-cost ceiling for ECBs with average maturity of 3-5 years.
- Ceilings for FIIs' investment in government securities and corporate bonds were raised by US$ 5 billion each to US$ 15 billion and US$ 45 billion, respectively.

Additionally, the Reserve Bank initiated various administrative steps to curb speculation, which included:

- Withdrawing the facility of cancellation and rebooking of contracts available under contracted exposure to residents and FIIs;
- Reducing the limit under past performance facility for importers to 25 percent of the limit available at that time;
- Making the past performance facility available to exporters and importers only on a delivery basis, mandating that all

cash/ tom/ spot transactions by ADs on behalf of clients were to be undertaken for actual remittances/ delivery only and could not be cancelled/ cash settled;

- Reducing the net overnight open position limit (NOOPL) of ADs across the board;
- Mandating that the intra-day position/ daylight limit of ADs should not exceed the existing NOOPL approved by the Reserve Bank.
- The taking of position by banks, in the currency futures segment, was also curbed, because it was rampantly used for arbitrage between the OTC and the currency futures, which exacerbated the volatility in the forex market.

C. **Outcome:** As a result of the series of measures undertaken to improve dollar supply in the foreign exchange market as also to curb speculation, the rupee appreciated by 11 per cent from 54.24 per US dollar on December 15, 2011 to 48.68 by February 6, 2012, before weakening again. The renewed pressure on rupee was mainly due to widening trade deficit, drying up of capital flows, particularly FII flows and apprehension about the exit of Greece from the euro.

Measures taken in May-June 2012

In order to improve the inflows as also to reduce the volatility in the rupee, the Reserve Bank under Governor Subbarao took additional measures in May-June, 2012.

The measures in May 2012 included increase in interest rate ceiling on FCNR(B) deposits, deregulation of ceiling on interest rate for export credit in foreign currency, and requirement to convert 50 per cent of the balances in the EEFC accounts to rupee balances.

Additional measures were taken In June 2012, in consultation with the government, which included, *inter alia*, allowing ECB for Indian companies for repayment of outstanding rupee loans towards capital expenditure under the approval route, enhancing the limit for FII investment in G-secs by US$ 5 billion to US$ 20 billion, rationalisation of FII investment in infrastructure debt in terms of lock in period and resident maturity, allowing Qualified Foreign Investors (QFIs) to invest in mutual funds that held at least 25 per cent of their assets in infrastructure under the sub-limit for investment in such mutual funds and broadening the investor base for G-Secs to include certain long-term investor classes, such as, Sovereign Wealth Funds, insurance funds and pension funds.

Outcome: The measures during May-June 2012 helped in stabilizing the rupee, which moved in a range-bound fashion in the subsequent months.

Some lessons from Various Past Episodes of volatility in the Forex Market

An important aspect of the policy response in India to the various episodes of volatility has been market intervention combined with monetary and administrative measures to meet the threats to financial stability while complementary or parallel recourse has been taken to communications through speeches and press releases. Empirical evidence in the Indian case has generally suggested that in the present day managed float regime of India, intervention has served as a potent instrument in containing the magnitude of exchange rate volatility of the rupee and the intervention operations do not influence as much the level of rupee (Pattanaik and Sahoo, 2001; Kohli, 2000; RBI, 2005-06).

The message that comes out from this discussion of various episodes of volatility of exchange rate of the rupee and the policy responses thereto is clear: flexibility and pragmatism have been the cornerstone of exchange rate policy in developing countries, rather than adherence to strict theoretical rules. It also underscores the need for central banks to keep instruments/policies in hand for use in difficult situations. Thus, availability of sufficient tools in the toolkit of a central bank is also a necessary condition to manage crisis.

India was able to escape the contagion effect of various currency crises in the second half of the nineties mainly because of prudent forex and reserve management policies and also, to an extent, because of relatively closed nature of its economy on account of sound capital controls. Indian rupee is fully convertible so far as current account transactions are concerned, but the process of opening up of the capital account has been gradual though a number of capital account liberalization measures have been taken over the years. The capital controls have worked well in the Indian case as they have helped in insulating the economy, to an extent, from the vagaries of international capital flows. India has consciously tried to reduce debt-creating flows, especially those which are essentially short-term in nature.

The Asian crisis and the more recent global financial crisis have underscored the importance of having certain necessary capital control in place (even international financial institutions like the IMF have revised their stance in this regard) as unfettered capital account liberalization is no longer considered the most desirable thing. Additionally, the various crises of the past two decades have highlighted the need for the EMEs to maintain a healthy forex reserve cover as this helps in inspiring confidence of the market in the ability of the central bank to contain volatility at the time of any crisis. Since EMEs are especially vulnerable to reversals and sudden stops in capital flows, this issue assumes paramount significance for ensuring financial stability of the EMEs. Even the debate surrounding the optimal level of reserves, based on various yardsticks, such as, import cover of reserves, Guidotti-Greenspan rule, liquidity-at-risk rule, *etc.*, is inconclusive and, recent developments have established that having a large quantum of reserves has turned out to be beneficial for EMEs in dealing with various episodes of crises, notwithstanding the costs associated with holding large reserves, as the quasi-fiscal costs are miniscule in comparison with the benefits in terms of financial stability and confidence.

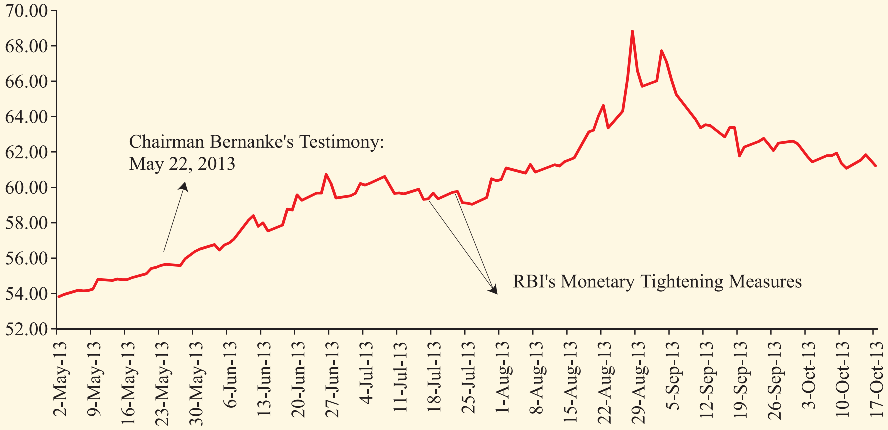
It is noteworthy that most of the measures taken by the RBI during the period of analysis aimed at curbing speculation and essentially related to the external sector/entities and were not general in nature. The measures, including the increase in fixed rate repo twice at the time of Asian financial crisis, were basically aimed at curbing arbitrage opportunity between money and forex market and not specifically as a tool to induce greater capital flows for which a number of other measures, including hike in NRI deposit rates to increase their attractiveness and easing of ECB norms were taken.

Section VII
Episode of Volatility Post Chairman Bernanke's Testimony on May 22, 2013

A. Backdrop to the Recent Episode of Volatility

In the aftermath of the global financial crisis and the Euro zone debt crisis, EMEs have faced enhanced uncertainty. Capital flows to EMEs have become extremely volatile with excessive capital inflows to EMEs in search of better yields, resulting from massive quantitative easing (QE) undertaken by the advanced economies to pump prime their economies, followed by sudden stops and reversals as witnessed in the post May 22, 2013 period on fears of tapering of the QE programme. As a result of substantial slowdown in capital inflows, the rupee experienced significant depreciating pressure from the second half of May 2013 with the rupee depreciating sharply by around 19.4 per cent against the US dollar between May 22, 2013 when it stood at 55.4 per US dollar and August 28, 2013 when it touched historic low of 68.85 per US dollar on the back of sharp reversals in capital inflows and unsustainable level of CAD (4.8 per cent of GDP in 2012-13) coupled with weak macroeconomic environment in the form of sharp deceleration in GDP growth rate (4.5 per cent in 2012-13 and 4.4 per cent in Q1 of 2013-14), high inflation (WPI inflation of 7.4 per cent in 2012-13), large fiscal deficit (4.9 per cent of GDP in 2012-13), etc (Chart 7). Though the rupee was generally

Chart 7: Volatility- Post May 22, 2013



depreciating in line with economic fundamentals even prior to Chairman Bernanke's testimony on May 22, 2013, his testimony, which led to overarching concern about possibility of early tapering of QE programme by the US Fed as signs of US recovery emerged, triggered large selloffs by the FIIs in most EMEs, including India, leading to heightened volatility in financial markets in the EMEs and sharp depreciation of EME currencies, including the Indian rupee, which was one of the worst performers during the period from the second half of May 2013 to August 2013. The hardening of long-term bond yields in the US and other advanced economies increased their attractiveness prompting foreign investors to pull funds out of riskier emerging markets, which received large capital inflows in search of better yield, as a recovery in the US made the EME fixed income assets less attractive *vis-a-vis* the US, especially in the absence of large quantities of cheap money to invest in the event of QE tapering. The sharp depreciation of the rupee was not unique to India. A number of other emerging market currencies, such as, South African rand, Brazilean real, Turkish lira, Indonesian rupiah *etc.*, witnessed similar trends. Many of the EMEs, including India, resorted to forex market intervention coupled with other policy measures, such as, hike in interest rates, import compression of non-essential items, incentivisation of capital inflows, removal of bottlenecks to inflows, *etc.*, to stabilise their currencies, which yielded mixed results.

B. Measures taken by the RBI to contain volatility

In view of the increased exchange rate volatility in the domestic forex market, especially after Chairman Bernanke's testimony on May 22, 2013, the Reserve Bank under Governor Subbarao announced a number of monetary policy measures on July 15, 2013. The measures, though intended to stem the volatility in the forex market, primarily operated through their effect on liquidity in the banking system by making it relatively scarce, thereby reducing demand for foreign currency. The measures included:

- Recalibration in MSF rate with immediate effect to 300 basis points above the repo rate, i.e., the MSF rate was increased to 10.25 per cent from the earlier 8.25 per cent,

- Limiting overall allocation of funds under LAF to 1.0 per cent of NDTL of the banking system reckoned at Rs. 75,000 crore with effect from July 17, 2013 and
- Announcement to conduct open market sales of government securities of Rs. 12,000 crore on July 18, 2013.

While the above set of measures had a restraining effect on volatility with a concomitant stabilising effect on the exchange rate, based on a review of these measures, and an assessment of the liquidity and overall market conditions going forward, it was decided on July 23, 2013 to modify the liquidity tightening measures.

- The modified norms set the overall limit for access to LAF by each individual bank at 0.5 per cent of its own NDTL outstanding as on the last Friday of the second preceding fortnight effective from July 24, 2013.
- Moreover, effective from the first day of the fortnight beginning from July 27, 2013, banks were required to maintain a minimum daily CRR balance of 99 per cent of the average fortnightly requirement.

However, with the return of stability in the forex market, in the mid-quarter review of Monetary Policy on September 19, 2013, a calibrated unwinding of exceptional measures of July 2013 was undertaken, Accordingly, MSF rate was reduced by 75 bps to 9.5 per cent and the requirement of maintenance of minimum daily CRR balance by the banks was reduced to 95 per cent along with a 25 bps increase in repo rate to 7.5 per cent. In continuation with the calibrated unwinding, MSF rate was reduced further by 50 bps to 9.0 per cent on October 7, 2013 along with introduction of 7 days and 14 days term repo facility and liquidity injection to the tune of Rs. 99.74 billion through OMO purchase auction.

Apart from the monetary measures, the Reserve Bank made net sales to the tune of US$ 10.8 billion in the forex market during the period May-August 2013 (around US$ 6.0 billion in July 2013 and US$ 2.5 billion in August 2013). The Reserve bank also intervened in the forward market with RBI's outstanding net forward sales nearly doubling to US$ 9.1 billion as at end-August 2013 from US$ 4.7 billion in July 2013. The Reserve Bank also took a number of administrative/ other measures to ease pressure on the rupee. Some of the key measures included:

- On July 8, 2013, banks were disallowed from carrying proprietary trading in currency futures/exchange traded options
- To moderate the demand for gold for domestic use, measures were taken to restrict import of gold by nominated agencies on consignment basis on May 13 and June 4, 2013. On July 22, revised guidelines regarding import of gold by nominated agencies was issued according to which at least 20 per cent of every import of gold needs to be exclusively made available for the purpose of export.
- Special dollar swap window was opened for the PSU oil Companies on August 28, 2013
- Norms relating to rebooking of cancelled forward exchange contracts for exporters and importers were relaxed on September 4, 2013
- A separate concessional swap window for attracting FCNR(B) dollar funds was opened on September 4, 2013
- Overseas borrowings limit was hiked from 50 per cent to 100 per cent of Tier I capital of the banks and concessional swap facility with the Reserve Bank for borrowings mobilized under the scheme was provided on September 4, 2013.

C. Outcome

The various measures taken by the RBI, both monetary as well as administrative, lent some stability to the rupee with the rupee exhibiting greater two way movements and stabilizing around the level of 62 - 63 per US dollar in the second half of September 2013 and around 61-62 level during October 2013. The rupee has been range-bound since then and has exhibited some strengthening bias in the recent period, especially in March 2014. The stability of the rupee in the medium-term will depend on both external as well as internal developments. The initial set of monetary tightening measures taken on July 15, 2013 led to some strengthening of the rupee *vis-à-vis* the US dollar. However, despite additional set of monetary measures taken on July 23, 2013, the rupee continued with its depreciating trend and touched historic lows during August 2013. The rupee, based on RBI reference rate, appreciated marginally by 0.6 per cent from 60.05 on July 15, 2013 to 59.69 per US dollar on September 23, 2013. However, despite RBI's monetary measures, the rupee depreciated continuously and touched historic low of 68.85 per US dollar on August 28, 2013, a sharp depreciation of around 13.3 per cent between July 23 and August 28, 2013. However, opening of dollar swap window for oil PSUs on August 28, 2013 and announcement of additional measures by the new Governor, Dr. Raghuram Rajan on September 4, 2013, which *inter alia* included relaxation in rebooking of cancelled forward contracts, concessional swap window for attracting FCNR (B) deposits and enhancement in overseas borrowing limits of ADs buoyed the market sentiment and reduced pressure on the rupee. Positive domestic factors, such as, significant narrowing of trade deficit in August 2013 on the back of rising exports, aided to some extent by the sharp depreciation of the rupee against the US dollar, and fall in imports, especially gold imports, turnaround in industrial production for July 2013, improvement in CPI inflation rate, *etc.*, coupled with positive external developments like deferment of QE tapering by the US Fed in its FOMC meeting on September 18, 2013, easing of geopolitical tension over Syria and resolution of the US budget impasse also aided the market sentiment, as a result of which the rupee made a smart turnaround and appreciated by 11.4 per cent to 61.81 per US dollar on September 27, 2013 from its historic low of 68.85 per US dollar on August 28, 2013, indicating significant improvement in market sentiments.

The rupee has been range-bound and has exhibited strengthening bias in the recent period on the back of sustained capital inflows. The rupee has moved in the range of 59.65 and 63.65 per US dollar during the period from mid-September 2013 to April

2, 2014. Despite the announcement on December 18, 2013 of commencement of tapering by the US Fed starting from January 2014 and the subsequent announcements about the increase in its pace, the rupee has generally remained stable, which indicates that the markets have shrugged off QE tapering fears. The rupee has remained relatively stable as compared to other major EME currencies like Brazilian real, Turkish lira South African rand, Indonesia rupiah and Russian rouble. The contagion effect of sharp fall in Argentina peso against the US dollar in the second half of January 2014 and the recent crisis in Ukraine also did not have any major impact on the rupee.

Recent economic developments, such as, continued FII inflows to the domestic equity markets and resumption of FII flows to debt market as well, especially since December 2013 coupled with substantial reduction in gold imports and increase in exports leading to significant reduction in current account deficit to 0.9 per cent of GDP in Q3 of 2013-14 have buoyed the market sentiment and contributed to the stability of the rupee in the recent months. As per RBI's estimates, CAD narrowed to 1.7 per cent of GDP in 2013-14 from 4.7 per cent in 2012-13. The forex swap facilities extended by the Reserve Bank along with enhancement in banks' overseas borrowing limit, which led to forex inflows in excess of US$ 34 billion, have bolstered forex reserves and aided the stability of the rupee. Thus, a host of factors have led to the stability of the rupee in the recent months.

The measures taken by the RBI, aided undoubtedly by both external as well as internal positive developments, have had a stabilizing impact on the forex market and have been successful in reversing the unidirectional expectations of rupee's depreciation.

Efficacy of Measures to contain the Recent Bout of Exchange Rate Volatility and the Way Forward

The measures taken by the Reserve Bank have helped in stabilizing the financial markets, in general, and the forex market, in particular. The measures have been successful in countering the all pervasive negative sentiment, which afflicted the markets during the period end-May to

August 2013. The rupee staged a sharp turnaround in September 2013, which continued in the subsequent months and also in Q1 of 2014. The measures taken by the RBI (swap window for attracting FCNR (B) and enhancement of overseas borrowing limits of banks) led to forex inflows to the tune of US$ 34 billion, which helped in bridging the CAD during 2013-14. The measure to open special dollar swap window for oil PSUs helped in removing a major chunk of demand from the forex market, which went a long way towards stabilizing the rupee as bulk dollar demand from oil PSUs is a major source of pressure on the rupee. These measures buoyed the market sentiment, which got reflected in the sharp turnaround made by the rupee from September 2014 onwards. Even the monetary tightening measures taken by the RBI on July 15 and 23, 2013, which were subsequently relaxed in the mid-quarter review of Monetary Policy on September 20, 2013, helped in reducing volatility to an extent by making rupee expensive, thereby reducing speculation in the forex market. Though monetary policy measures like hike in policy rate is used by many central banks to attract capital, flows, its efficacy in attracting greater capital flows is quite debatable. In this context, an RBI Working Paper (May 2011) on 'Sensitivity of capital flows to interest rate differential' has concluded that from the point of view of monetary policy, FDI and FII flows are not impacted by interest rate changes as they are primarily determined by growth prospects of the Indian economy and returns on equities, respectively. During 2009-10, these two, on a net basis, accounted for about 96 per cent of total net capital inflows to India while for the 10-year period from 2000-01 to 2009-10, they accounted for around 76 per cent of the total net capital flows. The empirical results, however, corroborated the expectation that ECBs and NRI deposits are interest sensitive, though policy interventions by authorities do tend to reduce interest rate sensitivity. Thus, monetary policy needs to take cognizance of the fact that debt flows like ECBs and NRI deposits are impacted both by interest rate as well as exchange rate movements, while sensitivity of capital flows like FDI and FII is relatively less to interest rate changes.

The kind of intense volatility witnessed in the forex market during May-August 2013 when the rupee experienced sharp depreciating pressure is unlikely to recur anytime soon as the situation has improved significantly in the last 7 months. All the macro-economic parameters, viz., current account deficit, fiscal deficit and inflation, which contributed to the sharp depreciation of the rupee, have shown marked improvement in the recent months. The stability of the rupee despite the commencement of QE tapering and sharp depreciation in many EME currencies bears testimony to the fact that the recent improvement in fundamentals has stood the rupee in good stead. However, downside risks in the form of still elevated retail inflation, continued weak economic performance, uncertainty surrounding global economic recovery, uncertainty surrounding capital flows to EMEs once QE is completely withdrawn, *etc.*, remain, which can cause intermittent turbulence in the forex market.

Additionally, despite a sharp decline in CAD to a sustainable level of 1.7 per cent of GDP in 2013-14 from 4.7 per cent in the previous year, it remains to be seen if the positive momentum could be sustained in the medium-to long-term, as this significant decline in CAD during 2013-14 has been mainly effected through a sharp compression in gold imports through exceptional policy measures, including import duty hike, taken by both the Government and the RBI, which may need to be rolled back in due course. Thus, the need to bring the CAD down to a sustainable level consistently for maintaining stable conditions in the forex market needs no reiteration.

In this context, domestic structural factors, such as, inelastic demand for POL and gold imports, which together account for a major chunk of India's imports coupled with large and increasing coal imports despite India being one of the largest producers of coal in the world are some of the important problems facing India's external sector. Efforts are already underway to reduce gold imports, deregulate POL pricing, especially diesel prices, find new ways of increasing supply of POL domestically through exploration and better use of existing facilities, increase coal output in order to reduce imports, etc., which will have a positive impact on CAD and, hence, on the exchange rate of the rupee in the long-term. There is a need to increase and diversify India's exports and also to increase total factor productivity growth of India's exports in order to increase its competitiveness. A number of measures to address these important issues pertaining to structural transformation of India's external sector are already underway. The government and the RBI have already taken a number of steps, such as, removal of procedural bottlenecks, speedy clearance of FDI proposals, provision of various incentives, pruning of negative list, etc., to facilitate FDI flows to various sectors like FDI in retail, civil aviation, pension, insurance, infrastructure sector, etc. All these measures, keeping in view the sound economic fundamentals of the economy, should help in reducing the CAD to sustainable levels in the medium-to long-term, thereby adding significant strength to India's external sector with concomitant stability on the exchange rate front.

Apart from the measures that have already been taken, there are talks about promoting invoicing of trade in domestic currency, which has hitherto not been very successful. In this context, negotiating bilateral currency swaps arrangements using domestic currencies with a number of countries in the Asian region will give fillip to regional trade and preclude the use of dollar for trade settlement purposes though such a move will lead to internationalisation of the rupee, with its attendant costs and benefits. India at present has swap arrangement with Japan to the tune of US$ 50 billion, but that involves the use of dollar. China has been aggressively internationalising renminbi since the onset of global financial crisis and has successfully put in place swap agreements involving local currencies with a number of countries (over 20 in number) in the recent years and India can learn from their experience. Governor Rajan in his statement on taking office on September 4, 2013 stated the following in regard to internationalization of the rupee: "As our trade expands, we will push for more settlement in rupees. This will also mean that we will have to open up our financial markets more for those who receive rupees to invest it back in. We intend to continue the path of steady liberalisation." Thus, the issue of internationalisation of the rupee in a careful and gradual manner needs to be taken up proactively.

Section VIII
Concluding Observations

This paper has attempted to identify the major episodes of volatility in Indian forex market in the past two decades, caused either by exogenous or endogenous factors, or a combination of both. The paper has attempted to capture the broad gamut of measures the Reserve Bank has taken to effectively manage various episodes of volatility in the past two decades. An analysis of the various episodes of volatility in the Indian forex market reveals that there has been a significant increase in exchange rate volatility in the aftermath of the global financial crisis, signifying the greater influence of volatile capital flows on exchange rate movements. An important aspect of the policy response in India to the various episodes of volatility has been market intervention combined with monetary and administrative measures to meet the threats to financial stability while complementary or parallel recourse has been taken to communications through speeches and press releases.

In the end, structural problems present in India's external sector, especially the persistence of large trade and current account deficits, will need to be addressed for a sustainable solution to the problem of exchange rate volatility, as significant reliance on hot money in the form of portfolio flows to bridge the large CAD is, at best, a temporary solution and reversals can be quick, necessitating painful adjustments in exchange rate and asset prices and, consequently, in the real sector as well because of inflationary consequences of large exchange rate adjustments. Thus, increase in India's exports of both goods and services through improvements in their competitiveness by enhancing their total factor productivity (TFP) growth coupled with enhanced FDI flows on the back of appropriate policy initiatives are the way forward in the medium to long-term in the absence of which the vulnerability of India's external sector to sudden stops and reversals in capital flows will continue.

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