**Foreign currency- Rupee Options**
**A.P.(DIR Series) Circular No.108 (June 21, 2003)**

**Reserve Bank of India**
**Exchange Control Department**
**Central Office**
**Mumbai-400 001**

A.P.(DIR Series) Circular No.108

June 21, 2003

To

All Authorised Dealers in Foreign Exchange

Madam / Sirs,

## Foreign currency- Rupee Options

As a part of developing the derivative market in India and adding to the spectrum of hedge products available to residents and non-residents for hedging currency exposures, it has been decided to permit foreign currency – rupee options with effect from July 7, 2003. Authorised dealers will be permitted to offer the product under the following terms and conditions:

a) This product may be offered by authorised dealers having a minimum CRAR of 9 per cent, on a back-to-back basis.

b) Authorised dealers having adequate internal control, risk monitoring/ management systems, mark to market mechanism and fulfilling the following criteria will be allowed to run an option book after obtaining a one time approval from the Reserve Bank:

i. Continuous profitability for at least three years

ii. Minimum CRAR of 9 per cent

iii. Net NPAs at reasonable levels (not more than 5 per cent of net advances)

iv. Minimum Net worth not less than Rs. 200 crore

c) Initially, authorised dealers can offer only plain vanilla European options.

d) i. Customers can purchase call or put options.

ii. Customers can also enter into packaged products involving cost reduction structures provided the structure does not increase the underlying risk and does not involve customers receiving premium.

iii. Writing of options by customers is not permitted.

e) Authorised dealers shall obtain an undertaking from customers interested in using the product that they have clearly understood the nature of the product and its inherent risks.

f) Authorised dealers may quote the option premium in Rupees or as a percentage of the Rupee/foreign currency notional.

g) Option contracts may be settled on maturity either by delivery on spot basis or by net cash settlement in Rupees on spot basis as specified in the contract. In case of unwinding of a transaction prior to maturity, the contract may be cash settled based on the market value of an identical offsetting option.

h) All the conditions applicable for booking, rolling over and cancellation of forward contracts would be applicable to option contracts also. The limit available for booking of forward contracts on past performance basis- i.e. contracts outstanding not to exceed 25 per cent of the average of the previous three years' import/export turnover within a cap of USD 100 mio- would be inclusive of option transactions. Higher limits will be permitted on a case-by-case basis on application to the Reserve Bank as in the case of forward contracts.

i) Only one hedge transaction can be booked against a particular exposure/ part thereof for a given time period.

j) Option contracts cannot be used to hedge contingent or derived exposures (except exposures arising out of submission of tender bids in foreign exchange).

2. Users

a) Customers who have genuine foreign currency exposures in accordance with Schedules I and II of Notification No. FEMA 25/2000-RB dated May 3, 2000 as amended from time to time are eligible to enter into option contracts.

b) Authorised dealers can use the product for the purpose of hedging trading books and balance sheet exposures.

3. Risk Management and Regulatory Issues

a) Authorised dealers wishing to run an option book and act as market makers may apply to the Chief General Manager, Reserve Bank of India, Exchange Control Department, Forex Markets Division, Central Office, Fort, Mumbai-400001 with a copy of the approval of the Competent Authority (Board/Risk Committee/ALCO) and a copy of the detailed memorandum put up in this regard. Authorised dealers who wish to use the product on a back-to-back basis may keep the above Division informed in this regard.

b) Market makers would be allowed to hedge the 'Delta' of their option portfolio by accessing the spot markets. Other 'Greeks' may be hedged by entering into option transactions in the inter-bank market. The 'Delta' of the option contract would form part of the overnight open position. As regards inclusion of option contracts for the purpose of 'AGL', the "delta equivalent" as at the end of each maturity shall be taken into account. . The residual maturity (life) of each outstanding option contracts can be taken as the basis for the purpose of grouping under various maturity buckets. ( For definition of the various 'Greeks' relating to option contracts, please refer the report of the RBI Technical Committee on foreign currency-rupee options -- relevant extracts are given in Annexure II).

**c) For the present, authorised dealers are expected to manage the option portfolio within the risk management limits already approved by the Reserve Bank.**

d) Authorised dealers running an option book are permitted to initiate plain vanilla cross currency option positions to cover risks arising out of market making in foreign currency-rupee options.

e) Banks should put in place necessary systems for marking to market the portfolio on a daily basis. FEDAI will publish daily a matrix of polled implied volatility estimates, which market participants can use for marking to market their portfolio.

4. Reporting

Authorised dealers are required to report to the Reserve Bank on a weekly basis the transactions undertaken as per the format appended to this circular, Annexure I.

5. Accounting

The accounting framework for option contracts will be as per FEDAI Circular No.SPL-24/FC-Rupee Options /2003 dated May 29,2003.

6. Documentation

Market participants may follow only ISDA documentation.

7. Capital Requirements

Capital requirements will be as per guidelines issued by our Department of Banking Operations and Development (DBOD) from time to time.

8. Banks should train their staff adequately and put in place necessary risk management systems before they undertake option transactions. They should also take steps to familiarise their constituents with the product.

9. The need for continuance of the product will be reviewed after six months based on the market development.

10. Necessary amendments to the Foreign Exchange Management Regulations, 2000 are being issued separately.

11. Authorised dealers may bring the contents of this circular to the notice of their constituents concerned.

12. The directions contained in this circular have been issued under Section 10(4) and Section 11(1) of the Foreign Exchange Management Act, 1999 (42 of 1999).

Yours faithfully,
**Grace Koshie**
**Chief General Manager**

**Annexure I**

[A..P.(DIR Series) Circular No.108
dated June 21, 2003]

**Option Transaction Report for the week ended_____**

| Sr. no | Trade date | Client/ C-party Name | Notional | Option Call/Put | Strike | Maturity | Premium | Purpose* |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

*Mention balance sheet, trading or client related.

**Annexure II**

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**The Greeks in detail**

***Delta***

The delta of an FX option is the rate of change of the option price with respect to the change in the underlying exchange rate. Mathematically, delta is the partial derivative of the option price with respect to the exchange rate.

$$\Delta = \frac{\partial C}{\partial S}$$

Where C is the value of the option and S is the underlying spot exchange rate.
Under Black & Scholes model, the delta of European call options on a currency is given by

$\Delta = e^{-rfT} N(d_1)$

And for European put option on a currency,

$\Delta = e^{-rfT} [N(d_1) - 1]$

**Delta Hedging**

As per the Black Scholes model it is possible to set up a riskless portfolio i.e. hedge one's risk by taking a position in the underlying for a position in the derivative. Expressed in terms of delta, the riskless portfolio is:

-1: Option
+Δ:USD/INR

The delta of an option changes with exchange rate. So to remain hedged, delta has to be rebalanced periodically.

***Gamma***

The gamma, Γ, of a foreign exchange option is the rate of change of the delta of the option with respect to change in the exchange rate. It is the second partial derivative of the portfolio with respect to the exchange rate:

$$\Gamma = \frac{\partial^2 C}{\partial S^2}$$

For European call or put option on a currency,

$\Gamma = e^{-rfT} N'(d_1) / S_o \sigma T^{1/2}$

**Gamma hedging**

A small gamma indicates that the delta changes slowly and hence the adjustments to keep a portfolio delta neutral are relatively infrequent. However, for large gamma the frequency of adjustments is relatively higher. The Gamma of a portfolio can be changed only using derivatives. A position in either the underlying itself or a forward contract on the underlying has zero gamma and cannot be used to change the gamma of a portfolio.

***Vega***

The Vega of an option, V, is the rate of change of the value of the option with respect to the volatility of the exchange rate:

$$V = \frac{\partial C}{\partial s}$$

Here, σ is the volatility of the underlying exchange rate. Under Black Scholes model, this would be estimated as the standard deviation of the lognormal returns of the underlying FX price time series.

Under the Black Scholes model, for European call or put option on a currency,

$V = S_o T^{1/2} N'(d_1)\, e^{-r_f T}$

**Vega hedging**

If Vega is high in absolute terms, the portfolio's value is very sensitive to small changes in volatility. A position in the underlying asset or in a forward contract has zero Vega. However, the Vega of a portfolio can be changed by adding a position in a traded option. If V is the Vega of the portfolio and VT is the Vega of a traded option, a position of –V/VT in the traded option makes the portfolio Vega neutral.

***Theta***

The theta of an option, Θ, is the rate of change of the option with respect to the passage of time. Theta is also referred to as the time decay of the option. Theta is usually negative for an option (An exception to this could be an in-the-money European call option on a currency with very high interest rates). This is because as time passes, the option tends to become less valuable.

**Theta Hedging**

Theta is not the same type of hedge parameter as delta. There is uncertainty about the future stock price, but there is no uncertainty about the passage of time.

***Rho***

Rho is the rate of change of the option value with respect to the interest rate.

$$r = \frac{\partial C}{\partial r}$$

In case of currency options, there are two rhos corresponding to the two interest rates. The rho corresponding to the domestic interest rate is given by

Call: $r = X\, T\, e^{-rT}\, N(d2)$

Put: $r = -X\, T\, e^{-rT}\, N(-d2)$

The rho corresponding to the foreign interest rate is given by

Call: $r = -T\, e^{-rfT}\ So\ N(d1)$

Put: $r = T\, e^{-rfT}\ So\ N(-d1)$

**Rho hedging**

Interest rate have comparatively lower volatility. For longer tenure options rho can be hedged using interest rate swaps (MIFOR curve to hedge INR Rho and USD LIBOR swaps to hedge USD Rho).