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Paper #3: Working Paper on
Mitigating Currency Risk for Investing in
Microfinance Institutions in Developing Countries

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January, 2004

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ABSTRACT

This paper focuses on the risks associated with the use of foreign direct investments (FDI) by investors in microfinance. Among the many risks involved in such investments, currency and exchange rate fluctuations are principal stumbling blocks reducing private investment in microfinance institutions in less developed countries. The paper explores the subject with: (1) background on currency fluctuations and five methods commonly used to mitigate currency risk (2) application of each method in a hypothetical US$1 million investment/loan in an Indian MFI and (3) recommendations for investors on assessing and mitigating currency risk.

The paper identifies key findings to successfully mitigate currency risk. For the hypothetical scenario of a $1 million investment in an Indian MFI, currency risk is *hedged* – or covered – by purchasing 'Put Options'. Quantified scenario results demonstrate that given the nature of MFI investments, the most appropriate currency risk mitigation method is currency options. However, these mechanisms must be investigated at a country level and each project requires cost-benefit analysis of a hedged versus unhedged investment to ensure financial value.

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Social Enterprise Associates applies business solutions to social problems to achieve public good. Through consulting services and partnerships, the company fosters financial and social objectives in 'double bottom line' ideas, entrepreneurs who develop them, and the organizations in which they grow.

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INTRODUCTION

Foreign direct investment (FDI) is an increasingly important source of external financing for Less Developed Countries (LDCs).[16] FDI flows to the 49 LDCs increased from less than $1.5 billion a year over 1989-94 to $3.5 billion per year from 1995-2000.[2] FDI flows are crucial to developing countries to: (1) induce higher levels of investment, growth and employment, (2) diversify economies away from dependence on raw, primary commodity export, and (3) augment weak domestic markets insufficient for capital accumulation.

Within the development context and at a micro level, microfinance institutions (MFIs)[3] have attracted investment attention based on exceptional financial performance, although MFIs also offer a double bottom line, including positive social impact. Many MFIs are in a financial bind as they lack sufficient capital to expand operations and face diminishing funds from the international donor community.[4] Commercial capital is the best and most viable source of inputs to scale up, grow, and accomplish the mission of providing affordable financial services to poor people. Investors, however, are foremost concerned with financial returns and hesitant to invest in MFIs due to the high perceived risk. For foreign lenders and investors – institutional and individual – capital investment in a developing country MFI provides economic promise but also carries extensive risk. Understanding, evaluating, and mitigating the risks is a prerequisite for increasing investments in MFIs.

Risks are typically divided into two categories, commercial and non-commercial (Table 1). Commercial risks include financial, operational and business risks whereas non-commercial ones encompass country and event risks. Primary financial implications are: (a) credit risk, (b) liquidity risk, (c) interest rate risk, (d) capital adequacy risk, and (e) currency and exchange rate risk.

Table 1: Foreign Investor Risks			
Commercial			*Non-Commercial*
Financial risks	**Operational Risks**	**Business Risks**	**Country & Event Risks**
• Capital Adequacy • Currency • Credit • Liquidity • Interest Rate • Balance Sheet • Income State.	• Business Disruption, Fraud & Corruption • Business Strategy & Market • Management Systems and Operations • Technology	• Legal • Policy Change • Financial System • Business Support • Infrastructure Service Failure • Environmental Factors • Competition	• War & Conflict • Natural Event • Policy Failure Event • Global Event Impact • Civil Society Pressures Political • Credit Worthiness

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[16] FDIs are typically equity investments made by institutional investors and multilateral agencies. LDCs are countries with low levels of output, living standards, and technology and with per capita GDPs generally below $5,000 and often less than $1,500. Source: http://www.nationmaster.com/kp/LDCs.

[2] *Mitigating Risks for Foreign Direct Investment in Least Developed Countries (LDCs),* Development Financing Report 2000, Ministry of Foreign Affairs, Sweden.

[3] Microfinance, also commonly known as microcredit or microlending, is the provision of small-scale loans and other services (business training, savings mobilization, insurance, etc.) to the poor to foster entrepreneurship and income generation, as a means to alleviating poverty. Source: www.cgap.org

[4] Numerous industry conferences, including the Microcredit Summit + 5, November 2002, have held panels on this subject. See also, Inter-American Development Bank website, www.iadb.org.

SECTION 1: CURRENCY FLUCTUATIONS

International investments are faced with considerations of a country's local currency. Currency value is determined in foreign exchange markets, impacted by foreign exchange (FX) movements. These fluctuations can be precipitated by fiscal and monetary policy decisions of governments, such as currency devaluation. They are also susceptible to external factors, such as insecurity or perceived insecurity. For example, during civil unrest in Indonesia, the currency fell by as much as 25%.[5] A foreign investor loses when the host currency depreciates in value relative to the investor's home currency. This prompts foreign investors to minimize risk or require compensation for the risk in higher returns. This risk, *defined as transaction exposure*, can be counteracted by a variety of methods.

Each mitigation method has associated costs and conditions to be considered when evaluating its use, and the level of exposure to accept. Currency risk reductions are applicable in the short and long term. Short-term transaction exposure is for time periods less than one year. Long-term exposure is those periods greater than a year. The most common method of addressing transaction exposure is by *currency hedging*.

CURRENCY HEDGE

A currency hedge is an insurance policy for foreign investors against currency fluctuations. For instance, in a total currency hedge, the possibility for any fluctuations is removed, thus allowing returns for the investment to

Definition
Transaction exposure - In international trade, potential risk that currency exchange rates will change after financial obligations are entered into and before they are settled.
Currency Hedging - A process that removes the effect on investment returns of fluctuations in the value of the foreign currency. A currency hedge preserves the exchange rate, between the home and the foreign currency, at a known value.

be derived solely from the performance of the underlying investment. In contrast, with no hedge, returns depend on the value of the home currency relative to the host currency. They are therefore subject to any and all fluctuations. In between these absolute states, investors may also choose a hedge amount.

Table 2 demonstrates the impact transaction exposure with no hedges on US$100,000 invested in an Indian project with 9% return. Two scenarios are: no currency fluctuation & currency-adjusted return.

Table 2: Return Calculation
Example: $100,000 investment with 9% expected return.
Scenario 1: 100% exchange rate (no fluctuation) Return: 100,000 * .09 = $9,000; Ending Value: 100,000 * 1.09 = **$109,000**
Scenario 2: 95% exchange rate (change by -5% in foreign relative to home currency) Step 1: Add 1 to 9% expected return = 1.09 Step 2: Add 1 to -5% change in exchange rate) = .95 Step 3: Multiply (1.09 * .95) = 1.0355 Step 4: Subtract 1.0355 – 1 = .0355 or 3.5% return Ending Value: 100,000 * 1.0355 = **$103,550**.

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[5] Wall Street Journal, 2002.

The calculations provide simple illustration of the impact a 5% exchange rate decrease has on return and investment value. Instead of a 9% return, final investment value of $109,000, the investor yields 3.5% with ending value of $103,550; the opportunity cost is $5,450 because of the impact of currency exchange. Foreign investors, with millions placed in developing countries, wish to reduce potential loses.

Investors rely upon five commonly-used methods to mitigate currency risk: (1) forward contracts, (2) future contracts, (3) currency options, (4) currency swaps, and (5) back-to-back loans, defined below.

Definitions
1. Forward Contract - A contract that obligates you to buy or sell a currency at a fixed rate on a specified future date. By linking this date to the date of your currency payment/purchase, you in effect lock in the exchange rate you want and eliminate the risk of future volatility. Contracts cannot be transferred.
2. Futures Contract - An exchange traded agreement to buy or sell a particular type and grade of commodity for delivery at an agreed upon place and time in the future. Futures contracts are transferable between parties.
3. Currency Options - A contract for a fee (premium + commission), sold by one party to another that offers the buyer the right, but not the obligation, to buy or sell a specified amount of one currency for a specified amount in another at an agreed-upon price during a certain period of time or on a specific date.
4. Currency Swaps - An agreement by two companies to exchange specified amounts of currency now and to reverse the exchange at some point in the future. A currency swap may not have an initial exchange, in which case it would involve one or more payments during the life of the swap, plus a final exchange.
5. Back-to-Back Loans - A loan where two companies in different countries borrow offsetting amounts in each other's currency. The purpose of this transaction is to hedge against currency fluctuations.
Note: Back-to-back loans are infrequently used today but were common when stiff exchange controls made very expensive to take an investor's home currency and convert it into the needed currency.

The application of these methods is outlined in Section 2.

SECTION 2: FIVE METHODS	

Scenario: How does an investor making a 5-year, US$ 1 million loan to an Indian MFI with an anticipated 10% return, account for currency risks?

	Application	Conditions
1) Forward Contract	Investor enters into 60-day contract with bank, *sell* 50,187,500 rupees at the current market exchange rate (1USD = 45.6595 rps). No matter what happens to the dollar-rupee exchange rate between signing of contract and next two months, the investor is assured by the bank, to have 50,187,500 rps. converted to $1,100,000 (inv + return). *Applicability to MFIs? – Low. MFIs will likely not be eligible for forward contracts; high costs make it prohibitive.*	1. The currency rate exposure is eliminated only if the MFI <u>generates profits</u> and returns the principal loan amount + 10% to investor. If not, the investor must still deliver 50,187,500 rps in return for the US$ 1,100,000. To do this, will have to purchase at the spot rate[6] two months later, which could again depend upon fluctuations in the exchange rate. 2. Banks refuse forward contracts to uncreditworthy companies and rarely offer <u>small businesses</u> contracts because banks bear the risks.
2) Futures Contract	Same process as forward contract, with futures *marked to market* on a daily basis.[7] Investor hedges position by *selling* short[8] the Indian futures contract. *Applicability to MFIs? – Low. Also, Indian rupee futures market not well developed. Possible in other currencies; rare in LDCs.*	1. A short sale of a future contract puts it against others who own the futures contract, meaning an increase in value of the futures contract is an equivalent loss to the MFI. However, the futures contract value also increased, leaving the net company value unchanged, thereby protected from the fluctuation of the rupee.
3) Currency Options	Investor hedges risk by purchasing options in another market (i.e. British pound). Hedge: With the current BP rate of .5784 (1$/1.7289BP), the investor purchases *Put Options* at a fixed cost per option with strike price (K) to be sold in the short term < 1 year *Applicability to MFIs? - High. Complete example presented in Table 4, using Crystal Ball simulation software.*	1. A key difference between currency options and forward contracts is options allow buyer the right, but not the obligation, to act. 2. If the buyer of the right to buy (call) or sell (put), elects no action, the contract expires. The maximum amount lost is the fee (premium + commission) to purchase the right. This provides flexibility against unfavorable fluctuations while providing investors potential gains.
4) Currency Swaps	Investor swaps large amount of currency with bank of host country followed by a later exchange. *Applicability to MFIs? No. Reserved for high-volume investments*	1. Currency swaps can be seen as packages of forward contracts, used to avoid credit risk. They are often combined with financings (i.e. issuing host currency) to improve rates.
5) Back-to-back Loans	Investor makes a $1,000,000 loan to an Indian company in the US while an Indian company makes an equal value loan of 45,625,163 Rupees (spot exchange rates) to the US firm in India. *Applicability to MFIs? – Low.*	1. These loans involve an arrangement between two companies of two different countries interested in investing in each other's country and need that currency. 2. Both companies remain exposed to default risk as obligation of one company is not avoided by the failure of the other to repay.

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[6] The current price at which a particular commodity can be bought or sold at a specified time and place. Source: http://www.investopedia.com.

[7] This means that any losses must be made up in cash on a daily basis, while the offsetting gain on the currency transaction will be deferred until the transaction actually occurs

[8] Selling Short: The selling of a security that the seller does not own, or any sale that is completed by the delivery of a security borrowed by the seller. Short sellers assume that they will be able to buy the stock at a lower amount than the price at which they sold short.

CURRENCY OPTIONS

Of the five currency hedging options, Currency options carry the highest utility for MFIs. Currency options contracts provide the buyer the right, but not the obligation, to buy or sell a security during a specified period or date. The key distinction of right versus obligation makes options more appealing to investors by protecting them from unfavorable currency fluctuations, but enables them to realize gains if the currency declines below a strike price (K, in example below). This is accomplished through call and put options. Two examples are documented.

Definition
'Put' Option - A right for the buyer to cause the seller to buy a designated amount of a given currency at a strike price or let the option expire.[9]
'Call' Option - A right for the buyer to buy a designated amount of a given currency at a strike price of let the option expire.
Strike price - The stated price per share for which underlying stock may be purchased (for a call) or sold (for a put) by the option holder upon exercise of the option contract.[10]

Example 1: The British pound (BP) rate[11] is 1.7289 ($US/ BP). An investor buys a put option to purchase US $1.65 million with strike price, K = 1.65 ($/BP). If the pound depreciates in one year to BP_1 = 1.50 ($/BP). The option payoff is $150,000 ($1.65-$1.50).

Example 2: In the previous example, if the pound appreciates in one year to BP_1 = 1.85 ($/BP). The option payoff is $0.

The payoff and return summary is:

$$\text{Re}\,turn = \frac{Final\ \text{Pr}ice - Initial\ \text{Pr}ice}{Initial\ \text{Pr}ice}$$

Put Option Payoff = K - BP_1, if $BP_1 \leq$ K, or
$\quad\quad\quad\quad\quad\quad = 0 \quad\quad$ if $BP_1 >$ K

Additionally, the revenue gained from hedging is summarized as:

$$Hedged\ \text{Re}\,venue = Unhedged\ \text{Re}\,venue + No.ofOptions \times (OptionPayoff - OptionCost$$

In order to test currency option hedge cases, a scenario was tested.[17] To run the simulations, historical data was gathered on the rupee and British pound rate over the past eight years and on rupee volatility for the same period. Additionally, the simulations were done for two scenarios, scenario one un-hedged and scenario two a hedged investment. The complete output from 1,000 trials is available in appendix, Table 4.

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[9] Source: Documentation for Derivatives by Anthony G. Gooch and Linda B. Klein, Fourth Edition, Volume 1, Euromoney Books, 2002.
[10] Source: www.investopedia.com
[11] BP Rate as of 12/5/03. Source: www.bloomberg.com
[17] Crystal Ball software was utilized to run simulations (1,000 trials) of potential payoffs.

CURRENCY HEDGE TEST FINDINGS

In Table 4, a variety of results are documented hedging a $1million loan to an Indian MFI. First, the historical mean was calculated for the rupee rate over the past 8 years, with average return -3.10%. This means that the Indian rupee depreciated and weakened compared to the dollar. In the last couple of years, the rupee appreciated and the return as of December 5, 2003, was positive 5.22%. Standard deviation of 4.61% reflects the Rupee's volatility.[14]

In comparison, the British pound (BP) has historical mean of 1.59% return, with recent return of 7.35%. The pound's volatility is 7.35%. The correlation run between the two currencies, which serves as a good indicator of potential currencies to utilizing hedging. The rupee – pound correlation is 68.97%, a significant correlation. But, a higher correlation (i.e. another currency) may be required by investors for a preferred hedge. The line graph depicts annual results.

In order to obtain more precise results, the two scenarios were run a second time with 2,000 trials (Table 3 below). In the first scenario, an <u>un-hedged</u> investment, the model was simplified to yield return in one year. The example shows if there is a 5% decrease in the value of the Indian rupee, the one-year return is $1,045,000.

Currency Correlation
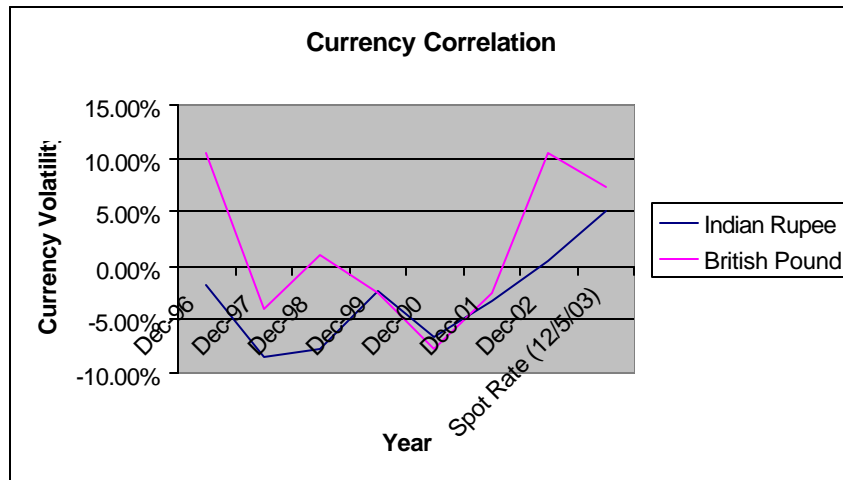
This means that, un-hedged, if the rupee depreciated 5%, the investor can expect reduced return of $55,000. However, this example is illustrative only and not conclusive of the probability of occurrence.

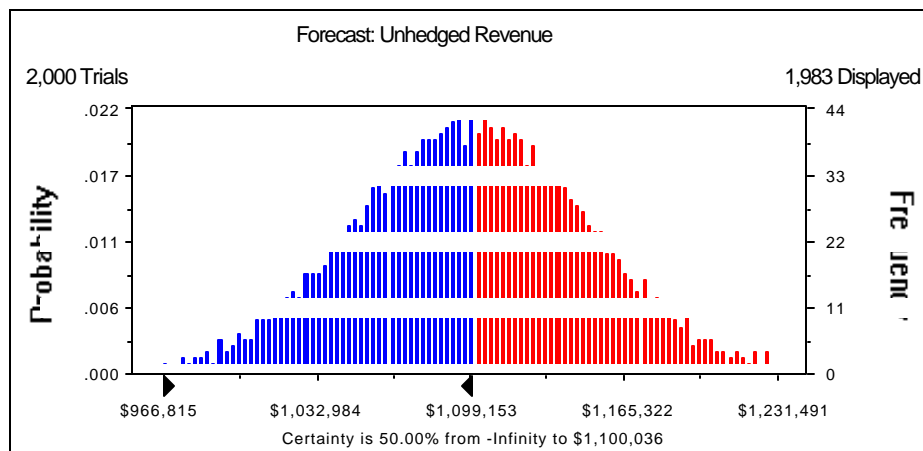| **Table 3**	(Scenario 1)	(Scenario 2)
Statistic	**Un-hedged Revenue**	**Hedged Revenue**
Trials	2,000	2,000
Mean	$1,099,989	$ 1,093,657
Std Deviation	$50,726	$ 70,043
P (Rev<=1,100,000)	50.0%	60.25%
Option Payoff	N/A	0.0192

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[14] Refer to appendix page 13 for a graph highlighting the volatility of the Indian rupee over the past eight years.
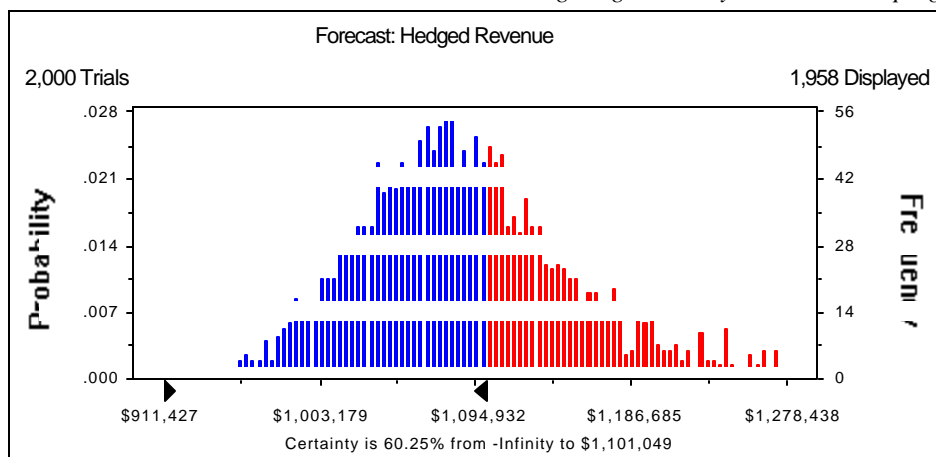
The simulations reveal some surprising results:

- Scenario 2 in Table 3 reveals if the Indian rupee depreciated by 10% and so did the British pound, the investor would be protected from the fluctuations and in fact, through hedging could expect returns of $1,066,493 instead of $990,000 (a gain of $76,493). However this was only one trial

- Given 2,000 trials, an investor can expect higher return if he/she does not hedge. This is due to several factors: a strengthening rupee and pound in recent years, which would preclude a downside fluctuation from occurring (the exact event that the investor wishes to be protected against). In this case, the investor is still better off because the appreciating currencies will yield a higher actual return from the MFI in the coming year. The only loss that the investor occurs is the $27,500 paid for purchasing the options contracts.

- The simulations also show that under the hedged scenario, there is a 50% chance the return is below $1,100,000 whereas a 60.25% chance in the hedged scenario. While seemingly counter-intuitive, it is explained by the moderate correlation between the rupee and pound. To hedge properly, an investor must select a currency highly correlated with the rupee (correlation > =95% to yield positive results).

Frequency charts for both scenarios are provided below:

Forecast: Unhedged Revenue

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Forecast: Hedged Revenue

2,000 Trials   1,958 Displayed

Certainty is 60.25% from -Infinity to $1,101,049

SECTION 3: MICROFINANCE INSTITUTIONS

The microfinance industry has averaged 30% annual growth for the last decade. MFIs work with more than 67 million poor people without access to formal financial services.[15] Of MFIs' assets, most were generated through grants and debt of soft loans on preferential terms. Estimates are that donors provide up to US$1billion annually. [18] As the industry grows, donor support is projected to be vastly insufficient to satisfy demand. Therefore, other capital sources are imperative for the industry's continued health.

MFIs have long sought access to private investors. But, investors' interests differ from those of donors. Investors value maximized returns, short time horizons and definite exit strategies. Given this, some of the five mitigation strategies are not helpful. Investors face illiquid and underdeveloped currencies in emerging economies, preventing forward and futures contracts. As most MFI transactions are still small, currency hedging may not be a cost-effective strategy.

Investors are more readily served by choosing a rate of currency fluctuation (based on currency volatility) they identify as tolerable and factor it in their investment returns in an internal rate of return (IRR). Returning to Table 1, if the investor anticipated -5% in the exchange rate, the desired risk adjusted expected return is 14.5% (9% realized return + 5.5%). However, in cases of extreme currency volatility, hedging is a valuable tool. Investors should begin by answering the following questions:
- What is the currency volatility of the investment based on the past 8-10 years of historical data? What has caused the fluctuations? What is the probability that they will occur again?
- What financial instruments are available to mitigate exchange risk in that country? What methods are applicable to the country's currency?
- Is currency hedging necessary? If so, what level of hedge is required? What are the expected returns using an un-hedged versus hedged scenario?

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[15] Microcredit Summit's 2003 State of the Industry Report.
[18] Data from International Finance Corporation presentation to Microfinance Working Group at Columbia University's School of International and Public Affairs on April 12, 2003.

SECTION 4: CONCLUSION

There is a clear tradeoff for investors mitigating currency risk in LDCs in the form of contract fees for the benefit of protection against currency fluctuations. The best financial instrument for investors interested in MFIs is currency options.

Before selecting a hedge, investors must thoroughly evaluate the level of currency risk for the respective developing country and the cost-benefits of a hedged versus un-hedged investment. In doing so, foreign investors will be able to make a much more informed investment and reap the sought-after financial returns while also insuring that MFIs get the capital essential for growth in order to reach the millions of poor people without access to financial services in LDCs.

Appendix I

Table 4

Currency Historical Data

	Year	Rupee Rate ($/rp)	Rupee Return (in %)	British pound Rate ($/BP)	BP Return (in %)
Dec-95	1	0.0284		1.5496	
Dec-96	2	0.0279	-1.87%	1.7140	10.61%
Dec-97	3	0.0255	-8.55%	1.6451	-4.02%
Dec-98	4	0.0235	-7.74%	1.6600	0.91%
Dec-99	5	0.0230	-2.43%	1.6182	-2.52%
Dec-00	6	0.0214	-6.70%	1.4930	-7.74%
Dec-01	7	0.0207	-3.25%	1.4546	-2.57%
Dec-02	8	0.0208	0.56%	1.6100	10.68%
Spot Rate (12/5/03)	9	0.0219	5.22%	1.7283	7.35%
Historical Mean (of returns)			-3.10%		1.59%
Standard Deviation (of returns)			4.61%		7.07%
Correlation between Indian rupee (IR) and British pound (BP)					68.97%

Scenario 1: Investor's Unhedged U.S. Dollar Risk

Investment in Indian Rupees in one year.	45,595,000	(in rps using spot rate)
Current Indian rupee rate	0.0219	(In US$/rp)
Indian Rupee Volatility	4.61%	

	Return	Price		
Indian rupee	-5.00%	0.0208		
Revenue in one year (unhedged)			$ 1,045,000	(in millions US$)

Scenario 2: Investor's Hedging Spreadsheet

Investment in Indian rupees in one year	45,595,000	(in millions IR)
Current Indian rupee Rate	0.0219	(US$/IR)
Current British pound Rate	1.7283	(US$/BP)
Strike Price of one-year British Pound put options	1.6500	
Cost per British pound put option	0.025	(in US$)
Number of British pound put options	1,100,000	(in millions US)
Indian rupee/British pound Correlation	68.97%	
Indian rupee Volatility	4.61%	
British pound Volatility	7.07%	

	Return	Price		27,500
Indian rupee	-10.00%	0.0197		
British pound	-10.00%	1.555		
Put Option Payoff		0.0945		
Cost of Put Options (based on typical costs of put options; does not reflect actual current put option costs for British pound).		$ 27,500		
Revenue in one year (unhedged)		$ 990,000		
Revenue in one year (hedged)		$ 1,066,493		

NOTES: Currency exchange data from Bloomberg as of 12/5/03

Appendix II

Bar Chart: Indian Currency Fluctuations 1995 – 2003.
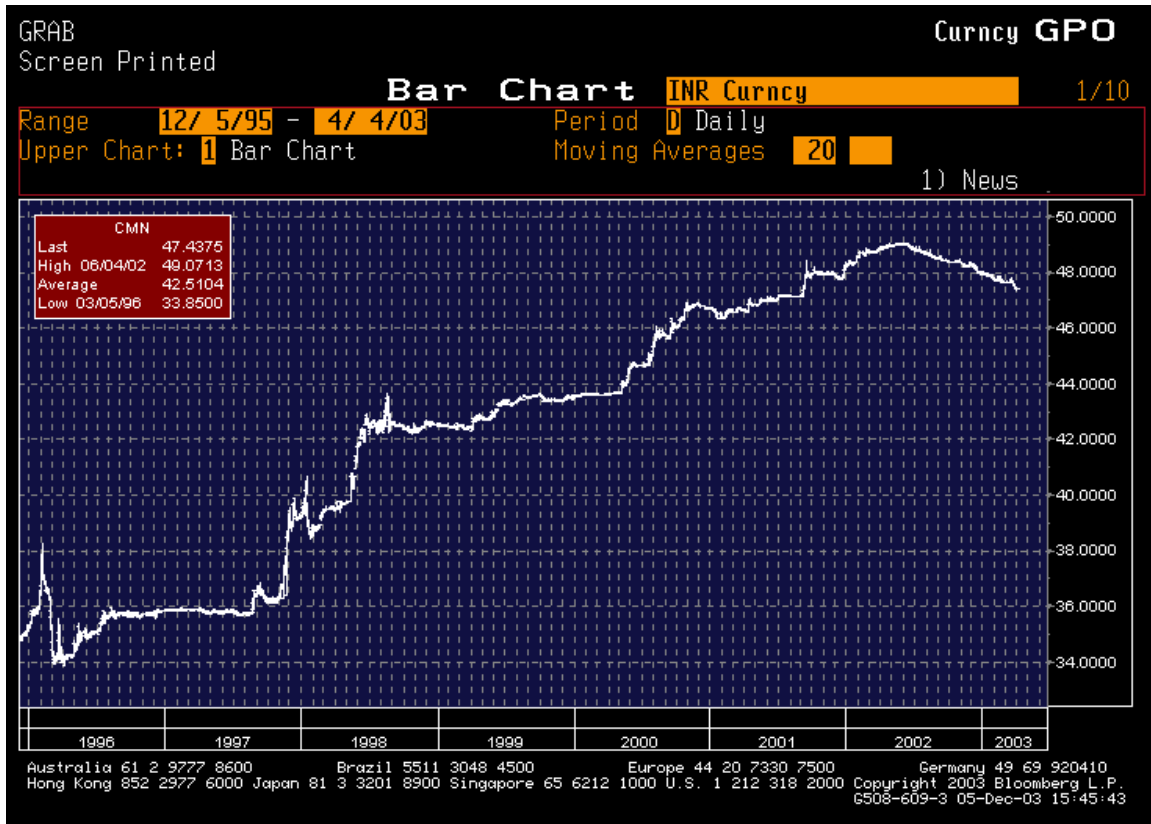
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