Chapter 4
ANALYSIS AND DISCUSSIONS

In this chapter FX risk management practices followed in advanced economies like Switzerland, USA, Germany, UK, Canada and Chile and in India collected from the secondary sources and through questionnaire have been studied.

4.1 Practices in select countries

4.1.1 Currency risk management practices of Swiss industrial corporations:

A survey of Swiss Firms to study the practices regarding FX exposure was conducted in 2000 by Claudio Loderer and Karl Pichler. The title of the survey was “Do you know your currency risk exposure?”

Many of these companies sell most of their output abroad and would therefore seem to be heavily exposed to currency risk. In fact, currency risk can be substantial. Between 1978 and 1996, the Swiss franc experienced dramatic swings in relation to major currencies such as the U.S. dollar, the Italian lira, and the British pound. Comparing highest and lowest exchange-rate levels, the U.S. dollar depreciated by 60% vis-à-vis the Swiss franc, the Italian lira by 70%, and the British pound by 62%. The annual currency rate volatilities was sizable in the six years, the volatility of the U.S. dollar, for example, had exceeded 12%. The purpose of the study was to examine whether industrials quantify their risk profile (RP). Such a RP maps firm value against unexpected changes in a specific output price or factor cost.

Generally, maximization of firm-value is the ultimate reason for managing risk. Under that assumption, adopting the appropriate risk-protection policy would seem to require knowing the (asymmetric) RP of firm value. Depending on the purpose of currency risk management, it can be simpler for managers to focus on other risk profiles. For instance, to reduce expected taxes in the presence of convex tax schedules, all they need to know is the currency risk profile of taxable income, which maps taxable income against unexpected changes in currency rates. Similarly, to avoid the

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45 Claudio Loderer and Karl Pichler, January 5, 2000, Institut für Finanzmanagement, Universität Bern, Engehaldenstrasse 4, 3012 Bern, Switzerland
deadweight costs of external finance, it might be simpler to focus on the RP of the
firm’s cash flow [Froot, Scharfstein, and Stein (1994), Tufano (1998a)]\(^{46}\). Therefore
the survey focused on knowledge of the RP of firm value.

It was found that industrials do not quantify their currency risk exposure and
investigate possible reasons. One possibility is that firms do not think they need to
know because they use on-balance-sheet instruments to protect themselves before and
after currency rates reach troublesome levels. This is puzzling because a rough
estimate of at least cash flow exposure is not a prohibitive task and could be helpful. It
is also puzzling that firms use currency derivatives to hedge/insure individual short-
term transactions, without apparently trying to estimate aggregate transaction
exposure\(^{47}\).

The full sample was biased toward larger firms, since firms with less exposure are less
likely to participate in the survey, the sample is also biased toward firms with non
negligible currency risk exposure. The sample firms were therefore larger firms with
nonzero currency risk exposure. Larger firms would seem to command more resources
and therefore be able to afford a more sophisticated risk management approach, larger
firms are arguably more interesting in a survey of risk management practices.

There are many ways in which firms can protect against foreign exchange risk. Bodie
and Merton (2000) list four broad possibilities.

**First**, firms can simply avoid risk. That would seem to involve choosing to sell or buy
in markets that are not exposed to currency risk. The head of the Swiss employers’
association of the machinery industry recently discussed tying Swiss wages to the euro
to reduce firms’ currency risk. In an open economy, this is almost impossible to
achieve since even if firms are able to avoid direct exposure, at least some of their
suppliers, customers, or competitors will bear some exposure.

\(^{46}\) For the U.S., see also Petersen and Thiagarajan (1998), Tufano (1998b), and Brown (1999).

\(^{47}\) Ibid, page 2
Second, firms can reduce the likelihood or the severity of losses. A Swiss company that exports to France can finance some of its operations with French francs or buy materials from French suppliers.

Third, firms can transfer risk to others. There are basically three ways they can do this:

- They can hedge. That means, they can sell potential gains from favourable currency changes to cover losses from unfavourable changes. A Swiss importer, for instance, can enter into a forward contract to buy Italian lire to fund its purchases from its Italian supplier;
- They can insure. This involves paying another party to assume their currency risk. For example, some firms insure with currency options whereas others do so by invoicing in Swiss francs rather than in foreign currencies;
- They can diversify. An importer can source from suppliers in different countries rather than from only one supplier. This diversification spreads risk over different, possibly uncorrelated currencies. The suppliers assume some of the importer’s risk since the importer will buy from the suppliers with the more favourable currency rates.

The final approach to risk protection in the Bodie and Merton (2000) classification is risk bearing. Firms can simply decide that the risk they are exposed to is too small to worry about.

Firms are then asked to state their exposure to the risk of unexpected changes in the U.S. dollar, the German mark, the Italian lira, and the French franc (the associated countries are important trading partners of Switzerland). Their answers are presented in Table 3. Not even 40% of the sample firms are able to quantify their exposure: 37% can do so for the U.S. dollar, 38% for the German mark, 30% for the Italian lira, and 28% for the French franc. These low percentages may be misleading, since not all firms have a significant exposure to all four currencies. Perhaps the firms that know their exposure to, say, the dollar are not concurrently exposed to any of the other three currencies. We therefore compute the number of firms able to quantify their exposure to at least one of the four currencies, but our conclusion does not change much. Only 43% of the sample firms can do so.

Almost two-thirds of the answering companies protect individual foreign exchange commitments and claims. In comparison, there is much more reluctance to
shield future cash in- and outflows that have not been contractually stipulated yet. Interestingly, only 26% of these firms focus, and therefore presumably compute, a net figure of aggregate transaction exposure (aggregate foreign exchange commitments minus claims).

- Frequency and type of currency derivatives used by industrial firms. The significance test examines whether forwards are used more often than other derivative securities. Forward contracts are used by 81% of the firms that use currency derivatives more than occasionally, much more frequently than other currency derivatives, in particular options. This makes sense if firms are confident about the exposure they want to reduce, consistent with the claim that they focus on transaction exposure. In contrast, if firms wanted to reduce economic exposure, we would probably observe more frequent use of options, since economic exposure itself is uncertain [see also Giddy (1988)]. This argument ignores disclosure considerations, however. Firms might prefer forward contracts to options because the former do not show up on the balance sheet [see also Bodnar and Gebhardt (1999),

- Establishing a firm’s currency RP of firm value requires the following steps: (1) projecting the firm’s free cash flows; (2) capitalizing those cash flows to compute firm value; and (3) assessing how unexpected changes in currency rates affect that value. There are several problems in implementing this estimation. First, it is difficult to project the relevant future cash flows. Second, the assets of these firms trade, if at all, in highly illiquid markets. That complicates the assessment of the appropriate cost-of-capital measures. Third, currency exposure changes with the identity and the policies of competitors, suppliers, and customers. Basing risk management on inaccurate measures of risk exposure can lead to seriously flawed hedges that could potentially increase rather than decrease currency risk. Almost half of the firms profess an inability to measure future cash flows and their currency composition with much precision. This is consistent with the claim that sample companies are afraid of making mistakes in assessing their currency risk exposure. There is also evidence that firms focus on short-term transaction exposure, since 34% of the firms hedge individual transactions. Note that 29% of the firm focus on the short term with the argument that any long-term exposure will be reduced with on-balance-sheet instruments.
Money-market hedges are defined in the questionnaire as financing foreign activities in foreign currencies, or lending or investing in foreign currencies to offset liabilities denominated in foreign currencies. The table shows that money-market hedges are fairly diffuse, as almost 60% of the firms claim to be using them. Firms also attempt to shed currency risk with contractual clauses that give them the right to choose the currency in which to pay or be paid. Currency risk sharing and various forms of government-sponsored currency risk insurance are also used, but much less frequently.

Sample year: 1996.
Percentage of firms using these instruments
Money-market hedges 56%
Choice of currency in which suppliers are paid 54%
Choice of currency in which customers are invoiced 51%
Currency risk sharing 23%
Swiss export risk insurance 16%
Export risk insurance provided by foreign countries 9%

Reaction to currency fluctuations. Nearly 80% of firms (not shown) say currency risk induces them to make at least one of the adjustments listed in the table. The use of operating adjustments in anticipation of unfavourable currency fluctuations follows a very similar pattern. If anything, preventive adjustments are used more often than ex-post adjustments.
Percentage of firms making these adjustments in 1996:
Pricing policy 65%
Choice of countries in which to buy inputs 48%
Credit policy 41%
Improving productivity 31%
Choice of countries in which to sell products and services 31%
Improving the flexibility of manufacturing systems 20%
Relocating parts of the firm abroad 18%
Shifting production among plants internationally 14%
Changing the pace of product/service innovation 10%
Setting the size of the budget for sales promotion 0%
5.1.1.2 The sample include some fairly large multinational corporations, such as Ciba-Geigy AG and Sandoz (now merged into Novartis), Swissair, Oerlikon Bührle, and Sulzer. More importantly, we can compare some of our findings with findings reported elsewhere. Bodnar and Gebhardt (1999), in particular, have surveyed derivative usage in German and U.S. firms. We can use that study for a comparison.

The more striking similarities between the two studies are:

- Like Swiss firms, U.S. and German firms use both currency derivatives and on-balance-sheet instruments to reduce currency risk. This has been observed also, among others, by Petersen and Thiagarajan (1998) and Brown (1999);
- In their risk management strategies, U.S. and German firms appear to pursue the same targets as Swiss firms. All firms, regardless of nationality, primarily target accounting earnings and cash flow rather than firm value. In comparison, 83% of our firms target operating cash flows, and 80% target earnings.
- As in our sample firms, U.S. and German firms hedge/insure transaction exposure, while essentially ignoring translation exposure.
- The horizon of U.S. and German firms in hedging/insuring transaction exposure is also not much longer than 12 months.
- OTC forwards are the most frequently used currency derivative in U.S. and German firms. OTC swaps come second (at least for German firms), and OTC options are third. Swiss firms have the same preferences. So, in general, it would appear that our firms are similar to firms in Germany and in the U.S. One apparent difference is that larger firms in the Bodnar and Gebhardt (1999) study are more likely than small firms to focus on cash flow and firm value. Swiss firms do not share that regularity. Yet, since Swiss companies are more likely when compared with the firms in the Bodnar and Gebhardt study to focus on cash flow and firm value to begin with, it is not clear whether this apparent difference is significant.

It would appear that U.S. and German firms hedge anticipated cash flows that are not contractually committed more often than our firms. We would need more information, however, to make a definite statement.
The purpose of this survey was to examine the risk management policies of industrial firms. The expectation was that they estimate the risk profile of firm value (or at least that of their operating cash flow) and hedge/insure it with derivative securities. That is not what we find. Firms appear to rely on operating tools both actively and reactively to protect against currency risk. Currency derivatives are used mainly to micro hedge/micro insure transaction exposure.

Firms do not know the currency RP of their value or that of their cash flow. Apparently, they do not think they need to know. Yet, this approach is puzzling, since knowing their RPs could help firms better calibrate their risk management tools. Whereas most firms ignore the quantitative dimensions of their RPs, they at least know the direction of the impact of unexpected currency rate changes on their cash flow. Yet, almost no firms are aware of risk profile concavities of the kind postulated in the literature as the reason to manage currency risk to maximize firm value. Firms either fail to properly understand why currency risk reduces firm value or manage risk even when it is unnecessary.

These results raise many questions for future research. One of the most challenging is the apparent overall approach to risk management by firms, namely the reduction of economic exposure with (mostly) on balance-sheet instruments on the one hand and the short-run micro hedging and micro insuring of transaction exposure with (mostly) currency derivatives on the other. What makes this approach particularly puzzling is that it does not seem to rely on even rough quantitative assessments of exposure (of firm, cash flow, or transaction value). We suspect that these observations could be the result of the way firms are internally organized and of the incentives they create for their executives.

CFOs and treasurers may have a compartmentalized view of the firm. Their main incentive might be to guarantee sufficient liquidity and borrowing capacity rather than to worry about firm value directly.

Focusing mainly on transaction exposure might therefore a sensible thing to do (although it is not clear why it would not make sense to aggregate individual foreign currency positions). Only the CEOs and the heads of the various divisions may have
the integral view that CFOs and treasurers apparently lack. But the divisions may not have the tools (currency derivatives) or the authority to manage currency risk other than with operating instruments. And the CEOs may not have the proper incentives to reduce currency risk with derivative securities. Moreover, CEOs, like academics, may have only a fuzzy notion of the benefits of currency risk management.

4.1.2 Financial risk management by US non-financial firms

Weiss Center for International Financial Research of the Wharton School, in partnership again with CIBC World Markets, undertook third survey on financial risk management practice and derivatives used by non-financial corporations in the United States between October 1997 and March 1998. In terms of size, 160 firms are from the large category, consisting of firms with fiscal year 1996 total sales greater than $1.2 billion, 116 are from the medium-sized category, with total sales between $1.2 billion and $150 million, and 123 are from the small category, with total sales less than $150 million.

Key findings of the survey are given below:

I. Use of Derivatives

A. Sample Firms and Overall Derivatives Usage

The first question in the survey asks firms whether they use derivatives. Of the firms, 200, or 50%, report using derivatives. Interestingly, in all three years the percentage of derivatives users from this group is 41%, although several firms switch between use and non-use across years. Overall, these results suggest that the percentage of firms using derivatives has remained constant over the past three years.

B. Change in Usage Intensity

Of derivative users, 42% indicated that their usage had increased over the previous year, compared to just 13% who indicated a decrease. The remaining firms indicated that their usage had remained constant. Overall, these responses suggested that a significant proportion of derivatives users is finding derivatives helpful enough that they are choosing to increase their usage.

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C. Derivatives Usage Conditional on Size and Activity

In the size dimension, usage is heaviest among large firms at 83%. The derivative usage rate drops to 45% for medium-sized firms and to 12% for small firms. That large firms are so much more likely to use derivatives is suggestive of an economies-to-scale argument for derivative use, with large firms better able to bear the fixed cost of derivatives use compared to small firms. In the industrial dimension, derivatives usage is greatest among primary product producers at 68%. Given that futures exchanges were originally established to help manage commodity risks, it is not surprising that such a large percentage of primary product producers use derivatives. Among manufacturing firms, 48% use derivatives; much of this usage is likely driven by foreign currency exposure arising from foreign operations or exporting/importing. Even among service firms, 42% use derivatives, most likely because of the increased internationalization of service firms and the growing need to manage foreign currency exposure.

The change in derivatives usage also varies across these groupings. Service firms are nearly twice as likely to have increased derivatives usage as manufacturing or primary-product firms. Also, not a single small firm indicated that it had decreased its derivatives usage over the previous year. These responses suggest that the usage rate is increasing most among groups where overall derivatives usage is least common.

D. Approach to Risk Management Across Risk Classes

Financial price risk can be classified into four broad classes: foreign-currency, interest-rate, commodity, and equity risk. The survey results reveals that of the firms using derivatives, foreign-exchange (FX) risk is the risk most commonly managed with derivatives, being done so by 83% of all derivatives users. Interest-rate (IR) risk is the next most commonly managed risk with 76% of firms indicating IR derivatives use. Commodity (CM) risk is managed with derivatives by 56% of derivatives users, while equity (EQ) risk is the least commonly managed risk at just 34%.

FX risk is most commonly managed by manufacturing firms, with 95% of this group indicating FX derivatives use. For service firms, IR risk was slightly more commonly managed with derivatives than FX risk, with derivatives usage rates of 78% versus 72%, respectively.
Approach, in terms of decision-making structure, to managing each class of risk. The following question was asked to choose between: 1) risk-management activities being primarily centralized, 2) risk-management decisions primarily decentralized with centralized coordination, or 3) risk-management activities primarily decentralized.

Centralized risk-management activities are overwhelmingly most common, with the only exception being commodity risk management where one-third of the firms indicated some degree of decentralized structure.

E. Concerns About Derivatives Usage
These issues include: accounting treatment, credit risk, market risk (unexpected changes in prices of derivatives), monitoring and evaluating hedging results, reaction by analysts and investors, Security and Exchange Commission (SEC) disclosure requirements, and secondary market liquidity (ability to unwind transactions). For each issue, firms are asked to indicate a high, moderate, or low level of concern or indicate that the issue is not a concern to them. Firms were also given the option of listing any other issues of great concern to them regarding derivatives use.

Accounting treatment was the issue causing the most concern among derivatives users, with 37% of the firms indicating a high concern and only 15% low or no concern with this issue. Undoubtedly, this concern is the result of the August 1997 release by the Financial Accounting Standards Board (FASB) of a draft proposal for a new accounting standard for the measurement and reporting of derivatives. Market risk, defined as unforeseen changes in the market value of derivative positions, was the next issue most troubling firms, with 31% of the firms indicating a high degree of concern and 27% of the firms indicating little or no concern. This was followed closely by monitoring and evaluating hedge results with 29% of the firms indicating a high degree of concern but 26% indicating little or no concern. The remaining four issues had significantly more firms indicating little or no concern as compared to high concern. In the case of credit risk, secondary market liquidity, and reaction by analysts and investors, more than 35% of the firms indicated low or no concern with these
issues. For credit risk, this result contrasts markedly with the 1995 survey in which it was the issue causing the most serious concern among derivative users. Among the “other issues” that some firms indicated high concern about were transaction costs and unauthorized trading.


The new proposal requires all derivatives to be recorded on the balance sheet at fair market value and marked to market each reporting period. Changes in market value are either reported in income each period, or directly in the equity section of the balance sheet, depending on the specific use of the derivatives. The rule also essentially covers all derivatives instruments, including derivatives embedded in other securities, thus expanding the set of derivatives instruments for which accounting rules are explicitly stated. For 73% of the firms, the new rules will have no effect on their derivatives use or their risk-management strategies. Of the 27% of the firms for which the new rules will cause some change, the most likely effect is a change in the type of instruments used, with 55% of these firms indicating this change. Other commonly mentioned effects include a reduction in the use of derivatives and a change in the timing of hedging transactions.

III. Foreign Exchange Exposure Management
This section focuses on the issue of currency exposure and its management using derivatives.

1.8. Currency Exposure
Foreign currency derivatives are the most commonly used class of derivatives with 83% of derivative-using firms utilizing them. In terms of the percentage of total revenues and costs in foreign currency, 40% of the firms report foreign currency revenues to be 20% or more of total revenues, while 36% of the firms report foreign currency expenses to be 20% or more of total expenses. So, many firms in the survey have significant foreign currency exposure.

It is interesting that a majority of firms roughly balance out total foreign currency revenues with foreign currency expenses. Although the responses mask whether the
expenses and revenues are in the same foreign currencies, and thus many of these balanced firms may have exposures to particular foreign currencies, this pattern suggests that natural hedging is a common way for firms to manage their exposure to exchange rates. Of the firms that report a net imbalance in total foreign currency revenues and costs, nearly twice as many firms report a net revenue exposure (26%) as report a net expense exposure (15%).

Conditionally, these revenue and expense exposures exhibit several interesting characteristics. First of all, large and medium firms are both substantially net-revenue-exposed, while the small firms are, on average, net-expense-exposed. Across industries, manufacturing and service firms are heavily revenue-exposed with more than three times as many net-revenue-exposed firms as net-expense-exposed firms. This is offset by a heavy net-expense exposure on the part of the primary-product firms.

B. Transactions in Foreign Currency Derivatives Markets

Firms were asked to indicate how often they transacted in the foreign currency derivatives market for hedging eight frequently cited exposures. These were contractual commitments – both on-balance-sheet (i.e., payables and receivables) and off-balance-sheet (i.e., signed contracts pending), anticipated transactions within one year, anticipated transactions beyond one year, economic/competitive exposure, translation of foreign accounting statements, and foreign repatriations.

The most frequently cited motivations for transacting in the foreign currency derivatives markets are for hedging near-term, directly observable exposures. The most commonly hedged exposures were on-balance-sheet commitments (89% hedge frequently or sometimes), anticipated transactions expected within one year (85% hedge frequently or sometimes), and foreign repatriations (78% hedge frequently or sometimes). Identifiable off-balance-sheet commitments are substantially less likely to be hedged by these firms than on-balance-sheet commitments. Anticipated transactions beyond one year are frequently hedged by 12% of the firms but sometimes hedged by 45%, suggesting that a majority of firms using foreign currency derivatives at least sometimes hedge exposures over a longer horizon. The more
amorphous and longer-term competitive exposure is hedged frequently by just 11% of the firms but sometimes by an additional 28%, which is a noticeable increase from past surveys. Hedging translation exposure was a reason for currency derivatives transactions for only a minority of the firms, with 14% doing this frequently and another 23% doing so sometimes. Finally, transacting in derivatives to hedge exposures from arbitraging interest rates across currencies was done frequently by only 5% of the firms; however, 35% of the firms indicated that they do this sometimes.

C. Hedging Intensity
The survey revealed that with the exception of three types of exposure — on-balance-sheet exposures, anticipated transactions less than one year and foreign repatriations — the majority of firms hedge less than 25% of their perceived exposures. Even for these three heavily hedged exposures, the average proportion hedged, shown in the final column of the table, is less than 50%. Only for on-balance-sheet commitments does the average percentage of the exposure hedged reach 50%. Thus, partial hedging appears to be normal practice for these firms. Even in the cases of these three types of exposures, only a third of the firms indicated that they hedged more than 75% of the total exposure. Again, these three were the more easily identifiable, near-term, transaction-based exposures. For longer-term exposures, such as anticipated transactions beyond one year and economic/competitive exposure, less than 10% of the firms indicated that they hedged as much as 75% of the perceived exposure. These results suggest that foreign currency hedging, rather than eliminating exposure, generally only reduces the exposures, but typically by less than half of the original outstanding exposure.

D. Maturity Structure of Hedging
First, short-term derivatives are used by a vast majority of firms. In fact, 82% of the firms utilize foreign-currency derivatives with an original maturity of 90 days or less, and 77% use foreign-currency derivatives with an original maturity of 91 to 180 days, while only 12% use foreign-currency derivatives with maturities of more than three years. Second, firms tend to concentrate most of their foreign-currency derivatives usage at the short horizon, especially 90 days or less. Thus, nearly one-quarter of the
firms do all of their foreign-currency derivatives activity in instruments with original maturities of 180 days or less. Finally, the intensity of usage drops off dramatically with the lengthening of the maturity of the derivatives. Very few firms use any instruments with maturities over one year. A small group, 7% of the firms, all large firms, concentrates their foreign-currency derivatives usage only in the long-horizon instruments.

E. Impact of a Market View on Foreign Currency Derivatives Use
Firms were asked to indicate the frequency with which their market views cause them to alter the timing or size of their hedges or to actively take a position in the market using derivatives. 10% of the firms indicated that their market view on exchange rates “frequently” altered either the size or the timing of the hedges that they entered into. A substantially larger number of firms occasionally incorporate their market view into their hedging decision, with 49% of the firms sometimes altering the timing of their hedges and 51% sometimes altering the size of their hedges. Without entering the debate about what constitutes a hedge and what constitutes speculation, it is apparent that a majority of firms sometimes takes into account their opinion about market conditions when choosing a risk-management strategy. A smaller, but still substantial, proportion of firms “actively take positions” based on a market view of the exchange rate. While only 6% of the firms “frequently” take positions, another 26% do so at least “sometimes.”

F. Benchmark for Evaluating Foreign Currency Risk Management
For foreign-currency risk management, the firms were asked about the benchmark they used for evaluating foreign-currency risk management over the budget/planning period.

Of the firms surveyed, 44% indicated that they did not have a benchmark for evaluating the foreign-currency risk-management process. Of the remaining responding firms, the most common benchmark was the use of the forward rates available at the beginning of the budget/planning period. Of the firms with some benchmarking, 42% used the forward rates, which is a simple and reasonable approach to the question. Of the responding firms with a benchmark, 24% indicated
that they simply use the spot rates available at the beginning of the period. This approach is questionable on theoretical grounds as the current spot rates do not incorporate any market expectations of currency movements over the period nor do they offer rates at which any risks could actually be laid off. Of the firms with some form of benchmark, 17% use a baseline percent hedged strategy. The firms indicated that the baselines for these benchmarks typically range from 50% to 100% hedged. Finally, 17% of the responding firms indicated the use of some other form of benchmark. Examples of these include comparison against fully open and fully hedged results, comparison against an average executable rate over a period, comparison against some combination of a forward and option hedge, and simple profit and loss on currency derivatives. While some of these ideas have more merit than others, it is disturbing that nearly half of the firms do not have a well-specified benchmark for evaluating whether their foreign-currency risk-management process is providing any useful service to the firm.

IV. Interest-Rate-Exposure Management
Nearly all firms that use interest-rate derivatives reported using them to swap from floating-rate debt to fixed-rate debt. While only 13% of the firms indicated that they do this frequently, 83% of the firms indicated that they use interest-rate derivatives to do this sometimes. In contrast, just 60% of the firms indicated that they use interest-rate derivatives to swap from fixed-rate debt to floating-rate debt with most firms doing so only sometimes as opposed to frequently. Of the firms, 66% indicated that their view on interest rates causes them to alter the timing of a transaction, 60% of firms doing so sometimes and just 6% doing so frequently. A slightly smaller percentage, 59%, responded that their view affected the size of their derivatives transaction, again with the majority, 54%, doing so sometimes. Additionally, 41% of the firms indicated that their view on interest rates causes them to actively take positions, with 37% doing so sometimes.

V. Option Contracts
Options are generally less popular than forwards in the FX area, swaps in the IR area, and futures in the CM area. Option use tended to be concentrated in exposures that are longer term and more contingent. Firms limited their option usage either because they
felt some other instrument was better suited to the exposure or they pointed to some
obstacle to their use, such as excessive cost or lack of sufficient comfort with their
behavior.

The variety of options commonly used in the market today has increased dramatically
over the past few years. In addition to standard options, average-rate options, barrier
options, and option combinations are widely available in the over-the-counter market.
Of the 200 derivatives-using firms, 68% indicated that they had used some form of
option within the past 12 months. FX options were the most common, used by 44% of
derivatives-using firms, while IR and CM options were used by just 28% of
derivatives using firms. The instrument-specific responses indicate that the standard
European-style (exercisable only at maturity) and American-style (exercisable any
time up to maturity) options are the most commonly used, with 42% of responding
firms using European-style and 38% using American-style options. Option
combinations, such as collars, straddles, etc., are used by 25% of all derivatives users.
The most commonly used exotic option is the average-rate option, which is different
in that its payoff is based upon the difference between the strike price and some
average of the history of prices. This type of option is used by 19% of derivatives
users. Barrier options, which come into existence or cease to exist when some price
point is reached, are used by 13% of the firms, while contingent-premium options,
with deferred or contingent-premium payments, have been used by just 6% of the
firms in the past 12 months. Among the “other” type of options used are compound
options (i.e., options on options) and equity options generally. Another is a ...
revealed by the table is that options usage is heaviest in foreign currencies and
commodities. Currency-option usage is heaviest in the European-style and the exotic
basket and barrier options while commodity option usage is heaviest in the American-
style and average-rate options.

Of large firms that used derivatives, 74% indicated the use of some form of option
within the past 12 months. This compares with 58% of medium-size firms and 47% of
small firms. By industry, manufacturing firms were most likely to use options, with
78% indicating some use compared to 67% of primary-product firms and 50% of
service firms. Manufacturing firms are substantially more likely to have used
European-style relative to American-style options, while the opposite is weakly true for firms in the primary-product and service sectors. Manufacturing firms are also more likely to have used barrier options, with most of this use being in the FX area. Finally, option combinations are most commonly used by primary-product firms.

VI. Control and Reporting Procedures

Responses regarding internal policy regarding derivatives usage and reporting & corporate policies regarding the monitoring and evaluation of derivatives risks are given below:

1.9. Corporate Policy and Reporting

Of the firms using derivatives, 79% report having such a documented policy. With regard to reporting of derivatives activity to the board of directors, 50% of the firms have no preset schedule, while 27% report either monthly or quarterly and another 17% only annually. Only 27 firms, or 14% of the firms using derivatives, indicate having neither a documented policy nor regular reporting of derivative activity to the board.

B. Counterparty Risk

For derivatives with maturities 12 months or less, 25% of the firms insist on a rating of AA or above for the counterparty, and 74% of the firms insist on A or above. Policies become even stricter for derivatives with maturities longer than 12 months. Of the firms, 40% insist on a rating of AA or above.

C. Monitoring and Evaluation

Monitoring helps keep the firms abreast of market changes. It also provides a basis for detecting sudden changes in value and determining whether such changes in value continue to constitute a sufficient hedge of the underlying exposure. 28% of the firms are revaluing their derivatives portfolio either daily or weekly, while another 27% revalue monthly. There is a shift towards the source of valuations. In contrast to previous results, where the original dealer was the most important source for information about revaluing derivatives, firms now indicate that internal sources (such as software and simple spreadsheets with market data) are the most relied upon.
method for revaluing derivatives. Of the firms, 43% indicated that in-house sources are the most important source for revaluing derivatives, with just 38% indicating that they still rely primarily on the original dealer. Also, 26% of the firms indicated a primary reliance on another dealer, consultant, or professional price vendor. This increase in in-house valuations as the primary source of valuation due to widespread availability of low-cost software for end-user pricing.

With regard to the risk of the derivatives portfolio, 44% of derivatives users indicated that they calculated a value at risk (VaR) measure for some or all of their derivatives portfolio. Use of VAR was much more common among large firms and firms in the primary-products sector.

Given that the purpose of risk management is to reduce risk rather than increase profits, it is surprising that 40% of the firms have a profit-based approach to risk-management evaluation. Such an approach can provide incentives for risk managers to take positions that may ultimately increase the total riskiness of the firm.

VII. Non-Use of Derivatives

Majority (60%) of firms do not use derivatives because their exposures are too small. An additional 14% of non-users with potentially large exposures indicated that the most important reason they do not use derivatives is that they can manage these exposures effectively by other means, such as operational diversification or risk-shifting/sharing arrangements.

The only other concern receiving much weight was the concern about perceptions of derivatives use by others, such as investors/analysts. Of the firms, 10% indicated that this was the primary reason in their mind for not using derivatives, with an additional 31% citing it as a supporting explanation.

The other three specifically mentioned issues, difficulty pricing and valuing derivatives, concerns over disclosure requirements of the SEC, and concerns over the new FASB accounting treatment, all generated only token measures of concern from the respondents.
VIII. Summary

Many of the results of this year's survey confirm and reinforce those found in previous surveys in 1994 and 1995. In particular, derivatives use is not widespread, with less than half of the population of firms using financial derivatives of any kind. While the intensity of derivatives use appears to be increasing among the firms using derivatives, no compelling evidence suggests that the total percentage of firms using derivatives has changed dramatically over the past four years. Foreign-currency derivatives are the most commonly used, followed by interest-rate, commodity, and equity derivatives, respectively.

4.1.3 Derivatives Usage in Risk Management by US and German Non-Financial Firms

This paper is a comparative study of the responses to the 1995 Wharton School survey of derivative usage among US non-financial firms and a 1997 companion survey on German non-financial firms, comparable sub sample of firms from the US study to match the sample of German firms on both size and industry composition. A comparison of the responses to parallel surveys on derivative usage conducted on comparable samples of US and German non-financial firms. The results of this comparison suggest that firms in both countries primarily use derivatives to manage risks from fluctuating financial prices. Given the responses, German firms are more likely to use derivatives than US firms, across all three classes of derivatives examined. This is consistent with Germany being a smaller more open economy leading to greater exposure of its firms to financial price risk, especially foreign exchange rates and commodity prices. It was found that German firms are more likely to use derivatives than US firms, with 78 percent of German firms using derivatives compared to 57 percent of US firms. Aside from this higher overall usage, the general pattern of usage across industry and size groupings is comparable across the two countries. In both countries, foreign currency derivative usage is most common, followed closely by interest rate derivatives, with commodity derivatives a distant third. In contrast to the similarities, firms in the two countries differ notably on issues.

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such as the primary goal of hedging, their choice of instruments, and the influence of their market view when taking derivative positions. These differences appear to be driven by the greater importance of financial accounting statements in Germany than the US and stricter German corporate policies of control over derivative activities within the firm.

In contrast, firms across the two countries differed noticeably on such issues as their primary the goal derivatives use, their choice of particular instruments in each derivative class, and the influence of their own view of the market when taking their derivative positions. Firms in the two countries differ with respect to the primary focus of risk management with derivatives, with German firms focusing more on managing accounting results and US firms focusing more on managing cash flows. This result is consistent with the greater importance of the financial accounting statements in Germany (where they also act as the basis for taxation) relative to the US (where they are purely to provide information to investors). German firms are more likely to incorporate their own view on price movements when taking derivative positions than US firms.

4.1.4 Risk management practices of Non-banks in the UK's FX Market

Up until the mid-1990s, the UK foreign exchange (FX) market for corporates was dominated by the main high street banks. There was a natural and obvious association between 'money' and 'bank', ensuring that all businesses used their bank when purchasing or selling foreign exchange. As a nation built on trade, the UK has a substantial number of import and export companies, many of which are reliant on a cheap and reliable international payment service in order to remain competitive. Whether the price and service on offer was good was not relevant; UK business had no alternative to their bank. Only if you were a very large corporation would you get access to superior service, relationship and price.

The Rise of the ‘Non-Bank’

As more UK businesses started to demand a simple and competitive method by which to book and send an FX payment overseas, a small number of dedicated FX ‘non-banks’ began to emerge. What non-banks could offer was a simple one-stop shop

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whereby a small business could book its FX rate and make a payment at the same
time; a simple method for success. This one-stop shop philosophy attracted many
clients. All of a sudden, UK companies could book an FX rate and send their
payments with just one phone call. In addition, if there were any problems, the
company knew exactly who to speak to as they were given a dedicated dealer and
relationship manager. This new ordering process was a breath of fresh air when
compared to the laborious process that companies had to endure with their bank.

Overlaying this approach was a strong relationship-based ethos. To a small UK
corporate at that time any relationship was a good one. Relationships between small
companies and their banks were sporadic and, in general, weak. This relationship-
based approach made the client feel valued, an emotion that most businesses crave,
regardless of their size.

‘Competitive pricing’ was the non-banks’ mantra, and as we know this was not a
difficult promise to deliver when the banks were offering such uncompetitive rates. In
fact, non-banks would often ‘lure’ the client in by offering market prices and, after a
time, would charge gradually more, until they reached the poor rates that the banks
were charging. In fact, many companies had a limited understanding about how the
FX market worked and how the rate on offer could vary between providers. The only
thing that was transparent was the fee on each payment, something the non-banks used
to their advantage.

As the global business environment becomes increasingly competitive and
excellent payment execution is simply not good enough. Profit maximisation and risk
mitigation are now the buzzwords around most boardrooms. This is not achieved
solely through competitive FX pricing. Of course, the better price a client gets, the
more they save at any given instant. However in the world of international business,
risk mitigation is paramount. Both banks and non-banks can actively compete on price
for unregulated products (such as spot FX). The most basic form of FX risk
management is that of forward contracts. These unregulated products offer simple yet
rigid solutions to FX risk mitigation, allowing companies to lock in a profit margin on
any traded goods, and prevent any unexpected losses from adverse movements in the
exchange rate. However, in such a competitive market, many companies find them
increasingly suffocated by their lack of flexibility. There is no ability to take advantage of any favourable movements in the exchange rate, and when competitors don’t hedge (and many don’t) and FX rates move in their favour, the sensible hedger is left uncompetitive and in a worse position.

Therefore, should UK businesses leave their risk unprotected? Absolutely not. Most companies are not in the business of gambling and should always protect their risks. There are, however, many other products available to avoid FX risk but that also allow the user the flexibility to benefit from favourable exchange rate movements, and/or flexibility on the end delivery amount. For example, FX options offer a simple solution by offering companies downside protection with potential upside gain.

4.1.5 HOW DO UK-BASED FOREIGN EXCHANGE DEALERS THINK THEIR MARKET OPERATES?\(^5\)

The results of a survey of UK-based foreign exchange dealers conducted in 1998. It addresses topics in three main areas: the microeconomic operation of the foreign exchange market; the beliefs of dealers regarding the importance, or otherwise, of observable macroeconomic fundamental factors in affecting exchange rates; microstructure factors in FX. It was found that heterogeneity of traders’ beliefs is evident from the results but that it is not possible to explain such disagreements in terms of institutional detail, rank or trading technique (e.g. technical analysts versus fundamentalists). As expected, non-observable fundamental factors are thought to dominate short horizon changes in exchange rates, but observable fundamentals are deemed important over much shorter horizons than the mainstream empirical literature would suggest. Finally, market ‘norms’ and behavioural phenomena are very strong in the FX market and appear to be key determinants of the bid–ask spread.

The three main topics are:

1. The microeconomic operation of the foreign exchange market: the trading techniques used by FX dealers, who traders deal with, and the mechanisms by which they trade.
2. Traders’ views on exchange rate determination: the perceived relevance of the concept of fundamental value, the factors that traders think important in determining exchange

\(^5\) YIN-WONG CHEUNG*,y, MENZIE D. CHINN\(^b\) and IAN W. MARSH\(^a\) Department of Economics, University of California, USA
\(^b\) LaFollette School of Public Affairs and Department of Economics, University of Wisconsin, USA.\(^c\) Cass Business School, London, UK

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rate changes over a range of horizons, and the predictability of exchange rate trends over the same range of horizons.

3. Further market microstructure factors: the size of bid-ask spreads, and the factors that determine spreads.

The results point to three areas of divergence between academic writing and traders’ views:

(i) Fundamental value is seen as a relevant concept by a large proportion of traders at horizons much shorter than mainstream academic theory can explain. Over half the respondents think exchange rate changes over a 6-month horizon (or less) accurately reflect changes in economic fundamentals of an observable nature. The academic consensus is closer to 36 months.

(ii) ‘Speculative forces’ appear to be an important factor in determining short-term currency movements. This is over and above the contribution made by economic factors, news, technical trading effects and bandwagon effects. Answering the question of what factors precipitate speculative flows in addition to the alternatives may contribute to our knowledge of exchange rate determination.

(iii) Although much has been made of the differences between chartists and fundamentalists, this survey shows very little evidence of systematic differences of opinion between these two groups. However, there is clear evidence of heterogeneity in the foreign exchange market as a whole. There is no consensus among traders on a wide range of important issues relating to fundamental value and the determinants of exchange rate movements.

The results also suggest a new answer to an old puzzle. The concept of purchasing power parity (PPP) as a measure of an exchange rate’s fundamental value is supported by a sizeable proportion of traders. However, a much smaller percentage of respondents would trade in such a way as to move exchange rates closer to PPP levels. This suggests an alternative reason for the ambiguous empirical results of tests of PPP.
In addition to the standard arguments such as measurement difficulties and price frictions, traders, who jointly determine exchange rates, in the main do not act so as to restore equilibrium.

Finally, the results point to a new puzzle. Traders do not vary their bid–ask spread either very often or for some of the reasons thought important in the microstructure literature. Instead, market convention appears to exert a strong hold over traders. Why this is so deserves further research, and the importance of 'market norms' should be incorporated into microstructure models.

The data used in this study were collected by a postal survey of UK-based foreign exchange dealers conducted in March/April 1998. A copy of the questionnaire is reported in the Appendix. Approximately 1940 surveys were sent out to named dealers whose affiliations were extracted from the 1997 Hambro's Dealers Directory.

Correlations
Trivially but reassuringly, for example, customer order-led traders conduct a significantly greater proportion of their deals with customers (52%) than other types of traders (22%); t-statistic is 6.76. At a more meaningful level, however, there is no significant relationship between trader type and any measure of market power (daily position limit, departmental turnover or rank), implying that high-ranking traders do not seem to use one particular trading strategy. Regarding trading systems, low position limit traders (5US$25 m) do appear more likely to use the interbank network (41%) rather than brokers when compared to higher-ranking traders (25%); t-statistic is 3.19.

1.10. FUNDAMENTAL VALUE
Most (macro)economic models of the exchange rate seek to explain a fundamental or equilibrium value. The survey showed that traders believe 'fundamental value' to be a concept of relevance to the foreign exchange market, but that this only truly becomes a widely held view when considering exchange rate movements over a period in excess of 6 months.

When looking intraday, only 3% of traders agree that exchange rate changes accurately reflect movements in fundamental value (Table 4(a)). This rises to 58% for the
intermediate horizon of up to 6 months, and to 87% for the long run (over 6 months). Just 1% of respondents selected 'no opinion', and then only over the long run which may be a period beyond the ken of exchange rate traders.

The responses to this question accord in part with the academic literature. Twenty-five years of research has had only limited success in modelling movements in exchange rates over horizons below 6 months, where the findings of Meese and Rogoff (1983) still hold considerable sway. For example, in their comprehensive survey of exchange rate modelling, Frankel and Rose (1995) conclude: ... the Meese and Rogoff analysis at short horizons has never been convincingly overturned or explained.

It continues to exert a pessimistic effect on the field of empirical exchange rate modelling in particular and international finance in general.

A clear pattern emerges from these studies (Frankel and Froot, 1987, 1990b; Froot and Ito, 1989; Chinn and Frankel, 1994). At short horizons, extrapolative expectations, as characterized by the first equation, are strong and follow a bandwagon form. That is, the estimated coefficient \( b_E \) is significantly greater than zero, such that positive (negative) changes in the log exchange rate, \( s \), over the previous periods are extrapolated into further positive (negative) expected changes over the forthcoming \( k \) periods. However, as \( k \), the forecast horizon, lengthens, the expectations coefficient turns negative, implying that expectations are more stabilizing; a positive (negative) change is expected to follow a negative (positive) move. This switch appears to occur in predictions over a period somewhere between 3 and 6 months. This move to the stable form over the longer-run coincides with estimates of \( b_R \) in the second equation, which are increasingly positive and significant as \( k \) rises. Such findings are supportive of a regressive expectations formation mechanism, whereby the exchange rate is forecast to move towards its equilibrium or fundamental value, \( s \). Equilibrium is loosely specified in many of these papers and, in increasing levels of sophistication, is proxied by a constant, long-term moving average or purchasing power parity estimates. Frankel and Froot (1987), for example, find an expected half-life of 2.5 years for deviations from a PPP equilibrium.
1.11. MICROECONOMIC ASPECTS OF FOREIGN EXCHANGE DEALING

Market microstructure is a major growth area in foreign exchange economics. Dissatisfaction with the failure of macroeconomics-based attempts to model key exchange rates, perhaps best exemplified by Meese and Rogoff (1983), is a major cause. More positively, the success of the microstructure approach in explaining hitherto opaque aspects of other asset markets has acted as a spur.

Lately, a proliferation of new databases facilitating high-frequency studies and/or containing microeconomic variables (e.g. inventory positions, order flow and bid–ask spreads) has allowed empirical research to address some of the issues raised by the theoretical microstructure literature. Unfortunately, the sheer size of the market, combined with its decentralized nature, makes generalizations based upon this empirical work questionable. Rather than seek 'hard numbers', this survey concentrates on opinions. This is not without danger, as is fully recognized by the authors. However, we believe that the paucity of information in this area means that with any plausible levels of measurement error or selection bias, the results of this survey contain sufficient information to be relevant to current research.

1.12. Summary

The results from the survey complement the studies in both the microstructure and macroeconomic literatures.

A key finding is that the irrelevance of the macroeconomic factors detected in the plethora of empirical exchange rate studies is to be expected, given the market participants' own assessment of the factors important at the daily, weekly or even monthly horizon)namely over-reaction, speculative and bandwagon effects. It reaffirms the importance of the non-fundamental factors in explaining short-term exchange rate fluctuations. On the other hand, the time horizon at which dealers believe observable fundamentals such as macro aggregates and prices have significant effects on exchange rates seems much shorter than that reported in the empirical literature. It is a challenge to reconcile these two strands of evidence.
While market practitioners accord some importance to purchasing power parity as the determinant of a currency’s ‘fundamental value’, it clearly does not dominate in their trading calculations.

Rather, traders view long-term movements as being determined by a much larger set of fundamental variables. Identifying the manner in which these other factors enter expectations may lend guidance to future empirical modelling of exchange rates.

4.1.6 Hedging Foreign Exchange Risk in Chile: Markets and Instruments

I. INTRODUCTION

This paper explores the following questions about the market for foreign exchange hedging in Chile: (i) the foreign exchange exposure of the Chilean corporate sector; (ii) the determinants of the demand and supply of foreign exchange hedging; (iii) the instruments available for hedging foreign exchange risk; (iii) the impact of the regulatory framework and market structure on the growth of the foreign exchange derivatives market; and finally, (iv) the degree to which foreign exchange risk hedging reduces systemic vulnerabilities to financial crises.

II. FOREIGN EXCHANGE EXPOSURE IN CHILE

In Chile, systemic risk from currency mismatches in corporate balance-sheets appears to be low, as foreign exchange exposure in Chile is low compared to other developed and emerging market countries. Caballero, Kowan, and Kearns (2004) report that the mean and median share of foreign currency liabilities in Chile are approximately 28 percent and 5 percent, compared to more than 50 percent and 60 percent respectively, in Argentina, Peru, and Uruguay. These authors also note that foreign exchange liabilities appear to be concentrated mainly in the tradable sector, a sector that may be able to withstand adverse exchange rate movements better than other industrial sectors. Central Bank figures also indicate that 84 percent of the total external debt in the non-financial private sector, standing at $24.9 billion or 34 percent of GDP by end-2003, is tilted towards medium and long-term maturities. The relatively long maturity profile reduces corporate sector vulnerabilities to adverse exchange rate movements. Finally, findings by

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Dominguez and Tesar (2001) suggest that foreign exchange exposure is significant only for 13 percent of publicly listed firms. At the industry level, the exposure only affects 17 percent of all industries. Foreign exchange exposure in the Chilean corporate sector is thus significantly lower than in other countries.

Factor analysis suggests the financial sector has been the most exposed to foreign exchange risk.

III. THE MARKET OF FOREIGN EXCHANGE DERIVATIVES

1.13. Demand and Supply

Foreign exchange derivatives in Chile are traded mainly in the over-the-counter market, and banks have a major role as market makers. Domestic banks and financial institutions can write a variety of derivatives instruments, and are responsible for matching corporate end-users and institutional investors' needs to cover exchange rate risk. Commercial banks are allowed to take positions on foreign futures contracts on foreign currency and interest rates, and on exchange-traded options on foreign currency and interest rate futures. Thus, commercial banks that act as market makers in the local market can hedge their net positions offshore if needed.

Demand for foreign exchange hedging comes mainly from large corporations, mostly because they have the resources and skills to implement foreign exchange hedging programs.

In consequence, they participate actively in the foreign exchange derivatives market. Small and medium enterprises, however, seldom hedge their foreign exchange exposures because of lack of knowledge about the benefits of hedging using financial instruments. Currently, local banks are organizing seminars to educate end-users in the small and medium enterprise sector about the benefits of foreign exchange hedging. Some market analysts also suggest that foreign exchange hedging may not be used more widely even among large corporations because it requires sacrificing the option to prepay dollar liabilities.

Financial institutions hedge a higher share of their currency exposure than non-financial institutions. In Chile, banks hedge 90 to 100 percent of their exposure, while corporations hedge only 40 percent (IMF and World Bank, 2004). This is not surprising since the
exposure of financial institutions is associated mostly to transactions on nominal contracts and a limited number of risk factors, which are easy to measure. Also, staff in financial institutions is more familiar with risk management techniques. In contrast, the exposure of non-financial corporations is difficult to assess since their exposure is not only related to financial assets and liabilities, but also to operating decisions.

Empirical evidence from small industrialized countries suggests that financial distress can often be the main driver of foreign exchange hedging in the corporate sector.

The regulation of foreign exchange derivatives in Chile follows the guidelines contained in the Law of Banks and Financial Institutions, and in the Law of Capital Markets. In addition, these contracts must satisfy the Central Bank regulations related to exchange rate markets and financial institutions.

These instruments include futures, forwards, swaps, and combinations of these instruments on the domestic currency, inflation-linked indexes, interest rates, and foreign currency and interest rates.

Hedging is determined mainly by three factors: the costs of financial distress, tax advantages, and agency costs among different stakeholders in the firm (Box 2). Empirical studies in small industrialized countries using survey data suggest financial distress is the main determinant of hedging. Jalilvand (1999) found that proxies for the costs of financial distress explain why Canadian firms use derivatives. For instance, firms with higher leverage and lower credit rating tend to use more derivatives. Taxes and agency costs were not important for Canadian firms. Financial distress also explains derivative usage in Australia, as found by Nguyen and Faff (2002). Finnish and Swedish firms also use currency derivatives to reduce financial distress costs, according to Hakkrainen et al (1998), and Hagelin (2003) respectively.

Arguably, financial distress may also be the main determinant of hedging in Chile, an hypothesis that may be testable using FECUS data.

Pension funds are the main providers of foreign exchange hedging to corporate end-users. As of end-December 2003, pension funds held 24 percent of their assets, or $11.9
billion, in foreign assets, most of them denominated in U.S. dollars (Table 3). Minimum coverage requirements of foreign assets makes pension funds the natural providers of foreign currency hedging to corporate end-users since they have an incentive to take the foreign currency paying leg of a derivatives transaction. Furthermore, the sizable foreign asset holdings of pension funds (14 percent of GDP) implies there is no shortage of foreign exchange hedging to meet corporate end users’ needs. Indeed, by end-December 2003, institutional investors had an outstanding dollar-paying position of $7.7 billion compared to the outstanding dollar buying position of $2.9 billion of corporations (Alarcón, Selaive, and Villena, 2004).

Exporters are also important providers of foreign exchange hedging to corporate end-users. According to market analysts and discussions with corporate treasurers, exporters also take foreign currency-paying positions in derivatives contracts. Central bank data show that foreign-currency paying positions of corporate end-users, mainly exporters, amounted to $4.8 billion or close to 28 percent of the total amount of foreign-currency paying positions in the domestic derivatives market in 2003 (Alarcón, Selaive, and Villena, 2004). However, some big exporters such as Codelco, prefer to conduct transactions in the spot market rather than the forward market because earnings volatility is not considered a major concern for their financial operations.

The supply of foreign exchange hedging, however, is concentrated on derivatives contracts with short maturities. Pension funds and exporters take foreign currency paying positions in derivatives contracts with maturities of three months or less, according to market analysts. Furthermore, analysts also note that pension fund managers do not always cover their long foreign currency positions fully since carrying naked dollar positions during periods of dollar appreciation is profitable.

Banks, therefore, are the suppliers of foreign exchange hedging for maturities of one year and above. Banks hedge the foreign exchange exposure arising from these long-term forward contracts with dollar and dollar-linked bonds issued by the Central Bank. Market analysts estimate that the outstanding amount of forward contracts with maturities above one year exceeds banks’ holdings of dollar and dollar linked instruments by 50 percent, implying that banks carry an unhedged position in Chilean pesos. Banks’ exposure,
though, is rather small given that these contracts only account for 1 percent of the forward market, as explained in the next section.6

B. Instruments
Forward Contracts
Forward contracts can be traded either onshore or offshore. In the onshore market, contracts can be written for Chilean pesos and Unidades de Fomento against the U.S. dollar, though the former are preferred. Nine out of ten contracts are non-deliverable (Moguillansky, 2002).

In the offshore market, forward contracts are non-deliverable and written only for Chilean pesos. Market analysts indicate that domestic corporations find more advantageous to hedge their exposure in the onshore market while the offshore market is used mainly by leveraged foreign investors. The average daily volume for the past three years have been in the range of 6 Back of the envelope calculations using figures reported by Alarcón, Selaive, and Villena (2004) and the opportunity costs detailed below suggest that the banks’ exposure arising from unhedged long-maturity forward contracts amounts only to $50-60 million, or barely 0.1 percent of total assets in the financial system.

The maturity breakdown of forward contracts in the onshore market is similar to that observed in Australia and New Zealand. In Chile, 21 percent of contracts are conducted for maturities of one week and less, 78 percent for maturities between 7 days and one year, and 1 percent for maturities of one year and above. The corresponding figures for Australia are 61 percent, 31 percent, and 8 percent, and for New Zealand, 41 percent, 58 percent, and 1 percent. Because a majority of contracts have very short maturities, hedging in the forward market may not contribute much to reduce cash flow volatility. This situation, however, is similar to the one in Australia and New Zealand.

Forward contract maturities
The onshore forward market is quite liquid for contracts with maturities of three months or less. Market participants indicate that the forward market for contracts with maturities of one year or less is a two-way market: the demand for foreign currency hedging by corporations with short dollar positions is mostly met by the supply of hedging from institutions with long dollar positions such as exporters and pension funds.
The cost of using forwards, as measured by the bid-ask spread as a percent of the forward rate, is low compared to emerging market countries. In Chile, the bid-ask spread is 8 basis points for one-month contracts. Compared to emerging market countries, the bid-ask spread in Chile is half of that observed in Brazil (15 basis points), similar to the spread in South Korea (8 basis points), but still higher than in small industrialized countries like New Zealand (4 basis points) and Australia (2 basis points) (Mendelson and Glaessner, 2004, and Alarcon, Selaive, and Villena, 2004).

The opportunity cost of hedging with forward contracts is comparable to costs in Australia and New Zealand. The opportunity cost can be measured as the foreign exchange gains foregone by locking in the exchange rate in advance. The higher the opportunity cost, the lower the incentives to hedge foreign exchange risk. Opportunity costs in Chile, measured as the difference in percent between the realized spot rate at the time the contract matures and the forward rate at the inception of the contract, are slightly lower than in Australia and New Zealand (Table 5). For the period April 2001 to April 2004, the average opportunity cost in Chile was similar to that in Australia and lower than in New Zealand. With respect to the maximum gain foregone by entering a forward contract, Chile also fared better than the other two countries during the time period examined.

Forward contracts in Chile, though, have additional costs that can work against their widespread use by corporate end-users. Corporate end-users that enter a forward contract with a bank may be required to post collateral with the bank because of counterparty risk. On average, the collateral requirement is equal to 5 percent of the nominal value of the contract for maturities less than 30 days, 7 percent to 10 percent for maturities over 30 days and up to 180 days, and 15 percent for maturities over 180 days and up to 360 days (Diario Estrategia, 2004). Even if corporations meet the credit ratings requirements of the bank underwriting the forward contract, the approval of a credit line is required. The credit line is costly since it ties up the bank’s economic capital. The cost of the credit line is passed on to the end-user as less the premium on forward rates.

These additional costs, that are tied up to the credit rating of the corporate end-user, may contribute to the observed low hedge ratios in the corporate sector. The collateral
requirement and the use of credit lines may explain why only 40 percent of foreign exchange liabilities were hedged using forwards (Mendelson and Glaessner, 2004), a figure well below those observed in other small industrialized countries. For example, results from a special survey in 1999 showed that in New Zealand financial contracts were used to hedge 64 percent of foreign currency denominated liabilities.

**Currency Options**

Plain vanilla currency options on U.S. dollar–Chilean peso (USD-CLP) are available offshore at prices similar to those quoted for U.S. dollar–Australian dollar (USD-AUD) and U.S. dollar–New Zealand dollar (USD-NZD) options. A simple way to measure the costs of using currency options for hedging is to use the implied volatility of at-the-money forward contracts.

While implied volatility can be used as a first approximation of an option premium, it may also reflect the compensation investors demand for expected realized volatility. Hence, high implied volatilities may reflect higher expected realized volatility and vice versa. The option premium, thus, is a better indicator of the option costs. Figure 3 shows the option premium for USD-CLP, USD-AUD, and USD-NZD options for the period May 2003-April 2004. The premium is lower for the Australian dollar, especially for the 6-month maturity contract, arguably reflecting higher liquidity in this market. The cost of hedging U.S. dollars using offshore currency options is similar for Chile and New Zealand.

There is an incipient onshore, over-the-counter currency options market whose growth has been constrained by regulation. Regulation prevents banks from offering option contracts. In order to circumvent this constraint, banks have set up affiliates or “sociedades de inversion” to offer these contracts to corporations. Corporate demand for these contracts remain low for two reasons, according to market analysts. First, in contrast to a forward contract, the option premium has to be paid upfront. Corporate users viewed this payment as a cost rather than the price of insuring against adverse exchange rate movements. Second, there is the perception that currency options may be “illegal” contracts since banks cannot offer them directly to their clients. As a result, the option market is very thin with a daily average volume of $2.5 million. The customer base in this market is comprised by large corporations.
Reflecting these regulatory constraints, currency options in the onshore market are rather expensive compared to offshore options. Option premia in the onshore over-the-counter market are quoted as a percentage of the spot rate, and currently, it stands at 3 percent for the three-month contract, and 4 percent for the 6 month contract (Diario Estrategia, Feb. 16, 2004). Compared to offshore options, domestic currency options are expensive since the average premium during the period April 2003-2004 was 2.2 percent for the 3-month contract, and 3.11 percent for the six-month contract.

IV. FOSTERING THE GROWTH OF THE FOREIGN EXCHANGE DERIVATIVES MARKETS

The growth of the foreign exchange derivatives market can enhance risk allocation during normal times. More efficient risk transfer, better investment decisions, and lower exchange rate volatility justify adopting policy measures that foster growth of the currency derivatives market. In addition, derivatives markets may help reduce agency problems that affect investment decisions by firms. Thus, increased availability of currency derivatives could contribute to enhance a country’s welfare. While there are no specific studies on how introducing currency derivatives affects existing markets, empirical studies also suggest that the volatility of the underlying asset declines substantially following the introduction of options (Conrad, 1989; Detemple and Jorion, 1990).

The development of the derivatives market, including foreign exchange contracts, requires modernizing current clearing and settlement systems and continuing the implementation of market friendly policies. There are still some legal and operational voids affecting the clearing and settlement systems, especially those related to the netting of positions. Among market friendly policies, authorities may consider removing restrictions on derivatives trading for pension funds and insurance companies. In addition, authorities may want to consider fostering the development of derivatives exchanges as a complement to the over-the-counter market. Exchanges do a better job than over-the-counter markets in decentralizing risk, reducing counterparty risk and its associated costs, facilitating price discovery, and allowing access to risk sharing instruments to small corporations.
V. FOREIGN EXCHANGE HEDGING AND FINANCIAL CRISIS

During periods of extreme financial distress, however, the availability of currency derivatives may exacerbate systemic risk in a country’s financial system. Prior to the occurrence of a financial crisis, markets become one-sided as firms and investors look forward to hedge their foreign currency exposures, using short-term instruments. With few or no investors willing to step in on the other side of the trade, market makers are forced to hedge their exposure by short-selling the domestic currency on the spot market. As a result, the domestic currency weakens further, domestic interest rates rise, volatility increases and corporate solvency deteriorates. A vicious circle emerges as continued weakening of the domestic currency prompts further demand for foreign currency hedge.

In addition, a liquid domestic derivatives market may also contribute to the transmission of financial crisis from neighbouring countries. For instance, it has been reported that volatility in the Chilean foreign exchange market increased during the second half of 2001 in the run-up to the Argentinean sovereign default. The surge in volatility has been attributed to multinational firms’ decision to hedge their currency exposures on Argentinean pesos using currency derivatives traded in the local Chilean market (Moguillansky, 2002). Systemic risk arising from derivatives transactions may be reduced through derivatives exchanges and centralized clearing-houses. When derivatives trading is concentrated among a handful of market makers, as is the case in Chile, the failure of one market maker can trigger a chain reaction. A centralized clearing-house reduces this risk by acting as the sole counterparty to all the exchange members. Risk is also reduced as the clearing-house nets aggregate positions across members. Furthermore, it is easier for authorities to monitor and regulate activities in the derivatives market if all information is concentrated on the clearinghouse.

VI. CONCLUSIONS

Foreign exchange exposure in Chile is lower than in other countries in the region, and similar to that observed in small industrialized countries. The most exposed sector is the financial sector. However, this is not a major source of systemic risk since a recent assessment of financial sector in Chile suggests that banks can withstand severe exchange and interest rate shocks successfully.
Managing currency exchange risk has been facilitated by a well-functioning forward market. There exists a two-way market, with pension funds and exporters taking foreign-currency paying positions and domestic corporate end-users taking foreign-currency buying positions.

Currently, the foreign exchange hedging needs of domestic users are met fully by pension funds and exporters. This situation is likely to continue as the pension fund industry continues to grow. Liquidity in the forward market, as measured by bid-ask spreads, is lower than in most emerging markets and deemed satisfactory by market participants.

Counterparty credit risk and lack of sophistication prevent small and medium enterprises from accessing the forward market. Banks require collateral from clients who do not meet internal credit rating requirements. Also, underwriting a forward contract requires first extending a credit line to the end-user. Costs associated to collateral and credit lines are passed on to the end-user as less favourable forward rates. Finally, corporate treasurers in the SME sector lack the needed training to manage currency risk actively.

Growth in the currency options market has been constrained by regulation. Allowing banks and pension funds to underwrite currency options could help fostering the development of this market. Currency options are valuable tools for hedging foreign exchange risk since their non-linear payoffs cannot be replicated with forward contracts. Also, establishing a liquid market of plain-vanilla currency options is a necessary step to introduce more exotic options.

Notwithstanding the benefits associated with currency derivatives markets, these markets may be a source of instability during periods of financial turmoil. In the absence of derivatives markets, speculative attacks are channelled through spot markets. Hence, the central bank can defend the exchange rate by intervening directly in the spot market. When derivatives markets exist, speculators can take virtually unlimited positions in forward and swap markets and reduce the effectiveness of Central bank’s intervention (Dodd, 2001). Furthermore, as markets become one-sided, dynamic hedging in the
derivatives market can amplify market movements. Authorities should bear these risks in mind while fostering the development of the derivatives market.

What Factors Determine the Demand for Foreign Exchange Hedging
Hedging foreign exchange risk is just one component of a firm's overall risk management program. Hedging foreign exchange risk is valuable if it helps reduce the costs of financial distress, decrease taxes, or avoid bad investment decisions arising from agency costs (Smith and Stulz, 1985).

Financial distress happens when a firm's income cannot cover its fixed expenses. Direct costs associated with financial distress are those linked to default, bankruptcy, reorganization, and/or liquidation. In addition, there are indirect costs associated with the firms' operations even if no default occurs. For instance, borrowing costs increased significantly to compensate for increased probability of default. Also, customer loyalty may decline causing sales, and hence, income to decline. Hedging reduces the likelihood of financial distress by reducing the volatility of foreign currency-denominated cash flows.

Foreign exchange hedging can decrease tax payments if the tax schedule is a convex function of income. In this case, smoothing pre-tax income lowers the average tax burden. Even in countries where the tax schedule is flat, tax preference items such as tax loss carry-forwards and investment tax credits create convexity, and hence, an incentive to hedge.

Finally, different stakeholders in the firm, that is shareholders, debt-holders, and managers, have conflicting objectives that may lead to sub-optimal investment decisions. For instance, managers' compensation largely depends on the performance of the firm. As a result, managers may demand a premium be added to their wages or bypass projects they deem too risky. If the firm hedges its exposure, including that related to foreign currency-denominated cash flows, these problems are attenuated. Hedging also helps firms to increase their leverage by reducing borrowing costs since it assures potential bondholders of a reduced probability of financial distress. Hence, it becomes easier for firms to achieve an optimal capital structure.
How Currency Derivatives Can Contribute to Destabilizing Exchange Rates during Periods of Distress

A market maker that is a foreign currency payer in a forward contract can hedge the foreign exchange risk exposure by creating a reverse position synthetically in the money market. This involves borrowing the present value of the notional amount of the contract in domestic currency, exchanging it for foreign currency in the spot market today and depositing it in a money market account. When the contract matures, the principal and interest earned on the foreign currency deposit offset the foreign currency payment, while the domestic currency received is used to pay the domestic currency loan. Hence, in the midst of a financial panic, hedging activity by market makers may lead to upward pressure on interest rate and downward pressure on the domestic currency beyond that justified solely by economic fundamentals. This situation was experienced in Brazil in mid-2002, when uncertainty about the presidential elections boosted demand for currency hedging in the forward market. Substantial selling pressure in the spot market drove the Brazilian real and domestic interest rates to all time highs.

End-users who want to hedge foreign exchange risk have to buy foreign currency call options, or equivalently, domestic currency put options. Market makers selling foreign currency call options to end-users can hedge their short position using delta hedging. Delta hedging requires buying an amount of foreign currency proportional to the notional amount of the option contract. The amount of foreign currency is determined by the “delta” of the contract, a measure of the sensitivity of the option price to changes of the exchange rate. When the exchange rate depreciates, that is, the foreign currency becomes more expensive relative to the domestic currency, the delta of the option increases. Therefore, the market maker is forced to buy increasingly larger amounts of foreign currency, which in turn, puts additional downward pressure on the domestic currency.
This paper investigates the impact of firm wide risk management practices on the foreign exchange exposure of 208 U.S. multinational corporations (MNC) over the period 1994 to 1998. Firm wide risk management is referred to here as the coordinated use of both financial hedges, such as currency derivatives, and operational hedges, described by the structure of a firm’s MNC foreign subsidiary network. We find that the use of currency derivatives, particularly forward contracts, is associated with reduced levels of foreign-exchange exposure. Furthermore, MNCs with dispersed operating networks have lower levels of currency exposure. These findings are robust to alternative ways of measuring foreign exposure. Finally, our results strongly support the view that MNCs hedging in a coordinated manner can significantly reduce exposure to currency risk. These results strongly suggest that operational and financial hedges are complementary risk management strategies.

I. Introduction
The practice of corporate risk management has changed dramatically over the past two decades. Originally, risk management was implemented on an uncoordinated basis across different units of the firm. The primary focus of these ad hoc risk management programs was to minimize costs of particular units. Today, however, risk management of currency exposure has, in many cases, evolved into a firm wide exercise that addresses both short-term and long-term exposures and encompasses financial as well as operational hedges. The ultimate goal of firm wide risk management is to reduce risk while placing the firm in a position to benefit from opportunities that arise from exchange rate changes. For example, Davis and Militello (1995) describe how Union Carbide employs a firm wide perspective in risk management. The company uses a one-year horizon for financial hedges (e.g., foreign-exchange derivatives), whereas for longer horizons, operational adjustments are made in sourcing, utilization of different plant locations, and pricing.

Firm wide risk management for multinational corporations (MNCs) is defined as the combined use of both financial and operational hedges as part of an integrated risk management strategy aiming at reducing exposure to foreign-exchange risk.

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4.1.7 Firm wide Risk Management of Foreign Exchange Exposure by U.S. Multinational Corporations

David A. Carter, Christos Pantzalis, and Betty J. Simkins
Department of Finance, College of Business Administration, Oklahoma State University, Stillwater, April 28, 2003
II. Multinational Corporations, Foreign Exchange Exposure, and Firm wide Risk Management

A number of studies have examined the uniqueness of U.S. multinational corporations (MNCs). For example, Errunza and Senbet (1981, 1984), Kim and Lyn (1986), and Morck and Yeung (1991) investigate the value of international operations. However, as Christophe (1997) points out, these studies generally focus on MNC activities during the 1970s, a period characterized by relatively stable exchange rates. In fact, the exchange rate volatility that has existed since the 1970s makes it necessary to investigate the means by which MNCs manage their risk, and the effectiveness of their risk-management techniques.

Financial and operational hedges are two fundamental ways MNCs can manage the risk introduced by increased exchange rate volatility. Flood and Lessard (1986) identify two types of exposure to foreign exchange risk: 1) transaction exposure and 2) operating exposure. Transaction exposure is the effect of unanticipated changes in real exchange rates on nominal cash flows (i.e., cash flows fixed in nominal terms) and primarily a short-term exposure that can be hedged using financial derivatives. In contrast, operating exposure is the effect of unanticipated changes in exchange rates on the cash flows associated with a firm's real assets and liabilities and is, therefore, primarily a long-term exposure that amounts to the impact of unexpected changes in the exchange rate on the firm's competitive position. Logue (1995) and Chowdhry and Howe (1999) argue that operating exposure cannot be effectively managed using financial hedges. Instead, they suggest that long-term strategy adjustments (i.e., operational hedges) are the most effective way of managing long-run operating exposure.

A firm facing future, contractually fixed, foreign-currency cash flows, in which the only source of uncertainty is the exchange rate (i.e., transaction exposure), can easily hedge with swaps or forward contracts. However, if the future cash flows are uncertain and not perfectly correlated with the exchange rate (i.e., operating exposure), financial hedging is likely to be ineffective.

*ibid*
A firm’s operating exposure to currency risk depends on the effect of unexpected changes in the exchange rate on the firm’s output prices (e.g., product prices) and input costs (e.g., raw materials, labor costs, etc.). Since the correlation of prices with exchange rates is determined by the degree of segmentation of their respective markets, operating exposure depends on whether input costs and output prices are determined locally or globally. Firms facing substantial operating exposures, as is often the case for U.S. MNCs, can manage this exposure by devising operating strategies that consist of combinations of different marketing initiatives, such as market selection or pricing strategy, and production initiatives, such as raw materials sourcing and production location (see Shapiro, 1996). Thus, operational hedges entail long-term operating policy adjustments that are implemented within a firm’s network of operating units. Theoretically, the effectiveness of these policies in managing operating exposures is enhanced when they can be implemented across different lines of business and locations.

II. Conclusion

This study investigates the influence of financial and operating hedges on the foreign-exchange exposure of U.S. multinational corporations. We build on previous studies of currency exposure to more fully understand how corporate risk management practices can reduce exposure to exchange-rate risk by managing risk across the firm. Our research is important for the following two reasons. First, the evidence indicates that operational hedges and financial hedges can effectively reduce foreign currency exposure. The ability to construct operational hedges, reflected in the MNC network structure, and the usage of various currency derivatives are significant determinants of currency exposure. Furthermore, these results are robust to alternative methods of measuring currency exposure, operating hedges, and financial hedges.

Second, the results indicate that multinational corporations are taking a firm wide or “strategic” perspective in their currency risk management strategy, and are thus focusing on hedging overall economic exposure. We present strong evidence that shows the combined use of operating hedges and financial hedges is associated with decreased exchange-rate exposure. If firms were speculating using currency derivatives, or not attempting to use operational hedges effectively, we should find financial hedges and operational hedges associated with increased exposure. However, this is not the case.
These results are consistent with the notion that operational and financial hedges compliment each other and support the importance of firm wide risk management in mitigating currency risk.

4.1.8 Summary of the Survey on Canadian Corporate Foreign Exchange Hedging

Each year since 2004, the Bank of Canada has undertaken a questionnaire with banks that are active in the Canadian dollar foreign exchange market through offices in Toronto and/or Montréal. These questionnaires focused on the foreign exchange hedging activities of their corporate customers. The purpose of these questionnaires has been to gain a better understanding of the degree to which hedging activities are evolving in corporate Canada, whether through reliance on natural hedges or through the use of financial market instruments, and to see the extent to which banks’ corporate client base rely on such strategies to buffer the effects of changes in the level of the Canadian dollar. The latest survey was sent to eleven banks in late May of 2007, and the Bank followed up with individual meetings in June 2007 with the respondents.2

The evidence collected from this survey was anecdotal and reflected the banks’ evaluations of their clients’ hedging activities and the effects of the stronger Canadian currency. Responses to the questionnaire varied significantly because of the differences in the client bases of the banks and variations in the nature of the hedging activities transacted as well as the subjective nature of the questionnaire. Nonetheless, common themes emerged, as highlighted below.

Results
1.14. Banks reported increases in the percentages of Canadian companies that they considered to be either experiencing a very negative or a very positive direct effect from the appreciation of the Canadian dollar.3

The results of the 2007 survey compared to previous years’ showed that a higher proportion of the respondent banks’ clients appeared to be negatively affected by the Canadian dollar’s strength. The percentage of firms expected to be very negatively impacted by the stronger Canadian dollar moved from around one-quarter to just under

one-third, according to those surveyed, while the percentage expected to be just negatively affected held steady.

There was also a slight increase in the percentage of Canadian companies that the banks considered to be experiencing a very positive direct benefit from the stronger Canadian dollar. The banks suggested that this group included such firms as importers with U.S. dollars to buy and commodity producers whose underlying products' price gains more than offset any currency effects. The proportion of client firms for which the Canadian dollar’s appreciation was seen as either neutral or moderately positive declined. Many banks noted that they have been impressed by the resilience shown by the Canadian economy as a whole over the course of the last five years in the wake of the large appreciation of the currency since 2002.

(2) Banks reported that many firms continued to be shielded from the stronger Canadian dollar to differing degrees by a combination of natural and financial hedges.

The most important factor cited by respondents behind this apparent resilience to the appreciation of the Canadian dollar was the natural hedge afforded by rising commodity prices. The importance of commodity prices as a natural hedge had been cited repeatedly by respondents in all previous surveys.

Other hedges most cited by respondents included:

i. the residual protection afforded by existing financial hedges, although these hedges are being rolled at less advantageous currency levels and thereby only buy time for companies to adapt by delaying the impact of the appreciation;

ii. the use of U.S.-dollar-denominated borrowing;

iii. shifting to lower-cost offshore production, as well as mergers and acquisitions of foreign capacity, although such strategic moves are usually predicated on longer-term views about the currency’s likely equilibrium level and the compatibility of such diversification with a firm’s existing business model; and
iv. the movement to U.S.-dollar-based accounting, although there has been little if any new use of this option over the past two years as most firms who wish to make the transition have likely already done so.

(3) Banks reported that the degree of financial hedge coverage and the average term of hedges targeted by U.S.-dollar sellers had continued to decline.

Almost all survey respondents reported that, on balance, the degree of coverage of financial hedges, as well as the term of the hedges for U.S. dollar selling firms had continued to shrink in comparison to what had been typical in the past. This was often associated with exporting firms that were experiencing negative currency effects from the stronger Canadian dollar, but that were unwilling to lock-in the exchange rate at current levels. Such firms preferred instead to use swaps or even to hold on to their US dollars once delivered, and just covered funding needs through the spot market in the meantime.

Several factors were cited in the 2007 survey to explain the declining use of financial hedges:

i. a belief as of June 2007 that the Canadian dollar would weaken somewhat at some point during the second half of 2007;

ii. an unwillingness by some firms to lock in a level for the Canadian dollar that was significantly stronger than their 2007 budgeted levels; and

iii. the fact that forward contracts traded at a discount (in terms of Canadian dollars per U.S. dollar), which would lock in an even stronger Canadian dollar level than would the then current spot levels.

In comparison, the banks reported that some importers were looking to further increase the average term and coverage ratio of their U.S.-dollar-buying hedges and to lock in what they saw as reasonable long-term levels for the Canadian dollar, while a minority were reluctant to lock-in hedges as long as they expected the exchange rate to continue to move in their favour. Note that U.S.-dollar buyers typically represented only about 5 per cent to 20 per cent of the corporate client base of the banks surveyed.
While the majority of firms that hedge using options were reported to still prefer simple structures, a gradual increase in the use of more exotic structures as well as some new corporate users of options as hedges were reported. According to respondents, simple option structures continued to be favoured due to accounting conventions that discourage the use of more complex option structures since such strategies are less likely to gain favorable hedge accounting treatment. However, several new trends in options use began to emerge in 2007:

i. More firms were choosing to undertake more complex option strategies which better addressed their economic exposures; these firms appeared to be prepared to live with the concurrent increase in mark-to-market balance sheet volatility;

ii. More use of participatory option structures which also act as protection for Canadian dollar buyers against extreme currency moves. Conversely, Canadian dollar sellers sought structures which allowed them to reduce the opportunity cost of fully hedging their exposures should the Canadian dollar continue to appreciate; and

3. Survey respondents were asked to separate their client base, based on the impact of the appreciation of the Canadian dollar, into the following categories: very negative, moderately negative, essentially neutral, moderately positive and very positive.

4. It was noted in June 2007 that the sharp currency appreciation in the second quarter of 2007 resulted in many firms never even having the opportunity to transact hedges at the levels originally budgeted for the year.

4.2 Practices in Indian corporates

4.2.1. The Indian risk equation

Broadly speaking, companies worldwide have to deal with two big baskets of risk. The first is business and economic risk, the second is market risk (volatility in forex, commodity, financial markets, etc). Over the years, Indian companies have been quite diligent and largely successfully in putting together strategies and processes to deal with business risk.

Commodity companies like Hindalco, Essar Steel and Tata Steel, among others, have reduced risk by integrating both forward and backward in the production chain. Tata

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Motors has reduced its exposure to the commercial vehicles segment by getting into cars, IT outsourcing companies are keenly developing their revenue streams in Europe to balance their heavy exposure to the US (Infosys has increased Europe revenues from 15% to 30% in five years), and large business groups have aggressively set up or acquired businesses abroad in order to de-link themselves from the Indian economic cycle.

“Risk is a fundamental part of management,” says Ishaat Hussain, Finance Director, Tata Sons. “There are risk-reward tradeoffs to be made all the time,” says Hussain, who works closely with several group companies in his role. “Risk management has always been embedded in business,” adds YM Deosthalee, Whole-Time Director and CFO, L&T. “But now, companies are beginning to address risk systematically, holistically and in an integrated manner. We have institutionalised risk management.” At L&T, there are clear processes in place to hedge risks associated with projects even at the bidding stage. Similarly, all projects beyond a certain value are cleared by a committee of directors.

“Risk management is embedded in our business model that we call PSPD (Predictable, Sustainable, Profitable and De-Risked),” says S Gopalakrishnan, Chief Executive Officer, Infosys Technologies. “The board oversees the risk management; then we have a risk committee, which assists the board in identifying, evaluating and mitigating operational, strategic and external environment risks. Then, there’s the risk council, consisting of the CEO, COO and CFO, that is responsible for management of risk. And, finally there are risk management officers within each of the departments of our various business units who facilitate the execution of risk management across the company. We also have a systematic risk-management process through which we identify risks using external indicators as well as a bottom-up evaluation of how various departments perceive their own risk to be. Based on this, we score all the risks and come out with the top 5-10 key risks along with actual mitigation action.”

Other companies are catching on. “We take a multi-planner approach to risk. We look at risk from different angles,” says C Ramakrishnan, President and CFO, Tata Motors. In 2006, the company tapped 540 executives to compile a ‘heat map’, which identified
and evaluated all possible risks. "We are evolving rapidly from the first stage of looking at risk-management, primarily as compliance and internal audit to the third stage where risk-management will get fully integrated into every process," says YM Kale, Hinduja Group President, Corporate Governance and Development. "Over the past two years, we have set in place a fairly formalised ERM (enterprise risk management) framework," says Ananda Mukerji, Managing Director & CEO, First Source.

Although there may still be some ground left to be covered, practices and processes established at many Indian companies are robust and mature. "We have hired Deloitte to compare the Essar Group’s risk-management practices with the best in the world," says VG Raghavan, CFO, Essar Global.

That was the good news, first. The bad news is that Indian companies are nowhere as prepared when it comes to managing market risks. In the last few months, currency, metals and commodities, and energy markets, have been hit by unprecedented two-way volatility. This has taken companies by surprise. The IT industry, for example, has been used only to a gradual depreciation of the rupee. But in recent times, the rupee appreciated sharply to the extent of threatening the very outsourcing business model, but subsequently lost value, leaving IT companies completely perplexed.

**Volatility, volatility**

At his Bombay House office, Ishaat Hussain sits with the increasingly ubiquitous Bloomberg terminal right behind him. "I manage risks eight hours a day," he says pointing to the rupee-dollar rates flashing on the screen. "If you have un-hedged positions in the forex market, you could burst a blood vessel every two minutes. Volatility is so high...but you have to see this as the cost of doing business." From here on, volatility is only going to increase, not decrease.

"We have revenues coming in pounds and dollars, and the cost base is spread in dollar, pound, Indian rupee and Philippines Peso," says Rohit Kapoor, President and Chief Executive Officer, EXL Service. "Currencies, in the last eight months or so,
have been swinging widely. It becomes extremely difficult to manage business in this kind of volatility.” Market risks, like these, are now beginning to weigh heavily even on long-term business decisions. “We were planning to set up a delivery centre in South Africa, but we had to drop it because the South African currency can be very volatile,” says Kapoor. EXL has since set up a centre in Philippines and is now looking at Eastern European countries, where currencies are more stable.

Traditionally, most companies have maintained that they do not worry about the markets and focus only on the business. That approach has served them well so far, but that was at a time when the markets were stable. But now, a two-way volatility, big and sharp, is here to stay. “I expect the rupee to be highly volatile in the Rs 41-45 band,” says Hussain. Or take oil. Even a couple of months ago, a $200 barrel seemed certain. But now, oil too has dropped to $112 from a high of $145 since July. Such volatility has left companies with only two options—build risk-tolerant businesses as much as possible, and take up more evolved and sophisticated hedging positions in the forex and commodity markets (though not exotic products that no one really understands).

**How companies hedge**

The IT industry, more than any other sector, has been hurt by market risks. Till 2007, the rupee-dollar movement was largely unidirectional—steady depreciation of the rupee. This was to the benefit of IT companies that generally tend to book long-term contracts at fixed rates. So, as the contracts matured, (the rupee would also generally depreciate) and the IT companies would earn more rupees per dollar worth of work completed. There was no need to hedge. But in 2007, when the markets started seeing two-way volatility, IT companies saw their margins erode. Since then, IT companies have been giving far greater thought to hedging forex risks.

Two options are available to companies. The first is to ‘protect your rate’, at a cost. Here companies buy hedges to protect the rate at which they have negotiated contracts with clients. This way, they do not loose when the rupee appreciates, nor do they gain when the rupee depreciates.
There is a cost attached to these hedges, but companies treat it like insurance. Companies like HCL Technologies follow this rigidly. “HCL intends to neither make such windfall gains (when the rupee depreciates) nor does it want to risk it’s margin (when the rupee appreciates), and hence HCL follows a policy of keeping itself adequately hedged against all such fluctuations by taking forward covers,” explains Sandip Gupta, Corporate Vice-President, Finance, HCL Technologies.

Satyam Computer takes a similar approach too, but for only 50% of its dollar inflow over the next 12 months. “Even though the rupee depreciated sharply in Q1 2008-09, we did not change our hedging strategy. It’s better not to get tempted by what’s happening in the market,” says V Srinivas, CFO, Satyam Computer. Such companies do not mind forgoing potential gains in favour of stable realisations.

“Although the writing on the wall is clear that the rupee will continue to depreciate, we aren’t going to change our forex hedging strategy,” adds Srinivas. Similarly, L&T has swapped its forex loans (worth approximately $ 800 million) into rupees. “We are willing to forego the benefit of rupee appreciation,” says Deosthalee.

That is the conservative view. But slowly companies are trying to stretch the boundary of pure safety. “The basic philosophy of our hedge program is to protect future earnings at certain rates without sacrificing the ability to benefit on the upside,” S Mahalingam, CFO, TCS, told analysts in a recent conference call. “We hedge our exposures through a combination of forward contracts and option contracts, with a substantial portion in options...During the sharp rupee appreciation during FY 2008, we had significant forex gains, largely offsetting the losses that occurred as a result of the appreciation. On the other hand, in spite of a strong depreciation of the currency during this past quarter, we have been able to participate in approximately 65% of the benefit. For the balance of the year, we will be able to participate on 80% of the exposure.”

This combination of protecting the downside risk without losing the opportunity to participate in much of the upside is difficult to strike. Infosys, for example, believes that in the short term, hedging is the only way out; and in the long term, companies
need to look at their business mix, services, geographical spread, etc. “If the fluctuation is sudden and significant, which is what happened in the last quarter (7%), your ability to manage and plan for that becomes very small. You have to take a hit,” says Gopalakrishnan.

**Spotlight on treasury**

But it is very likely that ongoing volatility in markets will force companies to constantly re-examine their stand regarding avoiding the downside and participating in the upside. Corporate treasuries could take two extreme views. The first is to provide pure insurance for the business. “Play only a supportive role to protect the business,” as NS Paramasivam, Global Treasury Head, Essar group, puts it. The other extreme is where treasury cells function as profit centres, aiming to make money from market opportunities. At the moment, most Indian treasury cells are content to play a supportive role. But that is slowly beginning to change.

“We have a small amount that we manage as a profit centre,” says L&T’s Deosthalee. “We do look out for the occasional market opportunity,” says Essar Group’s Paramasivam. He manages several billion dollars of global funds purely as a support centre. But a small amount of treasury profits is sometimes used as risk capital. After all, his mandate is to “lower the cost of imports as much as possible and increase the realisation on exports as much as possible”.

It is very unlikely that many companies will chose to convert their treasuries into full-fledged profit centres. But at the same time, it is also very likely that companies will start their walk away from treasury being a pure support function and towards the direction of making it a profit centre. Most will chose not to complete that walk, but will search for comfortable middle ground they can occupy. There will be some mistakes along the way. But given the volatility, simply avoiding the downside at the cost of losing the upside may prove to be costly too.

“We have the skill sets and maturity needed to convert our treasury to a profit centre,” says Deosthalee. “But we have no plans to do it yet. I don’t think Indian companies are ready to make a full shift.” Most agree with him. “The walk has begun,” says Tata Motor’s Ramakrishnan. “The degree and pace at which this happens will depend on each underlying business...it has to be a careful balance as there is temptation to rush.”
He too believes that the pendulum will never swing to the other extreme, but expects Tata Motors to move away from a pure-de-risking model just a little bit in the next two to three years.

Indian treasury cells are gaining expertise and growing in the range of risk-mitigating contracts and structures. Some are going beyond hedging currencies and into raw materials. About 60% of L&T’s project costs are in materials like steel, copper, silver etc. The company hedges raw material prices when required. Tata Motors has so far managed raw material costs through long-term contracts, but is now not ruling out hedging raw material prices in the future. “We are keeping an eye on it, and are constantly evaluating the benefits,” says Ramakrishnan.

Tata Motors is also alive to the idea of consolidating the treasury operations of all global subsidiaries (including Jaguar-Land Rover) under one roof. “The possibility of a centralised treasury exists. It is an exciting possibility. We could balance forex outflows and inflows, find natural hedges, identify sourcing synergies, etc,” says Ramakrishnan. At a larger group level, Hussain has been trying, for quite some time now, to find treasury synergies across the Tata Group. “I’ve spoken to a few banks on how we can leverage group treasury, without compromising the independence of individual companies. We may not be able to pool in our deals, but we could certainly work together more,” says Hussain.

The Essar Group already runs a central global treasury, headquartered in Mumbai. Operations of its recent Canadian acquisition Algoma Steel are managed out of Mumbai. “Algoma has to cope with volatility in the Canadian-US dollar exchange rate. This is being managed by the global treasury, though actual execution of deals could happen out of a desk in Dubai,” says Paramasivam. “All group forex inflows and outflows are managed by the global treasury, as well as the current surpluses,” adds Raghavan.

The group has also established a fair amount of automation in its treasury. All individual businesses are wired to the central 20-member treasury team using SAP Treasury. So every time any group company takes on a forex exposure, the treasury
team is automatically intimated and proceeds to build a hedge, if required. “You will find that Essar group companies have not reported forex losses this quarter,” says Paramasivam. In the past year, volumes handled by the team have trebled, and now runs into several billion dollars. “We are constantly challenging the capabilities of the people in treasury management, and exposing them to the senior management and the board,” says L&T’s Deosthalee.

These skills will come in handy if companies decide to gradually take a more proactive approach when it comes to managing market risk. The constant ‘I manage business, not markets’ refrain that one hears from CEOs, CFOs and treasury heads may gradually come under scrutiny. Companies had better face it—in volatile times, a prudent and well-run treasury can turn into a major competitive advantage.

According to Hinduja Group’s Strategy Head Aditya Sapru, short term financial markets turbulence (with global linkages) may not interfere with their long-term growth plans.” If growth is a given, sophisticated risk management skills have to go hand in hand”.

4.2.2 Practices from Surveyed companies

4.2.2.1 The questionnaire was sent to 111 companies. All the sample companies had imports. Of these only two companies were not having exports. From the Table 9, it can be observed that on an average Exports constituted 24.66% of net sales and Imports at 19.92%.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Net Sales</th>
<th>Net Profit</th>
<th>Exports</th>
<th>Imports</th>
<th>Exports as % of Sales</th>
<th>Imports as % of Sales</th>
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<tbody>
<tr>
<td>Average</td>
<td>2,609.15</td>
<td>324.06</td>
<td>667.91</td>
<td>487.10</td>
<td>24.66</td>
<td>19.92</td>
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<td>190.10</td>
<td>0.84</td>
<td>-</td>
<td>1.03</td>
<td>-</td>
<td>0.11</td>
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<tr>
<td>Maximum</td>
<td>28,081.41</td>
<td>4,012.97</td>
<td>10,127.08</td>
<td>6,226.96</td>
<td>99.99</td>
<td>82.47</td>
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<tr>
<td>Count</td>
<td>111</td>
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4.2.2.2 It can be observed from the table 10 below that Indian companies are satisfied with existing products available for FX risk management and are satisfied with RBI and Government policies. Technical indicators are used for short term hedging. In the medium term, the positions are kept open. It is opined that RBI intervention is high Indian market. And the exchange rates are mainly driven by Demand and Supply rather than interest rate differential. Companies use products across the spectrum like forwards, options, swaps, FRAs for managing FX Exposure.

<table>
<thead>
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<th>Table 11: Questionnaire Responses summary analysis</th>
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<tr>
<td>Factors</td>
</tr>
<tr>
<td>Fundamentals of economy</td>
</tr>
<tr>
<td>Technical Analysis</td>
</tr>
<tr>
<td>Combination of fundamentals and Technical</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>(a) Interest rate differential</td>
</tr>
<tr>
<td>(b) 1 month forward rates</td>
</tr>
<tr>
<td>(c) 3 month forward rates</td>
</tr>
<tr>
<td>(d) 6 month forward rates</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>(f)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6</th>
<th>RBI intervention and tracking by companies</th>
<th>Responses</th>
<th>% responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>RBI intervention in FX market</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>(b)</td>
<td>Daily</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>Weekly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(d)</td>
<td>Anytime</td>
<td>Anytime</td>
<td>100</td>
</tr>
<tr>
<td>(e)</td>
<td>Tracking Intervention</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>(f)</td>
<td>Modify Company’s Strategy</td>
<td>Yes</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>7</th>
<th>RBI Intervention and Band expected</th>
<th>% responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REER</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Depreciate gradually</td>
<td>Yes</td>
<td>13</td>
</tr>
<tr>
<td>3-5% &amp; 3months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-5% &amp; 6 months</td>
<td>Yes</td>
<td>60</td>
</tr>
<tr>
<td>RBI policy export oriented</td>
<td>Yes</td>
<td>27</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8</th>
<th>Fundamental factors determining FX rates in Spot and Forwards</th>
<th>% responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Demand and Supply</td>
<td>34</td>
</tr>
<tr>
<td>b.</td>
<td>Inflation differential</td>
<td>8</td>
</tr>
<tr>
<td>c.</td>
<td>Interest Rate differential</td>
<td>13</td>
</tr>
<tr>
<td>d.</td>
<td>Capital Flows,</td>
<td>37</td>
</tr>
<tr>
<td>e.</td>
<td>NRI Remittances</td>
<td>7</td>
</tr>
<tr>
<td>f.</td>
<td>Any other</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>9</th>
<th>Use of Technical indicators</th>
<th>% responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Elliot Wave/Moving average</td>
<td>13</td>
</tr>
</tbody>
</table>
10 **Exposure in FX is a risk position?**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>% responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Buyer’s (Importers)</td>
<td>Yes</td>
<td>20</td>
</tr>
<tr>
<td>b.</td>
<td>Seller (Exporter's risk)</td>
<td>Yes</td>
<td>14</td>
</tr>
<tr>
<td>c.</td>
<td>Exchange Rate risk</td>
<td>Yes</td>
<td>16</td>
</tr>
<tr>
<td>d.</td>
<td>Interest rate risk</td>
<td>Yes</td>
<td>14</td>
</tr>
<tr>
<td>e.</td>
<td>Country risk</td>
<td>Yes</td>
<td>11</td>
</tr>
<tr>
<td>f.</td>
<td>Liquidity risk</td>
<td>Yes</td>
<td>13</td>
</tr>
<tr>
<td>g.</td>
<td>Operational risk</td>
<td>Yes</td>
<td>12</td>
</tr>
<tr>
<td>h.</td>
<td>Any other</td>
<td>Yes</td>
<td>-</td>
</tr>
</tbody>
</table>

11 Most of the companies (60%) have separate Risk Management Committees and in 40% of cases Risk Mgmt is handled by either Finance or Treasury.

12 **Instruments used for FX risk management in order of importance**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Instrument</th>
<th>Importance</th>
<th>% responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Forward Contract</td>
<td>Yes</td>
<td>28</td>
</tr>
<tr>
<td>b.</td>
<td>Options</td>
<td>Yes</td>
<td>24</td>
</tr>
<tr>
<td>c.</td>
<td>Currency Swaps</td>
<td>Yes</td>
<td>17</td>
</tr>
<tr>
<td>d.</td>
<td>Futures contracts</td>
<td>Yes</td>
<td>9</td>
</tr>
<tr>
<td>e.</td>
<td>FRAs</td>
<td>Yes</td>
<td>12</td>
</tr>
<tr>
<td>f.</td>
<td>IRSs</td>
<td>Yes</td>
<td>11</td>
</tr>
<tr>
<td>G</td>
<td>Any other (please specify)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

13 Most of the companies do subscribe to Reuters basic version and keep track of the FX movements.

14 Regulatory issues and products by RBI: Companies are generally satisfactory.

15 **Management of Risk Positions**

<table>
<thead>
<tr>
<th></th>
<th>Importance</th>
<th>% responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor</td>
<td>Yes</td>
<td>- 100</td>
</tr>
<tr>
<td>Daily</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>Weekly</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>Monthly</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>Policy document available</td>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>Is it sufficient</td>
<td>Yes</td>
<td>100</td>
</tr>
</tbody>
</table>
4.2.3 When risk becomes life

On August 7, 2007, when the Indian currency was trading at Rs 40.42 to a dollar, and appreciating uncomfortably fast (10% in the past seven months), a senior group level director at a large Indian conglomerate sent out an email advisory to all chief financial officers in his fold. The director had noticed that some group companies had reported substantial profits on forex transactions relating to external borrowings and import payment obligations for the quarter ended June 2007. While some of these profits were on completed transactions, some part were unrealized gains, purely accounting in nature, shown on a mark-to-market basis on the spot rupee-dollar rate at the end of the quarter. Essentially, companies had borrowed abroad and because the local currency had appreciated, they were required to pay less rupees to repay the dollar loan at the then prevailing exchange rates. This was shown as an accounting gain.

The director, a seasoned veteran, feared the reverse could also happen anytime. He realized that if the rupee depreciated sharply, these profits could quickly turn into huge losses. (At that time, though, no one believed this could happen as the country was flooded with copious capital inflows and the RBI was fighting to reign in any runaway appreciation of the rupee.) And so, in a first-ever such email advisory, the director urged all CFOs to hedge all exposure relating to outstanding forex borrowings. “It is undesirable to leave the exposures open...I urge you to put in place appropriate hedging strategy to minimize the downside (including accounting) impact if we were to witness volatility and a reversal of the current trend (of an appreciating rupee),” he wrote in the email.

If only that email had been sent out to all CFOs in India Inc! The director’s words have now turned prophetic. The tide turned, and the rupee depreciated 9.7% against the dollar since February this year; it is now trading at a 17-month low. Many companies had chosen not to (or couldn’t) cover their exposure. Even large and respected companies left their forex borrowings uncovered expecting the rupee to appreciate further giving them even more forex gains. But the rupee fell, leading to huge mark-to-market losses. A quick sample of 17 companies had combined MTM losses of Rs 5,288 crore as on June 30, 2008.

\[\text{Ibid}\]
This episode has triggered several debates. Some companies have not shown these losses on the profit and loss account, but have shown it as a balance sheet adjustment. That has sparked an accounting debate. Some companies could not cover these exposures, as it was hard to find hedges that could match the long-term tenure of their forex borrowings. That has raised the issue of lack of depth and range of instruments, in India at least.

<table>
<thead>
<tr>
<th>Caught without cover</th>
<th>Mark to Market Foreign currency losses</th>
<th>(Rs. Crore)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIPRO</td>
<td></td>
<td>1262</td>
</tr>
<tr>
<td>RELIANCE INDUSTRIES</td>
<td></td>
<td>940</td>
</tr>
<tr>
<td>RELIANCE COMMUNICATION</td>
<td></td>
<td>787</td>
</tr>
<tr>
<td>JSW STEEL</td>
<td></td>
<td>313</td>
</tr>
<tr>
<td>TATA STEEL</td>
<td></td>
<td>303</td>
</tr>
<tr>
<td>HCL TECHNOLOGIES</td>
<td></td>
<td>300</td>
</tr>
<tr>
<td>BHARTI AIRTEL</td>
<td></td>
<td>260</td>
</tr>
<tr>
<td>TATA MOTORS</td>
<td></td>
<td>200</td>
</tr>
<tr>
<td>RANBAXY</td>
<td></td>
<td>191</td>
</tr>
<tr>
<td>STERLITE INDUSTRIES</td>
<td></td>
<td>156</td>
</tr>
<tr>
<td>GE SHIPPING</td>
<td></td>
<td>138</td>
</tr>
<tr>
<td>HINDLACO INDUSTRIES</td>
<td></td>
<td>115</td>
</tr>
<tr>
<td>TCS</td>
<td></td>
<td>81</td>
</tr>
<tr>
<td>FIRSTSOURCE</td>
<td></td>
<td>80</td>
</tr>
<tr>
<td>MAHINDRA &amp; MAHINDRA</td>
<td></td>
<td>78</td>
</tr>
<tr>
<td>KPIT CUMMINS</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>SATYAM COMPUTERS</td>
<td></td>
<td>36</td>
</tr>
</tbody>
</table>

Other companies were hit by their exposure to foreign currency convertible bonds (FCCBs), which, by their very nature, are hard to hedge. This has made people question the real utility of such instruments. But perhaps the most important among these debates is this: are treasury cells in Indian companies competent enough; and are risk-management structures and practices good enough to deal with this unprecedented two-way volatility, not just in the forex market, but also in the commodity, energy and financial markets?

**It's now time for ambitious Indian businesses to transform their attitude to risk and appetite for it.**

4.2.3.1 From the foregoing, it is essential to identify the factors causing influence on INR and discuss in details and take a decision to hedge or not to hedge. For example, the table

---

*Ibid*
given below shows that there is high volatility in few months and correspondingly high standard deviation. The factors behind this have to be studied properly and appropriate decision taken for exposing to or taking a calculated risk. Draw the essence of the study and the give direction for risk management.

Table 13

<table>
<thead>
<tr>
<th>Year</th>
<th>Monthly high-low % change</th>
<th>Standard Deviation</th>
<th>Yearly Average USD/INR rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>11.6</td>
<td>3.2</td>
<td>41.74</td>
</tr>
<tr>
<td>1999</td>
<td>2.8</td>
<td>0.9</td>
<td>43.30</td>
</tr>
<tr>
<td>2000</td>
<td>7.8</td>
<td>2.4</td>
<td>45.22</td>
</tr>
<tr>
<td>2001</td>
<td>4.3</td>
<td>1.4</td>
<td>47.45</td>
</tr>
<tr>
<td>2002</td>
<td>2.3</td>
<td>0.8</td>
<td>48.74</td>
</tr>
<tr>
<td>2003</td>
<td>5.3</td>
<td>1.7</td>
<td>46.85</td>
</tr>
<tr>
<td>2004</td>
<td>6.9</td>
<td>2.1</td>
<td>45.73</td>
</tr>
<tr>
<td>Feb-Jun 2005</td>
<td>1.3</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>6.9</td>
<td>2.1</td>
<td>44.42</td>
</tr>
<tr>
<td>2006</td>
<td>6.6</td>
<td>2.1</td>
<td>45.79</td>
</tr>
<tr>
<td>Feb-Mar 2006</td>
<td>1.3</td>
<td>0.4</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>12.8</td>
<td>3.6</td>
<td>43.18</td>
</tr>
<tr>
<td>Sep-08</td>
<td>16.2</td>
<td>4.5</td>
<td>47.04</td>
</tr>
</tbody>
</table>

For example: Rupee steady at 49.00/49.01 against a dollar on 21/10/08 and the following factors were driving the movement.

Despite consolidation in equity markets, the domestic unit moved in a range of between 48.9500 and 49.1550 during the day. It had closed at 48.99/49.00 on October 20, '08.

Forex dealers said the activity was not much as investors remained sideline but the rupee moved erratically on the alternate bouts of small dollar buying and selling. They said rupee drew some support from a fresh surge in equity markets which helped the currency to remain steady at close.

---

The Indian benchmark Sensex on Tuesday gained another 460 points or 4.5 per cent while Asian markets witnessed mixed pattern trading during the day.

FIIs pulled out over USD 1.0 billion from equity during last week, taking the total capital outflow to nearly USD 12 billion so far in the current calendar year.

**Rupee ends weaker than 50/dlr for first time**

The rupee closed weaker than 50 per dollar on 19th November 2008, Wednesday, for the first time as it was sideswiped by a falling stock market and demand for dollars to arbitrage a gap to offshore non-deliverable forward rates. It hit a low of 50.03 in late trade, its weakest since Oct. 27 when it hit a record low of 50.29.

"We have closed above 50 for the first time, it is a very bullish close for the dollar-rupee," a senior dealer with a private bank said. Losses in the share market also hurt sentiment. The share market fell 1.8 percent, and had lost nearly 17 percent over the past six sessions. Foreign funds have withdrawn more than $13 billion from Indian shares up to November 2008, after buying a record $17.4 billion last year. Dealers said the Reserve Bank was seen selling dollars via state-run banks to try to halt the rupee’s fall through the day, but said volumes were not large. It was estimated the central bank sold about $200 to $250 million.

4.2.4 Indian Outsourcing’s Local Hedge

The challenges facing India’s outsourcing firms like Infosys and Tata. The biggest challenge is a strengthening rupee, although there are others. For instance, foreign firms like IBM has set up shop in India doing outsourcing as well, posing more competition. If those weren’t enough, wage costs are escalating, possibly because IBM and others are hiring away personnel from local outsourcing firms. Indian software companies, which compete furiously with each other for global outsourcing deals, are now facing a common enemy in the rising rupee.

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61 Andy Mukherjee, Friday, July 20, 2007, *Bloomberg*
Infosys Technologies Ltd., India's second-largest computer-services provider, last week pared its full-year sales and profit estimates. A strengthening home currency is reducing the rupee value of its dollar revenue and earnings.

Tata Consultancy Services Ltd., Infosys's bigger rival, this week reported that its profit margin was hurt by 2.6 percentage points in the three months ended June 30 by, among other things, a 7 percent appreciation in the rupee against the dollar, the biggest quarterly gain in more than three decades.

The company said it managed to "largely offset" the impact on net income by hedging its revenue against an increase in the rupee's value. Although the day-to-day volatility in the exchange rate has abated since the end of April, the challenge of long-term competitiveness remains for Indian exporters.

As the Indian economy expands 9 percent a year, soaking in larger amounts of overseas capital, the real effective exchange rate of the rupee is bound to rise. Since inflation tolerance in India is low, much of this adjustment will occur through an appreciation in the nominal currency value. The Indian central bank will try to hold the rupee down when it can afford to loosen monetary conditions at home. It would be less willing to protect a competitive exchange rate when doing so could lead to overheating.

All is not lost for Indian software exporters. The economics of outsourcing are still in their favour, though wage costs are galloping, too. Out of the several large outsourcing deals from India in the past several years, few have gone to Indian companies.

In March 2004, IBM won a $750 million order from Bharti Tele-Ventures Ltd., an Indian mobile-phone service provider. Around the same time, Dabur India Ltd., a local maker of shampoos and beverages, asked Accenture to manage its computer systems. A 10-year, $150 million order from Bank of India, a state-owned commercial lender, went to HP.

At Infosys, revenue generated within the Indian market is just 2.4 percent of North American sales. The neglect of the home market was a logical thing to do when it was small, dominated by government orders. Now, when some of the fastest-growing companies in the world are in India, the apathy is strange. In the current fiscal year, which
will end in March 2008, the domestic software and services industry is expected to grow
22 percent to $10 billion in revenue.

Sure, exports will be three times as large. That, however, is no excuse to ignore the home
turf anymore. From retail and transportation to hospitality, banking, insurance and
telecommunications, there are many domestic businesses in which Indian companies are
scaling up at a breakneck speed to meet burgeoning demand.

These local growth engines offer learning opportunities. Indian outsourcing companies
must tap them if they want to go beyond being low-cost service providers. Apart from its
other advantages, local, rupee-denominated revenue will also serve as a natural currency
hedge.

4.2.5 Hedging easier for oil companies\(^{62}\)
Refiners can hedge up to 50 per cent of imports. The RBI has permitted domestic crude oil
refining companies to hedge their commodity price risk on domestic purchase of crude oil
and sale of petroleum products on the basis of underlying contracts, which are linked to
international prices on overseas commodity exchanges/markets.

Refining companies can hedge up to 50 per cent of the volume of imports during the
previous year or 50 per cent of the average volume of imports during the previous three
financial yeas, whichever is higher.

The companies will have to ensure regulalisation of the contracts booked under this facililit:
by production of supporting import orders during the currency of the hedge. The proposed
norms will allow Indian companies to hedge their payments without seeking the RBI’s
nod.

Indian oil firms purchase crude from overseas and process it in India. This, in turn, is sold
to the domestic companies at the spot price (the prevailing price at that point of time). Till
now, the companies could not hedge their future payments to the domestic oil firms
without getting the RBI’s approval. By the time approval is obtained, the oil prices go up.

\(^{62}\) Business Standard, BS Reporter / Mumbai April 30, 2008
say experts. Even if the payments are done in rupees, the underlying base price is in dollars and keeps fluctuating.

The RBI has also allowed Indian companies to invest overseas in energy and natural resources sectors such as oil, gas, coal and mineral ores in excess of the current limits with the prior approval of the central bank. This will help companies like Reliance Industries and Videocon Industries, who have been eyeing oil assets abroad.

4.2.6 IT companies hedge despite rupee fall

Despite the rupee’s fall since the beginning of 2008, India’s software and business process outsourcing companies continue to hedge their foreign exchange inflows as they believe the local currency will keep rising in the long-term.

Forex consultants said that some companies, however, have cancelled a small number of hedging contracts to sell in the spot market. The currency value, which has fallen 2.3 percent to 40.32 against the U.S. dollar since January 1, has taken the companies aback, as most of the dollar inflows, which account for more than half of India’s outsourcing revenue, have been hedged and hence won’t be able to gain from the fall.

For example, Infosys Technologies had assumed a conversion rate of Rs 39.41 against the dollar in its March quarter guidance. Similarly, Satyam Computer Services assumed an exchange rate of Rs 39.30 for the same period.

“We take a short-term view on the currency rather than a long-term view,” Infosys chief financial officer V Balakrishnan said. “The currency markets globally are very volatile and there is no point in taking a long-term view in a volatile environment. We only hedge our exposures and do not trade or speculate. The current level of the rupee is at an attractive level for the exporters to hedge.” Analysts said the fall in rupee would provide temporary relief to IT companies, since over 50 percent of their revenues are coming as dollar money.

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83 silicon India news bureau, Friday, March 14, 2008 [http://www.siliconindia.com/shownews/40330](http://www.siliconindia.com/shownews/40330)
4.2.7 Risk management in Indian industry—Excerpts
A case study of HCL technologies, Impact of global turbulences on Indian companies and Conference board’s study of ERM practices in four major companies, viz. Tata Motors, ICICI Bank, Tata Chemicals and Dr Reddys Labs are summarized. The essence is that there is a need to improve the risk management practices and FX exposure has to be managed properly, otherwise companies may have to book MTM or real losses. Details are at Appendix 15.

4.3 Southwest Airlines⁶⁴, one of the largest operators in the US, is a case in point. The company has been actively hedging oil prices since 1998, and has managed to lock in fuel prices way below market prices, even today and all the way till 2010. Some reports say this has helped the company profit by at least $3.5 billion in 10 years, enabling it to remain profitable even though the rest of the aviation sector has been wrecked by turbulence.

Last quarter, it reported a 15% rise in profit, while rivals floundered. Such an approach is not without its dangers. Continental Airlines, which also used hedging to manage fuel prices, unfortunately, got its timing wrong. It is now seemingly locked into paying prices that are higher than prevailing market prices by virtue of hedging contracts it entered into recently. But Indian companies would do well to consider the possibilities this opens up.

4.4 The Hedging decision⁶⁵
The issue of whether or not to hedge risk continues to baffle many corporations. At the heart of the confusion are misconceptions about risk, concerns about the cost of hedging, and fears about reporting a loss on derivative transactions. A lack of familiarity with hedging tools and strategies compounds this confusion. Corporate risk managers also face the difficult challenge of getting hedging tools (i.e., derivatives) approved by the company’s board of directors.

An effective hedging program does not attempt to eliminate all risk. Rather, it attempts to transform unacceptable risks into an acceptable form. The key challenge for the corporate risk manager is to determine the risks the company is willing to bear and the ones it wishes

⁶⁴ ibid
⁶⁵ The Corporate Hedging Process, by Ian H. Giddy, (Adapted from an article published by Bank of Montreal)
to transform by hedging. The goal of any hedging program should be to help company achieve the optimal risk profile that balances the benefits of protection against the costs of hedging.

**Step 1: Identify the risks**
Before management can begin to make any decisions about hedging, it must first identify all of the risks to which the corporation is exposed. These risks will generally fall into two categories: operating risk and financial risk. For most non-financial organizations, operating risk is the risk associated with manufacturing and marketing activities. In general, operating risks cannot be hedged because they are not traded.

The second type of risk, financial risk, is the risk a corporation faces due to its exposure to market factors such as interest rates, foreign exchange rates and commodity and stock prices. Financial risks, for the most part, can be hedged due to the existence of large, efficient markets through which these risks can be transferred.

**Step 2: Distinguish between hedging and speculating**
One reason corporate risk managers are sometimes reluctant to hedge is because they associate the use of hedging tools with speculation. They believe hedging with derivatives introduces additional risk. In reality, the opposite is true. A properly constructed hedge always lowers risk. It is by choosing not to hedge that managers regularly expose their companies to additional risks. Conversely, hedging strategies designed to reduce risk often receive a great deal of scrutiny. Corporate risk managers who wish to use hedging techniques to improve their company’s risk profile must educate their board of directors about the risks the company is naturally exposed to when it does not hedge.

**Step 3: Evaluate the costs of hedging in light of the costs of not hedging**
The cost of hedging can sometimes make risk managers reluctant to hedge. Admittedly, some hedging strategies do cost money. But consider the alternative. To accurately evaluate the cost of hedging, the risk manager must consider it in light of the implicit cost of not hedging. In most cases, this implicit cost is the potential loss the company stands to suffer if market factors, such as interest rates or exchange rates, move in an adverse direction. In such cases the cost of hedging must be evaluated in the same manner as the cost of an insurance policy, that is, relative to the potential loss.
Step 4: Use the right measuring stick to evaluate hedge performance

Another reason for not hedging often cited by corporate risk managers is the fear of reporting a loss on a derivative transaction. This fear reflects widespread confusion over the proper benchmark to use in evaluating the performance of a hedge. The key to properly evaluating the performance of all derivative transactions, including hedges, lies in establishing appropriate goals at the onset.

Step 5: Don’t base your hedge program on your market view

Many corporate risk managers attempt to construct hedges on the basis of their outlook for interest rates, exchange rates or some other market factor. However, the best hedging decisions are made when risk managers acknowledge that market movements are unpredictable. A hedge should always seek to minimize risk. It should not represent a gamble on the direction of market prices.

Step 6: Understand your hedging tools

A final factor that deters many corporate risk managers from hedging is a lack of familiarity with derivative products. Some managers view derivatives as instruments that are too complex to understand. Most derivative solutions are constructed from two basic instruments: Forwards (Swaps, Futures, FRAs, Locks) and Options (Caps, Floors, Puts, Calls, Swaptions).

Step 7: Establish a system of controls

As is true of all other financial activities, a hedging program requires a system of internal policies, procedures and controls to ensure that it is used properly. The system, often documented in a hedging policy, establishes, among other things, the names of the managers who are authorized to enter into hedges; the managers who must approve trades; and the managers who must receive trade confirmations. The hedging policy may also define the purposes for which hedges can and cannot be used. For example, it might state that the corporation uses hedges to reduce risk, but it does not enter into hedges for trading purposes. It may also set limits on the notional value of hedges that may be outstanding at any one time.
4.5 Trading in the Australian foreign exchange market

A survey conducted among the Dealers for their view on market behaviour and trading strategies. The type of factors that have a major influence on exchange rates differs depending on time horizon. Intra-day movements were mainly determined by order placements followed by over reaction to news, speculative forces, bandwagon effects and technical trading.

As the time horizon increases the respondents indicated that economic fundamentals have a growing impact on exchange rate movements while the other factors, apart from technical trading, become less significant, particularly over periods greater than six months. Technical analysis has the greatest influence on exchange rate movements up to six months but its impact is not as significant as the impact of fundamental analysis. Majority of dealers adopt an even mixture of fundamental and technical analysis. This mixture is required as changing economic fundamentals are only considered to affect the exchange rates over a medium to long term horizon. The economic announcement having the biggest impact both today and five ago is still interest rates.

---

Table 14: Economic announcement and its impact on FX markets in Australia and USA

<table>
<thead>
<tr>
<th>Economic Announcement</th>
<th>From Australia</th>
<th>From USA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Today (Sep 2000)</td>
<td>From USA</td>
</tr>
<tr>
<td></td>
<td>5 years ago (Sep 1995)</td>
<td>Today (Sep 2000)</td>
</tr>
<tr>
<td>Interest rate</td>
<td>(%)</td>
<td>(%)</td>
</tr>
<tr>
<td>Current account</td>
<td>28.2</td>
<td>27.5</td>
</tr>
<tr>
<td>Inflation</td>
<td>17.6</td>
<td>17.5</td>
</tr>
<tr>
<td>Trade deficit</td>
<td>16.5</td>
<td>15.0</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>11.8</td>
<td>13.8</td>
</tr>
<tr>
<td>GDP (GNP)</td>
<td>9.4</td>
<td>11.3</td>
</tr>
<tr>
<td>Retail Sales</td>
<td>7.1</td>
<td>2.5</td>
</tr>
</tbody>
</table>

4.6 Four factor Equation with a constant coefficient developed by myself (m.s.babu):

Here an attempt is made to develop an equation connecting the USD/INR exchange rate (e) by assigning weights to variables viz. Trade Surplus as % of GDP (a), Import cover of reserves (b) and Debt service ratio (c).

The data from 1990 to 2005 is analysed as shown in the Table 15 below. After assigning the weights and calculating the total weight and carried out the iterations to arrive at a comparable Constant factor (k).

The equation thus developed is

\[ \ln(e) \ast k = \ln(0.40a + 0.70b - 0.10c) \]  
where \[ k \geq 0.46 \] \& \[ k \leq 0.66 \]

<table>
<thead>
<tr>
<th>Equation A</th>
<th>ln(0.40a+0.70b-0.10c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equation A</td>
<td>ln (0.40<em>Trade surplus as %of GDP+0.70</em> Import cover-0.10*Debt service ratio)</td>
</tr>
<tr>
<td>Equation B</td>
<td>Log (average Exchange rate)*K</td>
</tr>
<tr>
<td>Equation B</td>
<td>k*ln(e)</td>
</tr>
<tr>
<td>where</td>
<td>Equation A=B</td>
</tr>
<tr>
<td>a is</td>
<td>Trade surplus as %of GDP</td>
</tr>
<tr>
<td>b is</td>
<td>Import cover</td>
</tr>
<tr>
<td>c is</td>
<td>Debt service ratio</td>
</tr>
<tr>
<td>e is</td>
<td>average USD/INR exchange rate &amp;</td>
</tr>
<tr>
<td>k is</td>
<td>a constant and varies in the range of 0.46 to 0.66</td>
</tr>
</tbody>
</table>

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67 Ibid. page 30
### Table 15: Four factor Equation developed - Data and calculation

<table>
<thead>
<tr>
<th>Year</th>
<th>a</th>
<th>Trade Surplus as % of GDP</th>
<th>Import Cover of Reserves (in months)</th>
<th>B</th>
<th>Debt Service Ratio (%)</th>
<th>c</th>
<th>Total weight</th>
<th>Average USD/INR Rate</th>
<th>ln(0.40a + 0.70b + 0.10c)</th>
<th>* ln(FE rate)</th>
<th>ln(FE rate)</th>
<th>k</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>-3</td>
<td>0.38</td>
<td>2.5</td>
<td>0.2</td>
<td>35.3</td>
<td>-0.17</td>
<td>0.41</td>
<td>17.88</td>
<td>1.4061</td>
<td>7.31</td>
<td>2.8837</td>
<td>0.49</td>
</tr>
<tr>
<td>1991</td>
<td>-1</td>
<td>0.13</td>
<td>5.3</td>
<td>0.42</td>
<td>30.2</td>
<td>-0.15</td>
<td>0.4</td>
<td>23.06</td>
<td>1.8453</td>
<td>9.15</td>
<td>3.1381</td>
<td>0.59</td>
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<tr>
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<td>0.29</td>
<td>4.9</td>
<td>0.38</td>
<td>27.5</td>
<td>-0.13</td>
<td>0.55</td>
<td>30.25</td>
<td>1.6601</td>
<td>16.49</td>
<td>3.4095</td>
<td>0.49</td>
</tr>
<tr>
<td>1993</td>
<td>-1.5</td>
<td>0.19</td>
<td>8.6</td>
<td>0.67</td>
<td>25.4</td>
<td>-0.12</td>
<td>0.74</td>
<td>31.79</td>
<td>2.0744</td>
<td>23.62</td>
<td>3.4592</td>
<td>0.69</td>
</tr>
<tr>
<td>1994</td>
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<td>0.36</td>
<td>8.4</td>
<td>0.66</td>
<td>25.9</td>
<td>-0.13</td>
<td>0.89</td>
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<td>1.9947</td>
<td>28</td>
<td>3.4448</td>
<td>0.58</td>
</tr>
<tr>
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<td>-3.2</td>
<td>0.41</td>
<td>6</td>
<td>0.47</td>
<td>26.2</td>
<td>-0.13</td>
<td>0.75</td>
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<td>1.712</td>
<td>24.71</td>
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<tr>
<td>1996</td>
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<td>0.49</td>
<td>6.5</td>
<td>0.51</td>
<td>23</td>
<td>-0.11</td>
<td>0.88</td>
<td>35.96</td>
<td>1.6734</td>
<td>31.82</td>
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<tr>
<td>1997</td>
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<td>6.9</td>
<td>0.54</td>
<td>19.5</td>
<td>-0.1</td>
<td>0.93</td>
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<td>1.6601</td>
<td>34.21</td>
<td>3.6014</td>
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<tr>
<td>1998</td>
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<td>8.2</td>
<td>0.64</td>
<td>18.7</td>
<td>-0.09</td>
<td>0.96</td>
<td>41.74</td>
<td>1.8453</td>
<td>40.17</td>
<td>3.7315</td>
<td>0.49</td>
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<tr>
<td>1999</td>
<td>-4</td>
<td>0.51</td>
<td>8.2</td>
<td>0.64</td>
<td>17.1</td>
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<td>1.07</td>
<td>43.3</td>
<td>1.7664</td>
<td>46.45</td>
<td>3.7682</td>
<td>0.47</td>
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<tr>
<td>2000</td>
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<td>8.8</td>
<td>0.69</td>
<td>16.6</td>
<td>-0.08</td>
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<td>43.21</td>
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<tr>
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<td>0.9</td>
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<td>2.1318</td>
<td>54.3</td>
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<tr>
<td>2002</td>
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<td>14.2</td>
<td>1.11</td>
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<td>2.374</td>
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<td>0.61</td>
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<tr>
<td>2003</td>
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<td>0.29</td>
<td>16.9</td>
<td>1.33</td>
<td>16.5</td>
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<td>72.15</td>
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<tr>
<td>2004</td>
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<td>0.68</td>
<td>14.3</td>
<td>1.12</td>
<td>6.1</td>
<td>-0.03</td>
<td>1.77</td>
<td>45.73</td>
<td>2.1401</td>
<td>81.01</td>
<td>3.8228</td>
<td>0.56</td>
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<tr>
<td>2005</td>
<td>-6.5</td>
<td>0.83</td>
<td>11.6</td>
<td>0.91</td>
<td>10.2</td>
<td>-0.05</td>
<td>1.69</td>
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<td>1.8779</td>
<td>75.23</td>
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<tr>
<td>Sum</td>
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<td>8.94</td>
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<tr>
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<td></td>
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</tr>
</tbody>
</table>

#### 4.7 USD/INR rates and FII Net sales/Purchases Nov 2007-Oct 2008

It can be observed from the exchange rate movement and the net inflows of FIIs during the period, November 2007 –October 2008. There is a strong correlation between these two variable in the Spot market. The trend is given in Graph 26 & Graph below. At an alpha level of 0.05 (i.e. 5% significance level), the P value is 0.015 which is very much below the alpha; and hence highly significant (Statistical analysis is at Appendix 11). Meaning that when there is net sales by FII in stock market the and they repatriate back to parent company, then INR is likely to depreciate against USD. The graphical analysis is given in Graphs 28 and 29 below.

**Graph 26 & 27 : Correlation between USD/INR Rate and FII net sales/purchases – Nov 2007-Oct 2008**
Graph 26 & 27: Correlation between USD/INR Rate and FII net sales/purchases – Nov 2007-Oct 2008

Graph 26

Correlation between USD/Rate and FII net sales/purchases: Nov 2007-Oct 2008

\[ R^2 = 0.0058 \]
4.8 **Summary**: FX exposure management practices followed by major countries and India including the respondent companies have been explained. Four factor equation $\ln(e)^k = \ln(0.40a+0.70b-0.10c)$ developed.

In the next and last chapter, summary of the research study findings and suggestions and recommendations shall be covered.