Dissertation Report

On

Exposures to Foreign Exchange

(BPCL & Infosys)

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Under the Guidance

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CERTIFICATE

This is to certify that the Project Report titled **"Exposures to Foreign Exchange (BPCL & Infosys)"** is a bonafide work carried out by **Mr. Naveen** of MBA 2012-14 and submitted to Delhi School of Management, Delhi Technological University, Bawana Road, Delhi-42 in partial fulfilment of the requirement for the award of the Degree of Masters of Business Administration.

Prof. P.K Suri

HOD, DSM
Place: Delhi
Date:

Declaration

I Naveen, student of MBA 2012-14 of Delhi School of Management, Delhi Technological University, Bawana Road, Delhi-42 declare that dissertation report entitled Foreign Exchange Exposures(BPCL & Infosys) submitted in partial fulfillment of Degree of Masters of Business Administration is the original work conducted by me.

The information and data given in the report is authentic to the best of my knowledge.

This Report is not being submitted to any other University for award of any other Degree, Diploma and Fellowship.

Naveen

Place: Delhi 2K12/MBA/35

Date:

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1. Executive Summary

The values of a firm's assets, liabilities and operating income vary continually in response to changes in myriad economic and financial variables such as exchange rates, interest rates, inflation rates, relative prices and so forth. We can label these uncertainties as macro-economic environmental risks. In addition, uncertainties related to its operating business such as interruptions in raw materials supplies, labour troubles, success or failure of a new product or technology and so forth obviously have an impact on the firm's performance. These can be grouped under the heading of core business risks. While core business risks are specific to firm, macro-economic uncertainties affect all firms in the economy. However, the extent and nature of impact of even macro-economic risks crucially depend upon the nature of a firm's business. For instance, fluctuations of exchange rate will affect net importers and net exporters quite differently; the impact of interest rate fluctuations will be very different on a bank from that on a manufacturing firm; oil price gyrations will affect an airline in one way and an oil producer in a quite different way. The nature of macro-economic uncertainty can be illustrated by a number of commonly encountered situations. An appreciation of the value of a foreign currency (or equivalently, a depreciation of the domestic currency), increases the domestic currency value of a firm's assets and liabilities denominated in the foreign currency-foreign currency receivables and payables, bank deposits and loans, etc. It will also change domestic currency cash flows from exports and imports. An increase in interest rates reduces the market value of a portfolio of fixed-rate bonds and may increase the cash outflow on account of interest payments. Acceleration in the rate of inflation may increase the value of unsold stocks, the revenue from future sales as well as the future costs of production. Thus the firm is "exposed" to uncertain changes in a number of variables in its environment.

In such conditions it becomes important to understand about the foreign exchange exposure & its impact on the Market Price of shares. For this reason I started this project in which I have tried to understand the Foreign Currency Exposure structure of two companies.

This project calculates the Foreign Exposure of two Indian companies

1.) Bharat Petroleum Corporation Limited
2.) Infosys

BPCL is a major importer of Petroleum Products whereas Infosys is a net exporter. Here I have tried to find out the relation between the Currency Exposure of a company in foreign currency with its share price. I have tried to analyze whether it’s the foreign exchange exposure which makes the fluctuation in the market value of share or the speculation plays the major role.

As the value of INR fluctuates a lot with respect to USSD, therefore I chose these two companies. Both of these companies deal in dollar-rupee combination.

BPCL imports petroleum products from Middle Eastern countries, & pay them in Dollars & it earns its revenue in Rupees whereas Infosys incur its costs in Rupees & it exports a large part of its services to USA & European Countries, therefore getting revenues in Dollars.

This report can be further used to develop a hedging strategy for these companies in future to minimize the fluctuations.

Further I have tried to find the correlation between the foreign exchange movement & the price movement of the shares of these two companies.

After the analysis I found that there is no significant relation between the foreign exchange movement & the share price.

2. RESEARCH METHODOLOGY

Research methodology is a systematic approach in management research to achieve pre-defined objectives. It helps a researcher to guide during the course of research work. Rules and techniques stated in research methodology save time and labour of the researcher as researcher know how to proceed to conduct the study as per the objective.

SELECTION OF TOPIC: The selection of topic is a crucial factor in any research study. There should be newness and it should give maximum scope to explore the ideas from different angles.

Variability in exchange rate is a major source of macroeconomic uncertainty affecting firms. After the 1970's, the rapid expansion in international trade and adoption of floating exchange rate regimes by many countries led to increase exchange rate volatility. The firm's exposure to exchange rate risk increased.

The estimation of exchange rate exposure is a relatively new area in international finance. After 1973, managers and economists become more concerned about the exchange rate fluctuations on firms. Also, for the past decade, researchers have been empirically investigating the exchange rate exposure of the firms. Inspiring from this I chose my topic of research in the same field "Foreign Exchange Exposure (BPCL & Infosys)".

RESEARCH DESIGN: "A Research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure" The research design followed to study the Foreign Exchange Exposure (BPCL & Infosys) is Descriptive and Analytical Research Design.

SOURCES OF DATA COLLECTION:

1. Secondary data collection

Secondary data collection:

The secondary data are those which have already collected and stored. Secondary data easily get those secondary data from records, journals, annual reports of the company etc. It has saved the time, money and efforts to collect the data. Secondary data also made available through trade magazines, annual reports, books etc.

This project is based secondary data collected through annual reports of the organizations. The data collection was aimed at study of Foreign exchange exposure of the companies.

ANALYTICAL TOOLS USED:

The analytical tools used for data analysis is as follows:

a) Regression Analysis

b) Excel

c) Cash Flow Analysis

d) Exposure Analysis

Regression Analysis:- In statistics, **regression analysis** is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. More specifically, regression analysis helps one understand how the typical value of the dependent variable (or 'criterion variable') changes when any one of the independent variables is varied, while the other independent variables are held fixed. Most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables – that is, the average value of the dependent variable when the independent variables are fixed. Less commonly, the focus is on a quantile, or other location parameter of the conditional distribution of the dependent variable given the independent variables. In all cases, the estimation target is a function of the independent variables called the **regression function**. In regression analysis, it is also of interest to characterize the variation of the dependent variable around the regression function which can be described by a probability distribution.

Regression analysis is widely used for prediction and forecasting, where its use has substantial overlap with the field of machine learning. Regression analysis is also used to understand which among the independent variables are related to the dependent variable, and to explore the forms of these relationships.

3. OBJECTIVE OF STUDY

Everything in life holds some kinds of objectives to be fulfilled. This study is not an exception to it. The following are a few straight forward goals which i have tried to fulfill in my project:

I. To calculate the cost & operating exposure of two Indian firms, namely, BPCL & Infosys.
II. To calculate the equity exposure of the same companies
III. To calculate the net cash flow exposure & the revenue exposure of these companies
IV. To find the relationship between the Market Price of share of these companies & the foreign exchange fluctuations

4. NEED OF STUDY

Liberlisation of financial markets has enhanced corporate risk significantly. Corporate treasurers have become increasingly concerned about exchange rate risk. It is primarily due to significant increased in international capital flows and exposure to different currencies.

Foreign exchange exposure is a measure of the potential for firm's profitability, net cash flow and market value to change because of a change in exchange rates. An importance task of the financial manager is to measure foreign exchange exposure and to manage it so as to maximize the profitability, net cash flow and market value of the firm.

With the liberalization of foreign exchange market, firms all over the world have aware of the fact that fluctuations in exchange rates expose their revenues, costs, operating cash flows and their market value to substantial fluctuations. Firms which have exports and imports of goods and services, foreign currencies borrowings and lendings, foreign investments are directly exposed to currencies fluctuations.

Due to all of the above reason a need to do a study on exposure arises.

Moreover everybody tries to beat the market & the speculations in the stock market play a major role in the movement of the values of the shares. Therefore it was required to find if there is any relation that exists between the movement of two exchanges, i.e., the foreign exchange & the stock exchange & hence it justifies the project "foreign exchange exposure (BPCL & Infosys)".

5. SCOPE OF THE STUDY

The scope of the study is identified after and during the study is conducted. The main scope of the study was to put into practical the theoretical aspect of the study into real lifework experience. To implement the concept studied in the classroom to the real world. This study tries to find the correlation between the two most talked buzz word of the financial world, i.e., stock exchange (two companies) & the foreign exchange (Rs-USSD).

This project can be used further in developing hedging strategy for the two companies, so that the risk involved in the business can be minimized.

In future this research can be continued & analysis can be done for the specific industry. In my study I have only included Rs-USSD currency, but we can also analyze other currencies for the same. Hence the study has a wide scope for research in future.

6. Limitations of the Study

Following are the limitations of the study:

- The topic “foreign exchange exposure” itself is a very vast topic & time was a constraint for the analysis.
- Due to time constraint, only two companies were analyzed which does not give the whole picture
- Only USSD-Rs currencies were analyzed.
- All the research is based on the secondary data available in the public books of the organization & the one available over the internet.
- Only five year data has been analyzed under this research, which cannot give the complete picture.

7. INTRODUCTION

Variability in exchange rate is a major source of macroeconomic uncertainty affecting firms. After the 1970's, the rapid expansion in international trade and adoption of floating exchange rate regimes by many countries led to increase exchange rate volatility. The firm's exposure to exchange rate risk increased.

In the literature three types of exposure under floating exchange rate regimes are identified; economic, translation and transaction. Translation and transaction exposures are accounting based and defined in terms of the book values of assets and liabilities denominated in foreign currency. Economic exposure is the sensitivity of company value to exchange rate movements. At the corporate level, changes in exchange rates affect the firm value, because future cash flows of the firm will change with exchange rate fluctuations. In other words, exchange rate changes have important implications for financial decision-making and for firm profitability.

Adler and Dumas (1984) show that even firms whose entire operations are domestic may be affected by exchange rates, if their input and output prices are influenced by currency movements.

It is widely believed that changing exchange rates affect the competitiveness of firms engaged in international competition. A falling home currency promotes the competitiveness of firms in home country by allowing them to undercut prices charged for goods manufactured abroad (Luehrman, 1991). Many simple partial equilibrium models (e.g. Shapiro) predict an increase in the value of the home country firm in response to a real drop in the value of the home currency. Economic theory suggests that under a floating exchange rate regime, exchange rate appreciation reduces the competitiveness of export markets; it has a negative effect on the domestic stock market. Conversely, if the country is import denominated, exchange rate appreciation may have positive effect on the stock market by lowering input costs.

The estimation of exchange rate exposure is a relatively new area in international finance. After 1973, managers and economists become more concerned about the exchange rate fluctuations on firms. Also, for the past decade, researchers have been empirically investigating the exchange rate exposure of the firms. Following Adler & Dumas (1984) most of the research measures the exposure as the elasticity between change in firm value and exchange rate. Empirically, this exposure elasticity is obtained from a regression of stock returns on an exchange rate change (Bodnar & Wong, 2000).

India's exchange and trade system have been liberalized extensively since 1991's. India now follows a managed free floating exchange rate policy. In recent years Indian economy has been suffered from economic crises. Volatility in foreign exchange rate and deviation from purchasing power parity became persistent in the economy. The firms operating in India are

affected in many ways from these economic conditions. The firms have faced higher business risk and foreign exchange risk. In this study, I aim to measure foreign exchange exposure of Two Indian companies especially for last 5 years. I also tried to find out the relationship between the stocks of these two companies & the foreign exchange movement.

Some of the terms that are being used in the analysis are explained here

1.) Cost Exposure :- In simple words cost exposure can be defined as the amount of a company's input cost that is exposed to foreign currency fluctuations. Some companies procure there raw material or part of their raw material or services from foreign countries. Now if there is any mutual fluctuation among the host country & the foreign country, the cost involved will change. Therefore a certain amount of risk is always associated in such cases. This is known as Cost Exposure.
2.) Operating Exposure :- Operating exposure is the degree of risk that a company is exposed to when there is some type of change in varying currency values that are relevant to the operation of the company. The shifts in exchange rates may affect the value of certain assets of the business and thus have an impact on the overall profitability of the company. For this reason, the idea is to position the company and its assets so that any change in the exchange rate is likely to exhibit either a favourable change or very little change at all.

   For most companies, it is the non-monetary assets that are usually affected by operating exposure. This includes assets like equipment and facilities. Shifts in the exchange rate can cause the value of these assets to increase or decrease over time, which may in turn cause the operating cash flows of the business to be affected in some manner. If the operating exposure leads to higher expenses for the operation, this can lead to smaller profits and a reduced flow of cash into the business, making it harder to remain competitive.
3.) Value Exposure :- Value exposure can be defined as the value of the company which is dependent on the foreign currency. A multinational company will have some inputs from different country & it will also earn a part of its income from the foreign currency. So the value of the company will be dependent on the currency or foreign exchange movement. This risked value is known as value exposure.

   For practical usage, it's value is generally taken as equal to the value of the operating exposure.
4.) Net Cash Flow Exposure :- It is the exposure to the variability of cash flow that
   - is attributable to a particular risk associated with a recognized asset or liability. Such as all or some future interest payments on variable rate debt or a highly probable forecast transaction and
   - could affect profit or loss

5.) Equity Exposure :- With everyone trained to look at the same sales figures and gross domestic product (GDP) numbers, it is always useful to find new ways to project a company's earnings or a country's growth rates. For equity investors, foreign exchange fluctuations can mean the difference between a profitable quarter and an unprofitable one, while for currency traders, equity movements can help to determine whether the overall market is seeking risk or avoiding it. With this information, traders and investors can get a better understanding of the close relationship between these two markets and also gain an added advantage in forecasting market direction.

There are many ways in which currencies can impact equities. For multinational companies, currency fluctuations can increase or reduce foreign earnings. For importers and exporters, exchange rates can impact profitability and sales.

In this project I have tried to do the analysis of exposure of the two Indian companies. But first the question arises that what are the reasons that the currencies fluctuate. In the next topic I have tried to include some short & long term reasons for the currency fluctuations.

8. Short & long-term factors that impact currencies

Financial globalisation means that all markets have an impact on each other—equities, currencies bonds or commodities. Hence, currency movement not only depends on the economic scenario of a country, but also on the overall macro-economic environment. Rupee's recent depreciation is an example as its movement is largely driven by global factors, which may not be under the control of the Indian central banker.

Hence, having an indepth understanding of the overall market mechanism can help gauge the trend in the currency markets. It's easy to understand the factors that affect the currency markets if we segregate them in two durations—short term and long term.

Short-term factors

Among the crucial short-term factors are interest rates, economic growth, trade flows, inflation, commodity-based currency impact, political or geopolitical conflicts and natural calamities in a country.

Interest rate: It plays a crucial role in providing direction to a currency, and a weak policy could lead to depreciation. A central banker usually adopts a loose policy when economic growth needs a boost. The nearzero monetary policy, along with quantitative easing by the Federal Reserve after the 2008 financial crisis, had led to weakness in the Dollar Index.

Though the index fell, sharp losses in the currency were prevented due to the increase in safe-haven demand. Hence, the impact of the event was two-fold. A country's monetary policy or interest rate regime impacts not only the movement of a domestic currency, but global currencies as well.

Economic growth: A country's strong economic growth translates into better expectations by investors. A currency strengthens when the economic scenario is upbeat and there are expectations that a stable trend will continue, or vice versa.

Trade balance: This has a major impact on the currency movement. A nation that has more exports than imports will witness a trade surplus, which will support gains for the currency. On the other hand, trade deficit will lead to depreciation in the currency.

Inflation: If inflationary expectations in a country are high, the central banker will look to curb it by increasing interest rates, or vice versa. A rise in rates will support the currency, while a fall will cause the demand for the currency to deteriorate.

Commodity imports: The countries that are dependent on commodity imports for domestic consumption usually face headwinds in terms of the currency movement. For India, the increase in gold imports caused the trade deficit to widen sharply, leading to depreciation in the currency.

Political turmoil, geopolitical tensions or natural disasters can also have a negative impact. Currency movement is largely dependent on the day-to-day economic data released across the globe, movement in the global equity markets and a change in commodity prices.

Long-term factors

Economic growth and inflation: Expectations of economic growth and inflation over a long period affect currency price movement. Consider the US economy, which underwent a long period of slow growth, during which the Dollar Index suffered losses. However, the current expectations of longterm growth are bullish, strengthening the Dollar Index as markets expect a reversal in the state of the economy.

As for inflation, the central bank targets a lower range as a higher inflation rate leads to depreciation in the currency as each unit can buy fewer goods and services. A high rate will restrict central bankers' steps to change the rate scenario. Hence, inflation expectations drive currency movement.

Stimulus measures: Such steps by central bankers to boost economic growth also impact currency. The quantitative easing program by the Federal Reserve led to a sharp bounceback in market sentiment during the financial crisis and led to the weakening of the Dollar Index. While stimulus measures led to a rise in risk sentiment and weakened the Dollar Index, the ongoing developments on the withdrawal of these steps is strengthening the Dollar Index, indicating the economic recovery in the US.

While these factors provide cues, new developments on the global economic front are equally important in deciding the trend.

9. LITERATURE REVIEW

Currency exposure

Economic theory suggests that firms are subject to foreign exchange exposure as their cash flows are driven, directly or indirectly, by changes in exchange rates. The direct exposure involves transaction exposure of expected future foreign currency cash flows (i.e. foreign currency receivables and payables). Indirect exposure arises from the impact of foreign exchange movements on the competitiveness of the firm. Consistent with these arguments, analytical research (see e.g. Shapiro, 1975; Heckman, 1985; Levi, 1994; Marston, 2001) predicts that exchange rate fluctuations are a major source of macroeconomic uncertainty that influence the returns and cash flows of corporations.

Given the theoretical expectation of a link between firm performance and exchange rates, one would expect empirical studies to establish this relationship. Yet, while early empirical studies (Jorion, 1990; Bartov and Bodnar, 1994; Amihud, 1994) almost suggest that foreign exchange movements do not affect stock prices, recent empirical research has produced mixed results. Dominguez and Tesar (2006) find that many publicly listed non-US firms from eight developed and emerging countries experience significant currency exposure.

El-Masry et al. (2007) examine the foreign exchange exposure of 394 UK firms over the period 1981-2001. They show that only 15% of their sample firms are significantly exposed to the fluctuations in the TWC. In a multi-country study, Hutson and Stevenson (2010) find that only 8% of their 312 UK firms are exposed to currency index movements during the period 1984-2003.

Several firm-level studies attribute the weak empirical findings to exposure measurement biases. Fraser and Pantzaliz (2004), for example, show that the exposure of US multinationals to exchange rate changes depends on the foreign exchange index used in the exposure regression. Specifically, they show that 5.5%, 8.7% and 12.6% of their 310 sample firms exhibit significant exposure to MAJCUR index, firm-specific exchange rate index and FRB's BOARD currency index, respectively. Rees and Unni (2005) examine the exchange rate exposure of large firms in the UK, France and Germany. They find that European firms exhibit more exposure to bilateral exchange rates than currency indices. Chow et al. (1997) show the exchange rate exposure of US multinationals increases with the length of return horizon. Muller and Verschoor (2006) find that US multinationals react asymmetrically to currency movements. They also show that asymmetries are more pronounced towards large versus small currency changes than over appreciation and depreciation cycle. Using a sample of 935 US companies with real operations

in foreign countries, they find that the percentage of firms with significant currency risk exposure increases from 7.27% to 29% after accounting for the asymmetric nature of the exposure. Tai (2008) also finds evidence of asymmetric currency exposure and asymmetry in the pricing of currency risk.

Several other methodological issues have been identified by industry- and index-level studies. Patro et al. (2002) examine the exchange rate exposure of index equity returns of 16 OECD countries. Using a GARCH specification, they find significant time-varying foreign exchange risk exposure. Priestley and degaard (2007) argue that since market portfolios are also exposed to currency fluctuations, including market returns in the exposure regression may cause spurious correlation between industry returns and exchange rate fluctuations. They show that the percentage of US industries exposed to movements of either JP¥ or Euros increases from 10.34% to 27.58% when orthogonalized, rather than actual, market returns and exchange rates are used in the linear exposure regressions.

This study contributes to the literature on foreign exchange risk measurements by examining the individual and the combined effects of time-varying risk adjustments and market return orthogonalization on the foreign exchange exposure of individual firms.

The determinants of currency exposure

The extant literature documents that foreign exchange exposure depends on a number of country, industry and firm characteristics. Patro et al. (2002) examines the extent to which equity index returns exposure can be explain by a country's macroeconomic variables. They find that imports, exports, credit ratings and tax revenues significantly affect currency risk. De Jong et al. (2006) show that 50 percent of the Dutch firms are significantly exposed to exchange rate fluctuations. They argue that firms in open economies, such as the Netherlands, are likely to experience significant foreign exchange exposure. Hutson and Stevenson (2010) report a significantly positive (negative) association between country openness (creditor protection) and a firm's exposure to the exchange rate movements.

Many studies show that foreign exchange exposure varies significantly across industries. Bodnar and Gentry (1993) examines the foreign exchange exposure of the US, Canadian and Japanese industries. They show that the level of engagement in foreign transactions is an important determinant of industry sectors exposure. Similar results are reported by Williamson (2001) in the context of US and Japanese Automotive industry.

Bodnar et al. (2002) argue that a firm's exposure depends on its ability to pass on the increased costs or prices resulting from exchange rate fluctuations to their customers. This, in turn,

depends on industry competitiveness, which determines the price elasticity of demand, and the degree of substitutability of the goods. Marston (2001) shows that industry competitiveness has significant effect on firm-level exposure. However, Dominguez and Tesar (2001) find that trade measured at the industry level has little impact on the exchange rate exposure of individual firms. Their findings, they argue, suggests that firms in sectors with great quantity of foreign transactions are more likely to hedge.

In addition to the macroeconomic variables and industry competitive structure, firm characteristics, such as foreign operations, hedging activities, size, leverage, liquidity and growth opportunities, are also shown to affect foreign exchange risk exposure. Jorion (1990) find that US firms with high levels of foreign sales exhibit more positive exchange rate exposure. Booth and Rotenberg (1990) show that foreign sales, foreign assets and foreign debt are amongst the determinants of the sensitivity of Canadian stock returns to the US dollar movements. However, Aggarwal and Harper (2010) show that the foreign exchange exposure faced by domestic companies is not significantly different from that observed in the sample of multinational corporations. Nydhal (1999), Allayannis and Ofek (2001) and Nguyen and Faff (2003), among others, establish that the use of derivatives reduces exchange rate exposure. Bodnar and Wong (2003) show that small firms are more exposed to foreign exchange movements than large firms. This evidence is consistent with the finding that large firms are more likely to hedge their foreign exchange risk exposure (see e.g. Allayannis and Ofek, 2001; Hagelin and Pramborg, 2006; Bartram et al., 2010). Nance et al. (1993) show that hedging is particularly popular amongst firms with considerable growth opportunities, high probability of financial distress and low level of liquid assets.

10. Bharat Petroleum Corporation Limited (BPCL)

Introduction

Bharat Petroleum Corporation Limited (**BPCL**) is an Indian state controlled oil and gas company headquartered in Mumbai, Maharashtra. BPCL has been ranked 225th in the Fortune Global 500 rankings of the world's biggest corporations for the year 2012.It was incorporated on November 3, 1952 as a private limited company with the name Burmah Shell Refineries Ltd.

Although it carries the ancient Sanskrit name for India (Bharat), Bharat Petroleum Corporation Limited (BPCL) is a modern refining and distribution company. It vies with Hindustan Petroleum for the #2 slot behind Indian Oil. The company's refineries -- in Mumbai, Kochi, and Numaligarh (62%-owned) -- collectively process more than 24 million metric tons of crude oil per year. BPCL sells engine oils and gasoline, liquefied petroleum gas (LPG), and kerosene. It has 10000 gas stations, a national network of kerosene dealers, and more than 2,450 LPG distributors. The company operates 50 LPG bottling plants and serves more than 30 million LPG customers across India.

BPCL operates in the petroleum industry in India. The company operates in a single segment - Refinery and marketing activities, which includes downstream petroleum sector. They are also engaged in the Exploration and Production of Hydrocarbons (E&P). **BPCL on a regular basis imports their LPG requirements mainly from the Middle East**. Occasional there are import requirements of Gasoil, Kerosene, Gasoline and Base Oil. The company refineries consist of Mumbai Refinery, Kochi Refinery, Numaligarh Refinery and Bina Refinery. BPCL exports Fuel Oil and Naphtha and Base Oil (Group II).

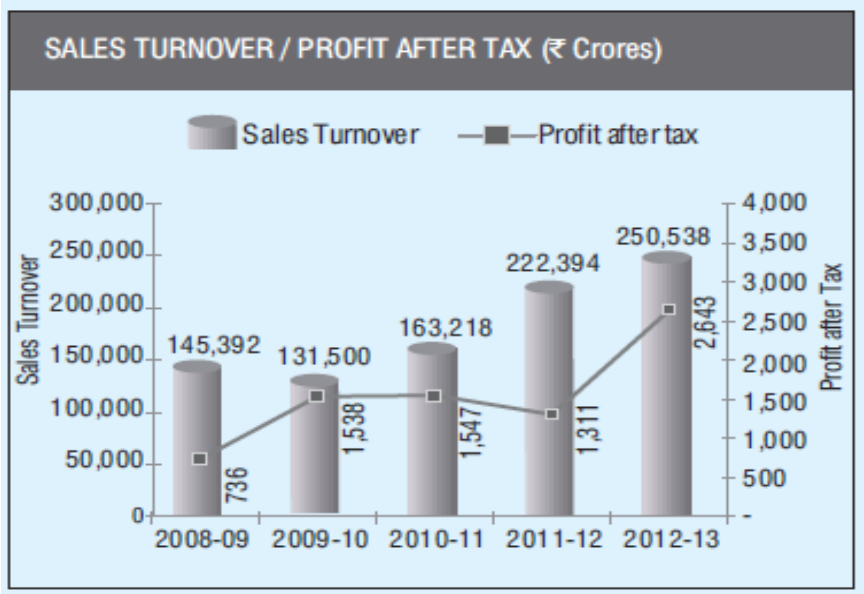
Key financial details for fiscal year ending March, 2013 are as under:

Sales: $44,319.1M

One year growth: 8.8%

Net income: $344.2M

Income growth: 129.6%



Information regarding BPCL's foreign exchange exposure

BPCL major earnings are in Indian currency i.e. Indian Rupee and the major cost incurred is by importing the oil. Major importing nation for BPCL is Saudi Arabia. Occasionally there are import requirements of Gasoil, Kerosene, Gasoline and Base Oil.

BPCL has large foreign currency loan and home currency loan which contributes to both leveraging and hedging effect.

Cost Exposure

FX Cost Exposure is the elasticity of firm anticipated cost to FX changes, viewed from the perspective of the firm's base currency. BPCL is an Indian firm but the basic cost it incurs in importing crude oil which comes from Saudi Arabia. We can thus calculate yearly cost for the last five years keeping imports and changes in foreign currency into account. I have used **Cumulative Annual Growth Rate** and **Actual percentage change** in the cost for 5 years which is used for normalization.

CAGR= [(Cost in 5^{th} year/ Cost in base year) ^ (1/n-1)] - 1

Annual Cost Growth Rate = ((Cost in next year – Cost in previous year)/Cost in previous year)*100

After calculating the value of CAGR and Actual Annual Cost Growth Rate (annually) I calculated the **percentage change attributable to the change in foreign currency** by using the following formula:

%age change attributable to the Foreign Exchange Change = Actual Annual Growth Rate - Cumulative Annual Growth Rate

Changes in Cost due to Forex changes				
Year	**Yearly Amount (in CroresRs.)**	**CAGR**	**Actual changes in Cost**	**%age Change attributed to FX Changes**
2007-08	48,921.90	-	-	-
2008-09	53,936.93	15.95%	10.25%	-5.70%
2009-10	50,592.45	15.95%	-6.20%	-22.15%
2010-11	62,730.40	15.95%	23.99%	8.04%
2011-12	85,562.97	15.95%	36.40%	20.45%
2012-13	97,489.49	15.95%	13.94%	-2.01%

After getting the percentage change in cost attributable to FX change and Annual percentage change in FX for that period, we have calculated the **Cost Exposure** for BPCL by using the formula:

Cost Exposure = (Percentage change in cost attributed to FX change (Rs.)/ Annual % change in FX (Rs.))*100

Changes in Forex Rate				
Date	**Forex Rate (Rs/$)**	**CAGR**	**Annual %age Change**	**Normalisation**
31st Mar 2008	39.97	-	-	
31st Mar 2009	50.65	1.67%	26.71%	25.03%
31st Mar 2010	46.27	1.67%	-8.64%	-10.31%
31st Mar 2011	44.47	1.67%	-3.89%	-5.56%
31st Mar 2012	50.86	1.67%	14.37%	12.70%
31st Mar 2013	54.12	1.67%	6.41%	4.74%

Cost & Operating Exposure				
Cost Exposure	Revenue Exposure	Operating Cash Flow Margin (G) [Details in next sheet]	(G-1)	Operating Exposure
-0.23	0	1.66	0.66	0.150228355
2.15	0	1.7	0.7	-1.503530472
-1.45	0	1.7	0.7	1.011798493
1.61	0	1.68	0.68	-1.095285584
-0.42	0	1.68	0.68	0.288425375

Average cost exposure for BPCL comes out to be 0.33 which means that for every 1% change in FX, cost changes by 0.33% according to the data of past 5 years.

Operating Exposure

To calculate the operating exposure for BPCL we first calculated the reciprocal of operating cash flow margin (G) by using the data for Sales Revenue and Operating Margin from its Annual Report of last 5 years.

Reciprocal of Operating Cash Flow Margin (G) = Sales Revenue/Operating Margin

Computing Operating Cash Flow Margin & Value of G					
	2008-09	2009-10	2010-11	2011-12	2012-13
Sales Revenue (A)	1,35,237.70	1,22,275.95	1,51,639.45	2,11,972.97	2,40,115.75
Operating Margin (B)	81300.77	71683.5	88909.05	126410	142626.26
Value of G (A/B)	1.66342459	1.70577539	1.70555697	1.67686868	1.6835311

From the value of G, G-1 can be calculated and then using the formula of Operating Exposure i.e. $E_O = E_R*G - E_C*(G-1)$ we have calculated the operating exposure for all the years (revenue exposure=0)**(refer table 3)**

The average operating exposure for BPCL comes out to be -0.2297. Now since the operating exposure is low positive, we can say that it is an importer with low pass through and little operational hedging as $-1 < E_O < 1$. For BPCL, we can also say that the pass through is low as the

products of BPCL like Domestic LPG are regulated and are provided at subsidized rates. Though there is an increase in prices but at irregular intervals when the pressure of costs for the company becomes high. Though, the company can use operational hedging to reduce its foreign currency exposure by trying to change its importing destinations or trying to explore oil domestically which can again be a costly affair.

Value Exposure

For the value exposure we can assume that, value exposure is equal to the operating exposure for the company.

Net Cash Flow Exposure

Net cash flow exposure means the change in net cash flows of a company with respect to the changes in the foreign exchange rate.

For this purpose,

Net cash flows = Operating Margin- Interest Cost

Computing Net Cash Flow					
	2008-09	2009-10	2010-11	2011-12	2012-13
Operating Margin (B)	81300.77	71683.5	88909.05	126410	142626.26
Interest cost	2,166.37	1010.95	1117.03	1,799.59	1,825.24
Net cash flow	79,134.40	70,672.55	87,792.02	1,24,610.41	1,40,801.02

After calculating net cash flows for BPCL, I have calculated the exposure of net cash flows by using the formula:

Net Cash Flow Exposure = (Percentage change in net cash flows attributed to FX change (Rs.)/ Annual % change in FX (Rs.))*100

Net Cash Flow Exposure					
Year	Yearly Net Cash flow (in Crores Rs.)	CAGR	Actual changes in Net Cash Flow	%age Change attributed to FX Changes	Net Cash Flow Exposure
2007-08	72089.73	-	-	-	-
2008-09	79,134.40	15.49%	9.77%	-5.72%	-0.23

2009-10	70,672.55	15.49%	-10.69%	-26.19%	2.54
2010-11	87,792.02	15.49%	24.22%	8.73%	-1.57
2011-12	1,24,610.41	15.49%	41.94%	26.44%	2.08
2012-13	1,40,801.02	15.49%	12.99%	-2.50%	-0.53

Average net cash flow for the BPCL is 0.46. We can observe that BPCL is using its foreign currency loan in an effective manner.

Equity Exposure

A firm's equity exposure is defined to be the elasticity of the firm's intrinsic stock value to FX changes, viewed from the perspective from the firm's base currency.

Now calculation of Equity exposure of Bharat Petroleum is done in two ways-

I. In this method three elements are being taken, to determine a firm's equity exposure to a currency:
   1. Firms FX Value exposure.
   2. The Financial Leverage (Ratio of firm's debt value to the firm's intrinsic value).
   3. Relative amount of debt denominated in the FX operating exposure currency.

$$E^{Rs}_{S\$} = (O^{Rs.}{}_{\$} - D^{Rs.}{}_{\$}/V^{Rs.})/(1- D^{Rs.}/V^{Rs})$$

Where,

$D^{Rs.}{}_{\$}$ = Amount of foreign currency ($) loan taken in Rs. value (hedging effect)

$D^{Rs.}$= Amount of Total Loan (Leveraging Effect).

V^{Rs} = Value of the firm in rupee terms.

Calculation of $D^{Rs.}{}_{\$}$

This includes the total foreign currency loans. BPCL has taken in short term borrowings of Rs. 16275.95crore.

Calculation of $D^{Rs.}$

The amount of total includes long term borrowings and short term borrowings which amounts to total of Rs 23839.04 crores.

Calculation of V^{Rs}

Value of the firm in rupees is being calculated by

V^{Rs} = MPS* No of shares outstanding + Total Debt

The number of outstanding shares of BPCL is 723084248 and the MPS (Market Price per share) is 378.15 (as on 31st March 2013). Hence the total value of the firm is **Rs.511824708381.20**.

For the corresponding years operating exposure the equity exposure is being calculated and for the 4 years the average is taken which comes out to be **-0.153138697**.

In BPCL the operating exposure is negative; having debt denominated in that currency does not hedge the FX exposure and in fact will exacerbate it.

2. Calculating Equity exposure using single factor regression method.

For regression method, the equation taken is

Market Price of Share (Y) = Equity Exposure (Slope) * (Foreign Exchange Rate) + C + Error

Using the above equation MPS of last 5 years is taken with foreign exchange rate for USD and INR. After regressing two variables with Y being dependent variable and X being Independent variable, the value of R square comes to be 0.0547 i.e. the 5.47% of variation in market share price is explained by foreign exchange changes.

The value of equity exposure comes out to be -1.173548253 which is not equal to the equity exposure as calculated above. Hence we can say that exchange rate not affect MPS significantly.

Result

Considering two situations of

- ✓ Time lag exchange rate effect delayed on MPS - Low pass through hence speculation.
- ✓ Speculation of exchange rate causing changes in MPS

For the first case there was no time observed in BPCL share price and in the second case the deviation of equity exposure reduced but the difference between the exposures was significant. Hence we can say that the changes in exchange rate do not significantly affect the market price per share. Speculation is dominant because of low pass through.

11. Infosys

Introduction

Infosys Limited (formerly Infosys Technologies Limited) is an Indian multinational provider of business consulting, technology, engineering, and outsourcing services. It is headquartered in Bangalore, Karnataka. Infosys is the third-largest India-based IT services company by 2012 revenues. Of this revenue, the majority comes from international business. In 2009, Infosys collected 1.2% of its income from the domestic Indian market.

Infosys Limited (NYSE: INFY) was started in 1981 by seven people with US$ 250. Today, they are a global leader in consulting, technology and outsourcing with revenues of US$ 7.231 billion (LTM Q3 FY13). Many of the world's most successful organizations rely on Infosys to deliver measurable business value. Infosys provides business consulting, technology, engineering and outsourcing services to help clients in over 30 countries build tomorrow's enterprise.

Revenue Exposure

FX Revenue Exposure is the elasticity of firm anticipated revenue to FX change, viewed from the perspective of the firm base currency. Infosys is an Indian firm but its revenue is highly comes from US. We analyses the quarterly balance sheet of Infosys for last six years from year 2007-2008 to 2012-2013. On the basis of that we calculated yearly revenue for the last five years. Using five year revenue we calculated **Cumulative Annual Growth Rate** and **Actual percentage change in Revenue** annually.

Calculation of **Cumulative Annual Growth Rate** for five year is done by applying this formula,

CAGR = ((Final Value/ Initial Value) ^.20)-1

CAGR for Infosys = ((36765/15347) ^.20)-1

CAGR = 19.01% yearly

We have calculated **Cumulative Annual Revenue Growth Rate** for five year by applying this formula,

*Annual Revenue Growth Rate = ((final value – Initial Value)/Initial Value)*100*

We apply this formula for next four year and we get Annual Revenue Growth Rate from year 2008-09 to 2012-13.

After calculating the value of CAGR and Actual Annual Revenue Growth Rate (for every individual year) we calculated **Normalization value** by using formula,

Normalization value = Actual Annual Revenue Growth Rate - Cumulative Annual Revenue Growth Rate

By doing in this way we got normalization value,

Detail table of calculation is given below,

Changes in Revenue						
Year	Quarter	Amount (in CroresRs.)	Amount (in CroresRs.)	CAGR	Actual Change in Annual Revenues	Normalization value
Year	Quarter	Amount (in CroresRs.)				
2007-08	2007-08 (Q1)	3,551				
	2007-08 (Q2)	3562				
	2007-08 (Q3)	3999				
	2007-08 (Q4)	4235	15347	0.190919		
2008-09	2008-09 (Q1)	4516				
	2008-09 (Q2)	5066				
	2008-09 (Q3)	5429				
	2008-09 (Q4)	5253	20264	0.190919	0.320388	0.129469
2009-10	2009-10 (Q1)	5104				
	2009-10 (Q2)	5201				
	2009-10 (Q3)	5335				
	2009-10 (Q4)	5500	21140	0.190919	0.043229	-0.14769
2010-11	2010-11 (Q1)	5758				
	2010-11 (Q2)	6425				
	2010-11 (Q3)	6534				
	2010-11 (Q4)	6668	25385	0.190919	0.200804	0.009885
2011-12	2010-11 (Q1)	6905				
	2010-11 (Q2)	7470				

	2010-11 (Q3)	8689				
	2010-11 (Q4)	8183	31247	0.190919	0.230924	0.040005
2012-13	2012-13 (Q1)	8909				
	2012-13 (Q2)	9,129.00				
	2012-13 (Q3)	9,398.00				
	2012-13 (Q4)	9,329.00	36765	0.190919	0.176593	-0.01433

After getting value of revenue change from year 2008-09 to 2012-13, we need to calculate Change in Foreign Exchange rate. For this we gather Foreign Exchange data for every quarter from year 2007-08 to 2012-13. And on the basis I calculated the **Annual percentage change in Foreign Exchange Rate.**

Changes in Forex Rate			
Date	**Forex Rate (Rs/$)**	**Annual %age Change**	**Normalization value**
30th June 2007	40.54		
30th Sept 2007	39.80		
31st Dec 2007	39.42		
31st Mar 2008	**39.97**		
30th June 2008	42.93		
30th Sept 2008	46.86		
31st Dec 2008	48.08		
31st Mar 2009	**50.65**	26.7012%	20.84810%
30th June 2009	47.87		
30th Sept 2009	47.82		
31st Dec 2009	46.41		
31st Mar 2010	**46.27**	-8.6386%	-14.49165%
30th June 2010	46.43		
30th Sept 2010	44.57		
31st Dec 2010	44.57		
31st Mar 2011	**44.47**	-3.8902%	-9.74330%
30th June 2011	44.60		
30th Sept 2011	49.07		

31st Dec 2011	53.02		
31st Mar 2012	**50.86**	14.3692%	8.51615%
30th June 2012	54.17		
30th Sept 2012	54.93		
31st Dec 2012	54.03		
31st Mar 2013	**53.12**	4.4473%	-1.40578%
	CAGR	5.853%	

After getting normalization value and Annual % change in FX, I calculated **Revenue Exposure** for Infosys by using formula,

*Revenue Exposure = (Normalization value (Rs.)/ Annual % change in FX ($))*100*

Without Normalization					
Computation of Operating Exposure					
	Revenue Exposure	Cost Exposure	Operating Cash Flow Margin (G) [Details in next Sheet]	(G-1)	Operating Exposure
2008-09	1.199903	0	2.827923348	1.827923	3.393233
2009-10	-0.50042	0	2.568556585	1.568557	-1.28537
2010-11	-5.16178	0	2.701208133	1.701208	-13.943
2011-12	1.60707	0	2.670730742	1.670731	4.292052
2012-13	3.970785	0	2.902395167	1.902395	11.52479
				Average	0.796331

With Normalization

Computation of Operating Exposure

	Revenue Exposure	Cost Exposure	Operating Cash Flow Margin (G) [Details in next Sheet]	(G-1)	Operating Exposure
2008-09	0.621013	0	2.827923348	1.827923	1.756177
2009-10	1.019136	0	2.568556585	1.568557	2.617708
2010-11	-0.10146	0	2.701208133	1.701208	-0.27405
2011-12	0.469752	0	2.670730742	1.670731	1.254582
2012-13	1.019077	0	2.902395167	1.902395	2.957763

Implication of Revenue Exposure in Business

Revenue Exposure shows the sensitivity in Revenue with respect to the foreign exchange change, so in this case we have 0.62 revenue exposure for year 2008-09 which says that 62% change in revenue happen just because of the change in foreign exchange rate fluctuation, similarly for year other years revenue exposure.

Here we can say that Infosys fluctuation in revenue is highly dependent upon foreign exchange change because every type of costing is done only in India and large portion of revenue is generated from USA, so any fluctuation in FX value affect highly to the Revenue of Infosys (if Revenue Exposure is 0 (Zero) it means that any fluctuation in FX value is not affecting Revenue of the firm).

Operating Exposure

In order to calculate operating exposure of Infosys we first calculated operating cash flow margin (G) by using the data for Sales Revenue and Operating Margin from its Annual Report of last 4 years.

Operating Cash Flow Margin (G) = Sales Revenue/Operating Margin

From the value of G, G-1 can be calculated and then using the formula of Operating Exposure $E_O = E_R*G - E_C*(G-1)$ we calculated (in this case Cost Exposure would be zero) the operating exposure for all the 4 years which was found to be as follows:

Without Normalization					
Computation of Operating Exposure					
	Revenue Exposure	Cost Exposure	Operating Cash Flow Margin (G) [Details in next Sheet]	(G-1)	Operating Exposure
2008-09	1.199903	0	2.827923348	1.827923	3.393233
2009-10	-0.50042	0	2.568556585	1.568557	-1.28537
2010-11	-5.16178	0	2.701208133	1.701208	-13.943
2011-12	1.60707	0	2.670730742	1.670731	4.292052
2012-13	3.970785	0	2.902395167	1.902395	11.52479
				Average	0.796331

With Normalization					
Computation of Operating Exposure					
	Revenue Exposure	Cost Exposure	Operating Cash Flow Margin (G) [Details in next Sheet]	(G-1)	Operating Exposure
2008-09	0.621013	0	2.827923348	1.827923	1.756177
2009-10	1.019136	0	2.568556585	1.568557	2.617708
2010-11	-0.10146	0	2.701208133	1.701208	-0.27405
2011-12	0.469752	0	2.670730742	1.670731	1.254582
2012-13	1.019077	0	2.902395167	1.902395	2.957763
				Average	1.662435

Since the average operating exposure of Infosys is coming out to be 1.662, hence we can say that it is an exporter with little operational hedging. Infosys has its offices in different countries adding to the operational hedging. As we know that for (E_O>1) this condition stays true. Since Infosys has no debt therefore even after having operating exposure greater than one then also there is no effect of financial leverage effect and hedging effect can be directly being observed as well.

Net Cash Flow

As it is a no debt company, there are no interest related expenses so the operating exposure is equal to NCF exposure for Infosys.

Value Exposure

We have assumed that value exposure is equal operating exposure.

Equity Exposure

A firm's equity exposure is defined to be the elasticity of the firm's intrinsic stock value to FX changes, viewed from the perspective from the firm's base currency.

Now calculation of Equity exposure of Infosys is done in two ways-

II. In this method three elements are being taken, to determine a firm's equity exposure to a currency:

4. Firms FX Value exposure.
5. The Financial Leverage (Ratio of firm's debt value to the firm's intrinsic value).
6. Relative amount of debt denominated in the FX operating exposure currency.

$$E^{Rs}{}_{S\$} = (E^{Rs.}{}_{\$} - D^{Rs.}{}_{\$}/V^{Rs.})/(1- D^{Rs.}/V^{Rs})$$

Where,

$D^{Rs.}{}_{\$}$ = Amount of foreign currency ($) loan taken in Rs. value (hedging effect)

$D^{Rs.}$= Amount of Total Loan (Leveraging Effect).

V^{Rs} = Value of the firm in rupee terms.

Calculation of $D^{Rs.}{}_{\$}$- Infosys is zero debt organization hence the amount of foreign currency or home country loan taken is zero. Hence no hedging effect.

Calculation of D^{Rs-} Infosys is zero debt organization hence the amount of total loan will be zero, no leveraging effect will be there.

Calculation of V^{Rs}– Value of the firm is determined by total shareholders which is 57, 41,51,559 and on 31st March 2012 share price was Rs 2864.95.

Year	No of shares	Share price	Market Capitalisation
2013	574151559	3,485.50	2001205258894.50
2012	574151559	2,318.50	1331170389541.50
2011	574151559	2,765.05	1587557768212.95
2010	573825192	3,445.00	1976827786440.00
2009	572830043	2,605.25	1492365469525.75
2008	571995758	1,117.85	639405458080.30

Year	Operating Exposure	Equity Exposure
2013	-0.648317748	-0.648317748
2012	0.743547048	0.743547048
2011	-0.686388355	-0.686388355
2010	4.391345238	4.391345238
2009	1.371210241	1.371210241

Result

Considering two situation of

- ✓ Time lag exchange rate effect delayed on MPS
- ✓ Speculation of exchange rate causing changes in MPS

For the first case there was no time observed in Infosys share price and in the second case the deviation of equity exposure reduced when we have taken the lag of 6 months. But it is still significantly different from value calculated from method one. Hence we can say that the changes in exchange rate do not significantly affect the market price per share.

The speculation is prominent in Infosys as the most of the projects in ITes are won as per the competitive bidding. Hence the exchange rate fluctuation does not affect the MPS. But the speculation can lead to positive or negative sentiments regarding position of profitability and hence affecting the MPS.

12. Findings of the study

BPCL

- ✓ Average cost exposure for BPCL comes out to be 0.33 which means that for every 1% change in FX, cost changes by 0.33% according to the data of past 5 years.
- ✓ The average operating exposure of the BPCL came out to be -0.2297. hence we can say that BPCL is importer with very less hedging
- ✓ The average net cash flow exposure was 0.46.
- ✓ The value of R square comes to be 0.0547, which means that the 5.47% of variation in market share price is explained by foreign exchange changes.

Infosys

- ✓ Average revenue exposure of Infosys came out to be 0.606, which means that for every 1% change in FX, revenue can change as much as by 0.61%
- ✓ The average operating exposure was 1.662 for Infosys, which shows it is net exporter.
- ✓ NCF exposure for the Infosys was zero as company has not taken any kind of debt, hence the interest expense is zero.
- ✓ The value of R square came out to be 0.0234, which implies that 2.34% of the movement of stock price can be explained by the foreign exchange movement.

13. Reference

Agarwal, S., and Ramaswami, S.N., (1992), Choice of foreign market entry mode: Impact of ownership, location and international factors, Journal of International Business Studies 23(1), 1-27.

Aggarwal, R., and Harper, J.T., (2010), Foreign exchange exposure of "domestic" corporations, Journal of International Money and Finance 29, 1619-1636.

Allayannis, G., and Ofek, E., (2001), Exchange rate exposure, hedging, and the use of foreign currency derivatives, Journal of International Money and Finance, 20 (2), 273-296.

Allayannis,G., and Weston, J.P., (2001), The use of foreign currency derivatives and firm market value, Review of Financial Studies 14, 243-276.

Amihud, Y., (1994), Exchange rates and the valuation of equity shares. In: Amihud, Y., Levich, R.M. (Eds), Exchange Rate and Corporate Performance. Irwin, New York, 49- 59.

Baltagi, B.H., Econometric analysis of panel data, third edition, (2005), John Wiley & Sons Ltd.
Bartov, E., and Bodnar, G.M., (1994), Firm valuation, earnings expectations, and the exchange rate effect, Journal of Finance 49, 1755-1785.

Bartram, S.M., Brown, G.M., and Minton, B.A., (2010), Resolving the exposure puzzle: The many facets of exchange rate exposure, Journal of Financial Economics 95, 148 – 173.

Berkman, H., Bradbury, M.E., and Magan, S., (1997), An international comparison of derivatives use, Financial Management 26(4), 69-71.

Bodnar, G.M., and Gentry, W.M., (1993), Exchange rate exposure and industry characteristics: Evidence from Canada, Japan and the US, Journal of International Money and Finance 12, 29-45.

Bodnar, G.M., Dumas, B., and Marston, R.C., (2002), Pass-through and exposure, Journal of Finance 57 (1), 199-231.

Bodnar, G.M., and Wong, F.M.H., (2003), Estimating exchange rate exposure: Issues in model structure, Financial Management 32, 35-67.

Bollerslev, T., Chou, R., and Kroner, K., (1992), ARCH modeling in Finance: A review of the theory and empirical evidence, Journal of Econometrics 52, 5-69.

Booth, L., Rotenbery, W., (1990), Assessing foreign exchange exposure: Theory and application using Canadian firms, Journal of International Financial Management and Accounting 2, 1-22.

Chow, E.H., Lee, W.Y., and Solt, M.E.(1997), The exchange rate exposure of asset returns, Journal of Business 70, 105-123.

De Jong, J., Ligterink, J., and Macrae, V., (2006), A firm-specific analysis of the exchange- rate exposure of Dutch firms, Journal of International Financial Management and Accounting 17, 1-28.

Dominguez, K.M.E, and Tesar, L.L., (2001), trade and exposure, American Economic Review 91(2), 367-370.

Dominguez, K.M.E, and Tesar, L.L., (2006), Exchange rate exposure, Journal of International Economics 68(1), 188-218.

Dunne, T.M., Hellier, C., Power, D., Mallin, C.A., Ow-Yong, K.H., and Moir, L., (2004), The introduction of derivates reporting in the UK: a content analysis of FRS13 disclosures, Journal of Derivatives Accounting 1(2), 205-219.

El-Masry, A., Abdel-Salam, O., and Alatraby, A., (2007), The exchange rate exposure of UK non-financial companies, Managerial Finance 33 (9), 620-641.

Froot, K.A., Scharfstein, J.S., and Stein, J.C., (1993), Risk management: Coordinating corporate investment and financing policies, Journal of Finance 48 (5), 1629-1658.

Fraser, S., and Pantzaliz, C., (2004), Foreign exchange exposure of US multinational corporations: a firm specific approach, Journal of Multinational Financial Management 14, 261-281.

Hagelin, N., and Pramborg, B., (2006), Empirical evidence concerning incentives to hedge transaction and translation exposure, Journal of Multinational Financial Management 16 (2), 142-159.

Heckman, C.R., (1985), A financial model of foreign exchange exposure, Journal of International Business Studies 41 (2), 83-99.

Hutson, E., and Stevenson, S., (2010), Openness, hedging incentives and foreign exchange exposure: A firm-level multi-country study, Journal of International Business Studies 41, 105-122.

Jorion, P., (1990), The exchange rate exposure of US multinationals, Journal of Business 63 (3), 331-345.

Kamath, K and Paul, V., (2011), Understanding recent developments in UK external trade, Bank of England Quarterly Bulletin, 51 (4), 294-304.

Levi, M.D., (1994), Exchange rate and the evaluation of firms. In Amihud, Y., Levich, R.M. (Eds.), Exchange Rate and Corporate Performance, Irwin, New York, pp. 37-48.

Marston, R.C., (2001), The effect of industry structure on economic exposure, Journal of International Money and Finance 20, 149-164.

Muller, A., and Verschoor, W.F.C., (2006), Asymmetric foreign exchange exposure: Evidence from U.S. multinational firms, Journal of Empirical Finance 13, 495-518.

Nance, D.R., Smith, C., and Smithson, C., (1993), On the determinants of corporate hedging, Journal of Finance 48(1), 267-284.

Nguyen, H., and Faff, R., (2003), Can the use of foreign currency derivatives explain the variations in foreign exchange exposure? Evidence from Austrian companies, Journal of Multinational Financial Management 13(3), 193-215.

Nydahl, S., 1999, Exchange rate exposure, foreign involvement and currency hedging of firms: Some Swedish evidence, European Financial Management 5(2), 241-257.

Pantzalis, C., Simkins, B.J. and Laux, P.S., (2001),Operational hedges and the foreign exchange of US multinational corporations, Journal of International Business Studies 32 (4), 793-812.

Patro, D.K., Wald, J.K., and Wu, Y., (2002), Explaining exchange rate risk in world stock markets: A panel approach, Journal of Banking and Finance 26, 1951-1972.

Priestley, R., and degaard, B.A., (2007), Linear and nonlinear exchange rate exposure, Journal of International Money and Finance 26, 1016-1037.

Rees, W. and Unni, S (2005), Exchange rate exposure among European firms: evidence from France, Germany and the UK, Accounting and Finance 45, 479–497

Shapiro, A.C., (1975), Exchange rate changes, inflation and value of multinational corporations, Journal of Finance (May), 485-502.

Smith, C.W., and Stulz, R.M., (1985), The determinants of firm's hedging policies, Journal of Financial and Quantitative Analysis 20(4), 391-405.

Tai, C-S., (2008), Asymmetric currency exposure and currency risk pricing, International Review of Financial Analysis 17, 647–663.

Williamson, R., (2001), Exchange rate exposure and competition: Evidence from the automotive industry, Journal of Financial Economics 59, 441-475.