EXCHANGE RATE FLUCTUATION AND FIRM VALUE ANALYSIS OF EMERGING MARKET MULTINATIONALS

By

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A dissertation submitted to the

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Abstract

The purpose of this dissertation is to broaden the understanding of exchange rate exposure of Emerging Market Multinationals (EMNCs). It is well known that emerging markets are more risky than the developed markets therefore it was hypothesized that the exchange rate exposure of the EMNCs would be greater than the developed market multinationals (DMNCs). The findings of the thesis are as follows. Using a sample of 212 MNCs from emerging and developed markets it was found that a) More than 60% of the EMNCs and the DMNCs are significantly exposed to exchange rate fluctuations. This finding in is an improvement from the earlier studies in this area where the proportion of exposed firms was thought to be below 25%. b) Analyzing the magnitude of the exposure, EMNCs are 20% more exposed than developed market MNCs. c) On analyzing the direction of the real exchange rate exposure, EMNCs are predominantly positively exposed to the exchange rate risk, i.e., they gain in value with local currency appreciation. Since the EMNCs have significant multinational presence, it is concluded that the positive exposure is a result of presence of foreign currency debt. A direct implication of these findings for the investor community is that EMNCs are more exposed to exchange rate fluctuations than DMNCs. Further in analyzing the EMNCs as investment vehicles, attention has to be given to the level of foreign debt held by EMNCs as this can have direct implications on the firm value.

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Arul Thirunavukkarasu

Introduction

Today, companies can fund themselves in the London or Luxemburg, coordinate their manufacturing activities from China or Mexico, source raw materials from Brazil or Africa, and sell products and services across the world. Such symbiotic processes have led to complicated interdependencies that have added intricacy to the exchange rate exposure of a company, thus making the management of such risks both more difficult and more vital.

Although there have been numerous studies over past several years on exchange rate exposure, it is still very common to find ourselves challenged when asked to succinctly describe the foreign exchange risk and exposure. Foreign exchange risk refers to the variability of domestic currency values of assets, liabilities, or operating incomes due to unanticipated changes in exchange rates. If foreign exchange rate changes are anticipated then there is no risk. For example, a company could be exposed to foreign exchange rate exposure but not at risk if it is operating in a fixed exchange rate regime. Whereas foreign exchange exposures is the sensitivity of changes in the real domestic currency value of assets, liabilities or operating incomes to unanticipated changes in exchange rate (Adler and Dumas, 1984).

When a firm is exposed to foreign exchange rate movements, the impact of the changes can be measured in many ways and this leads to the different classification of the

foreign exchange rate exposure. Three main types of exposure are identified in the literature: Accounting exposure/translation exposure, transaction exposure, and operating exposure. Accounting exposure refers to the changes in the reported owner's equity in the consolidated financial statements due to "translating" foreign currency financial statements of foreign subsidiaries into a single reporting currency to prepare worldwide consolidated financial statements. The focus is on a single non-functional currency denominated cash flow, transaction, or balance-sheet item and hence is relatively easier than the other two types to identify.

Transaction exposure refers to the changes in the value of the outstanding financial obligations incurred prior to a change in exchange rates but not due to be settled until after the exchange rates change. Thus, it refers to the changes in the cash flows that result from the existing contractual obligations. Operating exposure, also known as economic exposure, competitive exposure, or strategic exposure refers to the unexpected changes in the future cash flows. The difference between the two is that transaction exposure relates to future cash flows already contracted for, whereas operating exposure focuses on expected (not yet contracted for) future cash flows that might change because a change in exchange rates has altered international competitiveness.

In practice, economic exposure is computed as the net sensitivity of some aggregate measure of firm value to currency fluctuations. By focusing on the net sensitivity, economic exposure includes the direct and indirect effects of currency fluctuations. In practice there is little consensus on the use of appropriate choice of "aggregate" measure. The focus of this thesis is on the economic exposure of emerging market multinational firms.

Consider the case of Iceberg Corporation, a hypothetical US based MNC manufacturer and OEM supplier of marine transducers, sensors, and instruments for recreational and professional markets. Iceberg Corporation has a subsidiary in India (Iceberg India) where it assembles its transducers using modules produced in the USA and also sells some of its products in the local market. The functional currency for Iceberg India is Indian Rupees (INR) and the reporting currency is US Dollars (USD). Plant and equipment and long-term debt obligations were acquired and the Iceberg's common stock was issued by Iceberg India some time in the past. When these balance sheet items were translated back to the reporting currency USD, the company was exposed to exchange rate changes. This exposure is an example of accounting exposure.

Production involves USD- denominated components (the circuit board and microchip) and Indian Rupee-denominated components (local material and labor used in assembly), the USD value of production costs is sensitive to fluctuations in INR/USD. Following market practice, Iceberg's pricing group sets the price for its product in US dollars. The price is set on the day an order is received, at a level that 'reflects' the estimated USD cost of production. Iceberg's management believes that this pricing policy 'protects' the firm from currency fluctuations because it enables the firm to adjust prices in response to exchange rate induced changes in costs. However, because production backlogs cause delays of several months between the date an order is received (when the price is set) and date the device is manufactured (when production costs are actually incurred) Iceberg faces exposure in its contracted obligations and this is termed "transaction exposure". The net future revenues and costs also are exposed to currency fluctuations. From an economic perspective, the firm faces currency risk because both

future costs and revenues are sensitive to fluctuations in INR/USD, and those sensitivities differ, leaving the firm facing operating exposures.

Economic exposures are difficult to manage owing to their broad and subtle nature. In practice, firms follow either a bottom-up or a top-down approach to assess the economic exposure. In the former method, risk managers understand the sensitivity of the cash flows to the currency movements by analyzing the basic business practices such as pricing, together with statistical analysis of market behavior. Aggregations across specific cash flows lead to an estimate of the aggregate economic exposure. Although an expensive method involving complex data collection and analysis, this method gives a detailed understanding about the underlying channels through which currency movements affect the firm's value.

Alternatively, the top-down approach analyzes the statistical relationship between the selected measure of firm value and currency values, without making any attempt to understand or quantify any underlying mechanisms. Although easier to implement than the former, the results of this approach have to be viewed cautiously owing to the changes in market conditions, business practices, and other relationships that may render the estimated relationship unreliable.

While there is a widespread acceptance among firms regarding the importance of economic exposure to firm value, few firms manage it directly using only simple instruments such as forwards or options. The difficulty in understanding and quantifying the concept of economic exposure hinders the ability of the firm to devise appropriate exposure management strategies. Secondly, in the absence of proper hedge accounting standards, firms are forced to 'mark to market' their currency contracts used for hedging

purposes and this leads to unnecessary earnings volatility. Third, other techniques such as price adjustments seem to work better in some situations and firms tend to resort to such techniques rather than engaging in hedging strategies. In some situations, firms tend to rely on accounting based hedging as it is easier to identify and less complicated to understand.

In practice, a majority of the firms use financial market contracts to manage their accounting exposures and rely on periodic adjustments in business practices to further protect their economic value. a) Accounting exposures are typically managed by selling/purchasing forward 100% of the identified foreign currency amount to fully hedge an individually identified exposure. b) To further protect their value, firms implement periodic reviews and adjustments to business practices such as changing prices, altering the currency of their cost base, or changing the composition of their capital structure (altering the level of foreign currency debt etc).

From the above discussion it is evident that currency exposure has important implications for a company involved directly or indirectly in international business as it creates volatility in revenues, costs, earnings, and profits. In addition, volatility also impacts the company's business opportunities as allocation of resources becomes difficult, thus creating resource shortages for critical value-enhancing investments. Extensive research has been conducted to study the impact of these practices on MNCs, whereas their impact on EMNCs still remains unclear.

Moreover, the focus of research in FX exposure literature has primarily been on developed country multinationals and the nature of the FX exposure and the determinants and patterns of the FX exposure as it relates to developed country multinationals. Similar

research for EMNCs is scant. Emerging markets are characterized by high instability and exposure to adverse economic conditions. Prior research on EMNCs indicates that the characteristics of these multinationals is different from their developed country and domestic market counterparts (Aybar and Thirunavukkarasu, 2005) and this leads one to believe that their exchange rate exposure management would be unique as well. More specifically, Sabal argues that the differences between the developed countries and emerging markets lie in the variation in the economic and social environments between them (Sabal, 2002).

According to the 2004 World Investment Report by UNCTAD, the rate of outward FDI by companies from emerging markets has outpaced the FDI growth by companies from the industrialized countries. Furthermore, UNCTAD has predicted that this trend will continue in the future. In recent years, firms from South Korea and Singapore have already been successful in establishing their presence abroad. Samsung, for example, ranks among the top 30 most valuable brand names in the world. The most recent drivers of outward FDI are companies from China, India, Brazil, and Mexico. With a few exceptions, such as Samsung Electronics, these emerging blue chips are not household names in the industrialized world, and one cannot yet find many on lists of the top 500 global companies. But from India's Infosys Technologies (IT services) to Brazil's Embraer (Small jets), and from Taiwan's Acer (computers) to Mexico's Cemex (building materials), a new class of formidable competitors is rising.

From a fund manager’s perspective, investments in emerging markets blue chips are increasing. Asset prices are soaring in emerging markets. A 2006 report by BIS indicates that emerging market stocks, bonds, and currencies strengthened above historical

averages during the first quarter of 2006 (Figure 1). This growth can be attributed to massive foreign capital inflows into these markets. For instance, the Institute of International Finance estimates that net portfolio equity flows approached $60 billion in 2005, well above levels seen in previous years (Figure 2). Investors' enthusiasm for emerging market assets improved in part from perceptions about the strength of fundamentals. Improvements in recent years in external positions, financial systems and fiscal and monetary policies have made many emerging markets more resilient to shocks, thereby reducing the risks associated with emerging market investments. Moreover, Moody's sovereign rating upgrades outnumbered the downgrades by a ratio of about 3:1 symbolizing the change in the attractiveness of emerging markets. Further, Brazil and Argentina in December 2005 used part of their rapidly accumulating foreign exchange reserves to repay in full loans from the IMF totaling $25 billion. Top EMNCs are among the top holdings of emerging market funds or even internationally diversified funds. Therefore understanding FX exposure of EMNCs may also be revealing for fund managers.

With the growing importance of emerging market multinationals in global business, there is a need to understand the nature of the exposure and its implications on these enterprises. Clearly, emerging markets are high risk environments for multinationals to operate in and they pose unique challenges for researchers as well. These unique challenges motivated me to research the exposure of MNCs originating from this environment. Against this backdrop, I now set forth the specific research questions for the thesis. a) Owing to the risky nature of emerging markets and the lack of proper regulatory and institutional infrastructure can one expect EMNCs to have more

FX exposure elasticity than developed country MNCs? b) What are the determinants of FX exposure of EMNCs? c) Are there any industry specific/country specific/region specific trends that can be observed in EMNCs FX exposure? These questions form the primary focus of my dissertation.

This thesis analyzes the exchange rate exposure elasticity of EMNCs and identifies typologies among firms, taking into consideration the various firm, industry, and country level variables that would affect their exposure. An analysis of this issue would help emerging markets investors, fund managers and MNC managers to identify riskier firms in advance and formulate and execute strategies to create increased value for their shareholders.

Literature Review

Emerging Markets Environments

There is no widely accepted consensus on the definition of an emerging market. The term "Emerging markets" was coined by Van Agtmael, a researcher at the World Bank's International Finance Corporation in 1981(Van Agtmael, 1984). Broadly defined, an emerging market is a country making an effort to change and improve its economy with the goal of raising its performance to that of the world's more developed economies. However, there are three underlying characteristics that are often associated with these countries (Arnold and Quelch, 1998). The first is the low level of per capita GDP that indicates feeble economic development. Second, they are characterized by high GDP growth, which implies significant restructuring of industries in a short span of time and therefore higher profits and better investment opportunities. The third and the most critical aspect is the extent of market openness, which is low for these countries. All these countries suffer from wide variations and institutional flaws that lead to higher transaction costs (higher cost of capital, limited labor mobility, and increased cost of trading), which undermine the market mechanism and render these economies inefficient. In a survey conducted on ASEAN countries, investors expressed frustration over the way certain policies were implemented. For instance, an executive at a consumer goods company, making a common compliant explained that ASEAN's tariffs rate were determined more by the whim of customs officials than by government policy (Schwartz and Villinger (2004)). Additionally, an underdeveloped legal infrastructure leading to

widespread property right violations, lack of adherence to laws, and discretionary and unfair enforcement of laws further increases the transaction costs and undermines sound commercial development.

Across the emerging markets, these institutional voids pose significant challenges for the governments. A differentiating characteristic of the emerging markets is the implementation of reforms addressing these gaps towards building a functioning market economy. However, it is important to note that there is a great deal of variation in the extent and effectiveness of these efforts. While some countries are at advanced stages of this process such as Taiwan, Hong Kong and Portugal, others are either cautiously pursuing reform as China or at the initial stages as Vietnam.

In short, we cannot categorize a country as an emerging market by strictly applying the key characteristics explained above. It can only be said that emerging market countries tend to display some or all of these characteristics in varying degrees. The important point of interest for us is that, developed countries do not share these characteristics. Further, the nature and extent of development among developed countries can be explained largely by cultural and historical factors. Historians and economists have intensely debated this topic . For a detailed analysis of this subject, refer to Landes (Landes, 1998).

Emerging Market Multinationals

EMNCs operate in a multifaceted environment offering a complex mix of opportunities and shortcomings as described above. Because of their home country characteristics, EMNCs are exposed to additional risks including accelerated inflation, wild exchange rate fluctuations, adverse reparation laws and fiscal measures,

macroeconomic and political distress. It is plausible to argue that a far less noticed but potentially more significant improvement is the transformation of corporations in these markets. Under the internal and external pressures owed to the massive restructuring of their environments, a group of emerging market firms turned from predominantly inward orientation to increasingly outward looking postures.

These rather drastic strategic shifts are motivated either to take advantage of regional or global business opportunities or to respond to increasing competition from new domestic entrants and/or from foreign companies. Bartlett and Ghoshal (Bartlett and Ghoshal, 2000) found that successful EMNCs develop internal markets for labor, capital and technology compensating for the environmental shortcomings and use foreign ventures to build their capabilities to compete in highly profitable segments of their industries. On the lower end of the spectrum, they found EMNCs who enter the global markets in the low value added segment of the market stay there. Obviously, this group of EMNCs is far more vulnerable to internal and external shocks and has limited profitability and value creation capacity. These new players-referred to as Emerging Market Multinational Companies with regional and global focus are becoming a significant mechanism for the transfer of capital, technology, management and other assets within and between developing and developed countries, and creating new engines of growth.

EMNC's Exchange Rate Exposure

Given the risky nature of emerging markets and the distinct characteristics of EMNCs, there is a reason to suspect that the exposure of EMNCs would also be largely different from that of their developed country counterparts. In the endeavor to explore

this area (i.e., "Are there any differences between the exposures of EMNCs and DMNCs"), I have delved into the exposure literature. It has been established that FX exposure to a foreign currency can arise from three sources: (1) Sales seeking including exports of goods and services, (2) raw materials procuring and resource seeking including imports of goods and services, and (3) foreign currency liabilities. Though these three also sources lead to exposure for developed country MNCS, two of these sources, namely, sales seeking and foreign currency liabilities render a point of variation for the difference in the nature of exposure of EMNCs as explained below.

To analyze the differentiation caused by the first source of exposure, that is, market seeking, I examine the expansion patterns of the MNCs and EMNCs. In sales seeking, developed country multinationals follow an expansion strategy where they first move into other developed economies and later move into emerging markets. For example, psychic distance theory or the stages model of internationalization (Johansson and Wiedersheim-Paul, 1975, Johansson and Vahlne, 1977, Kogut and Singh, 1988) argues that firms would expand into regions that are "psychically" closer and then move on to farther locations. Therefore, developed country MNCs are primarily exposed to fluctuations of a more stable currency.

Following the same theory, EMNCs follow an expansion strategy where they first seek the markets of their peer emerging markets before moving into a stronger economy (Kumar and McLeod, 1981, Lecraw, 1977, Ting and Schive, 1981, Wells Jr, 1981, Wells, 1977, Wells, 1983). To illustrate this fact numerically, it is observed that FDI outflows from emerging markets have swelled over the past few years, rising from $ 3 billion in 1991 to 16 billion in 2002 and then surging to an estimated 40 billion (Global

Development Finance report 2005). This move is also encouraged by the fact that EMNCs are more adept in dealing with the governments of other emerging markets, which are perceived to be too risky and therefore largely neglected by the MNCs (Grosse, 2003). Obviously, this group of EMNCs is far more vulnerable to internal and external shocks and has limited profitability and value creation capacity. Hence it can be said that EMNCs are primarily exposed to fluctuations of a more volatile currency and therefore they increase their exchange rate exposure. This argument is further strengthened by the "up-stream down stream hypothesis" (Kwok and Reeb, 2000), which states that when firms from a developed country move into a lesser developed country, they tend to increase their systematic risk, and contrarily, when firms in less developed countries move into a comparatively more developed country they tend to decrease their systematic risk. So, when EMNCs move into their peer emerging markets, which is often the case as explained earlier, they face increased risk and this could therefore lead to higher exposure.

Furthermore, EMNCs find it difficult to establish operations in a more developed economy because of the incapability of these multinationals to face the more competitive and stable environment of a developed country. For example, Acer one of world's largest computer manufacturers from Taiwan tried to build a global brand, particularly by entering the developed countries. The branded business grew to significant volumes but continued to generate losses because the competitive environment was challenging for Acer. Meanwhile, customers for Acer's contract manufacturing product line feared that their business secrets would spill over to competing lines of businesses. They also feared that Acer would cross-subsidize its own brand with profits from contract manufacturing

and so undercut their prices. In 2000, Acer's strategy blew apart when IBM cancelled a major order, reducing its share of Acer's total contract-manufacturing revenue from 53% in the first quarter to only 26% in the second quarter of 2001 (Khanna, 2003).

Another side effect of the above argument that could increase the risk of EMNCs is the fact that the EMNCs face limitations in their choice of markets to expand and as a result, they are not as well geographically diversified as their developed country counterparts. This lack of diversification makes these markets vulnerable to contagion and this adds another component of risk. The contagion nature of emerging markets is evident from the cascading impact of the 1990's financial crises, which affected these markets in tandem.

The other point of departure stems from the differences in capital raising aspects of these two types of multinationals. An important distinction between EMNCs and developed markets MNCs lies in the inability of the EMNC to borrow from international markets in their local currency. Developed country MNCs are not constrained to raise capital in a foreign currency in the international market. They have a multitude of options that allow them to raise capital in their home currency and therefore keep their exposure at a minimum. On the contrary, EMNCs do not have the luxury of raising capital in their home currency in the international market because of the low demand for financial instruments denominated in the emerging market is home currency among global investors. So, EMNCs are under a pressure to raise capital in a foreign currency for their operations.

On a macro level, the race for foreign capital is further fueled by the fact that most of the emerging economies depend on foreign capital for their growth. This leads to

a shortage of local capital for investment, which in turn accelerates the trend of EMNCs to seek foreign sources of funding. In support of this idea, Caballero and Krishnamurthy, find that financial constraints lead emerging market firms to undervalue insuring against exchange-rate depreciations, and take on excessive dollar debt (Caballero and Krishnamurthy,2003). Calvo reviews other reasons why liability dollarization arises (Calvo, 2002). (See also Allen and Gale, 2000; Calvo, 1996; and Calvo and Guidotti, 1990). These inherent difficulties for EMNCs to raise capital in their local currency in international capital markets lends additional exposure. This has subject been well explored in the economic development literature (IMF, 2003).

The third and the most important distinction between EMNCs and developed country MNCs lies in the institutional voids (low transparency, weak corporate governance, macroeconomic and financial instability) that increase the cost of capital and constrain access to equity markets and also to some extent, access to long-term bond markets. For a further analysis of other broad factors. (see Aybar and Thirunavukkarasu, 2005 and Mathieson et al., 2004). As a result of these conditions, the EMNCs are forced in to international capital markets rather too soon, and this contributes to increasing their exposure. This early entry is coupled with the fact that advanced derivative instruments used by MNCs to hedge their exposure is virtually absent in most emerging markets.

The above reasons indicate that the nature of exposure for EMNCs could exhibit different behavior across different industries/countries/regions and may be in agreement or contrary to what is observed in developed country multinationals.

Foreign Exchange rate Exposure and Estimation

The focus of my thesis lies in the estimation of economic exposure and this section documents methodological developments in the existing literature in this field. Various attempts have been put forward by researchers to quantify the exposure and are variations of the mode in which a company's stock return is regressed on a foreign exchange rate variable. In each case, the coefficient of the foreign exchange variable is interpreted as the exposure of the company.

Adler and Dumas, and Hodder pioneered the research in this field and they showed that the exposure of a foreign asset is the slope coefficient in the univariate linear regression of the random home-currency price of a risky asset on a given future date against a possible future exchange rate(Dumas, 1978; Adler and Dumas, 1980; Hodder, 1982) . Adler and Dumas developed a simple model in an attempt to measure exchange rate exposure in terms of firm value using a top-down approach (Adler and Dumas, 1984):

$$r_{i,t} = \beta_0 + \beta_{1,i} r_{x,t} + \varepsilon_{i,t} \qquad i = 1,2,\ldots\ldots n$$

$$\varepsilon_{i,t} \sim N(0,\sigma^2)$$

where $r_{i,t}$ is return on firm i's stock at time t;

$r_{x,t}$ is percentage change in the exchange rate at time t;

$\beta_{1,i}$ is firm i's exchange rate exposure elasticity coefficient, which measures the sensitivity of a firm's returns to the exchange rate movements;

$\varepsilon_{i,t}$ is the residual that is unexplained by the regression model;

The authors conclude that the regression coefficient concept of exposure can provide a single comprehensive measure that summarizes the sensitivity of a firm to all

the various ways in which exchange rate changes can affect it. They point out that the concept of exposure thus defined is arbitrary, as stock prices and exchange rates are determined jointly. Decomposing the value of a firm into a component perfectly correlated with the exchange rate and an orthogonal component, as the authors suggest, does not imply a causal relationship between exchange rates and stock prices.

The Adler-Dumas model was improved by subsequent research on their basic regression equation. The existing literature can be organized into the following three strands, each focusing on the developments of the different components of the basic regression equation. The first strand concentrates on the developments made to the computation of the exchange rate, the second strand focuses on the addition of control variables to the Adler Dumas equation. The last strand focuses on the determinants of the exposure (slope coefficient) and various firm specific factors that have been identified.

In the first strand, the type of exchange rate that is used to capture the effects of exchange rate exposure is the result of a long intellectual debate in the exposure research. Jorion used a trade-weighted exchange rate derived from the Multilateral Exchange Rate Model (MERM) computed by the International Monetary Fund, in the Adler Dumas equation (Jorion, 1990). He finds that only 15 of 287 US Multinational firms have significant foreign exchange rate exposure at the 5% level. However, the results do show some evidence of cross-sectional variation in the exposure coefficient. On examining 32 large US exporting firms using lagged values of the exchange rate and the company's stock returns, Amihud argued that the hypothesis that exchange rate changes do not affect the value of exporting companies cannot be rejected (Amihud, 1994). Although Choi and Prasad have acknowledged the impact of exchange rate variability on the value of a firm,

empirical research on the subject was still scant in the mid 1990s (Choi and Prasad, 1995).

Choi and Prasad recognized that the exchange risk factor will not have the same effect on all firms, and that a company's sensitivity to this macroeconomic factor will depend on each firm's operating profile, financial strategies, and other firm-specific variables. Thus, an aggregate-level analysis may not reveal the true exchange risk sensitivity of firm value. Moreover, measuring the exchange rate exposure of firms as the elasticity between changes in firm value and changes in the exchange rates have led to low levels of statistical significance. Nevertheless, the exposure estimates vary across firms in a manner broadly consistent with the theoretical predictions of the impact of exchange rate movements on companies' cash flows (Jorion, 1990).

Miller and Reuer question the practice of using a single foreign exchange proxy which, in the authors' opinion, may overlook possible low or negative correlations among exchange rates over time and may underestimate corporate exposures by omitting variables needed to capture the divergent movements in currency values (Miller and Reuer, 1998). Their study uses a multiple currency model in analyzing the foreign exchange exposures of a large sample of US firms and finds that 13 to 17 percent are exposed to these exchange rates movements. Notably, the set of currencies most relevant to explaining shareholder returns varies across firms. Such differences are due to firms' differing international locations of buyers and suppliers, and plant configurations, as well as the location of competitors. The regression model specifies a framework appropriate for the sample and the use of the same currencies for all firms permits comparisons of the F statistics for the exchange rate effects across the sampled companies. Miller and

Reuer's study suggests that when estimating corporate exposure to several foreign exchange rates, the appropriate test of the joint hypothesis that several foreign exchange coefficients are equal to zero is the F-test rather than t tests for the effects of each of the individual currencies. Their results indicate that the proportion of firms exposed to foreign exchange rate movements does not depend on the inclusion or exclusion of market and interest rate controls. The resulting proportion of the exposed US firms is explained as a proof that current strategic and financial hedging practices do not eliminate economic exposures to foreign exchange movements for many US companies.

Ihrig used MNE specific exchange rates and accounted for the possibility of an exchange rate crisis impacting a firm differently in times of crisis. She found that one fourth of all MNE's had significant exchange rate exposure between 1995 and 1999 (Ihrig, 2001). Fraser and Pantzalis also used a firm specific exchange rate index and found that the number of firms significantly exposed depends upon the type of exchange rate used (Fraser and Pantzalis, 2004a). However, emerging market multinationals encounter additional challenges such as illiquid markets for their currency and almost non-existent cross exchange rates and they are more willing to deal in USD. For this reason, the following argument is put forth. (See Table 1 for table of cross currency liquidity).

It is clear that all the emerging market multinationals having foreign currency inflows and/ or outflows tend to convert these currencies to their home country currency only via the US dollar as the markets are illiquid for these exotic currency pairs. For example, let us consider the case of Vasantham Inc, an Indian technology firm having a ZAR (South African Rand) cash inflow and the firm wants to convert the ZAR to INR.

The ZAR/ INR market is non-existent. Therefore, the only alternative for this firm is to convert to their home currency through the USD, that is, convert the ZAR to USD and then USD to INR. Table 1 in the Appendix 1 shows the most liquid currency pair for most of the emerging market currencies. It can be clearly seen that USD is the most common denominator for these currencies with a maximum of $7bn in trading volume for the Mexican Peso to a minimum of $200 m for Chinese Yuan. Except for the Emerging Market countries in the Euro zone, which also have the Euro as a denominator, other countries have the USD as the most liquid cross currency in the foreign exchange rate market.

Along these lines of argument, it can be said that all the EMNCs, whether or not they trade in USD are exposed to USD currency fluctuations thereby creating an exposure to USD. While the EMNCs may have exposures in other currencies as well, the focus of this thesis is restricted to USD exposure as it is the common denominator for all the EMNCs.

Control and Improvement of Measurement

The next strand focuses on the control variables that were added to improve the strength of the model. One of the major drawbacks of the Adler-Dumas model is that the exchange rate coefficient may also contain the impact of macro-economic factors which are spuriously correlated with exchange rate changes and firm's stock returns (Bodnar and Wong, 2003). There may also be an omitted variable bias. In order to overcome this limitation subsequent researchers suggested the use of an augmented Capital Asset Pricing Model (Augmented CAPM) which includes a return on market portfolio as an additional independent variable.

Jorion illustrated an alternative specification to the univariate linear regression model proposed in earlier studies by controlling for market movements by including the return on a market portfolio in the regression equation (Jorion, 1990). The model can be summarized as follows:

$$r_{i,t} = \beta_0 + \beta_{1,i} r_{x,t} + \beta_{2,i} r_{m,t} + \varepsilon_{i,t} \qquad i=1,2,....n$$

$$\varepsilon_{i,t} \sim N(0, \sigma^2)$$

where $r_{i,t}$ is return on firm i's stock at time t;

$r_{x,t}$ is percentage change in the exchange rate at time t;

$\beta_{1,i}$ is firm i's exchange rate exposure elasticity coefficient,

$r_{m,t}$ is the percentage change in the market returns;

$\beta_{2,i}$ is the firm's exposure to the changes in the return on the market portfolio;

$\varepsilon_{i,t}$ is the residual that is unexplained by the regression model;

The inclusion of a market portfolio return in the simple exposure model changes the statistical properties and distribution of the exposure estimates. This market portfolio addition controls for value-relevant market-wide factors that represent macroeconomic effects correlated with the exchange rate. The exposure estimated in this extended model is a conditional exposure that is more stable across sub-periods (Bodnar and Wong, 2000). Because the market return explains a substantial amount of the typical firm's stock return variation, its inclusion in the exposure estimation model reduces the residual variance of the regression and improves the accuracy of the exposure estimates. Notably, the addition of the market portfolio return affects the interpretation of the exposure estimates in that the resulting "residual" exposure measures the deviation of the firms'

exposure from the market portfolio's exposure. Another outcome is that controlling for a market portfolio removes large negative cash flow effects, shifting the estimates upward relative to the total exposure estimates resulting from the regression model. In this market model the exposure coefficient is free from macroeconomic impact, but even in this model the return in market index is still contaminated with macroeconomic factors. In order to eliminate the impact of macroeconomic variables, a modified approach is taken in this thesis that involves orthogonalization of exchange rates and market returns and will be discussed later.

Bodnar and Wong explore the choice of the market portfolio. They argue that the common practice of using a value-weighted market portfolio gives more weight to the cash flow of large firms in term of the cash flow impact that is removed with the addition of a market exposure variable (Bodnar and Wong, 2000). Large firms are likely to see their cash flows increase when the dollar falls. Small firms tend to be more domestically oriented and potentially net importers rather than sellers of international products. Therefore, the use of a value-weighted market portfolio, they suggest, shifts the exposure estimate in a more positive direction. Bodnar and Wong used the equal weighted market portfolio, to treat each firm's exposure equally in terms of determining the market exposures. This improves the accuracy of exposure estimates. In this thesis, I use an equal weighted market portfolio to control for common macro economic effects.

Another methodological issue in the estimation of exposure elasticity is the optimal return horizon. Most of the empirical literature uses monthly data to estimate the models. Under assumptions of market efficiency and complete information, the choice of time horizon should not have a significant impact on exposure estimation results.

However, given the complexities of exposures and the noise in high frequency movements, it is possible that exposures will be more accurately estimated over longer time horizons (Bodnar and Wong, 2000). In conformity with the existing literature, the thesis uses monthly frequency data as daily data is prone to spurious disturbances and noise.

As mentioned before, Bodnar and Wong model the exposure coefficient as free from the macroeconomic impacts, but even in this model the return on the market index is still contaminated by exchange rates. In a recent paper, by Pritamani et al., the authors study the dual-effects of exchange rate exposure, and a methodological contribution was introduced in order to segregate non-exchange rate macroeconomic effects (Mahesh Pritamani et al., 2006). Here, they used a portfolio of domestic firms that did not have any foreign competition as a proxy for the non exchange rate macroeconomic effects, improving the reliability of their results.

In order to eliminate the macroeconomic variables impact, a modified approach is taken in this thesis. This modified approach that involves orthogonalization of exchange rates and market returns. Here, use a modification of existing methodology. Instead of choosing a portfolio of domestic firms, an orthogonalization of market returns can be used to achieve the same result. A new method for capturing macroeconomic effects (excluding the effects of exchange rates) on the market's return likewise is proposed. In this model, first, the markets' returns are regressed against foreign exchange returns (equation 1 below) and the unexplained portion of the regression (residuals) that accounts for macroeconomic factors excluding foreign exchange rate factors will be captured.

These error terms will then be used in place of the market returns in the regression equation (2), which is the standard equation used in the FX-literature.

$r_{m,t} = \beta_0 + \beta_{1,m} r_{x,t} + \varepsilon_{m,t}$ *m=1,2,….n …………………………………..(1)*

$\varepsilon_{m,t} \sim N(0,\sigma^2)$

where

$r_{m,t}$ is the percentage change in the market returns at time t;;

$r_{x,t}$ is percentage change in the exchange rate at time t;

$\beta_{1,m}$ is the foreign exchange elasticity to the changes in the return on the market portfolio;

$\varepsilon_{m,t}$ is the theoretical error term that is having variation of macro economic effects free from foreign exchange rate effects unexplained by the regression model;

$r_{i,t} = \beta_0 + \beta_{1,i} r_{x,t} + \beta_{2,i} \hat{\varepsilon}_{m,t} + \varepsilon_{i,t}$ *i=1,2,….n …………………..(2)*

where $r_{i,t}$ is return on firm i's stock at time t;

$r_{x,t}$ is percentage change in the exchange rate at time t;

$\beta_{1,i}$ is firm i's exchange rate exposure elasticity coefficient,

$\hat{\varepsilon}_{m,t}$ is the residual market return that is free from foreign exchange rate effects;

$\beta_{2,i}$ is the firm's exposure to the changes in the return on the market portfolio free from foreign exchange rate effects ;

$\varepsilon_{i,t}$ is the theoretical error term that is unexplained by the regression model;

The empirical studies reviewed have focused on estimating the exchange rate exposure of US firms or US multinationals. Other research has explored the exposures of firms located in other economies. Dominguez, for example, shows that many Japanese firms are exposed to yen-dollar exchange rate movements, suggesting that these firms do not fully hedge against exchange rate risk (Dominguez, 1998). The same study implies that, with the exception of the electric and utility industry, dollar appreciations are positively correlated with firm returns. Thus, as the dollar depreciated relative to the yen in the mid-eighties throughout the mid-nineties, the value of the Japanese companies fell as a consequence of their dollar exposure.

Glaum et al examine the economic exposure of German corporations to changes in the German mark/US dollar exchange rate, finding that a significant proportion of German firms have exposure, although their study's results are unstable over time (Glaum et al., 2000). The authors use a linear regression model specified in previous research, reiterating the fact that the inclusion of market portfolio returns changes the exposure results' interpretation: an individual residual exposure coefficient of zero does not imply that the particular firm's value is insensitive to exchange rate movements, but rather, that its sensitivity is exactly the same as the market's sensitivity.

Glaum et al also address some conceptual issues, including the fact that using exchange rate indices or monthly averages may have averaging-out effects. The use of daily changes of a single exchange rate may avoid this problem. Moreover, these authors use nominal returns, since the volatility of inflation rates means that most of the changes in nominal exchanges also translate into changes in real exchange rates. If exchange rate movements can be best described with a random-walk model, the best predictor of future

exchange rates is the current spot rate, and all changes can be interpreted as unanticipated. The study exploring the exposures of German firms to the German mark/ US dollar rate divided the 24 year time series (1974-1997) into four sub periods, but found both positive and negative exposure coefficients, and the results were unstable over time. The explanation provided for the instability of results is that it may be possible that a change in the level of import competition would have an impact on the exposures. Other factors leading to increases and decreases in exposure coefficients are changes in the structure of the firms' foreign currency denominated assets or liabilities and changes in their hedging activities. The time pattern found is also explained as a possible result of omitted variables, such as changes in the parity conditions due to interest rates changes that may affect share prices.

Donnely and Sheehy found a contemporaneous relationship between the exchange rate and the value of a portfolio of United Kingdom export intensive companies (Donnelly and Sheehy, 1996). They attributed the difference in their findings, compared to US based companies being due to the fact that the UK is a more open economy and that the sample companies chosen were more export intensive.

While all of the above research has focused on developed country multinationals, very little work has been undertaken with respect to emerging markets and emerging market multinationals. On examining the exchange rate exposure of firms from eight countries of which two are emerging markets (Chile and Thailand), Dominguez and Tesar found that a majority of Thai firms had negative exposure, while the positive and negative exposure distribution among firms was more even in other countries (Dominguez and Tesar, 2006). The authors argue that the foreign currency liabilities held

by the Thai firms could account for this difference. Taking the case of five East Asian countries, Kho and Stulz also explored the currency exposure of the banking sector during the Asian financial crisis (Kho and Stulz, 2000). They showed that, only for Indonesia and Philippines, the currency exposure added a significant negative impact to stock market returns. The impact of exchange-rate pegs on exchange-rate exposure was studied by Parsley and Popper who analyzed East Asian firms. They found that countries whose exchange rate was fixed against one currency exhibited no less exposure to other currencies (Parsley and Popper, 2002).

Determinants of exchange rate exposure coefficients

The determinants of exposure estimates form the third strand of the literature in this field. Jorion found that the co-movement between the stock market return and exchange rate returns is positively related to the percentage of foreign operations of US multinationals (Jorion, 1990). Choi and Prasad have established that cross-sectional differences in exchange rate risk sensitivity are linked to key firm specific variables like foreign operating profits, sales, and assets (Choi and Prasad, 1995). Miller and Reur explore the effects of strategy and industry structure on economic exposure and they concluded that although increased FDI activity led to a reduction of exposure, export intensity did not significantly affect the exposure (Miller and Reuer, 1998). Further, firms that invested in product differentiation strategies achieved no reduction in foreign exchange risk. Pantzalis, Simkins, and Laux have examined the impact of operational hedging on exchange rate risk, as measured by the "breadth" (number of countries that a company operates in) and "depth" (concentration in a single country) dimensions (Pantzalis et al., 2001). They find that exposure increases with "depth" and decreases

with “breadth”. Fraser and Pantzalis examined the determinants of exposure and they found that the relationship between the geographical network of a MNC and its exposure was not clear (Fraser and Pantzalis, 2004b). They also found conflicting results using different exchange rates (firm specific and common exchange rate) in their model. From the extant literature, I intend to study exchange rate determinants at four different levels of analysis: firm, industry, country, and regional group.

Why is firm stock price used as a proxy for firm value?

The stock price is used as a proxy for the true value or the intrinsic value of the firm in this thesis. This chapter discusses the justification for this assumption.

The efficient market theory claims that stock prices reflect all relevant information; that is, the current market price of a security incorporates all relevant information. Under market efficiency, the best estimate of the true value of a stock is given by the current market price. In an efficient market, it is assumed that a large number of analysts are assessing the true value of firms. The analysts try to find stocks whose market prices are substantially different from their true values. If the analysts find such ‘mispriced’ securities, they buy or sell them, driving the market price instantaneously towards their ‘true’ value. Thus, stock prices change every day, every hour, even every second, as new information flows into the market.

For example, consider the case of a hypothetical company Kershley’s, a corporation that produces chocolates. If analysts who study weather patterns anticipate a hard freeze that would be devastating to cocoa trees, they will try to make large profits by short selling the stock. This selling pressure drives the stock price down towards its “true value”. Thus, the information changes the stock price. If doctors at a prominent research

center release a study that shows that people who consume chocolates reduce their risk of heart attack, then the price of Kershley's stocks should rise because the demand for chocolates will likely to increase. Thus, the results of trading by the weather predictors, which would force the stock price down, would be reversed by the actions of the investors who think that the demand for chocolates (and the profits of chocolate manufacturers) will rise. This constant assimilation of information causes the prices of securities to change as investors react to all relevant information.

There are three forms of the efficient market theory (EMT): the weak, the semi-strong; and the strong forms. The weak form of the EMT states that stock prices reflect information revealed by the historical price sequence. The semi-strong form of the EMT states that stock prices reflect relevant publicly available information. The strong form of the EMT states that prices reflect all publicly and privately available information. Research evidence is mixed. The evidence against the strong form is the most conclusive; some insiders are clearly able to make abnormal returns. The evidence related to the weak and the semi-strong forms is mixed. The weak form of the EMT is not supported completely because of anomalous results, such as the January effect. The semi-strong form of the EMT is not supported completely because of large anomalous results, such as trading based on the size effect and the market-to-book-value ratio. Moreover, behavioral finance, a relatively new field with no unified theory offers some explanation for the existence of market inefficiency and anomalies. Behavioral finance theorists believe that investors suffer from 'errors of judgment' and 'errors of preference' and that these errors can help explain market-inefficiency and market anomalies. While behavioral factors do play a role in the decision making process of individual investors, it is not clear whether

these factors play a significant role at the aggregate market level and that they can explain the market inefficiency and market anomalies. For the purpose of this thesis it is assumed that the markets are efficient in the semi-strong form and therefore stock prices reflect publicly available information and historical information. Hence a company's market price is the best available estimate about its intrinsic value.

Further, market prices of the stock reflect the expectations of investors about the future prospects of companies. Investment bankers, corporate analysts, and investment analysts use valuation tools to assess the impact of corporate events such as mergers, acquisitions, divestiture, spin-offs, management buy-outs (MBOs), and leveraged recapitalizations. Each of these events may affect a company's future cash flows and the hence the value of the equity. Several types of value perspective exist. A company generally has one value if it is immediately dissolved and another value if it continues in operation. The going-concern assumption is the assumption that the company will maintain its business activities into the foreseeable future. The going-concern value of a company is its value under a going-concern assumption. Once established as publicly traded, most companies have relatively long lives. In addition to going concern values, the market place considers liquidation value (the value of the asset when it is sold individually), fair value (the price at which an asset would change between a willing buyer and a willing seller when the former is not under any compulsion to buy and the latter is not under any compulsion to sell).

Two broad types of going concern models are a) absolute valuation model and b) relative valuation model. An absolute value model is one that specifies an asset's intrinsic value. Such models can give a point estimate of value. Present value models, the most

important type of absolute equity valuation model, are regarded in academic finance theory as the fundamental approach to equity valuation. The logic behind such models is that the value of an asset to an investor must be related to the returns that the investor expects to receive from holding the asset. Under such a view, a present value model or discounted cash flow model of equity valuation views the value of common stock as being the present or discounted vale of its expected future cash flows. For common stock, one such valuation model is the dividend discount model. According to this model, the price of a share of a stock is equal to the present value of all the future dividends per share, discounted at a discount rate that is commensurate with the risk of the stock. Accordingly, the value Vo is defined as follows:

$$Vo = D_0 + \frac{D_1}{1+k} + \frac{D_2}{(1+k)^2} + \ldots\ldots\ldots \frac{Dn}{(1+k)^n}$$

Where, D_t = Dividend at the time t

k = discount rate

This model is not very useful in valuing stocks because it requires dividend forecasts for every year into the indefinite future. To make the DDM practical, constant-growth DDM was proposed by Myron Gordon as follows:

$$V_0 = \frac{D_1}{(k-g)}$$

Where, D_1 = The dividend at time$_1$ and

k = discount rate

g = growth rate of dividends.

Present value models based on the free cash flow concept include models known as the free cash flow to equity model and the free cash flow to the firm (FCFF) model. The FCFF valuation approaches estimates the value of the firm as the present value of future FCFF discounted at the weighted average cost of capital (WACC):

$$\text{Firm value} = \sum_{t=1}^{\infty} \frac{FCFF_t}{(1+WACC)^t}$$

The value of the firm if the FCFF is growing at a constant rate of g is:

$$\text{Firm value} = \frac{FCFF_0(1+g)}{WACC - g}$$

Another form of present value model is the residual income model. Residual income is calculated as the net income minus a deduction for the cost of equity capital. The deduction is called the equity charge, and is equal to equity capital multiplied by the required rate of return on equity (the cost of equity capital in percentage). According to this model, the intrinsic value of a share of common stock is the sum of book value per share and the present value of future per share residual income. According to this model,

$$\text{Vo} = B_0 + \sum_{t=1}^{\infty} \frac{RI_t}{(1+r)^t}$$

Where

Vo = Value of equity today

Bo = current per share book value of equity

RI_t = expected per-share residual income, equal to $E_t - rB_{t-1}$ or to $(ROE-r)* B_{t-1}$

E_t = expected earnings per share for period t

R = required rate of return on equity (cost of equity)

Relative valuation models, a second type of the going concern valuation model, on the other hand, specify the value of an asset relative to another asset. For example: P/E valuation technique.

Question arises whether the efficient market theory could be applied to the case of emerging markets. In probing into the literature of efficiency of emerging markets, which is presented below, it is seen that emerging markets are also efficient in the semi-strong form as there is not clear evidence for the presence of anomalies. Further, with the advent of technology, information is closely monitored and there is increased transparency. As result it can be argued that the emerging markets have a semi-strong efficiency.

In the 1960's, it was believed by many financial economists that financial markets were almost fully efficient in the sense that the prices of securities reflected all public and even most private information. Under this assumption, neoclassical economists developed models showing that financial markets would optimally allocate resources. However, in the 1970's and 1980's, a major change in this perspective came about with the discovery that anomalies such as calendar effects (day of the week effect) exist in stock market returns behavior. This section reviews the literature on anomalies in the securities market. The earliest work in this area is by researchers tested for evidence of a day-of-the week effect showing that mean returns and variances are different across days of the week (Fama, 1965; Cross, 1973). Specifically they demonstrated that the mean return (variance) on Monday is significantly lower (higher) than that of the other weekdays. Ho and Cheung reported a weekly pattern on stock return variances for several

Asian-Pacific markets (Ho and Cheung ,1994). Similar studies for developed and Asian emerging markets (French, 1980; Jaffe and Westerfield, 1985; Harris, 1986; Phillips-Patrick and Schneeweis, 1988; Aggarwal and Rivoli 1989; Ho, 1990) reported significant day-of-the-week effects. Rogalski showed evidence that the day-of-the-week effect in the US stock market occurs only from February to December (Rogalski, 1984). Dubois and Louvet argued that returns are lower at the beginning of the week but not necessarily on Monday (Dubois and Louvet, 1996).

A research by (Claessens *et al.*, 1995) investigates the behavior of stock returns in the twenty stock markets represented in the International Finance Corporation's Emerging Markets Data Base. They tested for return anomalies and predictability using statistical methodologies that have identified seasonal and size-based return differences, as well as general return predictability in industrial markets. They showed that emerging markets displayed only a few of the same anomalies. In particular, turn-of-the-tax-year effects and small-firm effects lacked evidence.

Other research work (Aggarwal and Rivoli, 1989) examines seasonal and daily patterns in the equity returns of four emerging markets: Hong Kong, Singapore, Malaysia, and the Philippines. Using daily data for the 12 years from September 1, 1976, to June 30, 1988 they showed the existence of a seasonal pattern in these emerging markets. In particular, returns for the month of January were higher than any other month for all of the markets examined except the Philippines. A robust day-of-the-week effect was also reported. The markets also exhibited a weekend effect of their own in the form of low Monday returns. In addition, a strong "Tuesday effect" was also reported, which

may be related to the + 13 hour time difference between New York and these emerging markets.

Contrastingly, a research work by (Ajayi *et al.*, 2004) conducts an empirical investigation of the day-of-the-week stock return anomaly using major market stock indices in eleven Eastern European emerging markets (EEEM) and concludes that there is no consistent evidence to support the presence of any significant daily patterns in the stock market returns of the EEEM. The empirical results indicated negative Monday returns in six of the EEEMs and positive Monday returns in the remaining five. Two of the six negative Monday returns and only one of the five positive Monday returns were statistically significant.

Competition is a necessary requirement for fully efficient resource allocation and research shows evidence that emerging markets are as competitive as the developed countries. For instance, Singh examines the role of competition policy in emerging markets from a developmental and international perspective. He suggests that the intensity of competition in leading emerging markets is not lesser than that observed in advanced countries (Singh, 2002).

Along the same lines of efficiency in resource allocation, which is an indicator of market efficiency, a research by Sabirianova *et al.*, examine the extent of the convergence of efficiency in the Czech Republic and Russia, which are economies that represent alternative models of implementing market oriented (Washington Consensus) development policies that have promoted privatization, competition and foreign investment (Sabirianova *et al.*, 2005). They tested a hypothesis which posits that only firms near the efficiency frontier benefit from such policies and they conclude that the

efficiency of firms in developing countries is approaching that of firms in advanced economies.

Stock markets in many emerging economies have progressed far in their development. Research shows that six emerging markets rank among the top 20 markets in the world in terms of market capitalization. With respect to trading value, Taiwan, Korea, and Malaysia were among the top 10 most active markets during 1998 (Jun *et al., 2003*) with trading in these three markets merely dispersed across a few companies but rather spread across a large number of domestic companies. For example, as of December 2000, there were approximately 6,000 companies listed in India, second only to the U.S. It is interesting to note that Korea has more companies listed than either France or Germany.

<……...Insert Table 2……..>

Table 2 shows the daily trading volume of the top 10 emerging market companies traded in Bombay Stock Exchange in India (BSE, 2006). It can be seen that the total shares traded of the ten companies put together is around 26 million shares, having a turnover value of around $206 million. Although research shows mixed evidence regarding the presence of anomalies in emerging market stock markets, it can be said that based on the above arguments regarding market development, (i.e. efficiencies of resource allocation, liquidity turnover, etc) the efficient market hypothesis still holds for emerging markets. Further, most of the EMNCS in the sample used in this thesis are cross listed in a developed market. Therefore, it can be argued that these companies are well followed by global investors, pension fund managers, and institutional investors. As a result, it can be said that the firm value is reflected in the stock price.

While it can be argued that the degree of efficiency cannot be equal to that of a developed country, most of the EMNCS in the sample used in this thesis are cross listed in a developed market. Therefore, it can be argued that these companies are well followed by global investors, pension fund managers, and institutional investors. As a result, it can be said that the firm value is reflected in the stock price.

Similarly, anomalies have been tested for in the foreign exchange markets. From the perspective of a US investor, authors showed that returns on foreign currencies are higher on Monday and Wednesday but lower on Thursday and Friday (McFarland, Petit, and Sung, 1982). In contrast, Jaffe and Westerfield reported negative Monday returns (Jaffe and Westerfield, 1985). A UK investor's perspective was adopted by Joseph and Hewins who found significant variations in currency returns by days of the week, holidays, beginning and the end of the month (Joseph and Hewins, 1992). Harvey and Huang undertook a similar research for currency futures and they claimed that there were significant differences in the volatility across weekdays. The volatility was higher on Friday and a less dramatic effect occurred on Thursday (Harvey and Huang, 1991). Cornett, Schwarz, and Szakmary found rejected the hypothesis of equal mean returns across weekdays for various currency futures, including Deutsche Mark, British Pound, and Swiss Franc (Cornett, Schwarz, and Szakmary,1995). In probing into the literature to see the statistical validity of such an effect in the currency market, author reports that, while the occurrence of such effects is well known it cannot be statistically validated (Tang, 2001). Further, Lee argues that while such effects exist in the mean return and standard deviation, a declarative statement of common existence of a statistically significant day-of-the-week effect cannot be made (Lee, 2004).

Another strand of literature focuses on higher moments in the study of the day-of-the-week effect of foreign exchange rates. Using US stock returns, authors suggested higher moments was a partial explanation for the observed weekly pattern in equity returns (Aggarwal and Schatzberg, 1997). However, the focus of the thesis is restricted to the mean and standard deviation of the returns. Therefore in this thesis, the calendar effects are no considered and the efficient market hypothesis is assumed to hold. Therefore, based on the above discussion, emerging markets are assumed to be efficient in the semi-strong form and EMNC's stock prices are used as a proxy for firm value. The next section discusses the data sample used and the methodology in detail.

Data and Methodology

Data

The sample used in the study was compiled from multiple sources. The primary company selection tool is the transnational list published in the annual World Investment Report by UNCTAD. All the lists of Emerging Market MNCs published since 1996 were used to compile the EMNC list. If a company appeared in the list at least once, it was included in the sample. Additionally, the Top 25 Transitional Multinationals list and the Top 10 Transnational Eastern European List published in the World Investment Report were also used. The combination of these sources created a sample of 106 companies with certified multinationality. Once the company rosters were created, data for analysis was retrieved from DataStream and Thomson Research databases. A database screening of the roster companies revealed that some companies either did not have relevant data or consistent time series in the databases. This reduced the total sample of companies to 120. The final roster included 120 companies from 16 countries located in four regions of the world (Africa, Asia, Europe and Americas). Figure 5 shows the nationality of the companies used in the sample number of companies from each country. A large number of the companies from Asia and the Americas provided sufficiently reasonable diversity from which to draw meaningful conclusions (Figure 7). As expected, two thirds of the companies come from middle income emerging market countries. A relatively diverse set of 15 industries, ranging from high value added technology firms to natural resources are

represented in the sample. (refer to Figure 6 for the distribution of the industries across the sample companies).

To draw a meaningful comparisons, a control group of developed country MNCs in the same industry was identified from the Top 100 Developed market MNC Transnational list published by UNCTAD, (refer to the graph for the country distribution of developed country MNCs in the control group). Exposure elasticity measurements and determinants analyses are based on monthly total return index collected over the 1996-2006 periods and annual accounting data. Stock price is used a proxy for firm value in this thesis as it incorporates the shareholders' expectations about the future earning potential of a firm. Therefore, prices are understood to be reflective of the fair value of a firm. This assumption derives its foundation from the efficient market hypothesis which states that "in an efficient market, competition among the many intelligent participants leads to a situation where, at any point in time, actual prices of individual securities already reflect the effects of information based both on events that have already occurred and on events which, as of now, the market expects to take place in the future. In other words, in an efficient market at any point in time the actual price of a security will be a good estimate of its intrinsic value" (Eugene F. Fama, 1965) The choice of the time period was driven by the desire to optimize the sample size. Exchange rate data for the respective countries and the local market index data in the local currency denomination were also collected from DataStream.

Methodology

Research Design

The objective of this thesis is to determine whether the exchange rate exposure elasticitics for EMNCs is greater than that of developed market MNCs and to describe the determinants and underlying patterns of the EMNC exposure. The first objective can be tested using the following hypothesis:

Ho: The exchange rate exposure of emerging market multinationals is equal to the exchange rate exposure of developed country multinationals.

Hα: The exchange rate exposure of emerging market multinationals is greater than the exchange rate exposure of developed country multinationals.

The above hypothesis can be tested using a simple experimental design. A sample group of emerging market multinational firms is chosen for the experimental group. The EMNCs originate from different countries and operate in different industry segments. A similar comparable group of developed country MNCs is chosen for the control group. These MNCs originate from similar industries of these of the EMNCs. For example, a group of EMNC operating in basic industry will be compared against a group of developed country MNCs in the same basic industry segment.

Procedure

The methodology used in this thesis can be broken down into the following three components. (i) Measurement of exchange rate exposure elasticity coefficients (ii) Mapping the differences between MNCs and EMNCs (iii) Mapping of underlying typologies to identify patterns across four levels: firm, industry, country, and region specificity.

(i) Measurement of the exchange rate exposure elasticity coefficient

Exchange rate exposure elasticity can be obtained via two methods. For the sake of robustness and validity both methods are performed in this thesis. The two methods are described below:

Method A (Using actual data)

In this method a two-stage regression procedure is adopted. In the first stage, we orthogonalize the market return and exchange rate index to remove the effects of exchange rates in the model. The markets' returns are regressed against the foreign exchange returns (equation 1 below) and the unexplained portion of the regression (error terms) that accounts for macroeconomic factors excluding foreign exchange rate factors will be captured. Two different types of exchange rate indices are employed in this step. The first one is the nominal exchange rate index, which is a simple bilateral exchange rate rebased to an appropriate date that fits the sample. The second type of index used is the real exchange rate index which is the price of domestic goods relative to foreign goods. It compares the price of basket of goods at home with the price of the same basket of goods abroad.

$$r_{m,t} = \beta_0 + \beta_{1,m} r_{x,t} + \varepsilon_{m,t} \quad \text{m=1,2,….n} \quad \text{……..(1)}$$

$$\varepsilon_{m,t} \sim N(0,\sigma^2)$$

where

$r_{m,t}$ is the percentage change in the market returns at time t;;

$r_{x,t}$ is percentage change in the exchange rate at time t;

$\beta_{1,m}$ is the foreign exchange elasticity to the changes in the return on the market portfolio;

$\varepsilon_{m,t}$ is the theoretical error term that is having variation of macro economic effects free from foreign exchange rate effects unexplained by the regression model;

In the second stage, the error terms from the first stage will be used in place of the market returns in the regression equation (2), which is the standard equation used in the FX-literature.

$$r_{i,t} = \beta_0 + \beta_{1,i} r_{x,t} + \beta_{2,i} \hat{\varepsilon}_{m,t} + \varepsilon_{i,t} \qquad i=1,2,....n \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

where $r_{i,t}$ is return on firm i's stock at time t;

$r_{x,t}$ is percentage change in the exchange rate at time t;

$\beta_{1,i}$ is firm i's exchange rate exposure elasticity coefficient,

$\hat{\varepsilon}_{m,t}$ is the residual market return that is free from foreign exchange rate effects;

$\beta_{2,i}$ is the firm's exposure to the changes in the return on the market portfolio free from foreign exchange rate effects ;

$\varepsilon_{i,t}$ is the theoretical error term that is unexplained by the regression model;

$\beta_{1,i}$ gives the exchange rate exposure elasticity.

Method B (Using Monte Carlo Simulation):

This method involves the following four steps: a) Orthogonalization b) Mapping the distribution for the market index free of exchange rate effects, mapping the total return index of the firm, and mapping the exchange rate of the each country. c) Using Monte Carlo Simulation obtain the simulated data for the variables d) Using the simulated data run subsequent regression models to capture the exchange rate exposure elasticity.

As in the previous method, the exchange rate and market return index are orthogonalized to remove the impact of exchange rate effects. The isolated error terms, the total return for each of firms in the experimental and control groups, and the exchange rate indices of the respective countries are fitted to a distribution that matches the data. Each MNC has a unique set of distributions that fits its corresponding variables (for example: Cemex, an EMNC used in the sample, would have a distribution for the isolated error terms, total return index of Cemex, and the exchange rate of MXP/USD). The distribution is sampled using the Monte Carlo method, with 1000 runs and estimates for the variables are obtained. These estimates are used in the regression equation (2), which was used in the previous method and presented below, to obtain the exchange rate elasticity coefficients for both the control and the experimental group of firms.

$$r_{i,t} = \beta_0 + \beta_{1,i} r_{x,t} + \beta_{2,i} \hat{\varepsilon}_{m,t} + \varepsilon_{i,t} \qquad i=1,2,....n \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where $r_{i,t}$ is return on firm i's stock at time t;

$r_{x,t}$ is percentage change in the exchange rate at time t;

$\beta_{1,i}$ is firm i's exchange rate exposure elasticity coefficient,

$\hat{\varepsilon}_{m,t}$ is the residual market return that is free from foreign exchange rate effects;

$\beta_{2,i}$ is the firm's exposure to the changes in the return on the market portfolio free from foreign exchange rate effects ;

$\varepsilon_{i,t}$ is the theoretical error term that is unexplained by the regression model;

$\beta_{1,i}$ gives the exchange rate exposure elasticity.

(ii) Mapping the difference between MNCs and EMNCs

This thesis proposes the following hypothesis

Ho: The exchange rate exposure of emerging market multinationals is equal to the exchange rate exposure of developed country multinationals.

Hα: The exchange rate exposure of emerging market multinationals is greater than the exchange rate exposure of developed country multinationals.

In order to test the above hypothesis an analysis of variance (ANOVA) technique was selected because it helps to determine group differences for a single dependent variables across 2 or more factors. The GLM (General Linear Model) procedure was employed to conduct ANOVA. The GLM is a theory that underlies a number of commonly used statistical techniques such as ANOVA, ANCOVA, MANOVA, MANCOVA, Regression, Multiple Regression, Log-Linear analysis, Logistic Regression etc. The general aim of methods underpinned by the GLM is to determine whether the independent variable(s) affect or relate to the dependent variable(s). When the variables are entered into any of the techniques, it is assumed that they have an additive effect, which means that they each contribute to the prediction of the dependent variable. For example, when three variables are placed into a general linear model the second variable adds to the predictive value of the first. The third variable adds to the predictive value of the second and first combined. In this thesis, the question of whether multiple levels of independent variables on their own or in combination with one another have an effect on the dependent variables is tested. Type III sum of squares is used in the model to take care of the uneven group sizes. It calculates the sum of squares after the independent variables have all been adjusted for the inclusion of all other independent variables in the model.

(iii) Mapping of underlying typologies to identify patterns.

In order to identify patterns in the relationship between the real exchange rate exposure elasticity coefficient and the various firm, industry, regional, and country level variables, cross tabulation is performed. Please refer to appendix 2 for a list of the variables used in the cross tabulation technique.

The purpose of cross tabulation is to show the relationship (or lack thereof) between two variables. That is, although there appears to be some relationship between the two variables, cross tabulation helps to determine if there any reason to believe that the differences between the groups is anything more than random variation. A number of tests are available to determine if the relationship between two cross tabulated variables is significant. One of the more common tests is chi-square. One of the advantages of chi-square is that it is appropriate for almost any kind of data. Pearson chi-square tests the hypothesis that the row and column variables are independent. The lower the value of the significance value (Asymp. Sig.), the less likely it is that the two variables are independent (unrelated). A layer variable can also be added to the cross tabs to create a three-way table in which categories of the row and column variables are further subdivided by categories of the layer variable. This variable is sometimes referred to as the control variable because it may reveal how the relationship between the row and column variables changes when you "control" for the effects of the third variable. In the thesis, ‘region group’, and ‘industry group’ are added as layer variables to control for the regional and industry effects in the relationship of between the real exchange rate exposure elasticity coefficient and the various firm level variables.

(iv) Identification of determinants

In order to check the robustness of the cross tabulation technique, a pooled time series analysis is also performed on the data set to identify the determinants of the real exchange rate exposure elasticity coefficient.

In this stage the exchange rate exposure elasticity coefficients are examined across four levels: firm, industry, country, and region specific to identify what factors influence the exposure. At the firm level, the focus is on the impact of degree of multinationality or internationalization on the exchange rate exposure elasticity in the context of EMNCs. Several measures have been used in the empirical literature to capture the multinational involvement of a firm but foreign to total sales (FSTS) ratio and foreign to total assets (FATA) ratio are the most widely used and accepted measure of the extent of internationalization. Sullivan (1994) shows that the ratio of foreign sales to total sales is an unambiguous measure of international involvement of a firm. In order to capture the degree of international experience and the involvement of the EMNCs, FSTS ratio and FATA ratio are used. For a group of companies in the sample, the subsidiary locations were identified. Using this information, a classification was made using a dummy variable depending upon whether the subsidiary was located in a developed (upstream investment) or developing country (downstream investment) groups. If an EMNC has subsidiaries in developed countries, the dummy variable takes the value of 1, and 0 otherwise. The literature reviewed in the earlier sections suggests that EMNC investments in developed countries generally is geared towards acquisition of strategic assets and have the potential to enhance competitive advantage of the EMNCs at home and foreign markets. Also, Kwok and Reeb (2000) suggest that MNC diversification to downstream (emerging economies) markets is associated with higher risks. Hence, this

variable determines the impact of upstream diversification or strategic asset seeking expansion on the exchange rate exposure.

An EMNCs capability to issue American Depositary Receipt (ADR) is taken as a signal of ease of access to international exposure and therefore a higher exchange rate exposure is expected for such firms. ADR issues by EMNCs can be treated as a sign of engagement in international financial markets. The dummy variables "ADR1, ADR2" is used to capture the impact of this factor on the exchange rate exposure elasticity. Three levels of ADRs are possible (Level I, Level II, Level III). The level of involvement in the international financial markets is signaled by the corresponding level of ADR issues.

The impact of a firm's industrial diversification on the exchange rate exposure is an interesting variable to explore because it is possible that EMNCs that engage in diversified industries would be encouraged to internalize capital and labor markets to compensate for the endemic weak institutional infrastructure in the emerging market (Khanna and Palepu 1997). Therefore, a priori, it is expected that EMNCs that are more diversified would have better exposure management capabilities and therefore have a lower overall exposure than a non-diversified EMNC. In order to capture the impact of company's utilization of internal labor and capital markets a dummy variable called "structure", which differentiates diversified versus single industry firms is used.

In order to capture the impact of the industry in which the company operates a dummy variable called "industry" is used. It is conceivable to think that companies operating in traditional industries would exhibit different exchange rate exposure patterns than companies operating in newly developed industries.

It is almost axiomatic that economic and political stability is a significant determinant of a firm's exchange rate exposure elasticity in emerging markets. In order to capture this country level effect, the Economist Intelligence Unit rating (EIU) is used as a proxy for country risk. Additionally a region dummy variable is used in order to explore possible linkages between exposure and geographic location.

Finally, size and leverage were also used to explore the impact on exchange rate exposure. It is established in theory that MNCs have an incentive to internalize market imperfections to achieve above market returns. In doing so, they become more exposed to currency risk. This effect can be observed in the "size" variable. Similarly the impact of leverage on the exchange rate exposure is examined using the variable "leverage".

Estimation Technique

The coefficients in each specification were estimated by using Pooled Time Series Regressions. Pooled time series regression allows us to estimate equations of the form:

$$y_{it} = \alpha_{it} + \beta_i' x_{it} + \varepsilon_{it'}$$

Where y_{it} is the dependent variable, and x_{it} and β_i are k-vectors of non-constant regressors and parameters for $i = 1,2,...N$ cross-sectional units. Each cross-section unit is observed for dated periods $t = 1,2,...T$.

The data can be viewed as a set of cross-section specific regressions so that there are N cross-sectional equations:

$$y_i = \alpha_i + x_i' \beta_i + \varepsilon_i$$

each with observations, stacked on top of one another. The stacked representation are presented as follows

$$Y = \alpha + X\beta + \varepsilon$$

Where, α, β and X and are set up to include any restrictions on the parameters between cross-sectional units. The residual covariance matrix for this set of equations is given by:

$$\Omega = E(\varepsilon\varepsilon') = E\begin{pmatrix} \varepsilon_1\varepsilon_1^{'} & \varepsilon_2\varepsilon_1^{'} & \ldots & \varepsilon_N\varepsilon_1^{'} \\ \varepsilon_{21}\varepsilon_1^{'} & \varepsilon_2\varepsilon_2^{'} & \ldots & \\ . & \ldots & \ldots & \\ \varepsilon_N\varepsilon_1^{'} & \ldots & \ldots & \varepsilon_N\varepsilon_N^{'} \end{pmatrix}$$

The pool specification is treated as a system of equations and the model is estimated by using system OLS. This specification is appropriate when the residuals are contemporaneously uncorrelated, and time-period and cross-section homoskedastic:

$$\Omega = \sigma^2 I_N \otimes I_T$$

The coefficients and their covariances are estimated using the usual OLS techniques applied to the stacked model.

Cross-Section Weighting

A cross-section weighted regression is used to account for cross-sectional heteroskedastic and contemporaneously uncorrelated residuals:

$$\Omega = E(\varepsilon\ \varepsilon^{'}) = E\begin{pmatrix} \sigma_1^2 I_{T_1} & 0 & \ldots & 0 \\ . & \sigma_2^2 I_{T_2} & \ldots & . \\ . & . & \ldots & . \\ . & . & \ldots & \sigma_N^2 I_{T_N} \end{pmatrix}$$

The FGLS (Feasible Generalized Least Square) with $\hat{\sigma}_i^2$ estimated from a first-stage pooled OLS regression. The estimated variances are computed as:

$$\hat{\sigma}_i^2 = \sum_{t=1}^{T_i} (y_{it} - \hat{y}_{it})^2 / T_i$$

Where $\hat{y}_{it}$ the OLS are fitted values. The estimated coefficient values and covariance matrix are given by the standard GLS estimator.

Cross Sectional Model

$$\beta_{1,i} = \delta_{0,i} + \delta_{1,i}TS_{1,i} + \delta_{2,i}Lev_{1,i} + \delta_{3,i}Int_{1,i} + \delta_{4,i}C_{1,i} + \delta_{5,i}ADR_{1,i} + \delta_{6,i}US_{1,i} + \delta_{7,i}R_{1,i} + \delta_{8,i}I_{1,i} + \varepsilon_{1,i}$$

Where, $\beta_{1,i}$ is firm I's exchange rate exposure elasticity coefficient

The impact of company, industry, region, and country level variables on the exchange rate exposure elasticity was estimated by using pooled time series regression method. Dummy variables were included to separate the industry, country, and regional effects. It is possible that the size and leverage of the firm can impact the foreign exchange exposure elasticity of the firm and it is therefore necessary to control for these effects. Total Assets and Total Sales were added to control for the firm size and the debt to total assets ratio was employed to control for the leverage effect. The degree of internationalization of the firm could also impact the exposure, consequently the ratio of foreign assets to total assets and foreign sales total sales were added to the model to control for this effect.

Results

Sample characteristics

The sample contains 106 multinational companies from emerging markets which is compared against a control group of 106 multinational companies from developed markets. Figure 3 shows the growth of the total return index of the MNCs used in the sample in this thesis. A hundred dollars invested in the MNC portfolio (EMNCs and DMNCs) 1995 would have returned around $650 by 2006. An investment in the portfolio of emerging markets would have yielded around $1000 as compared to a dollar investment in the portfolio of pure DMNCs which would have yielded $375 in the same 10 year period. Despite the fact that the sample firms represent larger EMNCs, there is a considerable variation in sales, asset values, funds generated from operations, total number of employees, and market capitalizations. Table 3 and Table 4 shows the sample characteristics of the emerging market and the developed market MNCs.

<……Insert Table 3 and Table 4 ……>

Table 3 shows the overall sample characteristics of the total assets of developed market and emerging market companies. For the emerging market group, the mean of total assets is around $5 billion and ranges between a minimum of $96 million and a maximum of $44 billion. The median asset value for the sample is around $2.7 billion. The cumulative total of the assets owned by all the EMNCs put together is $547 billion. In the Table 4, for the developed market group, the mean of total assets is around $30 billion and ranges between a minimum of $417 million and a maximum of $138 billion.

The median asset value for the sample is around $20.9 billion. The cumulative total of the assets owned by all the MNCs put together is $3.18 trillion.

Table 3 shows the sample characteristics of total sales of the developed market and emerging market MNCs. For the emerging market group, the mean of total sales is around $3.3 billion and ranges between a minimum of $55 million and a maximum of $34 billion. The median value for sales in the sample is around $1.7 billion. The dollar value of cumulative sales of all the EMNCs put together is $356 billion. In contrast, for the developed market group, the mean of total sales is around $27 billion and ranges between a minimum of $375 million and a maximum of $147 billion. The median value of sales for the sample is around $16.5 billion. The cumulative dollar value of sales for all the MNCs put together is around $2.9 trillion (Table 4).

Table 3 shows the sample characteristics for total debt for the developed market and emerging market MNCs. For the emerging market group, the mean of the total debt is around $1.5 billion and ranges between a minimum of $781,000 and a maximum of $15 billion. The median value for total debt in the sample is around $738 million. The cumulative dollar value of total debt of all the EMNCs put together is $164 billion. In contrast (refer Table 4), for the developed market group, the mean of the total debt in the sample is around $8.9 billion and ranges between a minimum of $27 million and a maximum of $60 billion. The median value of total debt for the sample is around $6 billion. The cumulative dollar value of total debt for all the MNCs put together is around $945 billion.

Table 3 shows the sample characteristics of 'total funds generated from operations' of the developed market and emerging market MNCs. For the emerging

market group, the mean of the total funds from operations is around $563 million and ranges between a minimum of -$40 million and a maximum of $7.2 billion. The median value for total funds generated from operations in the sample is around $236 million. The cumulative dollar value of total funds generated from operations of all the EMNCs put together is $59.6 billion. In contrast, for the developed market group, the mean of the total funds generated from operations in the sample is around $2.5 billion and ranges between a minimum of $5.9 million and a maximum of $16.8 billion. The median value of total funds generated from operations for the sample is around $1.5 billion. The cumulative dollar value of total funds generated from operations of all the MNCs put together is around $268 billion (Table 4).

Table 3 shows the sample characteristics of 'cash flows from financing activities (CAF Financing)' of the developed market and emerging market MNCs. For the emerging market group, the mean of the cash flows from financing activities is around $2 million and ranges between a minimum of -$1.3 billion and a maximum of $1.9 billion. The median value for cash flows from financing activities in the sample is around $4.4 million. The cumulative dollar value of cash flows from financing activities of all the EMNCs put together is $303 million. In contrast, for the developed market group in the Table 4, the mean of the cash flows from financing activities in the sample is around -$591 million and ranges between a minimum of -$7 billion and a maximum of $2.7 billion. The median value of total funds generated from operations for the sample is around -$189 million. The cumulative dollar value of total funds generated from operations of all the MNCs put together is around -$60.8 billion.

Table 3 shows the sample characteristics of 'total employees' of the developed market and emerging market MNCs. For the emerging market group, the mean of the total employees is around 19,500 and ranges between a minimum of 825 employees and a maximum of 241,000 employees. The median value for total employees from operations in the sample is around 13,000 employees. The cumulative number of employees employed in of all the EMNCs put together is around 2 million. In contrast, for the developed market group, the mean of the employees in the sample is around 85,000 employees and ranges between a minimum of 800 employees and a maximum of 423,509 employees. The median value of total number of employees for the sample is around 46,000 employees. The cumulative total number employees employed in of all the MNCs put together is around 9 million (Table 4).

<……Insert Table 5…… >

Table 5 reports the foreign sales, foreign assets, and total number of countries of operation of the emerging market MNCs in the sample. The mean of the foreign assets owned by EMNCs is $1.8 billion dollars with a median value of around $912 million. The maximum value of the foreign assets in the sample is around $32.7 billion and the cumulative value of the total foreign assets owned by all of the EMNCs put together is $193 billion. The mean of the foreign sales of EMNCs is $1.5 billion dollars with a median value of around $539 million. The maximum value of the foreign sales in the sample is around $20.7 billion and the cumulative value of the total sales of all of the EMNCs put together is $162.6 billion.

On an average the EMNCs operate in around 12 countries with a median value of around 7 countries. The maximum number of countries of operation is around 45

locations and the minimum number of countries of operation is 2. The cumulative total number of countries of operation of all the EMNCs put together is 1,186 locations. Further, if a EMNNC operated in a developed country, the country of operation is classified as an 'upstream' country of operation. On an average, there are around 3 upstream locations of operation with a minimum value of 0 and a maximum of 19 upstream locations. The median value is identified as 2 upstream locations. Out of the cumulative 1,186 foreign locations of operations 320 were upstream investments. Similarly "downstream" investment is defined as the one where the EMNCs invested in a country where the level of development is comparable to the home country. The mean of the downstream number of countries is around 9 locations with a minimum of 1 location and a maximum of 35 downstream locations. The median value is around 5 downstream investments. Out of the cumulative 1,186 locations, 866 were downstream investments.

<……Insert Table 6…… >

Table 5 reports the total cumulative dollar value of different parameters for the whole sample (MNCs and EMNCs). The sample consists of 212 companies, and they own around $3.7 trillion worth of assets around the world with total sales amounting to $3.2 trillion and having a debt of around $1.1 trillion. They generate around $320 billion from operations and have employed around 11 million employees. Their cash flow from financing activities is around -$60 billion. The average value of leverage ratio for the whole sample is around 29%, the borrowing ratio is 154%, the capital gearing ratio is around 40% with net profit margin of 6.85% and operating profit margin of 10.3% and ROCE at 10.32%, and ROE around 17.1%.

<……Insert Table 7 and Table 8…… >

Table 7 and Table 8 reports the leverage ratio, borrowing ratio, capital gearing ratio, net profit margin, operating profit margin, return on capital employed (ROCE), return on equity (ROE), and return on shareholders' equity (ROSE) for both the developed and emerging market MNCs in the sample. Leverage ratio indicates the ratio between Total Debt and Total Assets. The average leverage ratio for the EMNCs in the sample was around 28% with a minimum value of 0% and a maximum of 80% and standard deviation of 14%. The median leverage ratio for the sample was around 27%. In contrast, the average value of developed country MNCs was 30%, with a minimum value of 6% and a maximum value of 69% and a standard deviation of 14%. The median value of the ratio for the sample was around 29%.

For developed country MNCs, the borrowing ratio is the ratio between total loans and equity capital including reserves excluding total intangibles. The borrowing ratio for the EMNCs is defined as the ratio between total debt and shareholders' equity. The average borrowing ratio for the EMNCs in the sample was around 124% with a minimum value of -149% and a maximum of 1476% and standard deviation of 211%. The median borrowing ratio for the sample was around 59%. In contrast, the average value of developed country MNCs was 184%, with a minimum value of -14% and a maximum value of 2381% and a standard deviation of 287%. The median value of the ratio for the sample was around 99%.

The capital gearing ratio is defined as follows: (Long term debt + short term debt+ current position of long term debt)/(Total capital+ short term debt & current position of long term debt) * 100. The average value of capital gearing ratio for the EMNCs in the sample was around 34% with a minimum value of -36% and a maximum

of 80% and standard deviation of 18%. The median capital gearing ratio for the sample was around 33.5%. In contrast, the average value of developed country MNCs was 45.5%, with a minimum value of 8.5% and a maximum value of 89.6% and a standard deviation of 18.4%. The median value of the ratio for the sample was around 43.6%.

The net profit margin is defined as the ratio between net income before preferred dividends and the net sales or revenue. The average net profit margin for the EMNCs in the sample was around 9.55% with a minimum value of -25% and a maximum of 55% and standard deviation of 11.4%. The median net profit margin for the sample was around 7.6%. In contrast, the average value for developed country MNCs was 4%, with a minimum value of -16% and a maximum value of 26.7% and a standard deviation of 5.79%. The median value of the ratio for the sample was around 3.05%.

Operating profit margin is the ratio between operating income and net sales or revenues. The average operating profit margin for the EMNCs in the sample was around 12.5% with a minimum value of -5.4% and a maximum of 60.4% and standard deviation of 10.5%. The median operating profit margin for the sample was around 9.89%. In contrast, the average value of developed country MNCs was 8.19%, with a minimum value of -3.87% and a maximum value of 37.8% and a standard deviation of 7.5%. The median value of the ratio for the sample was around 5.94%.

Return on capital employed (ROCE) is defined as: (Net Income before Preferred Dividends + ((Interest Expense on Debt - Interest Capitalized) * (1-Tax Rate))) / (Last Year's Total Capital + Last Year's Short Term Debt & Current Portion of Long Term Debt) * 100. The average ROCE for the EMNCs in the sample was around 12.33% with a minimum value of -2.60% and a maximum of 43% and standard deviation of 8.5%. The

median ROCE for the sample was around 10.56%. In contrast, the average value of developed country MNCs was 8.31%, with a minimum value of -8% and a maximum value of 41.8% and a standard deviation of 6.6%. The median value of the ratio for the sample was around 8%.

Return on Equity (ROE) is defined as follows: (Net Income before Preferred Dividends - Preferred Dividend Requirement) / Last Year's Common Equity * 100. For Finland and Norway the ROE calculated by ROE = (Net Income before Preferred Dividends - Preferred Dividend Requirement + Reserves-Increase/Decrease) / (Last Year's Non-Equity Reserves + Last Year's Common Equity) * 100. ROE for Sweden = (Net Income before Preferred Dividends - Preferred Dividend Requirement / Last Year's Common Equity * 100The average ROE for the EMNCs in the sample was around 19.3% with a minimum value of -95% and a maximum of 204% and standard deviation of 35%. The median ROE for the sample was around 14.8%. In contrast, the average value of developed country MNCs was 15%, with a minimum value of -114.5% and a maximum value of 312% and a standard deviation of 36%. The median value of the ratio for the sample was around 11.5%.

<……Insert Figure 5 …… >

Figure 5 shows the distribution of the country of origin of the multinational companies used in the sample. It can be seen that around 13% of the sample EMNCs originate from Hong Kong and a minimum number (around 1%) of the EMNCs originate from the Philippines and Russian Federation. For the developed market MNCs around 21% of the MNCs originate from Japan and a minimum of 1% of MNCs originate from Belgium.

<……Insert Figure 6…… >

Figure 6 shows the distribution of industry groups of the MNCs in the sample. 15% of the sample comes from "diversified industries" and around 2% of the sample comprise "automobile, media, and health" industry group. The control group of MNCs was also selected from the same industry groups for meaningful comparisons. For example, 10 EMNCs were selected from "basic resources" industry group and this group was matched with corresponding 10 developed market MNCs from the "basic resources" industry group.

<……Insert Figure 7 …… >

Figure 7 shows the regional distribution of MNCs in the sample. The whole sample is categorized into four geographical regions namely, Africa (South Africa), Asia (Japan, Singapore, India, Hong Kong, South Korea, Taiwan, Malaysia, Australia, and Philippines), Europe (Belgium, Finland, France, Germany, Hungary, Ireland, Italy, Netherlands, Norway, Poland, Russian Federation, Slovenia, Spain, Sweden, Switzerland, UK) and Americas (Argentina, Brazil, Chile, Canada, and Mexico). The distribution shows that the highest number of EMNCs originate from Asia (around 51%) and the lowest number of EMNCs in the sample originate from Africa (around 8%). On the other hand, a large percentage of the developed-country multinationals originate from Europe (around 72%) and the smallest number of companies originate from the Americas (only Canadian – around 4.75%).

Results of Exposure Coefficient

Table 5 shows the results of the exposure measurement model:

$$r_{i,t} = \beta_{0,j} + \beta_{1,i} r_{x,t} + \beta_{2,i} \hat{\varepsilon}_{m,t} + \varepsilon_{i,t} \qquad i=1,2,....n \ \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where $r_{i,t}$ is return on firm i's stock at time t;

$r_{x,t}$ is percentage change in the exchange rate at time t;

$\beta_{1,i}$ is firm i's exchange rate exposure elasticity coefficient,

$\hat{\varepsilon}_{m,t}$ is the residual market return that is free from foreign exchange rate effects;

$\beta_{2,i}$ is the firm's exposure to the changes in the return on the market portfolio free from foreign exchange rate effects ;

$\varepsilon_{i,t}$ is the theoretical error term that is unexplained by the regression model;

$\beta_{1,i}$ gives the exchange rate exposure elasticity.

<……Insert Table 9 …… >

Three different types of exchange rates are used and as a result three sets of exchange rate exposure elasticity coefficients and their corresponding market index coefficients are obtained. The exchange rates used are nominal exchange rate (NM), Real Exchange Rate (RER), and simulated exchange rate (SM) which were obtained through a Monte Carlo Simulation.

Panel A reports the results of the exchange rate exposure analysis for all the multinationals (both from developed and emerging markets) in the sample. The mean of the exchange rate exposure elasticity coefficient using nominal exchange rates is 0.00122 with a median value of 0.01645. Using Real Exchange Rates the mean of the exchange rate exposure elasticity coefficient is -0.0146 with a median value of -0.0399. Using Simulated Exchange Rates the mean of the exchange rate exposure elasticity coefficient is -0.0013 with a median value of -0.0034. The mean of the market index coefficient using the nominal exchange rates is 0.5274 with a median of 0.55. Using Real Exchange

Rates the mean of the market index coefficient is 0.5286 with a median value of 0.5540. The mean of the market index coefficient using Simulated Exchange Rates is -0.0004 with a median of 0.0017.

Panel B reports the results of the exchange rate exposure analysis for Emerging Market multinationals in the sample. The mean of the exchange rate exposure elasticity coefficient using Nominal Exchange Rates is -0.112 with a median value of -0.126. Using Real Exchange Rates the mean of the exchange rate exposure elasticity coefficient is 0.0901 with a median value of 0.1122. Using Simulated Exchange Rates the mean of the exchange rate exposure elasticity coefficient is -0.0022 with a median value of -0.0059. The mean of the market index coefficient using Nominal Exchange Rates is 0.557 with a median of 0.5773. Using Real Exchange Rates the mean of the market index coefficient is 0.5596 with a median value of 0.5789. The mean of the market index coefficient using Simulated Exchange Rates is -0.0014 with a median of -0.0010.

Panel C reports the results of the exchange rate exposure analysis for the developed country multinationals in the sample. The mean of the exchange rate exposure elasticity coefficient using nominal exchange rate is 0.11477 with a median value of 0.143. Using Real Exchange Rate the mean of the exchange rate exposure elasticity coefficient is -0.1192 with a median value of -0.1471. Using Simulated Exchange Rate the mean of the exchange rate exposure elasticity coefficient is -0.0004 with a median value of -0.0017. The mean of the market index coefficient using the nominal exchange rate is 0.4979 with a median of 0.5334. Using Real Exchange Rate the mean of the market index coefficient is 0.4976with a median value of 0.5296. The mean of the market index coefficient using the simulated exchange rate is 0.0007 with a median of 0.0033

Clearly, the above results indicate that using Real Exchange Rates instead Nominal Exchange Rates in the model results in a change in the direction of the resulting exchange rate exposure elasticity coefficients. Figures 5 & 6 show this phenomenon. Figure 5 shows the distribution of the resulting positive (around 24% of EMNCs and 79% of DMNCs) and negative exchange rate exposure elasticity coefficients (around 76.4% of EMNCs and 20.75% of DMNCs) when nominal exchange rates are used in the analysis. This is compared with Figure 6 which shows the distribution of the resulting positive (around 73% of EMNCs and 18.8% of DMNCs) and negative exchange rate exposure elasticity coefficients (around 27% for EMNCs and 81.3% for DMNCs) when real exchange rate are used in the analysis.

<……Insert Table 10 …… >

Table 10 reports the number of EMNCs and DMNCs that had significant exchange rate exposure elasticity coefficients at the 1% 5%, and the 10% levels. Panel A reports the exchange rate exposure elasticity coefficient when nominal exchange rate were used in the sample. At the 1% level 40 EMNCs out of the 106 EMNCs (around 38% of the EMNCs) in the sample, had significant exchange rate exposure elasticity coefficients. Around 18 of the 106 EMNCs (17% of the EMNCs) had significant exchange rate exposure elasticity coefficients at the 5% level. At the 10% level 5 EMNCs (5% of the EMNCs) had significant exchange rate exposure elasticity coefficients. Therefore, in the total sample of EMNCs around 63 EMNCs (about 60% of the EMNCs sample firms) had significant exchange rate exposure elasticity coefficients, with 63.5% of the coefficients being significant at the 1% level.

Panel A also reports a similar statistics for the DMNCs. At the 1% level 37 DMNCs out of the 106 DMNCs (around 35% of the DMNCs) in the sample, had significant exchange rate exposure elasticity coefficients. Around 15 of the 106 DMNCs (14% of the DMNCs) had significant exchange rate exposure elasticity coefficients at the 5% level. At the 10% level 12 DMNCs (11% of the DMNCs) had significant exchange rate exposure elasticity coefficients. Therefore, in the total sample of DMNCs around 64 DMNCs (about 60% of the DMNCs sample firms) had significant exchange rate exposure elasticity coefficients, with 57.8% of the coefficients being significant at the 1% level.

Panel B reports the exchange rate exposure elasticity coefficient when real exchange rates were used in the sample. At the 1% level 40 EMNCs out of the 106 EMNCs (around 38% of the EMNCs) in the sample, had significant exchange rate exposure elasticity coefficients. Around 16 of the 106 EMNCs (around 15% of the EMNCs) had significant exchange rate exposure elasticity coefficients at the 5% level. At the 10% level 7 EMNCs (5% of the EMNCs) had significant exchange rate exposure elasticity coefficients. Therefore, in the total sample of EMNCs around 63 EMNCs (about 60% of the EMNCs sample firms) had significant exchange rate exposure elasticity coefficients, with 63.5% of the coefficients being significant at the 1% level.

Panel B also reports a similar statistics for the DMNCs. At the 1% level 35 DMNCs out of the 106 DMNCs (around 33% of the DMNCs) in the sample, had significant exchange rate exposure elasticity coefficients. Around 19 of the 106 DMNCs (around 18% of the DMNCs) had significant exchange rate exposure elasticity coefficients at the 5% level. At the 10% level 10 DMNCs (9.4% of the DMNCs) had

significant exchange rate exposure elasticity coefficients. Therefore, in the total sample of DMNCs around 64 DMNCs (about 60% of the DMNCs sample firms) had significant exchange rate exposure elasticity coefficients, with 54.7% of the coefficients being significant at the 1% level.

Panel C reports the exchange rate exposure elasticity coefficient when simulated exchange rate were used in the sample. At the 1% level 2 EMNCs out of the 106 EMNCs (only 2% of the EMNCs) in the sample, had significant exchange rate exposure elasticity coefficients. Around 3 of the 106 EMNCs (around 3% of the EMNCs) had significant exchange rate exposure elasticity coefficients at the 5% level. At the 10% level 1 EMNC (only 1% of the EMNCs) had significant exchange rate exposure elasticity coefficients. Therefore, in the total sample of EMNCs only 6 of EMNCs (about 6% of the EMNCs sample firms) had significant exchange rate exposure elasticity coefficients, with 33.3% of the coefficients being significant at the 1% level. Simulated exchange rates therefore did not yield encouraging results. For further analysis, the thesis focuses only on Real Exchange rates.

Panel C also reports a similar statistics for the DMNCs. At the 1% level none of the 106 DMNCs (0% of the DMNCs) in the sample, had significant exchange rate exposure elasticity coefficients. Only 1 of the 106 DMNCs (around 1% of the DMNCs) had significant exchange rate exposure elasticity coefficients at the 5% level. At the 10% level 5 DMNCs (4.5% of the DMNCs) had significant exchange rate exposure elasticity coefficients. Therefore, in the total sample of DMNCs around 6 DMNCs (about 6% of the DMNCs sample firms) had significant exchange rate exposure elasticity coefficients.

These results form a contribution to the field of exchange rate exposure as it reports a large number (almost 60% that is 63 companies of 106 DMNCs) of significant exposure coefficients in comparison to the previous studies in this area. Jorion, (Jorion, 1990) finds that only 15 of 287 US Multinational firms have significant foreign exchange rate exposure at the 5% level. However, the results do show some evidence of cross-sectional variation in the exposure coefficient. Amihud (Amihud, 1994) found no evidence of significant exchange rate for sample of 32 largest US exposrting firms over the period 1982-1988. Bodnar and Gentry (Bodnar and Gentry ,1993) test for exchange rate exposure at the industry level in the US, Japan and Canada. They find significant exposure in 11 of 39 US industries (28%) over the period 1979-1988. Miller and Reuer (Miller and Reuer, 1998) study uses a multiple currency model in analyzing the foreign exchange exposures of a large sample of US firms and finds that 13 to 17 percent are exposed to these exchange rates movements. Ihrig (Ihrig, 2001) found that 25% of all MNE's had significant exchange rate exposure between 1995 and 1999. On examining the exchange rate exposure of firms from eight countries of which two are emerging markets (Chile and Thailand), Dominguez and Tesar (Dominguez and Tesar, 2006) found that over 20% of firms are exposed. Hence the results clearly show that EMNCs, and Non-US DMNCs have significant exposures to exchange rate fluctuations.

Nature of exchange rate exposure

Figure 8 shows the direction of the nominal exchange rate exposure elasticity coefficient of the sample. It can be seen that a majority (around 80%) of the DMNCs have a positive nominal exchange rate exposure elasticity coefficient, of which 54% have significant positive values. Of the remaining 20% around 7% of the firms have significant

negative exposure coefficients. The reasoning behind the direction of the exposure can be complicated to understand. If the MNCs are net exporters, they may benefit from a depreciation of local currency which would make their goods more competitive in foreign markets. In contrast, if the MNCs are net importers, they may lose from a depreciation of local currency as they would face higher prices for their imported goods in local currency terms. For the DMNCs used in the sample, a positive coefficient is found. This is in conformance with the existing theory that MNCs will gain during local currency depreciation as explained above.

Figure 8 also plots the direction of the exchange rate exposure elasticity coefficient of the EMNCs in the sample. A contrasting picture is evident. It can be seen that a majority (around 77%) of the EMNCs have a negative nominal exchange rate exposure elasticity coefficient, of which almost 55% have statistically significant values. Of the remaining 23% around 5% of the firms have significant positive exposure coefficients. There could be two reasons behind this phenomenon. Either EMNCs are net importers of intermediate products or the EMNCs are net importers of foreign liabilities.

This result is consistent even if the exposure is measured in real terms (use of RER instead of nominal exchange rates). In RER, the real depreciation comes about via either of the following reasons: a) Inflation is lower at home than abroad and/or b) The currency depreciates in nominal terms. That is, a fall in the relative price of domestic goods indicates that domestic goods are becoming cheaper relative to foreign goods. In this case, (when the real depreciation happens) exporters gain in value whereas, net importers lose value. As seen in the figure DMNCs primarily have negative exposure and EMNCs predominantly have positive exposure. Figure 9 presents the supporting data

graphically. For the DMNCs, a majority of the firms (77%) have negative exposure of which almost 54% have significant values. Around 33% of the DMNCs have positive exposure of which 6.6% have significant values. Whereas in the case of EMNCs, 73% of the firms have positive exposure of which 25% of the values are statistically significant. The remaining 27% of the EMNCs have negative exposure coefficients of which 15% of the firms have significant values.

Mapping the difference between EMNCs and DMNCs

The following hypothesis was proposed in the thesis:

Ho: The exchange rate exposure of emerging market multinationals is equal to the exchange rate exposure of developed country multinationals.

Hα: The exchange rate exposure of emerging market multinationals is greater than the exchange rate exposure of developed country multinationals.

In order to test for the above hypothesis, that is to check for any differences between the exchange rate exposure elasticity coefficient of the emerging market group and the developed market group an ANOVA model was employed. The results of the test are discussed below. Three different ANOVA tests were performed using Real Exchange Rate Exposure Coefficients as the dependent variables. The results are discussed below.

<……Insert Table 11…… >

Table 11 displays the results of analysis of variance with respect to real exchange rate elasticity coefficient. Table 10 reports the Levene's test for equality of the error variances across the cells defined by the combination of factor levels. The significance value for Real Exchange Rate Coefficient is greater than 0.05, so there is no reason to believe that the equal variances assumption is violated for this variable.

<……..……Insert Table 12 and Table 13……>

Table 12 reports the results of the univariate test of between subject effects. Type III sum of squares were used in the test. The corrected model is significant at the 1% level. Therefore, the null hypothesis of equality of exposure coefficient across the emerging market and developed market groups is rejected. Further, a simple contrast test was performed in order to quantify the difference between the exchange rate exposure of the EMNC and DMNC group (Table 13). Emerging market multinationals on average have 21% (with a 95% confidence interval of 16% to 25%) more exchange rate exposure than the developed market multinationals. The results are significant at the 1% level.

Therefore, the null hypothesis is rejected and the alternative hypothesis was accepted at the 1% significance level. Therefore, it can be said that the exchange rate exposure elasticity coefficient for emerging market multinationals is significantly larger than the exchange rate exposure elasticity coefficient of developed market multinationals. The theory proposed in the thesis is thus confirmed by the statistical results. Further analysis is performed to understand the patterns of the exchange rate exposure elasticity coefficients of the EMNCs across various firm, industry, and country level variables. The following section explains the results.

Mapping the typologies

In order to identify patterns in the relationship between the real exchange rate exposure elasticity coefficients and the various firm, industry, regional, and country level variables, cross tabulation is performed. Please refer to appendix 2 for variables used in the cross tabulation technique.

For the firm level analyses, two sets of cross tabulations were performed. The first set of analysis aims to explore the relationship between the magnitude of the real exchange rate exposure elasticity coefficients and the various firm specific characteristics. Here, the firms were classified according to whether they had "low" real exchange rate exposure elasticity coefficients or "high" real exchange rate exposure elasticity coefficients (magnitude of exposure). Low real exchange rate exposure elasticity coefficients are defined as those whose values are less than the median of the real exchange rate exposure elasticity coefficients, and high real exchange rate exposure elasticity coefficients are those values that are higher than the median of the real exchange rate exposure elasticity coefficients. The second set aims to explore the relationship between the direction of the real exchange rate exposure elasticity coefficients and the various firm specific characteristics. Here, the EMNCs in the sample were divided into two categories based on whether they had "positive" or "negative" real exchange rate exposure elasticity coefficient (direction of exposure). For both sets, all the firm level variables are classified as "low" and "high" using the median of the series. Of all the 21 firm specific variables in the study only the significant patterns are discussed below. However, the other cross tabulations (those that did not have statistical significance) are reported in the appendix. Cross tabulations are also performed for industry and regional level pattern identifications.

Firm Level Analyses

Patterns in the magnitude of the real exchange rate exposure elasticity coefficients

Foreign Asset and real exchange rate exposure

Figure 11 shows the results of the cross tabulation between the degree of multinationality as represented by the foreign assets and the real exchange rate exposure elasticity coefficients. The figure plots the foreign assets on the horizontal axis and the nature of the real exchange rate exposure elasticity coefficient on the vertical axis. The value in each quadrant represents the number of firms that are found in the corresponding category. For example, 31 EMNCs (36%) in the sample have high exchange rate exposure elasticity coefficient and high value of foreign assets. Pearson's Chi-Square Asymptotic statistics is used to test for the statistical significance of the 2X2 classifications. Accordingly we can state that the relationship shown in Figure 11 is statistically significant at the 5% level. A priori, a positive relationship is expected between the degree of multinationality and the real exchange rate exposure elasticity coefficient.

<…….Insert Figure 11 ……..>

It is strikingly evident from the above figure that firms with a higher value of foreign assets have higher real exchange rate exposure elasticity coefficient (36% or 31 EMNCs). Firms with a lower value of foreign assets have a lower real exchange rate exposure elasticity coefficient (26% or 22 firms). Clearly, the degree of multinationality has a positive relationship with the real exchange rate exposure elasticity coefficient.

Foreign Sales and real exchange rate exposure

Figure 12 shows the results of the cross tabulation between the degree of multinationality as represented by the foreign sales and the real exchange rate exposure elasticity coefficients. The figure plots the foreign sales on the horizontal axis and the nature of the real exchange rate exposure elasticity coefficient on the vertical axis. The

value in each quadrant represents the number of firms that are found in the corresponding category. Using Pearson's Chi-Square Asymptotic statistics the relationship shown in Figure 12 is statistically significant at the 1% level. A priori, a positive relationship is expected between the degree of multinationality and the real exchange rate exposure elasticity coefficient.

<……Insert Figure 12 …… >

It is also very evident from the above figure that firms with a higher value of foreign sales have higher real exchange rate exposure elasticity coefficient (37% or 32 EMNCs). Firms with a lower value of foreign assets have a lower real exchange rate exposure elasticity coefficient (27% or 23 firms). Clearly, the degree of multinationality has a positive relationship with the real exchange rate exposure elasticity coefficient further confirming the earlier result.

FSTS Ratio and real exchange rate exposure

Figure 13 shows the results of the cross tabulation between the degree of multinationality as represented by the ratio between foreign sales and total sales (FSTS), and the real exchange rate exposure elasticity coefficients. The figure plots the FSTS on the horizontal axis and the nature of the real exchange rate exposure elasticity coefficient on the vertical axis. The value in each quadrant represents the number of firms that are found in the corresponding category. Using Pearson's Chi-Square Asymptotic statistics the relationship shown in Figure 13 is statistically significant at the 10% level. A priori, a positive relationship is expected between the degree of multinationality and the real exchange rate exposure elasticity coefficient.

<……Insert Figure 13 …… >

It is remarkably evident from the above figure that firms with a higher value of FSTS ratio have higher real exchange rate exposure elasticity coefficient (29% or 25 EMNCs). Firms with a lower value of FSTS ratio have a lower real exchange rate exposure elasticity coefficient (30% or 26 firms). Clearly, the degree of multinationality has a positive relationship with the real exchange rate exposure elasticity coefficient further confirming the earlier results. Thus, from the first set of analyses it can be concluded that degree of multinationality is a clear indicator of the magnitude of exposure of EMNCs. An EMNC having higher degree of multinationality tends to exhibit higher real exchange rate exposure.

Patterns in the direction of the real exchange rate exposure elasticity coefficients

Foreign Involvement and real exchange rate exposure

Figure 14 shows the results of the cross tabulation between the level of foreign involvement as measured by FSTS ratio and the real exchange rate exposure elasticity coefficients. The figure plots the FSTS ratio on the horizontal axis and the nature of the real exchange rate exposure elasticity coefficient on the vertical axis. The value in each quadrant represents the number of firms that are found in the corresponding category. For example, 35 EMNCs (41%) in the sample have positive real exchange rate exposure elasticity coefficient and low FSTS ratio. Pearson's Chi-Square Asymptotic statistics is used to test for the statistical significance of the 2X2 classifications. Accordingly we can state that the relationship shown in Figure 14 is statistically significant at the 10% level. Apriori it is expected that irrespective of the level of foreign involvement, an EMNC will gain during local currency depreciation and therefore the EMNC will have a positive real exposure coefficient.

<……Insert Figure 14 …… >

It can be seen from the figure that a majority of the firms that have low FSTS ratio tend to have a positive real exchange rate exposure elasticity coefficient (41% or 35 EMNCs). Similarly, a majority of the firms that had a high FSTS ratio also tend to have a positive real exchange rate exposure elasticity coefficient (32.6% or 28 EMNCs). Therefore when using FSTS as an indictor of foreign involvement, the nature of the exposure for EMNCs is predominantly positive, whether the firms have a low or high foreign involvement.

A positive value on the real exchange rate exposure elasticity coefficient signifies appreciation of the RER (appreciation of local currency in nominal terms or higher inflation at home than abroad) with increase in firm value. Therefore, the observed relationship is contradictory to the generally established theory of MNCs which says that MNCs will gain value with local currency depreciation through gain of export competitiveness (Desai *et al.*, 2004).Therefore, in the case of EMNCs, the existing relationship can come about for two reasons: a) MNCs are net importers b) they have a foreign currency denominated liabilities. Condition (a) can be ruled out because it is clear from Figure 12 that the EMNCs in the sample have significant foreign sales. Therefore, the net importer argument cannot fully support the behavior. However, foreign currency denominated liabilities could be a valid cause for the positive real exposure elasticity coefficient. When an EMNC has a foreign currency denominated liability, a local currency appreciation would lead to a decrease in the firm value.

Size of employees and real exchange rate exposure

Figure 15 shows the results of the cross tabulation between the size of the employees and the real exchange rate exposure elasticity coefficients. Here the number of the employees is interpreted as an indicator of size of the firm. Other proxies for size of the firm such as "Total Assets", "Total Sales", "Total Foreign Assets" etc (Please refer to table for a complete list) were also tested but the results were statistically insignificant. Only "size of the employees" showed statistically significant relationship with exchange rate exposure elasticity coefficient and is discussed in this section. This tabulation is performed to see if the size of the firm had an effect in determining the direction of the exposure.

Figure 15 shows the Employee Size on the horizontal axis and the nature of the real exchange rate exposure elasticity coefficient on the vertical axis. The value in each quadrant represents the number of firms that are found in the corresponding category. For example, 44 EMNCs (42%) in the sample have positive real exchange rate exposure elasticity coefficient and high employee size. Pearson's Chi-Square Asymptotic statistics is used to test for the statistical significance of the 2X2 classifications. Accordingly we can state that the relationship shown in Figure 15 is statistically significant at the 1% level.

<……Insert Figure 15 …… >

It can be seen from the figure that larger firms do have a positive real exchange rate exposure elasticity coefficient (42.3% or 44 firms). Further, among the smaller sized firms, a majority of them still have a positive real exchange rate exposure elasticity coefficient (31% or 32 firms). This indicates that smaller firms also gain from local currency appreciation. It can therefore be inferred that irrespective of the size of the firm,

EMNCs tend to exhibit a positive exposure, that is, they gain in value with local currency appreciation.

Country risk and real exchange rate exposure

Figure 16 shows the results of the cross tabulation between country risk and the real exchange rate exposure elasticity coefficients. Here, higher values of country risk indicates an increased risky nature of the home country. Figure 16 plots the country risk on the horizontal axis and the nature of the real exchange rate exposure elasticity coefficient on the vertical axis. The value in each quadrant represents the number of firms that are found in the corresponding category. For example, 44 EMNCs (42%) in the sample have positive real exchange rate exposure elasticity coefficient and high country risk. Pearson's Chi-Square Asymptotic statistics is used to test for the statistical significance of the 2X2 classifications. Accordingly we can state that the relationship shown in Figure 16 is statistically significant at the 5% level.

<……Insert Figure 16 …… >

It can be seen from the figure that irrespective of riskiness of country of origin, firms have a positive real exchange rate exposure elasticity coefficient. From the second set of cross tabulations it can be inferred that EMNCs tend to have a positive real exchange rate exposure elasticity coefficient irrespective of degree of multinationality, size, and country risk.

Regional Level Analyses

Patterns in the magnitude of real exchange rate exposure elasticity coefficients

Cross tabulations were performed to see if there were any regional patterns in the magnitude of the real exchange rate exposure elasticity coefficients. The sample was

divided into 4 regions namely, Africa, Asia, Europe, and Americas (for a detailed list of the countries in each region please refer to Figure 18). The results are shown in Figure 17 and the relationship is statistically significant at the 1% level.

<……Insert Figure 17 …… >

From the Figure 17, it can be seen that except EMNCs from Europe, other EMNCs have high real exchange rate exposure elasticity coefficients. That is, 63% of African firms, 56% of Asian EMNCs, 58% of EMNCs from the Americas had high real exchange rate exposure elasticity coefficients. Cross country comparisons cannot be made because the number of firms under each region is different.

<……Insert Figure 18…… >

In the Figure 18, further breakdown into countries within each region revealed interesting patterns as follows: At the 1% level, all the firms from Argentina, Singapore, and South Korea had high real exchange rate exposure elasticity coefficients. In contrast all EMNCs from Hungary, Philippines, Poland, Russian Federation, Slovenia, and Taiwan had statistically significant low exposure coefficients at the 1% level. The results have to be evaluated with caution because of the unequal number of firms in each country in the sample. (Please refer to Figure 18 for the nature of exposure in other countries)

Patterns in the direction of real exchange rate exposure elasticity coefficients

Cross tabulations were performed to see if there were any regional patterns in the direction of the real exchange rate exposure elasticity coefficients. As earlier, the sample was divided into 4 regions namely, Africa, Asia, Europe, and Americas The results are shown in figure and the relationship is statistically insignificant at the 10% level.

<……Insert Figure 19…… >

Further breakdown into countries within each region revealed interesting patterns as follows: At the 1% level, all firms from India, Malaysia, Philippines, Russian Federation, Singapore, South Korea, and Taiwan have positive real exchange rate exposure elasticity coefficients. In contrast all EMNCs from Argentina had statistically significant low exposure coefficients at the 1% level. The results have to be evaluated with caution because of the unequal number of firms in each country in the sample. (Please refer to Figure 19 for the nature of exposure in other countries)

Industry Level Analyses

Magnitude of the real exchange rate exposure elasticity coefficients

Cross tabulations were performed to see if there were any patterns at the sector level in the magnitude of the real exchange rate exposure elasticity coefficients. The EMNCs are classified into three industrial sectors as follows: Traditional, Services, and Diversified. The results are shown in Figure 20 and the relationship is statistically significant at the 1% level.

<……Insert Figure 20 …… >

The majority of EMNCs from traditional industrial sector (almost 63%). exhibit low real exchange rate exposure elasticity coefficients. On the other hand, a majority of firms from the diversified industrial (75%) sector have high real exchange rate exposure elasticity coefficients. EMNCs in the service industry show marginal difference in the number of firms exhibiting low and high exposure. These results are significant at the 5% level. Further breakdown into industries within each sector did not reveal any significant patterns.

Direction of the real exchange rate exposure elasticity coefficients

Cross tabulations were performed to see if there were any patterns at the sector level in the directions of the real exchange rate exposure elasticity coefficients. No statistically significant results were generated.

Cross sectional analysis of determinants of exchange rate

As a check for robustness, a multivariate pooled time series analysis was performed. The results indicate firm size, degree of leverage, degree of Multinationality, Access to International Capital, Upstream Investments affects the EMNCs real exchange rate exposure elasticity coefficients. The results are reported in Table 14. From the table it can be seen that except the regional variables, all the other variables are statistically significant in determining the real exchange rate exposure at the 5% level. The variable 'total sales' is used as a proxy for firm size and results indicate that it is an important determinant of exchange rate exposure. Apriori it is not clear what to expect of the relationship between size and exposure because on the one hand larger firms are more likely to engage in foreign operations which would lead them to have more exposure. And on the other hand, larger firms are more likely to have more resources to manage their exchange rate exposure and therefore less exposure can be expected. However, empirical evidence shows a significant positive relationship.

<……..Insert Table 14…….>

Our cross-sectional analysis further indicates that leverage affects the EMNC's exposure positively. In other words higher leverage is associated with higher exposure. The extent of leverage signifies the EMNCs' capability to tap external fund sources effectively. It also means increased exposure to domestic and international market shocks. This finding is consistent with the fact that EMNCs originate from moderate to

high risk economic environments, and their home markets are subject to frequent financial and economic shocks. It is also important to note that this aspect of leverage may be particularly pronounced because the sample period 1996-2005 includes a number of crises experienced in emerging markets such as Asian crisis of 1997 and Argentinean crisis of 2001-2002. Even if an emerging market country may not be hit directly, contagion may cause sudden disruption in access to capital through financial sector troubles and interest rate hikes, which create liquidity problems and contraction in real sectors. Highly leveraged firms caught off guard are most likely to experience higher exchange rate exposure. This result is in conformance with the results of the cross-tabulations explained earlier where a predominantly positive exchange rate exposure for the EMNCs was attributed to the presence of heavy foreign currency liabilities. The results of the cross-sectional analysis, further confirms this idea. In other words, higher exchange rate exposures are a result of higher levels of debt capital of the EMNCs.

Another important determinant of the exchange rate exposure is the country risk that is the risk level of the country of origin of the EMNCs as measured by the EIU's country risk indicators. Results show that higher the risk of the country, the higher is the exchange rate exposure of the EMNC. Higher values of the risk indicator implies higher political instability, poor economic performance, deteriorating domestic and international debt indicators, poor credit ratings, limited access to money and capital markets and high discount rates, therefore an EMNC originating from a high risky country is expected to be associated with high exchange rate exposure. Regression results indicate that higher FATA ratio is associated with higher exchange rate exposure. This result is in conformance with the well established theory of multinationality which argues that as

MNCs expand their foreign operations, they increase their dealings with foreign exchange which leads them to have more exposure. Therefore a positive relationship between the FATA and the exposure is expected and is empirically evident.

ADR variable is used as dummy variable to indicate whether the EMNC has issued ADR or not. This variable is used as a proxy to indicate whether an EMNC is under strict corporate governance practices. The results of the regression show a negative relationship between the ADR dummy and the exchange rate exposure. This could be explained by the fact that EMNCs that are listed in the US market can be expected to have access to knowledge about better exposure management practices. Therefore under conditions of better corporate governance standards, these EMNCs exhibit lower exposure coefficients. Regional effects were also checked and among the three regional variables used, only Euro zone indicated a positive relationship with the exchange rate exposure. This indicates that EMNCs from the Euro zone are more exposed to USD exposure than other firms in the sample. Finally, our regression results indicate that a presence in the developed country markets (indicated by the upstream dummy variable) leads to a positive impact on the exchange rate exposure of the EMNCs. That is, as EMNCs expands to a more developed nation, its exchange rate exposure increases. Economic justification for this behavior of EMNCs is not clear.

Conclusion

This thesis began in an attempt to understand the nature of exchange rate exposure for EMNCs as compared to that of the DMNCs. It was hypothesized that the exposure of EMNCs would be greater in magnitude than that of DMNCs. Data for 106 EMNCs was collected and a rigorous analysis was undertaken. Three important findings have emerged from the analysis and form new and important contributions to the study of foreign exchange. The first finding of this study is that almost 60% of the multinational companies sampled were significantly exposed to exchange rate fluctuations. While it is generally accepted by both operational managers and fund mangers that exchange rates affect a MNC's value and there has been little empirical research on these effects in the academic literature. In comparison to the earlier work in this field, where the proportion of exposed firms was typically thought to be below 25%, this study shows that exchange rate exposure is generally substantially higher. The discovery of this higher level of general exposure can be attributed to in some part to the methodology adopted in calculating the exchange rate exposure.

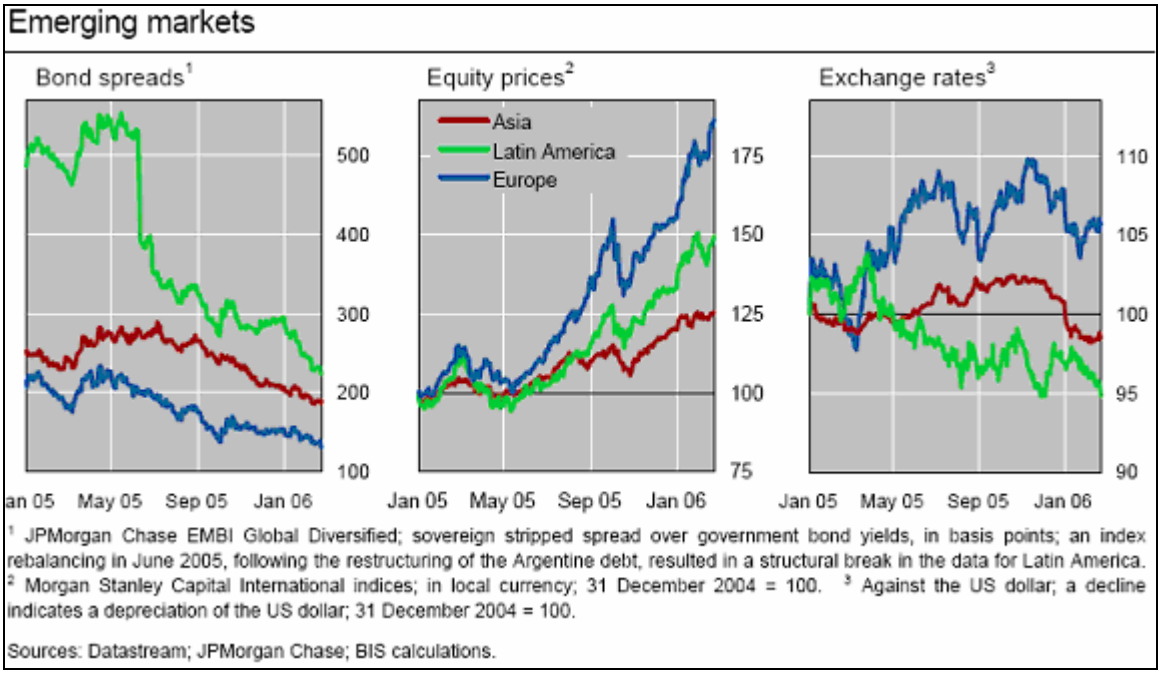
A second finding of the study, which should be should be of value for practitioners is that EMNCs are by and large more exposed than the developed country counterparts. In some cases this due to the inherently risky nature of emerging markets and/or the presence of institutional voids which do not allow for hedging activities. Further research will amplify and extend these claims.

A third finding is that EMNCs have a predominantly positive real exchange rate exposure whereas DMNCs have a predominantly negative real exchange rate exposure. Positive real exchange exposures in the study were generally due to either import orientation or large foreign currency liabilities. Since the EMNCs used in this sample have a significant level of multinationality, the import orientation argument alone is not valid explanation for this effect. We must therefore concluded that these EMNCs have heavy foreign currency liabilities in their balance sheets and that that causes a positive real exchange rate exposure. For investors, the implication of this third finding is that while analyzing the EMNCs it is important to pay attention to the foreign currency liabilities as this can have direct implications for firm value.

Appendix 1

Figure 1 Importance of Emerging Markets

Figure 1 shows the Bond spreads, Equity prices and Exchange rate of emerging markets (Asia, Latin America and Europe)



[1] JPMorgan Chase EMBI Global Diversified; sovereign stripped spread over government bond yields, in basis points; an index rebalancing in June 2005, following the restructuring of the Argentine debt, resulted in a structural break in the data for Latin America. [2] Morgan Stanley Capital International indices; in local currency; 31 December 2004 = 100. [3] Against the US dollar; a decline indicates a depreciation of the US dollar; 31 December 2004 = 100.

Sources: Datastream; JPMorgan Chase; BIS calculations.

Figure 2 Capital Flows to Emerging Markets
Figure 2 shows the private capital flows to emerging market by instrument (Loans, Bonds, Equities) and by region(Asia, Europe, Latin America)

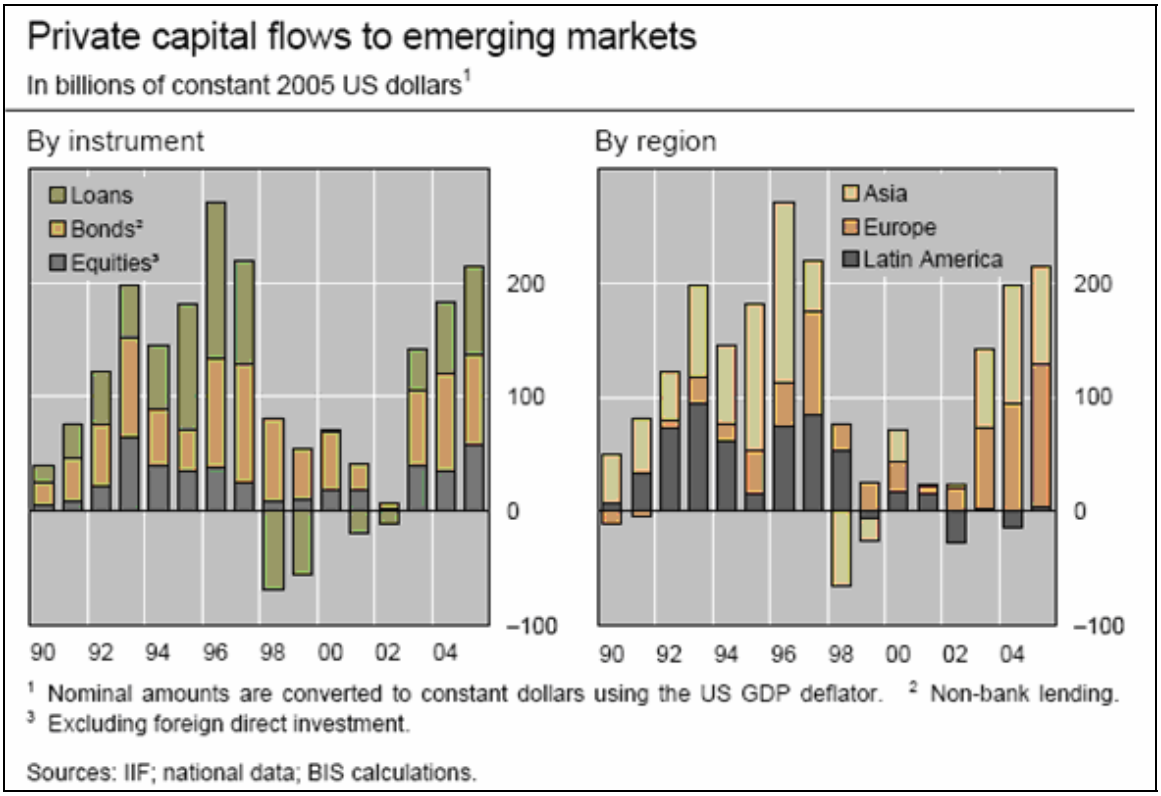


Figure 3 Percentage of official holding of foreign exchange

Figure 3 shows the distribution of official holding of foreign exchange in the respective regions (Industrial and Developing Countries)

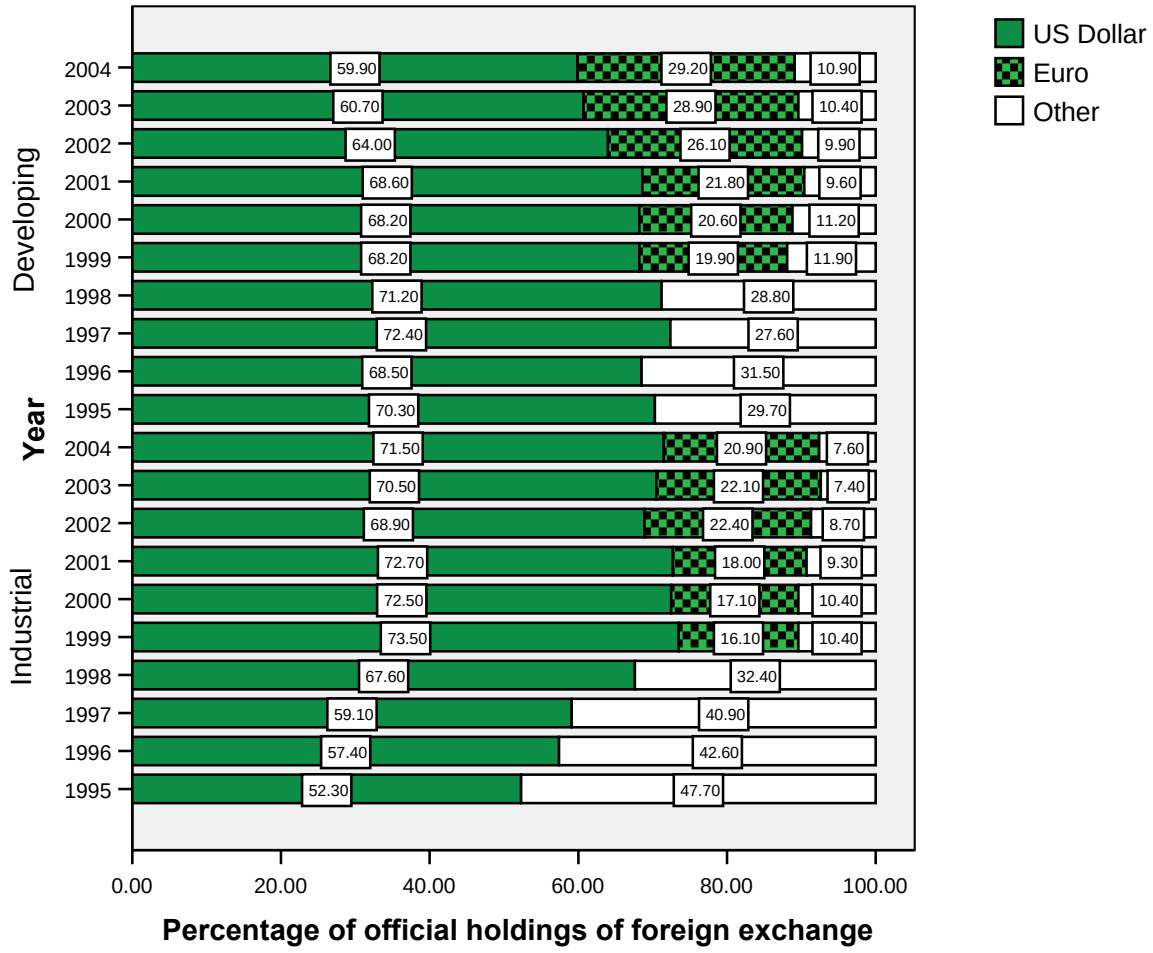


Figure 4 Multinational Total Return Index

Figure 4 shows the growth of total return index all the sample Multinational firms

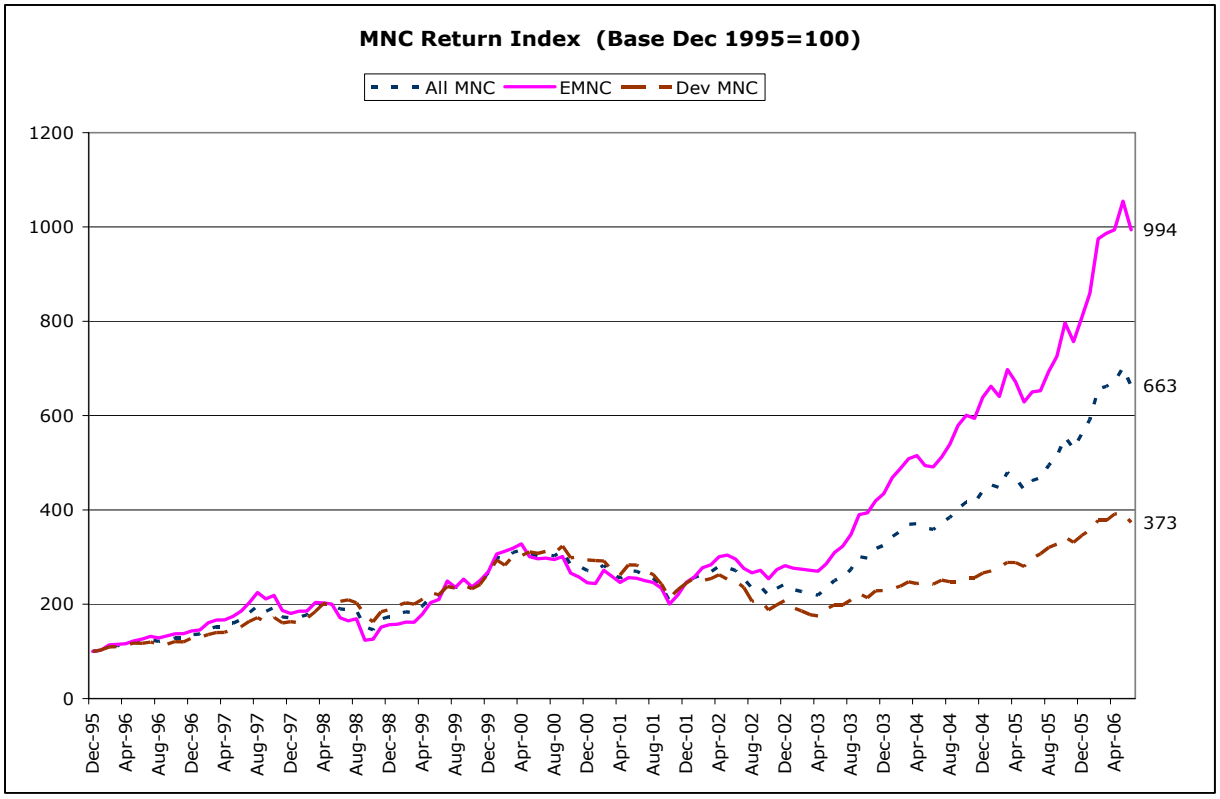


Figure 5 Distribution of Multinationals Sample by country
Figure 5 shows the frequency chart of sample Multinationals across the country of origin

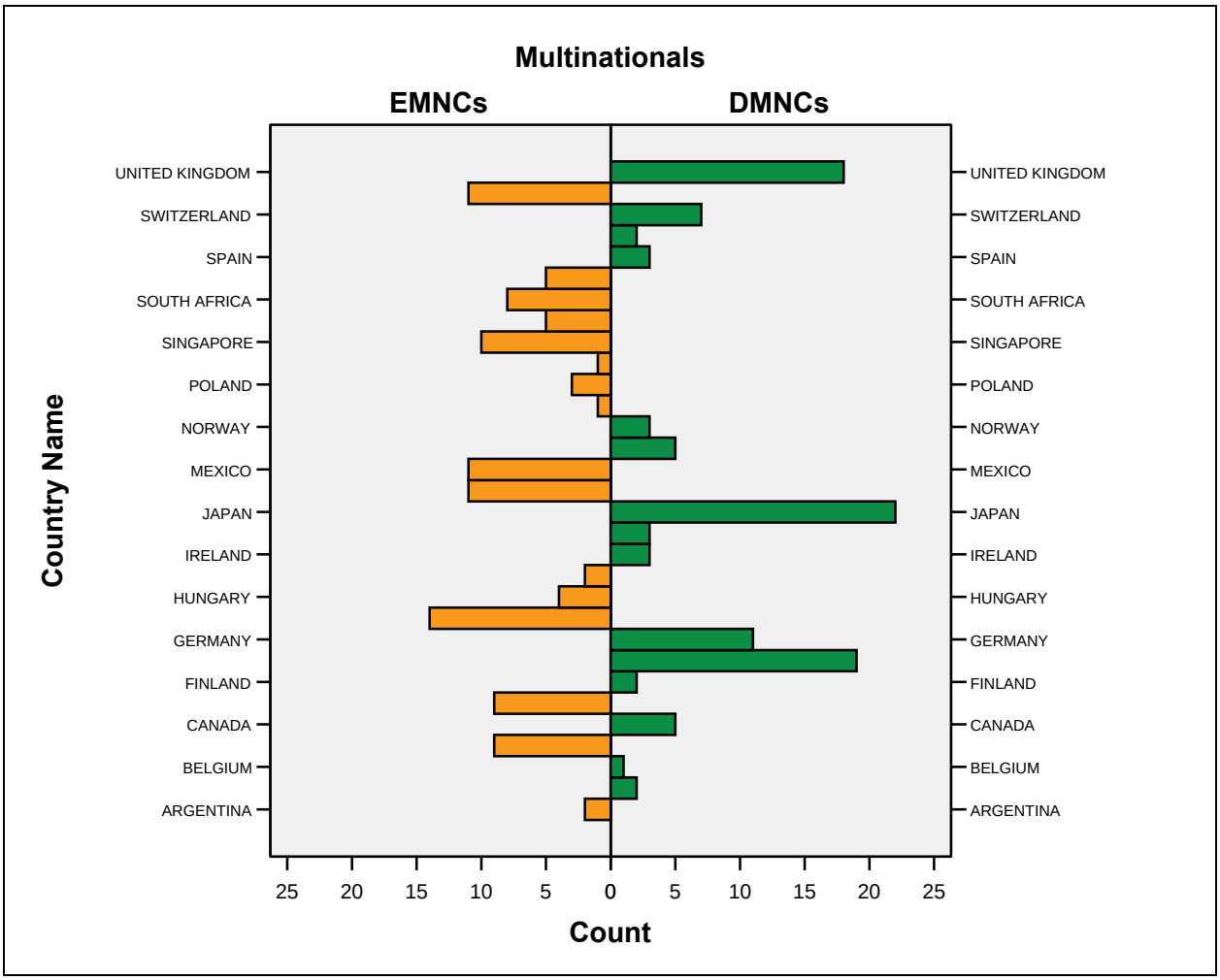


Figure 6 Distribution of Sample Multinationals by Industries

Figure 6 shows the frequency chart of sample multinationals across the industry

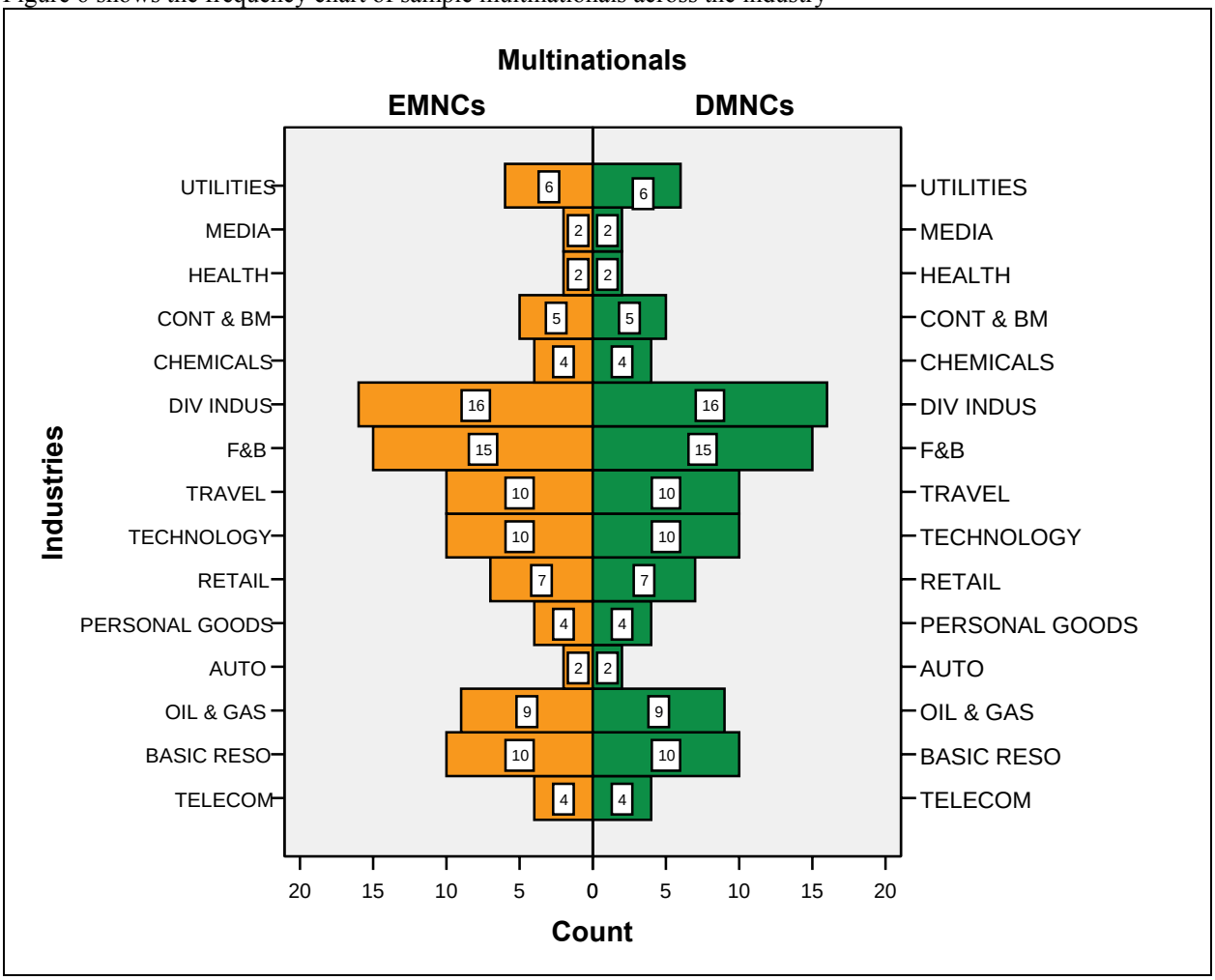


Figure 7 Distribution of Sample Multinationals by Region

Figure 7 shows the frequency chart of sample multinationals across the region (Africa, Asia, Europe and Americas)

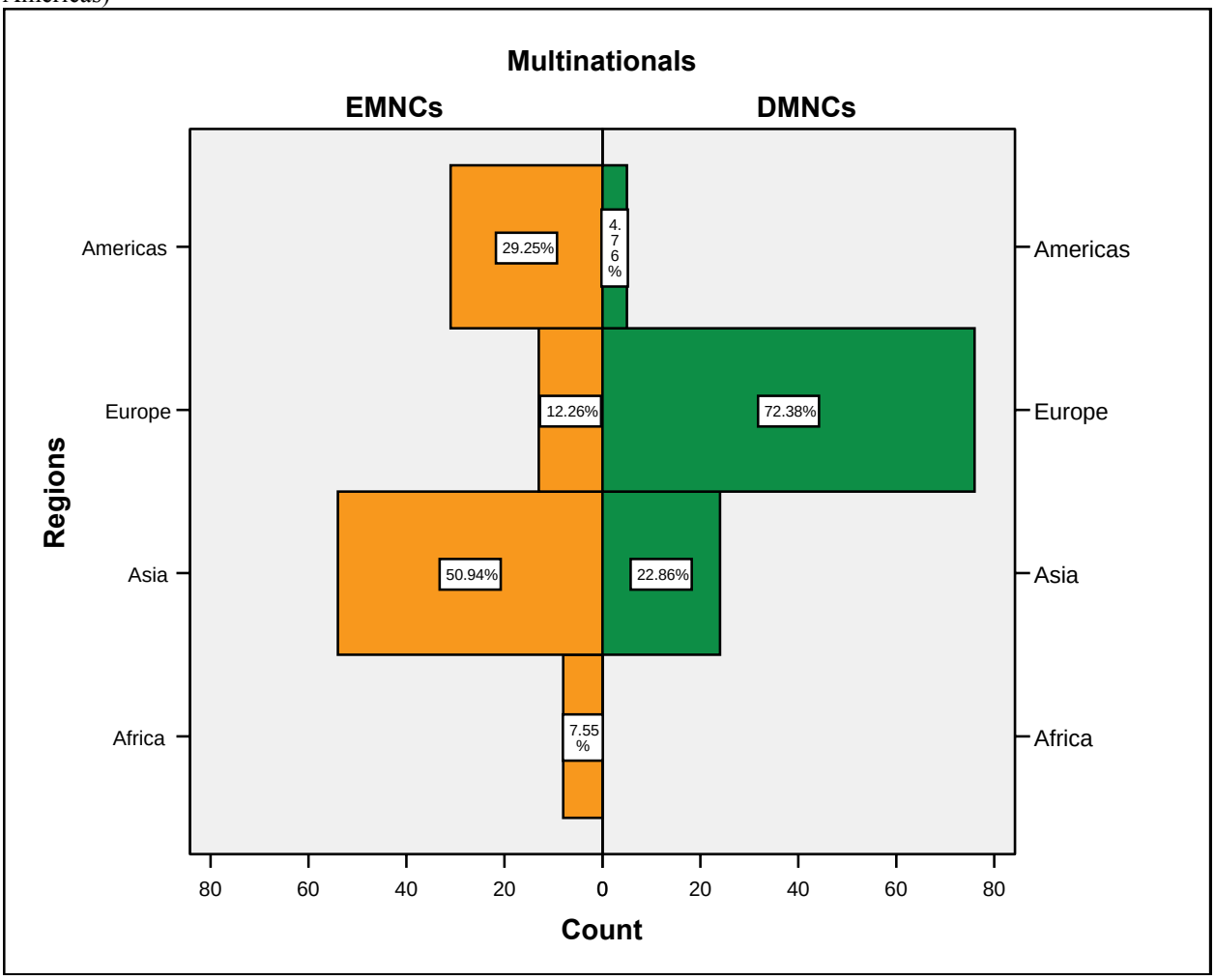


Figure 8 Nature of Nominal Exchange Rate Exposure Coefficients

Figure 8 shows the direction of nominal exchange rate exposure coefficients of sample multinationals

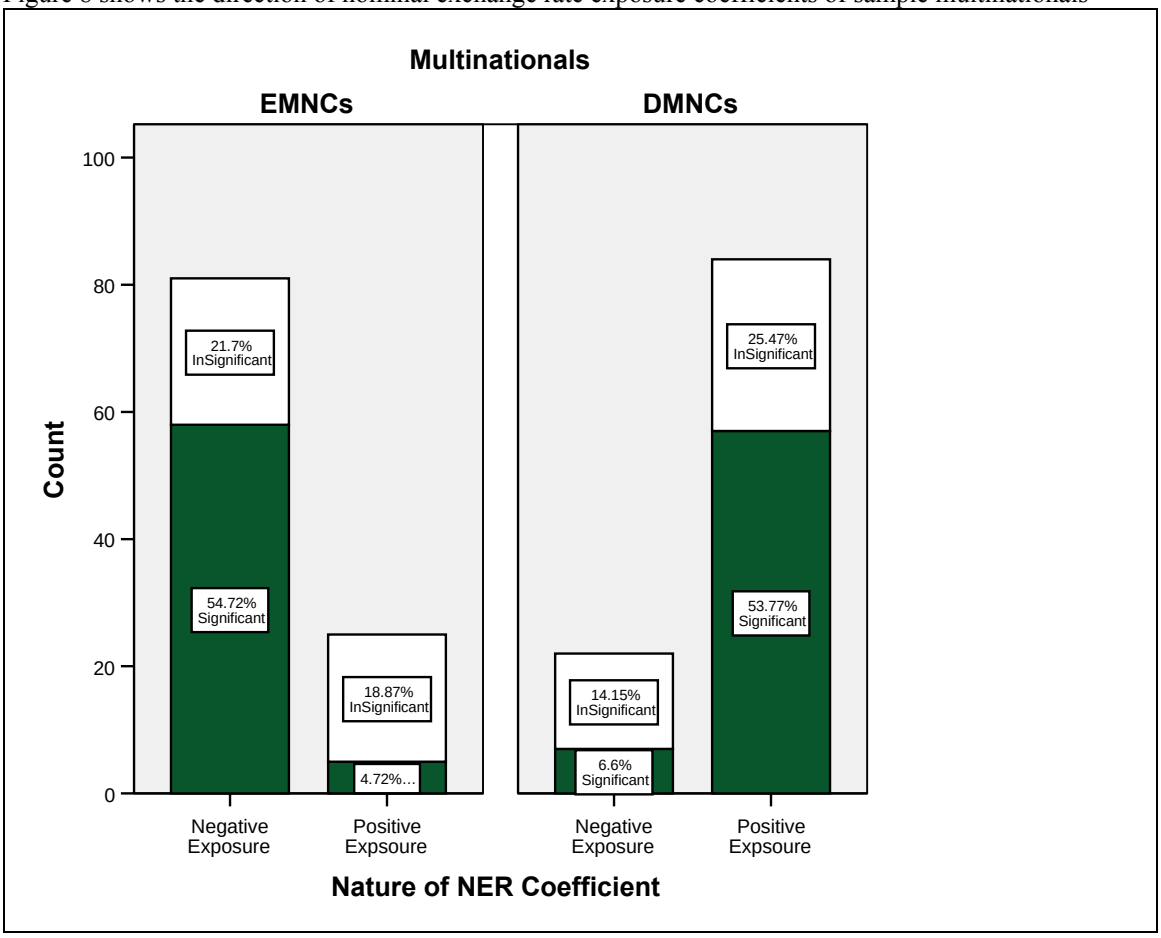


Figure 9 Nature of Real Exchange Rate Exposure Coefficients

Figure 9 shows the direction of real exchange rate exposure coefficients of sample Multinationals

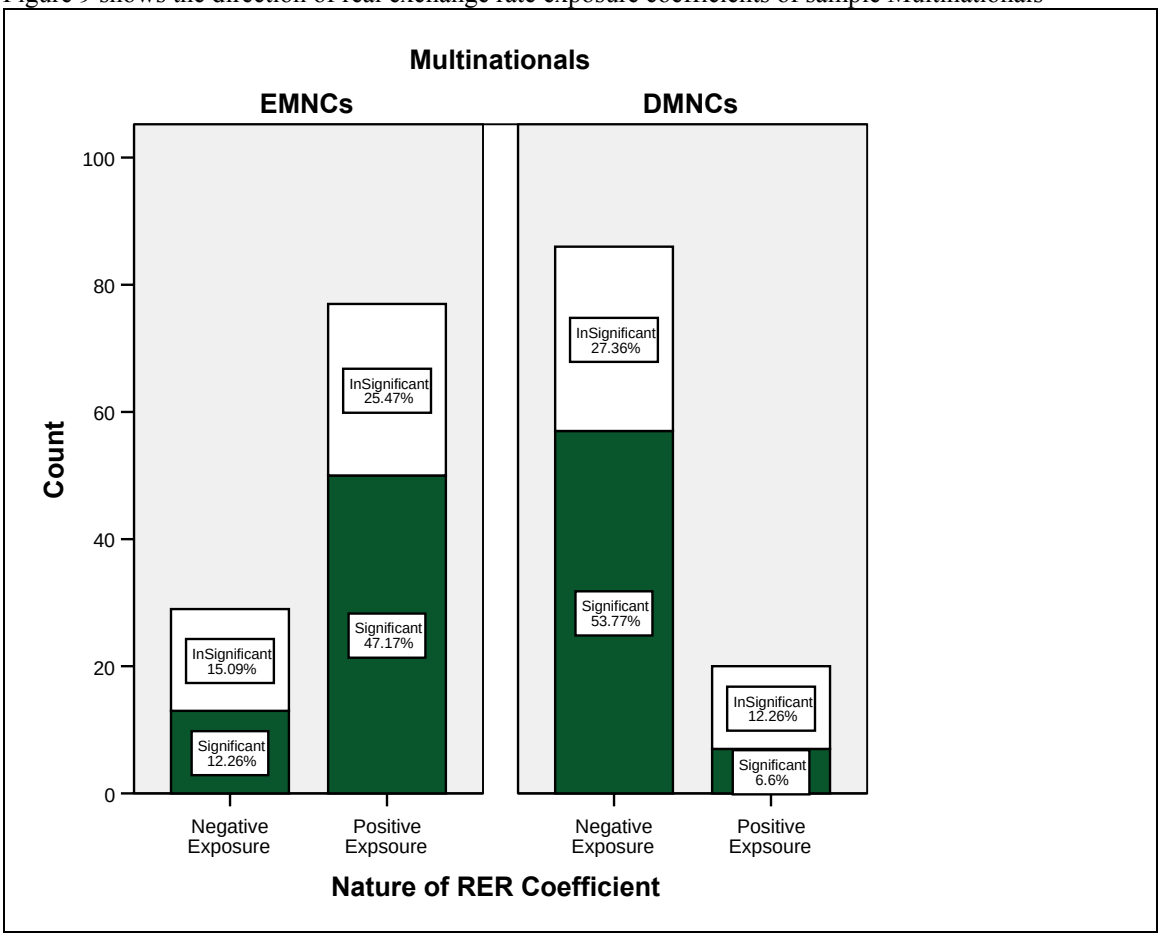


Figure 10 Nature of Simulated Exchange Rate Exposure Coefficients

Figure 10 shows the direction of simulated exchange rate exposure coefficients of sample Multinationals

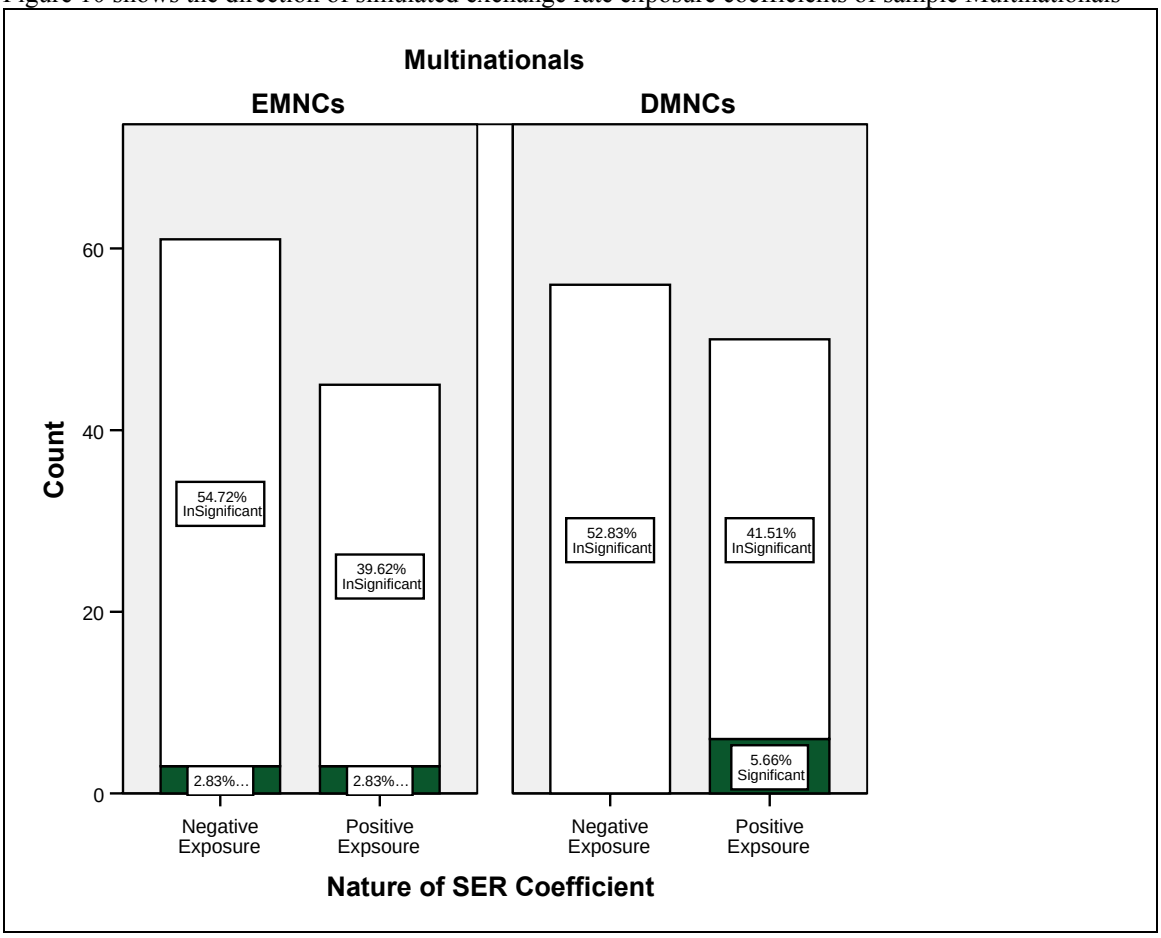


Table 1 Overview of Emerging Markets Foreign Exchange Market

Table 1 shows the most liquid cross, best liquidity time, average daily trading volume and settlement time

Currency	Most liquid cross	Best Liquidity	Average Daily Trading Volume	Settlement
Chinese Yuan	USD/CNY	0130-0230 GMT	U.S. $200m	T+1
Hong Kong Dollar	USD/HKD	0130-0830 GMT	U.S. $1.5bn	T+2
Indian Rupee	USD/INR	0400-1000 GMT	U.S. $750m	T+2
Korean Won	USD/KRW	0130-0830 GMT	U.S. $2bn	T+2
Mexican Peso	USD/MXN	0830-1930 GMT	U.S. $7bn	Spot, T+1
Singapore Dollar	USD/SGD	0100-0800 GMT	U.S. $1bn	T+2
South African Rand	USD/ZAR	0900-1700 GMT	U.S. $1bn	T+2
Thai Baht	USD/THB	0100-0900 GMT	U.S. $700 - 900m	T+2
Czech Koruna	EUR/CZK	0900-1700 GMT	EUR $2-3bn	T+2
Hungarian Forint	EUR/HUF	0900-1600 GMT	EUR 500-700m	T+2
Polish Zloty	USD/PLN	0900-1700 GMT	U.S. $1bn	T+2
Turkish Lira	USD/TRL	0830-1700 GMT	U.S. $500m	T+2

Table 2 Emerging markets shares traded and turnover value

Scrip Name	Open	High	Low	Last	Shares Traded	Turnover Value
HINDUSTAN LEVER LTD.	$ 4.91	$ 5.25	$ 4.91	$ 5.21	6,589,492	$ 32,906,818
RIL COM VEN	$ 1.76	$ 1.86	$ 1.75	$ 1.85	4,207,164	$ 23,054,545
TATA STL	$ 5.20	$ 5.73	$ 5.14	$ 5.66	2,509,922	$ 30,427,273
VIDESH SANCH	$11.82	$12.27	$11.82	$12.12	2,481,718	$ 22,536,364
INDIA CEMENT	$ 9.12	$ 9.22	$ 9.00	$ 9.10	2,386,190	$ 8,429,545
RELIANCE CAPITAL LTD.	$ 3.52	$ 3.58	$ 3.43	$ 3.56	2,229,270	$ 24,815,909
GUJARAT AMBUJA CEMENTS	$11.02	$11.32	$10.95	$11.13	2,201,689	$ 4,909,091
RELIANCE	$ 2.18	$ 2.27	$ 2.17	$ 2.26	2,155,967	$ 51,461,364
HINDALCO IN	$23.30	$24.14	$23.30	$24.06	2,085,049	$ 8,163,636

Source: Bombay Stock Exchange http://bseindia.com/mktlive/groupvols.asp access on 07/01/2006

Table 3 Sample profile by Emerging markets

Table 3 reports the sample characteristics of the various financial indicators of emerging market multinational firms. Total Assets is the sum of tangible fixed assets, intangible assets, investments, other assets, total stocks & work in progress, total debtors & equivalent and cash & cash equivalents of the firm in thousands of dollars. Total Sales is calculated as the sum of gross sales and other operating revenues less discounts, returns and allowances in thousands of dollars. Total Debt is the total of all interest bearing and capitalized lease obligations also reported in thousands of dollars. Funds from operations (Funds_Operations) is the sum of net income and all non-cash charges or credits. Net cash flow from financing (CAF Financing) the net cash receipts and disbursements resulting from reduction and/or increase in long or short term debt, proceeds from sale of stock, stock repurchased/redeemed/retired, dividends paid and other financing activities. Total Employee represents the number of both full and part time employees of the company.

EMNCs		Total Assets	Total Sales	Total Debt	Funds_Operations	CAF Financing	Total Employee
Mean		$5,161,978	$3,363,965	$1,554,309	$563,119	$2,895	19,494
Median		$2,787,565	$1,742,376	$738,840	$236,183	$4,490	13,070
Std. Deviation		$7,125,468	$5,418,207	$2,512,635	$1,002,379	$310,294	27,286
Skew ness		3.22	3.92	3.74	4.19	1.69	6
Std. Error of Skew ness		0.23	0.23	0.23	0.23	0.24	0
Kurtosis		12.73	17.00	16.39	22.03	17.80	42
Std. Error of Kurtosis		0.47	0.47	0.47	0.47	0.47	0
Minimum		$96,902	$55,730	$782	-$40,227	-$1,334,763	826
Maximum		$44,972,513	$34,983,407	$15,953,145	$7,255,301	$1,930,994	241,000
Sum		$547,169,677	$356,580,334	$164,756,774	$59,690,579	$303,957	2,027,333
Percentiles	25.00	$1,130,979	$888,136	$266,403	$89,843	-$59,818	4,892
	50.00	$2,787,565	$1,742,376	$738,840	$236,183	$4,490	13,070
	75.00	$6,107,169	$3,406,605	$1,615,401	$513,223	$59,603	25,260
N	Valid	106	106	106	106	105	104
	Missing	0	0	0	0	1	2

Table 4 Sample profile of developed market multinationals

Table 4 reports the sample characteristics of the various financial indicators of developed market multinational firms. Total Assets is the sum of tangible fixed assets, intangible assets, investments, other assets, total stocks & work in progress, total debtors & equivalent and cash & cash equivalents of the firm in thousands of dollars. Total Sales is calculated as the sum of gross sales and other operating revenues less discounts, returns and allowances in thousands of dollars. Total Debt is the total of all interest bearing and capitalized lease obligations also reported in thousands of dollars. Funds from operations (Funds_Operations) is the sum of net income and all non-cash charges or credits. Net cash flow from financing (CAF Financing) the net cash receipts and disbursements resulting from reduction and/or increase in long or short term debt, proceeds from sale of stock, stock repurchased/redeemed/retired, dividends paid and other financing activities. Total Employee represents the number of both full and part time employees of the company.

DMNCs		Total Assets	Total Sales	Total Debt	Funds_Operations	CAF Financing	Total Employee
Mean		$30,003,210	$27,542,567	$8,916,470	$2,534,041	-$591,257	84,838
Median		$20,965,896	$16,581,441	$6,002,103	$1,522,396	-$189,460	46,124
Std. Deviation		$28,905,444	$30,602,773	$10,129,546	$3,034,907	$1,335,554	87,084
Skewness		1.59	2.02	2.37	2.38	-2.14	1
Std. Error of Skewness		0.23	0.23	0.23	0.23	0.24	0
Kurtosis		2.60	4.27	7.05	6.70	7.79	2
Std. Error of Kurtosis		0.47	0.47	0.47	0.47	0.47	0
Minimum		$417,549	$375,531	$27,834	$5,937	-$7,349,533	792
Maximum		$138,584,753	$147,785,149	$60,086,180	$16,833,599	$2,784,589	423,509
Sum		$3,180,340,277	$2,919,512,092	$945,145,794	$268,608,323	-$60,899,512	8,992,831
	25.00	$8,693,578	$7,637,817	$2,701,801	$683,993	-$860,422	22,576
	50.00	$20,965,896	$16,581,441	$6,002,103	$1,522,396	-$189,460	46,124
Percentiles	75.00	$41,429,527	$36,854,570	$11,882,578	$3,309,766	$23,351	122,638
	Valid	106	106	106	106	105	104
N	Missing	0	0	0	0	1	2

Table 5 Sample profile of emerging market multinationals

Table 5 reports various indicators of degree of multinationality. Upstream location represents number of upstream Location (if a EMNNC operated in a developed country, the country of operation is classified as an 'upstream' country of operation). Downstream location represents number of downstream Location ("downstream" investment is defined as the one where the EMNCs invested in a country where the level of development is comparable to the home country.) Total Locations is the total number location EMNCs have operations. Foreign Sales is calculated as the sum of gross foreign sales and other operating revenues less discounts, returns and allowances in thousands of dollars.

EMNCs		Upstream Locations	Downstream Locations	Total Locations	Foreign Assets	Foreign Sales
Mean		3	9	12	$1,824,393	$1,534,228
Median		2	5	7	$911,875	$539,133
Std. Deviation		4	8	11	$3,602,553	$2,811,368
Skewness		2.21	1.59	1.60	6.45	4.08
Std. Error of Skewness		0.24	0.24	0.24	0.23	0.23
Kurtosis		5.84	1.75	1.71	52.50	21.97
Std. Error of Kurtosis		0.48	0.48	0.48	0.47	0.47
Minimum		0	1	2	$0	$0
Maximum		19	35	45	$32,762,833	$20,745,800
Sum		320	866	1,186	$193,385,675	$162,628,191
Percentiles	25.00	1	3	4	$78,850	$75,813
	50.00	2	5	7	$911,875	$539,133
	75.00	4	11	14	$2,015,875	$1,780,050
N	Valid	100	100	100	106	106
	Missing	6	6	6	0	0

Table 6 Total value of Multinationals

Table 6 reports the sample characteristics of the various financial indicators of all the sample multinational firms both developed and emerging market multinationals. Total Assets is the sum of tangible fixed assets, intangible assets, investments, other assets, total stocks & work in progress, total debtors & equivalent and cash & cash equivalents of the firm in thousands of dollars. Total Sales is calculated as the sum of gross sales and other operating revenues less discounts, returns and allowances in thousands of dollars. Total Debt is the total of all interest bearing and capitalized lease obligations also reported in thousands of dollars. Funds from operations (Funds_Operations) is the sum of net income and all non-cash charges or credits. Net cash flow from financing (CAF Financing) the net cash receipts and disbursements resulting from reduction and/or increase in long or short term debt, proceeds from sale of stock, stock repurchased/redeemed/retired, dividends paid and other financing activities. Total Employee represents the number of both full and part time employees of the company.

Firm Level Variable	Total value
Total Asset	$3,727,509,953
Total Sales	$3,276,092,425
Total Debt	$1,109,902,568
Funds Gen from Operations	$328,298,901
CAF Financing	-$60,595,555
Total Employee	$11,020,164

Table 7 Financial ratio of emerging market multinationals

Table 7 reports various financial ratio of emerging market multinational firms. Leverage is the ratio of total debt to total assets. Borrowing Ratio represents ratio of Long term debt, short term Debt and current portion of long term debt) to common equity. Capital Gearing Ratio represents ratio of Long term debt, short term Debt and current portion of long term debt to total capital, short term debt and current portion of long term debt. Net Profit Margin is ratio of pretax income to net income after preferred dividends. Operating Profit Margin represents ratio of Operating Income to Net Sales or Revenues. Return on Capital Employed (ROCE) is calculated as the EBIT divided by the sum of total capital employed and short-term borrowing. Return on Equity (ROE) is the ratio of "earned for ordinary" and "equity capital and reserves" and is also stated as a percentage. Return on shareholder's Equity (ROSE) is the ratio of "earned for ordinary" and "shareholder's equity capital" and is also stated as a percentage.

EMNCs		Leverage Ratio	Borrowing Ratio	Capital Gearing	NPM	OPM	ROCE	ROE	ROSE
Mean		27.60	124.68	34.16	9.55	12.54	12.33	19.30	19.30
Median		27.33	59.43	33.50	7.67	9.89	10.56	14.84	14.84
Std. Deviation		13.95	211.18	18.10	11.45	10.54	8.56	34.79	34.79
Skewness		0.52	3.87	-0.23	1.08	1.67	1.39	2.85	2.85
Std. Error of Skewness		0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Kurtosis		0.85	18.28	1.32	3.09	4.70	2.64	14.52	14.52
Std. Error of Kurtosis		0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Minimum		30.49	-149.44	-36.34	-25.13	-5.47	-2.67	-94.97	-94.97
Maximum		80.25	1,476.29	80.11	55.11	60.46	43.00	204.29	204.29
Percentiles	25.00	16.41	33.24	22.91	3.13	5.58	6.92	8.36	8.36
	50.00	27.33	59.43	33.50	7.67	9.89	10.56	14.84	14.84
	75.00	36.97	110.89	44.87	12.62	18.09	16.67	24.11	24.11
N	Valid	106	106	106	106	106	106	106	106
	Missing	0	0	0	0	0	0	0	0

Table 8 Financial ratio of developed market multinationals

Table 8 reports various financial ratio of developed market multinational firms. Leverage is the ratio of total debt to total assets. Borrowing Ratio represents ratio of Long term debt, short term Debt and current portion of long term debt) to common equity. Capital Gearing Ratio represents ratio of Long term debt, short term Debt and current portion of long term debt to total capital, short term debt and current portion of long term debt. Net Profit Margin is ratio of pretax income to net income after preferred dividends. Operating Profit Margin represents ratio of Operating Income to Net Sales or Revenues. Return on Capital Employed (ROCE) is calculated as the EBIT divided by the sum of total capital employed and short-term borrowing. Return on Equity (ROE) is the ratio of "earned for ordinary" and "equity capital and reserves" and is also stated as a percentage. Return on shareholder's Equity (ROSE) is the ratio of "earned for ordinary" and "shareholder's equity capital" and is also stated as a percentage.

DMNCs		Leverage Ratio	Borrowing Ratio	Capital Gearing	NPM	OPM	ROCE	ROE	ROSE
Mean		29.66	184.36	45.54	4.14	8.19	8.31	14.90	14.90
Median		28.57	99.57	43.60	3.05	5.94	8.09	11.58	11.58
Std. Deviation		13.99	287.48	18.41	5.79	7.57	6.62	36.17	36.17
Skewness		0.91	4.98	0.42	0.82	1.31	1.47	5.41	5.41
Std. Error of Skewness		0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Kurtosis		0.70	33.05	-0.12	3.76	2.12	6.20	46.27	46.27
Std. Error of Kurtosis		0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Minimum		6.17	-14.59	8.54	-16.24	-3.87	-8.08	-114.51	-114.51
Maximum		69.22	2,381.04	89.64	26.72	37.80	41.87	312.42	312.42
	25.00	19.21	55.32	32.13	0.79	2.70	2.93	4.12	4.12
	50.00	28.57	99.57	43.60	3.05	5.94	8.09	11.58	11.58
Percentiles	75.00	36.91	192.11	55.12	5.86	12.25	11.67	17.04	17.04
	Valid	106	106	106	106	106	106	106	106
N	Missing	0	0	0	0	0	0	0	0

Table 9 Exchange rate exposure coefficient

Table 9 reports mean and median the exchange rate exposure coefficient of emerging and developed market multinationals. NM coefficient is the nominal market exposure coefficient. NER coefficient is the nominal exchange rate exposure coefficient. RM coefficient is the real market exposure coefficient. NER coefficient is the real exchange rate exposure coefficient. SM coefficient is the simulated market exposure coefficient. SER coefficient is the simulated exchange rate exposure coefficient.

				Percentiles		
Exposure Coefficient	N	Mean	Median	25	50	75
Panel A: All Multinationals						
NM Coefficient	212	0.5274	0.5504	0.4079	0.5504	0.6609
NER Coeffcient	212	0.00122	0.01645	-0.17629	0.01645	0.15301
RM Coefficient	212	0.5286	0.5540	0.4023	0.5540	0.6637
RER Coefficient	212	-0.0146	-0.0399	-0.1729	-0.0399	0.1405
SM Coefficient	212	-0.0004	0.0017	-0.0250	0.0017	0.0220
SER Coefficient	212	-0.0013	-0.0034	-0.0219	-0.0034	0.0159
Panel B: Emerging Market Multinationals						
NM Coefficient	106	0.5570	0.5773	0.4571	0.5773	0.7037
NER Coeffcient	106	-0.11233	-0.12641	-0.22616	-0.12641	-0.00095
RM Coefficient	106	0.5596	0.5789	0.4515	0.5789	0.7114
RER Coefficient	106	0.0901	0.1122	-0.0268	0.1122	0.2053
SM Coefficient	106	-0.0014	-0.0010	-0.0219	-0.0010	0.0191
SER Coefficient	106	-0.0022	-0.0059	-0.0195	-0.0059	0.0152
Panel C: Developed Market Multinationals						
NM Coefficient	106	0.4979	0.5334	0.3786	0.5334	0.6308
NER Coeffcient	106	0.11477	0.14302	0.03792	0.14302	0.21708
RM Coefficient	106	0.4976	0.5296	0.3794	0.5296	0.6302
RER Coefficient	106	-0.1192	-0.1471	-0.2296	-0.1471	-0.0486
SM Coefficient	106	0.0007	0.0033	-0.0297	0.0033	0.0242
SER Coefficient	106	-0.0004	-0.0017	-0.0228	-0.0017	0.0182

Table 10 Frequency of significance of exchange rate exposure

Table 10 reports the frequency of significant exchange rate exposure at 1%, 5% and 10% level of significance. Panel A reports the significance of nominal exchange rate exposure coefficient. Panel B reports the significance of real exchange rate exposure coefficient. Panel C reports the significance of simulated exchange rate exposure coefficient

	EMNCs			DMNCs		
Panel A: Nominal Exchange Rate Coefficients						
Sig Level	Frequency	Percent	Cumulative	Frequency	Percent	Cumulative
0.01	40	37.7	63.5	37	34.9	57.8
0.05	18	17.0	92.1	15	14.2	81.3
0.10	5	4.7	100.0	12	11.3	100.0
Sub Total	63	59.4		64	60.4	
Insignificant	43	40.6		42	39.6	
Panel B: Real Exchange Rate Coefficients						
0.01	40	37.7	63.5	35	33.0	54.7
0.05	16	15.1	88.9	19	17.9	84.4
0.10	7	6.6	100.0	10	9.4	100.0
Sub Total	63	59.4		64	60.4	
Insignificant	43	40.6		42	39.6	
Panel C: Simulate Exchange Rate Coefficients						
0.01	2	1.9	33.3	0	0.0	0.0
0.05	3	2.8	83.3	1	0.9	16.7
0.10	1	0.9	100.0	5	4.7	100.0
Sub Total	6	5.7		6	5.7	
Insignificant	100	94.3		100	94.3	
Grand Total	106	100.0		106	100.0	

Table 11 Levene's Test of equality of error variances

Levene's Test of Equality of Error Variances(a)			
Dependent Variable: RER Coefficient			
F	**df1**	**df2**	**Sig.**
3.528887742	1	210	0.061693803

a. Design: Intercept+ECODE
b. Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

Table 12 ANOVA-Test of between subjects effects

Tests of Between-Subjects Effects					
Dependent Variable: RER Coefficient					
Source	**Type III SS**	**df**	**Mean Square**	**F**	**Sig.**
Corrected Model*	2.321(a)	1	2.3214	86.7837	0.0000
Intercept	0.0450	1	0.0450	1.6804	0.1963
ECODE	2.3214	1	2.3214	86.7837	0.0000
Error	5.6174	210	0.0267		
Total	7.9838	212			
Corrected Total	7.9388	211			

*R Squared = .292 (Adjusted R Squared = .289)

Table 13 Contrast Results of ANOVA

Custom Hypothesis Tests: Contrast Results (K Matrix)			
DMNCs vs. EMNCs- Simple Contrast*		Dependent Variable RER Coefficient	
Contrast Estimate			-0.2093
Hypothesized Value			0.0000
Difference (Estimate - Hypothesized)			-0.2093
Std. Error			0.0225
Sig.			0.0000
95% Confidence Interval for Difference	Lower Bound		-0.2536
	Upper Bound		-0.1650

*Reference category = EMNCs

Figure 11 Cross tabs between foreign asset and magnitude of RER exposure

	Foreign Asset	
	Low	High
Low RERC	22 25.6%	22 25.6%
High RERC	11 12.8%	31 36.0%
Asymp. Sig. (2-sided)		0.023

Figure 12 Cross tabs between foreign sales and magnitude of RER exposure

	Foreign Sales	
	Low	High
Low RERC	23 26.7%	21 24.4%
High RERC	10 11.6%	32 37.2%
Asymp. Sig. (2-sided)		0.007

Figure 13 Cross tabs between FSTS ratio and magnitude of RER exposure

	FSTS	
	Low	High
Low RERC	26 30.2%	18 20.9%
High RERC	17 19.8%	25 29.1%
Asymp. Sig. (2-sided)		0.084

Figure 14 Cross tabs between FSTS ratio and direction of RER exposure

	FSTS	
	Low	High
Negative RERC	8	15
	9.3%	17.4%
Positive RERC	35	28
	40.7%	32.6%
Asymp. Sig. (2-sided)		0.088

Figure 15 Cross tabs between employee size and direction of RER exposure

	Employee Size	
	Low	High
Negative RERC	20	8
	19.2%	7.7%
Positive RERC	32	44
	30.8%	42.3%
Asymp. Sig. (2-sided)		0.008

Figure 16 Cross tabs between country risk and direction of RER exposure

	Country Risk	
	Low	High
Negative RERC	20	9
	18.9%	8.5%
Positive RERC	33	44
	31.1%	41.5%
Asymp. Sig. (2-sided)		0.017

Figure 17 Cross tabs between regions and magnitude of RER exposure

	Regions			
Magnitude	Africa	Asia	Europe	Americas
Low RERC	3	24	13	13
	37.5%	44.4%	100.0%	41.9%
High RERC	5	30	0	18
	62.5%	55.6%	0.0%	58.1%
Asymp. Sig. (2-sided)				0.002

Figure 18 Cross tabs between countries and magnitude of RER exposure

Magnitude	RER Exposure Coefficient			
	Low		High	
Countries	Count	% within Countries	Count	% within Countries
Argentina	0	0.0%	2	100.0%
Brazil	7	77.8%	2	22.2%
Chile	3	33.3%	6	66.7%
Hong Kong	7	50.0%	7	50.0%
Hungary	4	100.0%	0	0.0%
India	1	50.0%	1	50.0%
Malaysia	5	45.5%	6	54.5%
Mexico	3	27.3%	8	72.7%
Philippines	1	100.0%	0	0.0%
Poland	3	100.0%	0	0.0%
Russia	1	100.0%	0	0.0%
Singapore	0	0.0%	10	100.0%
Slovenia	5	100.0%	0	0.0%
South Africa	3	37.5%	5	62.5%
South Korea	0	0.0%	5	100.0%
Taiwan	10	90.9%	1	9.1%
Asymp. Sig. (2-sided)				0.000

Figure 19 Cross tabs between countries and direction of RER exposure

Direction	RER Exposure Coefficient			
	Negative		Positive	
Countries	Count	% within Countries	Count	% within Countries
Argentina	2	100.0%	0	0.0%
Brazil	3	33.3%	6	66.7%
Chile	1	11.1%	8	88.9%
Hong Kong	13	92.9%	1	7.1%
Hungary	2	50.0%	2	50.0%
India	0	0.0%	2	100.0%
Malaysia	0	0.0%	11	100.0%
Mexico	1	9.1%	10	90.9%
Philippines	0	0.0%	1	100.0%
Poland	1	33.3%	2	66.7%
Russia	0	0.0%	1	100.0%
Singapore	0	0.0%	10	100.0%
Slovenia	4	80.0%	1	20.0%
South Africa	2	25.0%	6	75.0%
South Korea	0	0.0%	5	100.0%
Taiwan	0	0.0%	11	100.0%
Asymp. Sig. (2-sided)				0.000

Figure 20 Cross tabs between sector group and magnitude of RER exposure

Magnitude	Sector Group		
	Traditional	Service	Diversified
Low RERC	26	23	4
	63.4%	46.9%	25.0%
High RERC	15	26	12
	36.6%	53.1%	75.0%
Asymp. Sig. (2-sided)			0.028

Table 14 Pooled Time Series Results

Table 14 reports the results of pool time series results. Total Sales is calculated as the sum of gross sales and other operating revenues less discounts, returns and allowances in thousands of dollars. Firm size is proxied by the total sales. Leverage is the total debt to total assets ratio. Degree of Internationalization is proxied by foreign assets to total assets ratio is the percentage of foreign assets of the firm divided by its total asset. Country Risk proxy is the EIU Country Risk Indicator. Upstream/Downstream variable is used as a dummy variable to indicate the presence of EMNC in a developed market (Upstream dummy=1). 'Asia Region Dummy' takes the value of 1 if the EMNC originated from Asia. 'Americas Region Dummy' takes the value of 1 if the EMNC originated from the Americas. 'Europe Region Dummy' takes the value of 1 if the EMNC originated from European region.

Dependent Variable: RERC			
Variable	Coefficient	t-Statistic	Prob.
Total Sales	2.09E-09	2.726508	0.0065
Leverage	0.087222	2.59238	0.0097
Degree of Internationalization	0.010755	2.2698	0.0235
Country Risk	0.000904	2.176953	0.0298
Access to Int'l Capital	-0.04896	-4.41037	0.0000
Upstream/ Downstream Dummy	0.085546	6.201939	0.0000
Asia Region Dummy	-0.00453	-0.33501	0.7377
Americas Region Dummy	0.029622	1.537807	0.1245
Europe Region Dummy	-0.07453	-3.8978	0.0001

Appendix 2

Cross tab Results

RER Exposure Coefficient * Local Beta

Cross tab

			Local Beta		
			Low	High	Total
RER Exposure Coefficient	Low	Count	28	20	48
		% of Total	27.7%	19.8%	47.5%
	High	Count	23	30	53
		% of Total	22.8%	29.7%	52.5%
Total		Count	51	50	101
		% of Total	50.5%	49.5%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.248(b)	1	.134		
Continuity Correction(a)	1.690	1	.194		
Likelihood Ratio	2.257	1	.133		
Fisher's Exact Test				.165	.097
Linear-by-Linear Association	2.226	1	.136		
N of Valid Cases	101				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 23.76.

RER Exposure Coefficient * Total Asset

Crosstab

			Total Asset		Total
			Low	High	
RER Exposure Coefficient	Low	Count	30	23	53
		% of Total	28.3%	21.7%	50.0%
	High	Count	23	30	53
		% of Total	21.7%	28.3%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.849(b)	1	.174		
Continuity Correction(a)	1.358	1	.244		
Likelihood Ratio	1.854	1	.173		
Fisher's Exact Test				.244	.122
Linear-by-Linear Association	1.832	1	.176		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * Foreign Asset

Cross tab

			Foreign Asset		Total
			Low	High	
RER Exposure Coefficient	Low	Count	22	22	44
		% of Total	25.6%	25.6%	51.2%
	High	Count	11	31	42
		% of Total	12.8%	36.0%	48.8%
Total		Count	33	53	86
		% of Total	38.4%	61.6%	100.0%

Chi-Square Tests

Pearson Chi-Square

Value	5.151(b)
df	1
Asymp. Sig. (2-sided)	.023

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.12.

RER Exposure Coefficient * FATA

Cross tab

			FATA		Total
			Low	High	
RER Exposure Coefficient	Low	Count	25	19	44
		% of Total	29.1%	22.1%	51.2%
	High	Count	18	24	42
		% of Total	20.9%	27.9%	48.8%
Total		Count	43	43	86
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.675(b)	1	.196		
Continuity Correction(a)	1.163	1	.281		
Likelihood Ratio	1.681	1	.195		
Fisher's Exact Test				.281	.140
Linear-by-Linear Association	1.656	1	.198		
N of Valid Cases	86				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.00.

RER Exposure Coefficient * Total Sales

Cross tab

			Total Sales		Total
			Low	High	
RER Exposure Coefficient	Low	Count	26	27	53
		% of Total	24.5%	25.5%	50.0%
	High	Count	27	26	53
		% of Total	25.5%	24.5%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.038(b)	1	.846		
Continuity Correction(a)	.000	1	1.000		
Likelihood Ratio	.038	1	.846		
Fisher's Exact Test				1.000	.500
Linear-by-Linear Association	.037	1	.847		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * Foreign Sales

Cross tab

			Foreign Sales		Total
			Low	High	
RER Exposure Coefficient	Low	Count	23	21	44
		% of Total	26.7%	24.4%	51.2%
	High	Count	10	32	42
		% of Total	11.6%	37.2%	48.8%
Total		Count	33	53	86
		% of Total	38.4%	61.6%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.362(b)	1	.007		
Continuity Correction(a)	6.207	1	.013		
Likelihood Ratio	7.516	1	.006		
Fisher's Exact Test				.008	.006
Linear-by-Linear Association	7.276	1	.007		
N of Valid Cases	86				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 16.12.

RER Exposure Coefficient * FSTS

Cross tab

			FSTS		Total
			Low	High	
RER Exposure Coefficient	Low	Count	26	18	44
		% of Total	30.2%	20.9%	51.2%
	High	Count	17	25	42
		% of Total	19.8%	29.1%	48.8%
Total		Count	43	43	86
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.978(b)	1	.084		
Continuity Correction(a)	2.280	1	.131		
Likelihood Ratio	2.996	1	.083		
Fisher's Exact Test				.131	.065
Linear-by-Linear Association	2.944	1	.086		
N of Valid Cases	86				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 21.00.

RER Exposure Coefficient * Total Debt

Cross tab

			Total Debt		Total
			Low	High	
RER Exposure Coefficient	Low	Count	28	25	53
		% of Total	26.4%	23.6%	50.0%
	High	Count	25	28	53
		% of Total	23.6%	26.4%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.340(b)	1	.560		
Continuity Correction(a)	.151	1	.698		
Likelihood Ratio	.340	1	.560		
Fisher's Exact Test				.698	.349
Linear-by-Linear Association	.336	1	.562		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * Leverage Ratio

Crosstab

			Leverage Ratio		Total
			Low	High	
RER Exposure Coefficient	Low	Count	27	26	53
		% of Total	25.5%	24.5%	50.0%
	High	Count	26	27	53
		% of Total	24.5%	25.5%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.038(b)	1	.846		
Continuity Correction(a)	.000	1	1.000		
Likelihood Ratio	.038	1	.846		
Fisher's Exact Test				1.000	.500
Linear-by-Linear Association	.037	1	.847		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * Borrowing Ratio

Cross tab

			Borrowing Ratio		Total
			Low	High	
RER Exposure Coefficient	Low	Count	29	24	53
		% of Total	27.4%	22.6%	50.0%
	High	Count	24	29	53
		% of Total	22.6%	27.4%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.943(b)	1	.331		
Continuity Correction(a)	.604	1	.437		
Likelihood Ratio	.945	1	.331		
Fisher's Exact Test				.437	.219
Linear-by-Linear Association	.934	1	.334		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * Capital Gearing Ratio

Cross tab

			Capital Gearing Ratio		Total
			Low	High	
RER Exposure Coefficient	Low	Count	29	24	53
		% of Total	27.4%	22.6%	50.0%
	High	Count	24	29	53
		% of Total	22.6%	27.4%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.943(b)	1	.331		
Continuity Correction(a)	.604	1	.437		
Likelihood Ratio	.945	1	.331		
Fisher's Exact Test				.437	.219
Linear-by-Linear Association	.934	1	.334		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * Net Profit Margin

Cross tab

			Net Profit Margin		Total
			Low	High	
RER Exposure Coefficient	Low	Count	25	28	53
		% of Total	23.6%	26.4%	50.0%
	High	Count	28	25	53
		% of Total	26.4%	23.6%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.340(b)	1	.560		
Continuity Correction(a)	.151	1	.698		
Likelihood Ratio	.340	1	.560		
Fisher's Exact Test				.698	.349
Linear-by-Linear Association	.336	1	.562		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * Operating Profit Margin

Cross tab

			Operating Profit Margin		Total
			Low	High	
RER Exposure Coefficient	Low	Count	30	23	53
		% of Total	28.3%	21.7%	50.0%
	High	Count	23	30	53
		% of Total	21.7%	28.3%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.849(b)	1	.174		
Continuity Correction(a)	1.358	1	.244		
Likelihood Ratio	1.854	1	.173		
Fisher's Exact Test				.244	.122
Linear-by-Linear Association	1.832	1	.176		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * ROCE

Cross tab

			ROCE		Total
			Low	High	
RER Exposure Coefficient	Low	Count	24	29	53
		% of Total	22.6%	27.4%	50.0%
	High	Count	29	24	53
		% of Total	27.4%	22.6%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.943(b)	1	.331		
Continuity Correction(a)	.604	1	.437		
Likelihood Ratio	.945	1	.331		
Fisher's Exact Test				.437	.219
Linear-by-Linear Association	.934	1	.334		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * ROE

Cross tab

			ROE		Total
			Low	High	
RER Exposure Coefficient	Low	Count	24	29	53
		% of Total	22.6%	27.4%	50.0%
	High	Count	29	24	53
		% of Total	27.4%	22.6%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.943(b)	1	.331		
Continuity Correction(a)	.604	1	.437		
Likelihood Ratio	.945	1	.331		
Fisher's Exact Test				.437	.219
Linear-by-Linear Association	.934	1	.334		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * Cash Flow from Financing Activities

Cross tab

			Cash Flow from Financing Activities		
			Low	High	Total
RER Exposure Coefficient	Low	Count	24	29	53
		% of Total	22.9%	27.6%	50.5%
	High	Count	29	23	52
		% of Total	27.6%	21.9%	49.5%
Total		Count	53	52	105
		% of Total	50.5%	49.5%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.155(b)	1	.283		
Continuity Correction(a)	.773	1	.379		
Likelihood Ratio	1.157	1	.282		
Fisher's Exact Test				.331	.190
Linear-by-Linear Association	1.144	1	.285		
N of Valid Cases	105				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 25.75.

RER Exposure Coefficient * Funds Generated from Operations

Cross tab

			Funds Generated from Operations		
			Low	High	Total
RER Exposure Coefficient	Low	Count	29	24	53
		% of Total	27.4%	22.6%	50.0%
	High	Count	24	29	53
		% of Total	22.6%	27.4%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.943(b)	1	.331		
Continuity Correction(a)	.604	1	.437		
Likelihood Ratio	.945	1	.331		
Fisher's Exact Test				.437	.219
Linear-by-Linear Association	.934	1	.334		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * Employee Size

Cross tab

			Employee Size		Total
			Low	High	
RER Exposure Coefficient	Low	Count	29	23	52
		% of Total	27.9%	22.1%	50.0%
	High	Count	23	29	52
		% of Total	22.1%	27.9%	50.0%
Total		Count	52	52	104
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.385(b)	1	.239		
Continuity Correction(a)	.962	1	.327		
Likelihood Ratio	1.388	1	.239		
Fisher's Exact Test				.327	.163
Linear-by-Linear Association	1.371	1	.242		
N of Valid Cases	104				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.00.

RER Exposure Coefficient * Country Risk

Cross tab

			Country Risk		Total
			Low	High	
RER Exposure Coefficient	Low	Count	29	24	53
		% of Total	27.4%	22.6%	50.0%
	High	Count	24	29	53
		% of Total	22.6%	27.4%	50.0%
Total		Count	53	53	106
		% of Total	50.0%	50.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.943(b)	1	.331		
Continuity Correction(a)	.604	1	.437		
Likelihood Ratio	.945	1	.331		
Fisher's Exact Test				.437	.219
Linear-by-Linear Association	.934	1	.334		
N of Valid Cases	106				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 26.50.

RER Exposure Coefficient * Upstream Locations

Cross tab

			Upstream Locations		Total
			Low	High	
RER Exposure Coefficient	Low	Count	23	18	41
		% of Total	28.8%	22.5%	51.3%
	High	Count	16	23	39
		% of Total	20.0%	28.8%	48.8%
Total		Count	39	41	80
		% of Total	48.8%	51.3%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.817(b)	1	.178		
Continuity Correction(a)	1.264	1	.261		
Likelihood Ratio	1.825	1	.177		
Fisher's Exact Test				.189	.130
Linear-by-Linear Association	1.795	1	.180		
N of Valid Cases	80				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 19.01.

RER Exposure Coefficient * Downstream Locations

Cross tab

			Downstream Locations		
			Low	High	Total
RER Exposure Coefficient	Low	Count	29	20	49
		% of Total	29.0%	20.0%	49.0%
	High	Count	23	28	51
		% of Total	23.0%	28.0%	51.0%
Total		Count	52	48	100
		% of Total	52.0%	48.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.986(b)	1	.159		
Continuity Correction(a)	1.462	1	.227		
Likelihood Ratio	1.993	1	.158		
Fisher's Exact Test				.169	.113
Linear-by-Linear Association	1.967	1	.161		
N of Valid Cases	100				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 23.52.

RER Exposure Coefficient * Total Locations

Crosstab

			Total Locations		Total
			Low	High	
RER Exposure Coefficient	Low	Count	28	21	49
		% of Total	28.0%	21.0%	49.0%
	High	Count	23	28	51
		% of Total	23.0%	28.0%	51.0%
Total		Count	51	49	100
		% of Total	51.0%	49.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.451(b)	1	.228		
Continuity Correction(a)	1.009	1	.315		
Likelihood Ratio	1.454	1	.228		
Fisher's Exact Test				.239	.158
Linear-by-Linear Association	1.436	1	.231		
N of Valid Cases	100				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 24.01.

RER Exposure Coefficient * Regions

Cross tabulation

			Regions				Total
			Africa	Asia	Europe	Americas	
RER Exposure Coefficient	Low	Count	3	24	13	13	53
		% within Regions	37.5%	44.4%	100.0%	41.9%	50.0%
		% of Total	2.8%	22.6%	12.3%	12.3%	50.0%
	High	Count	5	30	0	18	53
		% within Regions	62.5%	55.6%	.0%	58.1%	50.0%
		% of Total	4.7%	28.3%	.0%	17.0%	50.0%
Total		Count	8	54	13	31	106
		% within Regions	100.0%	100.0%	100.0%	100.0%	100.0%
		% of Total	7.5%	50.9%	12.3%	29.2%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.973(a)	3	.002
Likelihood Ratio	20.005	3	.000
Linear-by-Linear Association	.241	1	.623
N of Valid Cases	106		

a 2 cells (25.0%) have expected count less than 5. The minimum expected count is 4.00.

RER Exposure Coefficient * Country Name

Cross tabulation

		RER Exposure Coefficient			
		Low		High	
		Count	% within Country Name	Count	% within Country Name
Country Name	ARGENTINA	0	.0%	2	100.0%
	BRAZIL	7	77.8%	2	22.2%
	CHILE	3	33.3%	6	66.7%
	HONG KONG	7	50.0%	7	50.0%
	HUNGARY	4	100.0%	0	.0%
	INDIA	1	50.0%	1	50.0%
	MALAYSIA	5	45.5%	6	54.5%
	MEXICO	3	27.3%	8	72.7%
	PHILIPPINES	1	100.0%	0	.0%
	POLAND	3	100.0%	0	.0%
	RUSSIAN FEDERATION	1	100.0%	0	.0%
	SINGAPORE	0	.0%	10	100.0%
	SLOVENIA	5	100.0%	0	.0%
	SOUTH AFRICA	3	37.5%	5	62.5%
	SOUTH KOREA	0	.0%	5	100.0%
	TAIWAN	10	90.9%	1	9.1%
Total		53	50.0%	53	50.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	45.005(a)	15	.000
Likelihood Ratio	58.438	15	.000
N of Valid Cases	106		

a 22 cells (68.8%) have expected count less than 5. The minimum expected count is .50.

RER Exposure Coefficient * Regions

Cross tabulation

			Regions				Total
			Africa	Asia	Europe	Americas	
RER Exposure Coefficient	Negative	Count	2	13	7	7	29
		% within Regions	25.0%	24.1%	53.8%	22.6%	27.4%
	Positive	Count	6	41	6	24	77
		% within Regions	75.0%	75.9%	46.2%	77.4%	72.6%
Total		Count	8	54	13	31	106
		% within Regions	100.0%	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.261(a)	3	.154
Likelihood Ratio	4.731	3	.193
Linear-by-Linear Association	.022	1	.883
N of Valid Cases	106		

a 2 cells (25.0%) have expected count less than 5. The minimum expected count is 2.19.

RER Exposure Coefficient * Country Name

Cross tabulation

Country Name ARGENTINA

Count	RER Exposure Coefficient	Negative	2
		Positive	0
	Total		2
% within Country Name	RER Exposure Coefficient	Negative	100.0%
		Positive	.0%
	Total		100.0%

Country Name BRAZIL

Count	RER Exposure Coefficient	Negative	3
		Positive	6
	Total		9
% within Country Name	RER Exposure Coefficient	Negative	33.3%
		Positive	66.7%
	Total		100.0%

Country Name CHILE

Count	RER Exposure Coefficient	Negative	1
		Positive	8
	Total		9
% within Country Name	RER Exposure Coefficient	Negative	11.1%
		Positive	88.9%
	Total		100.0%

Country Name HONG KONG

Count	RER Exposure Coefficient	Negative	13
		Positive	1
	Total		14
% within Country Name	RER Exposure Coefficient	Negative	92.9%
		Positive	7.1%
	Total		100.0%

Country Name HUNGARY

Count	RER Exposure Coefficient	Negative	2
		Positive	2
	Total		4
% within Country Name	RER Exposure Coefficient	Negative	50.0%
		Positive	50.0%
	Total		100.0%

Country Name INDIA

Count	RER Exposure Coefficient	Negative	0
		Positive	2
	Total		2
% within Country Name	RER Exposure Coefficient	Negative	.0%
		Positive	100.0%
	Total		100.0%

Country Name MALAYSIA

Count	RER Exposure Coefficient	Negative	0
		Positive	11
	Total		11
% within Country Name	RER Exposure Coefficient	Negative	.0%
		Positive	100.0%
	Total		100.0%

Country Name MEXICO

Count	RER Exposure Coefficient	Negative	1
		Positive	10
	Total		11
% within Country Name	RER Exposure Coefficient	Negative	9.1%
		Positive	90.9%
	Total		100.0%

Country Name PHILIPPINES

Count	RER Exposure Coefficient	Negative	0
		Positive	1
	Total		1
% within Country Name	RER Exposure Coefficient	Negative	.0%
		Positive	100.0%
	Total		100.0%

Country Name POLAND

Count	RER Exposure Coefficient	Negative	1
		Positive	2
	Total		3
% within Country Name	RER Exposure Coefficient	Negative	33.3%
		Positive	66.7%
	Total		100.0%

Country Name RUSSIAN FEDERATION

Count	RER Exposure Coefficient	Negative	0
		Positive	1
	Total		1
% within Country Name	RER Exposure Coefficient	Negative	.0%
		Positive	100.0%
	Total		100.0%

Country Name SINGAPORE

Count	RER Exposure Coefficient	Negative	0
		Positive	10
		Total	10
% within Country Name	RER Exposure Coefficient	Negative	.0%
		Positive	100.0%
		Total	100.0%

Country Name SLOVENIA

Count	RER Exposure Coefficient	Negative	4
		Positive	1
		Total	5
% within Country Name	RER Exposure Coefficient	Negative	80.0%
		Positive	20.0%
		Total	100.0%

Country Name SOUTH AFRICA

Count	RER Exposure Coefficient	Negative	2
		Positive	6
		Total	8
% within Country Name	RER Exposure Coefficient	Negative	25.0%
		Positive	75.0%
		Total	100.0%

Country Name SOUTH KOREA

Count	RER Exposure Coefficient	Negative	0
		Positive	5
		Total	5
% within Country Name	RER Exposure Coefficient	Negative	.0%
		Positive	100.0%
		Total	100.0%

Country Name TAIWAN

Count	RER Exposure Coefficient	Negative	0
		Positive	11
		Total	11
% within Country Name	RER Exposure Coefficient	Negative	.0%
		Positive	100.0%
		Total	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	62.258(a)	15	.000
Likelihood Ratio	69.391	15	.000
N of Valid Cases	106		

a 24 cells (75.0%) have expected count less than 5. The minimum expected count is .27.

RER Exposure Coefficient * Sector Group

Cross tabulation

			Sector Group			Total
			Traditional	Service	Diversified	
RER Exposure Coefficient	Negative	Count	8	15	6	29
		% within Sector Group	19.5%	30.6%	37.5%	27.4%
	Positive	Count	33	34	10	77
		% within Sector Group	80.5%	69.4%	62.5%	72.6%
Total		Count	41	49	16	106
		% within Sector Group	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.359(a)	2	.307
Likelihood Ratio	2.393	2	.302
Linear-by-Linear Association	2.284	1	.131
N of Valid Cases	106		

a 1 cells (16.7%) have expected count less than 5. The minimum expected count is 4.38.

RER Exposure Coefficient * Industries

Cross tabulation

		RER Exposure Coefficient			
		Negative		Positive	
		Count	% within Industries	Count	% within Industries
Industries	TELECOM	0	.0%	4	100.0%
	BASIC RESO	3	30.0%	7	70.0%
	OIL & GAS	3	33.3%	6	66.7%
	AUTO	1	50.0%	1	50.0%
	PERSONAL GOODS	4	100.0%	0	.0%
	RETAIL	2	28.6%	5	71.4%
	TECHNOLOGY	0	.0%	10	100.0%
	TRAVEL	3	30.0%	7	70.0%
	F&B	2	13.3%	13	86.7%
	DIV INDUS	6	37.5%	10	62.5%
	CHEMICALS	1	25.0%	3	75.0%
	CONT & BM	1	20.0%	4	80.0%
	HEALTH	1	50.0%	1	50.0%
	MEDIA	0	.0%	2	100.0%
	UTILITIES	2	33.3%	4	66.7%
Total		29	27.4%	77	72.6%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.483(a)	14	.116
Likelihood Ratio	24.496	14	.040
Linear-by-Linear Association	.046	1	.830
N of Valid Cases	106		

a 23 cells (76.7%) have expected count less than 5. The minimum expected count is .55.

RER Exposure Coefficient * Sector Group

Cross tabulation

			Sector Group			
			Traditional	Service	Diversified	Total
RER Exposure Coefficient	Low	Count	26	23	4	53
		% within Sector Group	63.4%	46.9%	25.0%	50.0%
	High	Count	15	26	12	53
		% within Sector Group	36.6%	53.1%	75.0%	50.0%
Total		Count	41	49	16	106
		% within Sector Group	100.0%	100.0%	100.0%	100.0%

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.135(a)	2	.028
Likelihood Ratio	7.357	2	.025
Linear-by-Linear Association	6.997	1	.008
N of Valid Cases	106		

a 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.00.

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