CHAPTER – II

REVIEW OF LITERATURE

2.0 Introduction

In the last few years, there has been increasing interest on the decisions of firms to enter or exit foreign markets. Since the break-down of the Bretton Woods system of fixed exchange rates, exchange rates have fluctuated widely, adding extra uncertainty to foreign investors’ decision to enter into foreign market. Future exchange rate affects a foreign firm's cash-flow, and thereby influences decision making on Foreign Direct Investment (FDI). Most research in this area to date has concentrated on two issues: 1) can the level of exchange rate influence multinational activities?; and 2) can volatility in exchange rate have any impact on the location and relocation decisions of multinationals? This chapter attempts to explore the various theoretical arguments in section 2.1 and empirical literature in section 2.2 on exchange rate movements and FDI. Finally, section 2.3 critically examines the earlier research and identifies research lacuna for the present study.

2.1 Theoretical Literature

Ownership, Location and Internalization (OLI) Paradigm (Dunning 1977\(^1\)) was an early attempt to create an overall framework to explain why multinational enterprises (MNEs) choose FDI, rather than serve foreign markets through alternative modes, such as licensing or exporting. The OLI Paradigm states that a firm must first have some competitive advantage in its home market that can be transferred abroad if the

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firm is to be successful in FDI. Second, the firm must be attracted by specific characteristics in the foreign market that will allow it to exploit its competitive advantage in that market. And finally, the firm will maintain its competitive position by attempting to control the entire value chain in its industry. This leads it to FDI, rather than licensing or out-sourcing.

The decision about the entry mode of multinational enterprises into a foreign country has been analyzed only in a few theoretical studies. In principle, the foreign investor has the option to acquire an existing company (or shares) in the host country or to set up an entirely new plant, which is referred to as Greenfield investment. Buckley and Casson (1998)$^2$, and Görg (2000)$^3$ were of the opinion that competition intensity in foreign market determines the decision between Greenfield investment and acquisition. Furthermore, technological intensity and technological gap between the investor and the affiliate play an important role. Empirical studies of the entry mode choice focus on factors, like the investors’ degree of diversification, advertising intensity, relative size of the subsidiary to that of the investor, and the growth of demand in the target market (Hennart and Park 1994)$^4$. Also, the investors’ technological level is an important determinant of the entry choice. According to Dixit and Pindick (1994)$^5$, most investment projects share three important characteristics: i) irreversibility of the investment; ii) uncertainty about the cash

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flows; and iii) the possibility of the investor to delay the investment. By developing an option model applied on real investments, they found how uncertainty affects the timing decision.

Froot and Stein (1991)\textsuperscript{6} examined the connection between exchange rates, wealth positions of firms and FDI, when globally integrated capital markets are subject to informational imperfections. Capital market imperfections mean that multinational enterprises attribute a lower cost to internal financing than the price of capital they would have to pay using external financing sources. Their model considered the United States (US) target firms sold at auction to the highest bidder. Due to monitoring costs, informational asymmetries about an asset’s payoffs cause external financing to be more expensive than internal financing. As a result, the more net wealth the bidder can bring to such an ‘information-intensive’ investment, the lower would be his/her total cost of capital. In the words of Froot and Stein (1991),\textsuperscript{7} “to the extent that foreigners hold more of their wealth in non-dollar denominated form, a depreciation of the dollar increases the relative wealth position of foreigners, and hence lowers their relative cost of capital, so that, \textit{ceteris paribus}, more foreign investors win auctions”. As a result, depreciation of the host country currency against the home currency increases the relative wealth of foreigners, and therefore may increase the attractiveness of the host country for FDI. Hence, foreign firms would be able to acquire assets relatively cheaper in the host country.

\textsuperscript{7} Ibid., p. 1194.
An alternative traditional explanation of the link between exchange rate and FDI was given by Klein and Rosengren (1994). They particularly focused on the effect of currency movements on relative labour costs. They stated that relative labour costs among industrial countries were largely determined by currency movements during the floating exchange rate period. Thus, a depreciation of a country's currency was associated with an increase in inward FDI, which put domestic investors at a disadvantage compared to foreign investors by reducing their relative wealth.

Blonigen (1997) criticized Froot and Stein’s (1991) capital friction model and pointed out that in the case of FDI by acquisition, the price of asset and its returns may not be in the same currency as they involved purchase of firm-specific assets (such as, technology, managerial skills, etc.) by the investor in a foreign currency. These firm-specific assets could then be transferred for production to the home country or to any third country that would generate returns in another currency. He therefore argued that exchange rate movements could impact FDI through acquisition, as it involved returns in currencies other than that used for the purchase of asset.

He stressed the interaction between goods and factor market segmentation and the importance of firm-specific assets. In Blonigen model (1997), reservation prices of domestic and foreign firms differ for foreign investment projects if firms produced in different countries and sold their products in different markets. He assumed that firm produced and sold in their home market, and that FDI was used only to purchase firm-specific assets, i.e., the underlying technology, in a foreign country. Since a firm’s

revenue depended on exchange rate changes, their ability to bid for firm-specific assets depended on the exchange rate as well. The model considered a firm that intended to purchase knowledge-rich foreign assets in foreign currency and by leveraging this knowledge in its home market, expected to generate returns in its own currency as a result of this acquisition. Under this scenario, given that the foreign firm’s costs and returns are in different currencies, a depreciation of the foreign currency would increase the firm’s reservation bid for the knowledge-rich asset (relative to domestic firms’ reservation bid), thus increasing its likelihood to win the auction.

For investigating the impacts of exchange rate volatility on FDI, Kiyota, et. al. (2004) followed the models used by Froot and Stein (1991) and Klein and Rosengren (1994) with some modifications. They put forward two arguments for the relationship between exchange rate and FDI. They argued that if depreciation in the host country currency reduces production costs, then it would make it attractive for foreign investors to seek production efficiency by lowering the value of assets of the host country currency in terms of the home country currency. As a result, the cost of undertaking FDI would decline in terms of foreign currency by making the foreign investor more attracted to the depreciating country.

The potential role of exchange rates in location decisions needs to be seen from significant perspective, though it is only one of the many factors that might influence FDI. In an earlier work, Itagaki (1981) developed a financial flexibility argument to

examine the impacts of exchange rate risk and government fiscal policies on multinational firms. He constructed a model involving both domestic and foreign production, as well as intra-firm transfers of goods and royalty payments. MNEs were assumed to be a monopolist in both markets and price discrimination was possible. He stated that an expected devaluation of home currency always increased the incentive for foreign production and sale of final goods. Further, he posited that an increase in exchange rate risk may incite a firm to invest abroad as a way of hedging against a short position in its balance sheet. A depreciation of the firm's home currency might reduce the value of domestic assets relative to foreign liabilities, but would simultaneously increase the value of assets and revenue streams for its affiliates in foreign countries.

The early paper by Cushman (1985)\textsuperscript{16} laid out a firm-level model of international investment that depends on the interaction of exchange rate expectations, trade linkages and financing options a firm may have. He considered a two-period world, in which the firm maximizes certainty equivalent of future real profits expressed in domestic currency. He examined four cases, in which the firm: i) produces and sells output abroad using foreign inputs; ii) produces and sells abroad with inputs imported from home; iii) produces and sells at home with imported foreign inputs; and iv) produces at home and abroad for foreign sale. The model included terms for both the real exchange rate level and the firm's subjective estimate of the risk-adjusted expected change in real exchange rate. In cases two and three, foreign and domestic production are complementary, while in case four they are substitutes.

The first-order conditions and comparative statics of Cushman's model showed that the impact of a change in exchange rate levels or expectations on the level of FDI depended on the investor's revenue and cost configuration. For example, a real appreciation of the foreign currency was associated with lower levels of foreign investment in case one, but higher level in case two where the lower costs of imported inputs lowered the marginal costs of foreign labour and capital. The impact of a rise in the expected change in real exchange rate was higher FDI in cases one to three, but ambiguous in case four. He also advocated that producing in the destination market was a good substitute for exports if there was a strong uncertainty on exchange rates, but this benefit vanished if production was partially re-exported.

Cushman (1988)\(^{17}\) argued that the impact of exchange rate risk on FDI was ambiguous and depended on the mechanism of how multinational firms operated, capital and labour cost effects, and output price effects. In the simplest case, a risk averse multinational who sold/produced abroad, maximized expected utility of profits. Uncertainty in exchange rate manifested itself in uncertain future profits, with the investment made in the present. In this case, risk increased the cost of investing abroad and hence resulted in reduced FDI. However, if the firms also export to meet the demand abroad, then exchange rate risk would reduce trade and production in the home country by substituting FDI to service the host country. This was to mitigate the amount of profits exposed to risk. In this case, FDI flows would most likely rise, presuming the substitution effect dominates the afore-mentioned direct effect. If on the other hand, FDI was undertaken to export back to the home country, the impact of exchange risk depended on whether capital or labour costs dominated, and whether

the risk exposure was positive or negative (accounting for the fact that the standard deviation of profits must be positive before substitution into the utility function).

Another ambiguous case was when output was produced either domestically or abroad, sold domestically or abroad, and exports were used to meet demand in either country. The eclectic OLI (ownership, location and internalization) framework of multinational firms (Dunning 1988)\textsuperscript{18} implies a direct role for real exchange rate by stressing that the main motivation for FDI was to move to locations with lower costs of production.

The well-known option argument of Dixit (1989)\textsuperscript{19} developed a completely different approach applicable to the analysis of exchange rate fluctuation and investment. In his model, the firm has the option to enter a foreign market, make investment and incur the sunk costs necessary for entry or exit the market and incur a lump-sum exit cost. It also has the option to wait and remain idle in its current state. He posited that firms entered a country when the real exchange rate was favourable and developed valuable intangible assets specific to the location. If the exchange rate subsequently depreciates, foreign firms would not exit at the same exchange rate at which they entered. He observed that exit was deterred even when the firm realized current losses, though it had an intangible asset which was required to maintain its market value. He called the option between entry and exit because of exchange rate as export hysteresis. Darby, et. al. (1999)\textsuperscript{20} extended the basic model of Dixit’s

(1989)\textsuperscript{21} option pricing model to exclusively focus on FDI, and more importantly, uncover the specific conditions under which investment would be hampered by exchange rate uncertainty. He argued that the optimal price range to wait increased with uncertainty, if the cost of waiting was less than market risk-free return.

Aizenman (1992)\textsuperscript{22} juxtaposed the production flexibility approach onto the Dixit-Pindyck-type conceptualization of the option value. He observed that increases in volatility increased the value of diversification, which pushed firms to shift production to the country where it was the cheapest, and also discouraged investment by increasing the uncertainty surrounding return on exercising the Dixit–Pindyck option to invest abroad. He also examined the factors determining the effect of exchange rate on triggering relocation of production facilities across countries. The factors were barriers to entry (initial costs, i.e., the non-recoverable costs of existing industry), the type of firm level exposure to risk (e.g., through price or quantity uncertainty), and the degree of risk aversion of producers. Further, he demonstrated that a floating exchange rate would transmit the effects of country-specific shocks across national borders, which eroded the ability of firms to diversify risk by shifting production across borders. In this sense, exchange rate volatility associated with a flexible regime could be construed as deterring FDI.

Contrary to the models of Froot and Stein (1991)\textsuperscript{23} and Blonigen (1997)\textsuperscript{24}, both of which albeit through different channels predicted a negative relationship between the

\textsuperscript{21} Dixit (1989), loc. cit.
\textsuperscript{23} Froot and Stein (1991), loc. cit.
\textsuperscript{24} Blonigen (1997), loc. cit.
exchange rate level and inward FDI, Campa (1993)\textsuperscript{25} laid out a much simpler approach than Cushman (1985)\textsuperscript{26} to examine how exchange rate uncertainty affected FDI based on Dixit’s (1989)\textsuperscript{27} options theory. In his model, the firm's decision whether or not to invest abroad depended on the expectations of future profitability. In such a case, the higher the level of exchange rate, the higher would be the expectations of future profits from entering a foreign market. Therefore, his model predicted that an appreciation of the host country currency would increase FDI into it. He suggested that exchange rate volatility could also impact on the investment decisions of risk-neutral firms. He hypothesized that, as investors were concerned with future expected profits, firms would postpone their decision to enter (or exit) as the exchange rate becomes more volatile. Risk-neutral firms would thus be deterred from entering foreign markets in the presence of high levels of exchange rate uncertainty.

In a model by Kogut and Kulatilaka (1994)\textsuperscript{28}, the foreign firm had a choice among three operating modes, viz., export, locally manufacture, or activity in the foreign market. The choice of mode was determined by expectations on the real exchange rates dynamics, production function of the individual firm, and its current operating state. They observed that once investment was made in the foreign country, it provided the option to expand in future. Thus, the result indicated that exit was very unlikely once foreign production was possible. They called the option between entry

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\textsuperscript{27}Dixit (1989), loc. cit.
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and exit by manufacturing direct investment due to exchange rate as production hysteresis\textsuperscript{29}.

Kogut and Chang (1996)\textsuperscript{30} extended the model of Kogut and Kulatilaka (1994) and analysed the effect of direct investment decision on the previous path of exports and investment in a country. They assumed that exhibiting investment decisions by considering heterogeneity across firms depended upon their previous histories. They observed that firms with strong exports to a host country would have invested in distribution channels and established brand labels. Thus, the investors intend to preserve the value of their assets by shifting manufacture investments to the host country when changes in exchange rates deteriorated their terms of trade. This showed that exchange rate movements influenced the timing of investment for a firm, conditional on its previous investment, and thereby allowed for a secular aggregate trend in FDI. In other words, initial investments had the character of learning about the foreign market or allowing consumers to establish loyalty to brand labels and other perishable intangible assets. Under more favourable exchange rates, the firm acted to expand its investments in the U.S. market. In this sense, the initial entries carried high option content relative to their own investment.

\textsuperscript{29} The dynamic problem facing a firm is to choose the current operating mode. If there were no costs to switching and no new investment modes required, this problem would simply be to choose the mode which generated the maximum one-period profits. But switching and investment costs were likely to be substantial. Given the uncertainty of exchange rate, the choice of current operating mode should also consider the probability that exchange rate may favour alternative modes in the future. It is the combination of uncertainty that underlies hysteresis. Hysteresis is the case where firms enter a country when its country real exchange rate is favourable, and develop valuable intangible assets specific to the location.

Goldberg and Kolstad (1995)⁴¹ examined the impact of short-term real exchange rate variability on production location. In their two-period model, a multinational produced only for sale abroad, and decided whether to satisfy foreign demand by exporting with domestic production or by investing in production abroad. The first period was characterized by these capacity decisions with uncertainty in foreign demand and real exchange rate variability. These uncertainties were revealed in the second period, as payments for investments were made and profits were realized and repatriated. The two important assumptions of their model were that utility was negatively related to the variability of profits, and that, adjustment of factors of production could not be undertaken after the realization of any shock to exchange rates. This means that firms did not have the option of waiting to see what happened to the exchange rate before investing. Thus, expectation of changes prompted diversification.

The multinational firm maximised expected utility of profits, which depended on expected profits and the variance of profits. The authors demonstrated that with risk aversion, even when production costs were equalized between the home and foreign market, uncertainty of future exchange rate volatility affected the decision of where to locate facilities and where investment flows. They showed that there would be some production abroad when foreign demand shocks and real exchange rate shocks were negatively correlated. So, there were some grounds for suggesting that currency risks would at times promote international investment.

Sung and Lapan (2000)\textsuperscript{32} extended the Goldberg and Kolstad (1995)\textsuperscript{33} model of production flexibility approach, which highlighted the role of exchange-rate uncertainty on the decision of a risk-neutral multinational firm. They assumed that a risk neutral firm could operate in two different plants, i.e., one abroad and one at home, facing decreasing average costs in each plant, but selling only in the home market. Exchange rate fluctuations were exogenous, and hence multinational firms could take advantage by shifting production to the countries where the value of local currency made input costs look the cheapest, \textit{ceteris paribus}. This decision depended on the sunk cost invested in the foreign market. A risk-neutral firm benefited from exchange-rate volatility, thereby leading to increased investment or diversion of investment from one location to another. Further, if the foreign plant was started, then increased (ex-post nominal) exchange rate uncertainty would increase expected profits of the firm. Under greater production flexibility, mode of choice may not be likely to be exercised in a floating exchange rate regime.

Martin, et. al. (1999)\textsuperscript{34} observed that the manner in which revenues, assets, operating expenses and profits of multinational corporations (MNCs) were geographically distributed, would influence the level of exchange rate exposure. They argued that exposure would lead to increased (decreased) revenue for a MNC when foreign currencies appreciated (depreciated), as domestically produced goods and services would become relatively less (more) expensive. Alternatively, exposure could induce increased (decreased) costs as foreign currencies appreciated (depreciated), since foreign-sourced inputs and foreign-denominated debt would


\textsuperscript{33} Goldberg and Kolstad (1995), loc. cit.

become relatively more (less) expensive. They further argued that, the MNCs may reduce their exposure by establishing foreign subsidiaries by conducting international business abroad, so that their foreign revenues were partially offset by foreign expenses. Further, by increasing foreign involvement, the MNCs would compete more effectively with export or import rivals as exchange rates fluctuated. Besides, sales generated by exporting to foreign countries could result in different degrees of exposure than selling abroad using foreign affiliates. Firms with predominantly export sales, holding the level of sales by foreign affiliates constant, had limited flexibility. MNCs allowed for greater expediency in shifting sources of inputs and outputs, thereby improving control over input costs and output prices as exchange rates fluctuated. Therefore, it was hypothesized that exposure was positively related to the degree of export sales.

Lin, et. al. (2006) opined that the relationship between exchange rate risk and FDI was determined by investment motive. They argued that both export-substituting and market-seeking firms chose an optimal time to enter the foreign market by investing sunk cost, where the variable cost comprising labour costs should be lower in order to compensate for the opportunity cost loss via higher entry costs. Further, they argued that an increase in exchange rate volatility tended to delay the FDI activity of a market-seeking firm, but accelerated it for an export-substituting firm. The latter was because: substituting FDI for exports reduced the firm’s exposure to

36. Export-substituting FDI refers to the situation in which an exporting firm, originally producing at its home country and serving a foreign market via exports, relocates its whole production abroad to serve the foreign market. The motive of export-substituting FDI is to reduce the firm’s production cost. By contrast, market-seeking FDI refers to the situation in which a domestic firm, originally not serving a foreign market via exports, chooses to set up a foreign subsidiary to produce and sell in a given foreign market. Thus, the motive of market-seeking FDI is to create a new market for its product.
exchange rate risk; and gains from risk reduction. Whereas, as the market-seeking firm had not served the foreign market via exports, an increase in exchange rate volatility would reduce the expected utility gain from this activity and also increase the option value of delaying investment into the host country.

The uncertainty inherent in floating exchange rate tempted investors to foresee the movement. Using survey data, Frankel and Froot (1987)\textsuperscript{37} found evidence of inelasticity of expected future spot rate with respect to current spot rate. Motivated by the Frankel and Froot (1987)\textsuperscript{38} model, Chakrabarti and Scholnick (2002)\textsuperscript{39} provided a new explanation by linking FDI and exchange rate changes based on mean-reversion expectations. According to them, FDI was particularly suitable for examining long-term exchange rate expectation of agents, as the FDI projects typically had long time horizons. Thus, if the agents invested when there was devaluation of a foreign currency, then the expected mean reversion (i.e., an expected future appreciation of the foreign currency) would increase the value of repatriated profits from these projects. They postulated that FDI would flow to that country under these circumstances, because the foreign asset currently appeared to be cheap relative to its expected future income stream. Thus, foreign investors reacted differently to small exchange rate shocks than to large shocks when updating their expectations for future exchange rate levels.

2.2 **Empirical Literature**

Previous research works on exchange rate have emphasized its importance as a major determinant of international trade and FDI flow. Although association between exchange rate and FDI has been empirically studied by several authors, the nature of linkages between exchange rate level and its volatility, and the flow of international capital flows are ambiguous. This section reviews literature on the effects of exchange rate level and its volatility on FDI flows.

Batra and Haldar (1979)\(^{40}\) developed a theoretical model to identify the impact of fixed and floating exchange rates on multinational firms. They argued that under fixed exchange rate, if the home currency is devalued, it would lead to increased profits in export and import competing industries. As an impact of devaluation, total sales in both foreign and home countries may increase or decrease depending on the behaviour of marginal cost. They opined that the impact of a fluctuating exchange rate depended crucially on the firm’s expectations. They argued that when the firm expects exchange rate to exceed the cost of forward exchange rate and all marginal costs are rising, then home sales would increase while the foreign sales and exports decrease. At the same time, the firm reduces its production at home and increases it abroad.

Cushman (1985)\(^{41}\) theoretically analyzed the effects of real exchange rate risk and expectations on direct investment. He presented different theoretical cases of foreign and domestic investments in a two country world, according to which the multinational decides where to purchase inputs, where to produce, in which country it finances its capital purchases, and where it sells its production. To test for possible


\(^{41}\) Cushman (1985), loc. cit.
risk and expectations effects on direct investment, he used annual data on bilateral direct investment flows from the United States (US) to the United Kingdom (UK), France, Germany, Canada and Japan, for the years 1963 through 1978. The pooled estimation result for bilateral direct investment flows showed significant reduction in the US direct investment in response to increase in the current real value of foreign exchange. Further, it showed higher significant reduction in risk in response to expected appreciation of real foreign currency. Majority of his results related to whether FDI and domestic production for exports were substitutes or complementary relation.

Jorion (1990)\textsuperscript{42} examined the impact of exposure of the US multinationals to foreign currency risk. He employed Generalised Least Square (GLS) method using annual data over the period 1971-1987. Disaggregated data for 287 firms were collected based on the degree of foreign involvement, which was measured as the sum of all reported foreign sales divided by the sum of total sales over the same years. He identified significant cross-sectional differences in the relationship between the value of U.S. multinationals and exchange rate, and analyzed the sources of these differences in exposure for three sub-periods 1971-75, 1976-80 and 1981-87. He also found foreign exchange exposure to be positively and reliably correlated with the degree of foreign involvement. But, exposure without foreign operation did not appear to differ across domestic firms.

Bailey and Tavlas (1991)\textsuperscript{43} examined the relationship between exchange rate variability and direct investment in the United States. They employed stock

adjustment model using quarterly data for the period 1976 to 1986 to examine their objective. They distinguished exchange rate variations in terms of both short-term volatility and long-term misalignment. They found the relationship between exchange rate variability and direct investment to be ambiguous for risk-averse firm. The empirical analysis also revealed that exchange rate volatility did not affect real direct investment in the U.S during the managed floating rate period.

Froot and Stein (1991) investigated the impact of real exchange rates on FDI from industrial countries, such as United Kingdom, West Germany, Canada and Japan to the United States, by using annual data covering the period 1974-87. Breaking overall FDI inflows into thirteen separate industries, they found that all of the thirteen coefficients on exchange rate had negative signs, indicating that depreciation led to greater FDI flows. The estimated coefficients of exchange rate were found to be negative and statistically significant for the United States and West Germany.

Based on Dixit’s option pricing theory, Campa (1993) tested whether entry into the US market was deterred by real exchange rate volatility. The estimation was based on a model where uncertainty in exchange rate for a risk neutral firm increases the value of option to enter a foreign market, which led to decreased instances of entry into the market, and hence less investment. Entry was also dependent on the level and rate of change in exchange rate, sunk cost, advertising cost and labor cost. Further, he empirically tested the effect of exchange rate uncertainty on FDI in the United States. He collected panel data for a sample of 61 United States’ wholesale trade industries between 1981 and 1987. He employed Tobit model to examine his objectives and

44. Froot and Stein (1991), loc. cit.
found that uncertainty about future exchange rate, sunk cost and level of advertising expenditure protected entry for risk-neutral firms. The result also revealed that there was no relationship between exchange rate trend and the number of firms entering into the market.

Klein and Rosengren (1993)\textsuperscript{46} examined the link between real exchange rate of dollar and flow of FDI into the United States, and tested imperfect capital market and relative labour cost hypothesis. They used panel data disaggregated by source country, such as Canada, Germany, France, Japan, the Netherlands, Switzerland and the United Kingdom, on different measures of FDI for the years 1979 to 1991. They employed correlation coefficient and Ordinary Least Square (OLS) regression technique to examine the objective. They found that both relative wealth and real exchange rate had negative and statistically significant effects on the US inward FDI, whereas relative labour cost had no effect on it. The empirical model supported the imperfect capital market hypothesis of determination of FDI against the alternate model of relative labour cost hypothesis.

Dewenter (1995)\textsuperscript{47} explored the relationship between the value of dollar, cross border acquisition flows and take-over premia in the US. He collected 3,036 transaction-specific data on FDI flows, that were announced and negotiations completed in 1975 to 1989. He employed Spearman’s rank correlation, OLS regression and Seemingly Unrelated Regression (SUR) to examine his objectives. He found that there was no significant relationship between the level of exchange rate and FDI, after controlling for relative corporate wealth and the overall level of investment.

\textsuperscript{46} Klein and Rosengren (1993), loc. cit.
Goldberg and Kolstad (1995) examined whether short-term real exchange rate variability impacts production location. In their two-period model, a multinational produces only for sale abroad by deciding whether to satisfy foreign demand by exporting with domestic production or by investing in production abroad. The authors found that with risk aversion, even when production costs were equalized between the home and foreign markets, uncertainty of future exchange rate volatility affected the decision of where to locate facilities and investment flows. They observed that there would be some production abroad when foreign demand shocks and real exchange rate shocks were negatively correlated. Under such circumstance, exchange rate variability increased the share of capacity produced abroad.

Further, they empirically tested the theoretical model they developed on the effect of real exchange rate uncertainty on bilateral FDI between the US and Canada, Japan, and the UK. The study was conducted using quarterly data from 1978-1991. The share of production of a source country flowing to a host country was specified as a function of the volatility of bilateral real exchange rate (measured as the rolling standard deviation over 12 quarters), volatility of host country demand, the correlation between exchange rate and foreign demand, real exchange rate, and host country demand. They found that for four of the six regressions run, exchange rate volatility positively and significantly affected FDI shares. The authors also found that the two regressions for which these results did not hold were subject to econometric difficulties that affected the signs and significance of the coefficients.

Kumar (1995)\textsuperscript{49} analysed the evolution of India’s FDI policies in four phases, i.e., the 1960s, 1970s, 1980s and 1990s. The sectoral pattern of FDI showed that it encouraged skill intensive and more technology-oriented industries. The Indian government policies shaped this type of sectoral pattern by influencing the relative configuration of ownership, internalisation, and vocational advantage of foreign investors in the country. He found that there was a wide divergence in FDI outflow from India to other countries. The results revealed that current environment of intensive competition among under-developed countries through the liberalizing policy was inadequate. The study also revealed that more effective use of India’s bargaining advantage with respect to multinational enterprises, such as domestic market, abundant supplies of skilled manpower and technical professional at low wages, was desirable to attract a greater magnitude of export-oriented FDI.

Sen (1995)\textsuperscript{50} examined the impact of FDI inflows in improving short-run balance of payments in India during the period 1990 to 2000. The author observed that inflow of FDI would lead to short-run trade balance deteriorations greater than direct imports. Therefore, FDI should not be considered as a short-run balance of payment management device. With the negative balance of payment effects, government should take up collateral set-ups to avoid serious foreign exchange problems. The choices available to government for effectively countering this prospect were: i) increased planned foreign borrowings; ii) implementation of appropriate macro-economic adjustments; and iii) ensuring that the foreign investors use sufficient

foreign exchange as equity to cover not only their direct import, but also the additional imports through macro-economic repercussions.

Using firm level data for the period 1976 to 1989, Kogut and Chang (1996) examined the effect of previous investment by Japanese electronics companies in the US, given the real exchange rate. They restricted the study to electronic companies industries listed on the Tokyo Stock Exchange. They employed correlation matrix, multiple regression and partial Likelihood hazard model to examine the objective. Their result was consistent with both the imperfect financial market and production hysteresis arguments. They found that real exchange rate clearly affected the timing of investments, while previous investments served as a platform for subsequent expansion. They argued that the initial investments into the host country allowed consumers to establish loyalty to brand labels and other perishable intangible assets under more favourable exchange rate. At later stage, the foreign firm acted to expand its investment in the US market. Thus, initial entries carried high option content relative to their own investment.

Blonigen (1997) examined the link between exchange rate movements and Japanese acquisition of FDI in the United States. He collected panel data set of 361 Japanese acquisitions across three digit (SIC) industries in the US from 1975 through 1992. He employed negative binomial and random negative binomial model to examine his objective. He classified the industries as manufacturing and non-manufacturing industries, and again sub-divided them into low Research and Development (R&D) and high R&D industries. He found that the effect of real exchange rate was statistically significant in the case of both manufacturing and non-

manufacturing industries. The result was similar for both low R&D and high R&D industries as well. He concluded that devaluation of dollar led to higher level of Japanese acquisition of FDI in the United States.

By considering FDI flows from the US and Japan, Goldberg and Klien (1997) examined the determinants of trade, FDI and real exchange rate in Southeast Asian and Latin American countries. They employed multiple linear regressions for the analysis using cross-section and time-series panel annual observations from 1978 to 1993. The results revealed that FDI was significantly affected by bilateral exchange rate in Japan and the US. Further, real exchange rate affected trade directly through relative price of goods and indirectly through the effect of FDI.

Gastanga, et. al. (1998) examined the effects of various policies on FDI inflows from the perspective of “eclectic theory” of international investment. They conducted the study by pooling cross-section and time-series data for 49 less developed countries between 1970 and 1995. They conducted multivariate OLS regression analyses to examine the effects of each type of policy on FDI flows, with and without controls for other relevant determinants. They found that exchange rate distortions in host countries did not have significant influence on FDI and the expected rate of economic growth was highly significant. Further, corruption had an adverse effect on FDI, whereas other measures like bureaucratic delay, contract enforcement nationalization risk and the degree of openness to capital flows had significant positive effects on FDI.

Gopinath, et. al. (1998)\textsuperscript{55} examined the effects of exchange rate on exports, outward FDI and foreign affiliate sales in India, using country-wise panel data for the period 1982 to 1995. They employed Ordinary Least Square regression to examine their objectives. They found that real exchange rate had a positive effect on outward FDI and foreign sales. However, volatility in real exchange rate had a negative effect on both outward FDI and foreign sales. They concluded that dollar appreciation led to substitutability between FDI and trade in the US food processing industry.

Martin, et. al. (1999)\textsuperscript{56} examined the factors influencing economic exposure of the U.S. based Multinational Corporations (MNCs). They collected a sample of 168 US based MNCs with foreign operation primarily in Europe for the period 1987 to 1993. They employed OLS, correlation coefficient and simple statistics to examine their objectives. They found that European imbalance and larger proportion of export sales were significantly related to exchange rate exposure.

By extending Dixit-Pindyck (1994)\textsuperscript{57} model, Darby, et. al. (1999)\textsuperscript{58} theoretically examined the effect of exchange rate uncertainty on investment expenditure and different types of industries. They verified the model using quarterly data for the period 1976 to 1996 by estimating aggregate investment equations for five countries, viz., France, Germany, Italy, the UK and the US. They also tested both Jorgenson (1963)\textsuperscript{59} and Tobin’s (1969)\textsuperscript{60} Q models to examine their objectives. The results


\textsuperscript{57} Dixit and Pindyck (1994), loc. cit.


revealed that exchange rate volatility had negative impact on investment, though the effects were smaller than the expected earning effects.

Broll and Wong (2000)\textsuperscript{61} investigated the interaction between financing and hedging decisions of a multinational firm facing exchange rate uncertainty. In order to address the issue of international capital structure decision in general and optimal currency mix determination in particular, they developed a single period model of a multinational firm having a wholly owned foreign subsidiary and facing exchange rate uncertainty. They observed the effect of exchange rate movements, multiple tax jurisdictions segmented capital structure and currency forward markets on determining the optimal international capital structure and the best mix of currencies. Further, they opined that if risk-averse multinational firm had access to an unbiased currency forward market, then the multinational firm would devise its international capital structure so as to minimize the global weighted average cost of capital. Or else, the multinational firm would have to rely on money market hedge by issuing more foreign currency denominated debt and less domestic currency denominated debt, thereby leading to higher global weighted average cost of capital.

Sharma (2000)\textsuperscript{62} examined the growth of export and the role of FDI in export performance in India during the years 1970-98. He also investigated the determinants of export performance in a simultaneous equation framework. He found that demand for India’s export increased when its export prices fell in relation to world price and


real appreciation of rupee adversely affected export demand. FDI had insignificant impact on India’s export even when the coefficient of FDI had a positive sign.

Sung and Lapan (2000)\(^6^3\) examined the effects of exchange rate uncertainty on FDI decision of a risk-neutral multinational firm (MNF). They assumed that the firm could open plants each in two different countries with decreasing average cost. They observed that exchange rate volatility creates opportunities for the MNF to move production to lower cost plants. They also showed that with sufficient exchange rate volatility, the firm can increase expected profits by opening several plants. They concluded that under exchange rate risk if the multinational firm faced competition in the foreign market, then foreign firm may open plants in both markets which would prevent entry of local competition.

Kosteletou and Liargovas (2000)\(^6^4\) theoretically and empirically examined the relationship between FDI and real exchange rate, using annual data for 12 European Union (EU) countries, the US and Japan for the period 1960 to 1997. They employed co-integration and two stage least square models to examine their objective. The analysis revealed unidirectional causal flows from real exchange rate to FDI for countries, like the United States, the United Kingdom and Japan. The results were similar to the model of financial behaviour. They also found the existence of bi-directional causality for small countries in the EU countries.

Quere and Revil (2001)\(^6^5\) framed a model on exchange rate strategy to attract FDI, by considering the case of a risk-averse multinational firm locating in two alternative


foreign counties to re-export. They collected data for 42 developing countries receiving FDI from 17 Organisation for Economic Co-operation and Development (OECD) countries during 1984 to 1996. Using multiple regression equation, they found that one per cent appreciation in real exchange rate reduced FDI stock by 0.22 per cent, whereas one point increase in exchange rate volatility reduced it by 0.60 per cent. They concluded that if the host countries were close to one investing country, like central and Eastern European countries, and wanted to attract FDI, then they would face high incentive to stabilize their currencies against that of the specific investor. This was consistent with building of currency blocks around the main FDI providers. However, they opined that such strategies raised competition among the host countries of a given block, because FDI from the anchor country becomes more sensitive to relative competitiveness in various locations of the block.

Aizenman and Marion (2001)\textsuperscript{66} examined the determinants of FDI during 1980-1999, using cross-sectional data for 103 countries. They modeled inflows as a function of real gross domestic product (GDP) per capita in the first period as well as its square, school enrollment, population growth, average trade share and volatility. Volatility was measured as standard deviation of the monthly percentage change in real effective exchange rate over the twenty year period. They found that volatility had a positive and significant effect for developed economies. Measuring volatility and FDI inflows at average values, the authors found that increasing volatility by 10 per cent increased the FDI inflow share of GDP by 7.5 per cent.

Based on quarterly data from 1976-1998, Amuedo-Dorantes and Pozo (2001) tested the effects of exchange rate uncertainty on total inflows of FDI (share in output) into the United States. Their analysis was interesting on two accounts. They tested both an unconditional measure of uncertainty, the moving standard deviation of percentage change in real trade weighted exchange rate, and a conditional measure using the Generalised Autoregressive Conditional Heteroskedasticity (GARCH) methodology. In simple OLS regression analysis of FDI flows on the volatility and level of exchange rate, they found that volatility measured as rolling standard deviation was positively and significantly related to FDI flows. However, volatility negatively and significantly affected FDI when the conditional measure was used. Further, testing and correcting for stationarity and cointegration, the authors found that the first measure did not have a significant short-run effect on FDI inflows, while there was a negative and significant effect when the conditional measure was used.

Revil and Quere (2001) examined the impact of potential changes in exchange rate strategy of China on the amount and distribution of trade and FDI in the country. To examine the impact of exchange rate on foreign trade, they used a panel data of 15 emerging countries and 33 importing countries, for the years 1984-1999. In addition, they examined the impact of exchange rate on FDI by using panel data for 42 host emerging and industrialized countries during 1984-1996. They employed OLS regression to examine their objectives. They found that real exchange rate was likely to be an increasing concern for both trade and FDI to China. Secondly, exchange rate volatility attracted FDI to China. However, they found that the impact

of exchange rate uncertainty on trade was not significant. They concluded that diversifying the peg of Yuan was likely to stabilise inward FDI in China, especially if yen was to acquire a significant role.

Moon and Lado (2001)69 critically examined the existing literature with respect to “unconventional” FDI and suggested an alternative approach based on “imbalance” theory. They argued that MNCs had both ownership advantages and disadvantages. Firms with advantages may invest abroad by exploiting those advantages, like technological capability, marketing and management skill, whereas they may also be motivated by their own disadvantages, viz., firms assets portfolio. The authors differentiated conventional and unconventional FDI, in terms of important factors like market seeking, factor seeking, oligopolistic reaction, risk diversification and country of origin.

Against the arguments of existing theories, they found that FDI flows from less developed countries to developed countries, due to advanced technology and management know-how, might attract FDI. Country of Origin (COO) was also found to be an important factor, due to consumer perception of getting quality products from reputed countries. It was argued that oligopolistic reaction of FDI may be violated because of domestic followers. They found that not only financial reason played a role, but political reason also tended to influence FDI flows.

Using annual data from 1982 to 1995, Chakrabarti and Scholnick (2002)70 examined annual bilateral FDI flows to 20 OECD countries from the United States and its relationship to the mean, standard deviation (the risk measure) and skewness

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of the nominal monthly exchange rate in the prior year. In a standard OLS regression, random and fixed effects model, volatility had a negative and insignificant effect on FDI flows. However, when correcting for autocorrelation and panel-specific heteroscedasticity, the authors found a significant negative effect of the standard deviation of exchange rate on FDI outflows from the US to developed countries. They observed that investors adjusted for small changes in exchange rates rather than for relatively larger shocks, when their expectations were based on future exchange rate levels.

Focusing on the period around the 1997 Asian financial crisis, Chen and So (2002) \(^{71}\) examined the relationship between exchange rate variability and the volatility of returns of the US multinationals, using weekly stock return data for 129 firms over three years’ investigation period from January 1996 to December 1998. Their model was based on Capital Asset Pricing Model (CAPM) and single factor market model. They found that volatility of common stock return for the multinational firms increased significantly with increases in the exchange rate variability. Sales exposure to Asia experienced a significant increase in market risk. After controlling for changes in market risk, they found that increase in volatility was systematic in nature, because market risk of the selected firms increased during periods of increased exchange rate variability.

Gorg and Wakelin (2002) \(^{72}\) examined the annual bilateral inward FDI from 12 developed countries into the United States, as well as outward FDI from those countries to the United States during from 1983-1995. FDI was measured as sales by

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multinationals in the host country, which was regressed on the level of real exchange rate, distance between partner countries, freight costs, GDP of trading partners, relative interest rates, relative labour costs, volatility of real exchange rate, and a trend term. Volatility was measured as standard deviation of the log of monthly changes in the real exchange rate. Estimation of the US outward and inward FDI, in either simple OLS analyses or fixed/random effects estimation, showed that volatility was in most cases positive though insignificantly related to FDI. They concluded that markets for hedging became more developed, allowing MNEs to protect themselves against exchange rate risk.

Using Engle Granger Causality test, Alaba (2003) used the relationship between the behaviour of exchange rate and FDI with respect to Nigeria for the years 1982 to 1996. He used two different sets of exchange rate data, viz., official exchange rate and parallel exchange rate market, for his analysis. He found that exchange rate movements in both official market and parallel market were significant for FDI flows in agriculture and manufacturing sectors. Further, he found that parallel market exchange rate was more important driver of activities in the Nigerian economy.

Crowley and Lee (2003) tested the effects of nominal exchange rate volatility on quarterly US foreign direct investment flows into and from 18 OECD countries during 1980-1998. They employed GARCH, OLS regression, and random and fixed effect model to examine their objectives. They found that exchange rate volatility and investment relationship differed remarkably across countries. The countries with


relatively stable exchange rates tended to be the least affected by a currency movement. The panel regression confirmed the presence of disparities across countries, as well as over different time periods. They concluded that exchange rate volatility and FDI relationship would be absent if movements in the exchange rate were relatively small.

Kiyota and Urata (2004) attempted to analyse the effects of exchange rate and its volatility on Japan’s FDI at aggregated as well as disaggregated industry level. In addition, they examined the impact of the US dollar pegged system on FDI. They used annual FDI data from Japan to its partner countries between 1990 and 2000, and conducted both industry level and country level analyses. They followed Froot and Stein (1991) and Klein and Rosengren (1994) models with some modification to investigate the impact of exchange rate volatility on FDI. They found that depreciation of the host country currency attracted FDI, while large volatility in real exchange rate discouraged it. The US dollar peg system was not found to be an attractive exchange rate regime for foreign investors. Further, there was a regional difference in the impacts of exchange rate volatility on FDI for the East Asian and Latin American countries. The authors suggested that flexible, but stable exchange rate system was needed to successfully attract FDI.

Brooks, et. al. (2004) explored the ability of portfolio and FDI flows to track movements in Euro and Yen against the dollar using quarterly data for the period 1988 to 2000. They employed simple Ordinary Least Square regression with different components of balance of payment, in terms of US dollar to Yen and Euro,
to identify the factors that significantly influenced exchange rate. They found that net portfolio flows from the Euro area into the US blocs possibly reflected differences in expected productivity growth and track movements in the Euro against the dollar. They found that net FDI flows, which captured the recent burst in cross-border mergers and acquisitions activity, appeared to be less important in tracking movements in the Euro-dollar rate. It was possibly because many mergers and acquisitions transactions consisted of share swaps. They also found that movements in Yen versus the dollar remained more closely tied to conventional variables, such as the current account and interest differential.

Becker and Hall (2009)\textsuperscript{79} investigated the impact of exchange rate uncertainty on FDI. They considered both volatility and covariance between exchange rates and believed that this was particularly important in the weight of the possible entry of a country, such as the UK into the European Monetary Union (EMU). They developed a theoretical framework that demonstrates that risk-averse firms benefit from FDI diversification, and generated GARCH estimation of the conditional covariance and conditional correlation between dollar sterling and the dollar euro exchange rates. They also estimated an econometric model of FDI in R&D, using panel data for the UK manufacturing industries for the period 1993-2000. Based on the industry-wise data, they found that UK’s entry into EMU increased both the variance and covariance between sterling dollar and euro dollar exchange rates, which tended to relocate FDI R&D into the UK. They concluded that the country’s entry may not mean an overall reduction in exchange rate volatility. For instance, if pound sterling was pegged to dollar and the UK moved to monetary union, then the overall

exchange rate volatility would depend on the relative volatility of the dollar and the euro. But if the UK joined monetary union, then the correlation of pound and the euro would be united.

Barell and Pain (1996)\textsuperscript{80} investigated the role played by demand and relative factor prices both at home and abroad, and exchange rate expectations, in determining the total level of FDI by the US companies. They considered three aspects of the overall investment decision of the multinational corporations, i.e., within plant factor substitution, across plant production substitution, and the means of finance for overseas investment. They collected quarterly data from 1971 to 1988 for the study period. Their result revealed positive relationship between capital costs and outward FDI, which supported the hypotheses that a rise in relative cost of production led to a diversion of resources away from the domestic sites. In contrast, home country interest rate would reduce FDI, as firms would switch to borrowing in foreign currencies in the host country. They also found that short-term movements in exchange rate played an important role in determining changes in investment. Expected change in exchange rate also led to postponement of investment, possibly due to expectation of future currency gains by delaying payments in foreign currency that were expected to depreciate. Market size and relative factor costs of both labour and capital were found to be important determinants of the stock of overseas investment. Movement of exchange rate was greater than the movement in labor cost, due to which investors reacted differently to currency changes. Hence, volatility of exchange rate affected volatility of FDI as compared to the investment of affiliates.

Kohli (2001) attempted to analyse the trend and pattern of capital flows in India and their effect on macroeconomic variables in the economy in the 1990s. He also studied the response of the policy makers to the new challenges posed by partial capital account liberalisation. The author found that an inflow of foreign capital during this period had resulted in real exchange rate appreciation, besides having a significant impact on the domestic money supply. During a capital surge, these effects were countered through intervention and sterilisation policies on capital inflows.

Pain and Welsum (2003) examined the relationship between exchange rate and FDI in six large economies, namely the US, the UK, Canada, Germany, France and Italy, during the period 1971 to 2000. Using OLS regression, they found ambiguous relations between exchange rate and FDI, as the impact of exchange rate on FDI relies on the types of investment, different time periods and heterogeneity across countries. They found that fixed exchange rate regime stimulated investment, due to the benefits of better investment climate particularly for larger economies. They also found that an appreciation of the host country currency had a negative impact on FDI inflows, whereas exchange rate volatility had a positive but insignificant impact on it.

Athukorala and Rajapatirana (2003) empirically analysed the relationship between capital flows and real exchange rate in selected Asian and Latin American countries during the period 1985 to 2000. They considered eight Asian economies (i.e., China, India, Indonesia, Korea, Malaysia, the Philippines, Singapore and

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Thailand) and six Latin American countries (i.e., Argentina, Brazil, Chile, Colombia, Mexico and Peru), and made a comparative study of the trend and pattern of capital flows to the two regions. They employed a single-equation model to examine the determinants of real exchange rate by incorporating variables like excess money supply, government expenditure, FDI, change in nominal exchange rate, openness and capital flows. They found that the degree of real exchange rate appreciation associated with capital inflows was uniformly much lower in the greater foreign capital inflows relative to the size of their economies. Further, the composition of capital flows mattered in determining their impact on the real exchange rate. The real exchange rate problem was a phenomenon predominantly associated with other capital flows, and FDI seemed to have a salutary effect on it. Nominal exchange rate change seemed to have a significant lasting effect on the real exchange rate of only the Asian countries. Whereas, due to wage-price rigidities, the impact of a given nominal exchange rate change seemed to dissipate quickly in the Latin American countries.

Bouoiyour and Rey (2005) 84 studied the behaviour of real effective exchange rate (REER) of Dirham against the European currencies (EU15) over the period 1960-2000. They measured volatility through standard deviation and misalignment as the difference between actual REER and the equilibrium REER (NATREX model). They employed Johansen and Jesulius cointegration model and estimated simultaneous-equation model using Seemingly Unrelated Regression (SUR) method, where the misalignment is treated as an instrumental variable. They found that a rise in the volatility of dirham reduced trade flows (both exports and imports). Misalignments

also affected the trade flows, i.e., an over-valuation led to a reduction in Moroccan exports and an increase in its imports, where as globally it led to a deterioration in the trade balance with the European Union. They also found that neither the volatility nor misalignment had an effect on FDI in favour of Morocco.

Using quarterly data for the period 1993 to 2003, Chakraborty (2006) examined whether the inflows of capital were volatile in India following the financial liberalisation in the 1990s. He found that net capital inflows had been volatile, but not all components of aggregate inflows, like FDI and external commercial borrowing, which did not move in a similar fashion. He further analysed how capital inflows adjusted to changes in real exchange rate and other macroeconomic variables in India since 1993. The econometric results indicated that an error-correction mechanism was operating between the net inflows of capital and real exchange rate. He found that macroeconomic fundamentals did not have any significant affect on the dynamic adjustment of capital inflows. Further, in the post-liberalisation period, a co-integration relationship existed between net inflows of capital, real exchange rate and interest rate differential. They argued that co-movements in these variables were due to the policy of foreign exchange market intervention by the Reserve Bank of India (RBI), which helped to prevent the volatility of real exchange rate in spite of exchange rate volatility in net inflows of capital.

Theoretically and empirically, Lin, et. al. (2006) investigated the impact of exchange rate uncertainty on the timing of FDI. They developed an integrated framework of FDI under uncertainty by extending Dixit-Pindyck’s (1994) real option

model. To identify the diversity of motives of the timing of FDI, they examined two motives of the investing firm, viz., export-substituting and market seeking. They argued that when the firm is risk-averse, exchange rate uncertainty tended to delay FDI activity of a market-seeking firm, whereas for the export-seeking firm it accelerated it. They also argued that the relationship between exchange rate uncertainty and FDI varied with the extent of exposure to exchange rate risk, which was determined by investing motives. They collected firm-level data on Taiwan’s outbound FDI in China over the period 1987-2002 to test the validity of these theoretical issues. They employed Cox’s proportional hazard model (Cox 1972\textsuperscript{87} and 1975\textsuperscript{88}) to examine their objectives. The empirical results revealed that the relationship between exchange rate uncertainty and FDI was crucially dependent on the export seeking and market seeking motives of the investing firms.

2.3 Concluding Remarks

The diversified theoretical arguments on the impact of exchange rate levels and its volatility on FDI may be summarized here. Since the break-down of the Bretton Woods system of fixed exchange rates, exchange rates have fluctuated widely, adding extra uncertainty to the FDI decision to enter foreign market. Future exchange rate tends to affect a firms’ cash flow and thereby influences its decision to make entry into the host country. Most of the theories have stressed the importance of entry mode of FDI with respect to its timing of entry into a foreign market and suggested different factors responsible for it. Over the past few years, there has been an

increasing interest in analyzing the decision of firms to enter or exit foreign markets (Campa 1993).

Some studies have also directed attention to examining the possible effects of depreciation and appreciation of real exchange rate on the location of domestic and international investment flows. For instance, if both foreign and domestic firms were bidding for domestic asset, then depreciation of the domestic country’s exchange rate would increase the relative wealth of the foreign firm and make it profitable to invest offshore. Further, depreciations would lower the relative cost of production in the domestic economy, which in turn would increase FDI inflow. Quite often the results, both theoretical and empirical, indicate that there is a relationship between FDI and exchange rates [See Cushman (1988); Froot and Stein (1991); Klien and Rosergren (1994); Goldberg and Kolstad (1995); Blonigen (1997); Goldberg and Klein (1997); Amuedo-Dorantes and Pozo (2001); and Kiyota, et. al. (2004)]

Itagaki (1981), Cushman (1985), Kogut and Kulatilaka (1994), Goldberg and Kolstad (1995), and Kogut and Chang (1996) illustrated the importance of considering post-FDI changes in the exposure of a firm’s profits to exchange rate risk. If the investing firm could choose to serve foreign markets via exports or FDI, then an increase in exchange rate volatility would lead the firm to substitute FDI for exports, since FDI activity reduced the exposure of its profits to exchange rate risk (Blonigen 2005). On the other hand, if the purpose of FDI was to diversify location of production to increase market share and to have the option of production flexibility (Aizenman 1992), then a positive relationship between uncertainty and FDI was to be expected to avoid de facto trade barriers (Sung and Lapan 2000). However, Lin, et. al. (2006) argued that an increase in exchange rate volatility tended to delay the FDI activity of a market-seeking firm, whereas it would accelerate the FDI activity of an
export-substituting firm. This indicates that both exchange rate levels and its volatility alter the inflow of FDI. Thus, in times of uncertainty about future economic conditions, postponing investment and waiting for new information has a net value, provided the same investment opportunity would still be available in future (Dixit and Pindyck 1994). By not investing, an expected profit stream is forgone, but the ability to make more profitable choices in future is retained. This option value was likely to rise, the greater the degree of uncertainty.

Almost certainly the impact would vary across industries according to their market structure and across different types of capital goods, according to the ease with which they can be resold. There are also circumstances in which investment can create options in times of uncertainty. For example, investing in other countries can create options for firms. By opening more than one operating facility, the multinational firm is purchasing a real option, since it gains both the flexibility to switch the location of production in response to exchange rate movements as well as a platform that can be used to overcome informational imperfections or home bias in the preferences of foreign consumers. This creates new investment opportunities [‘across country’ and ‘within country’ options in the terminology of Kogut and Kulatilaka (1994)]. However, theoretical models also predict that exchange rate uncertainty would instead suppress FDI. These arguments assert that unpredictable fluctuations in exchange rate introduce added uncertainty into both the production costs and future revenues of overseas operations, thus deterring potential investors.

The empirical results of different studies are difficult to compare as the sample period, countries, and more importantly, measure of risk vary widely. Most of the studies have been conducted for developed countries, whereas very few studies focus on developing countries, like Quere and Revil (2001) for Africa; Revil and Quere
(2001) for selected developing countries; Lin, et. al. (2006) for China; and Alaba (2003) for Nigeria. However, research on FDI in India is very sparse, especially studies on the impact of exchange rate uncertainty on FDI. A few studies focus on the issues of exchange rate volatility and capital flows (Kohli 2001 and Chakraborty 2006), but not particularly on FDI. Hence, there is a need to conduct a similar study in the Indian context.

As regards analytical tools employed, most of the studies have applied OLS regression method, while some have applied methods like partial likelihood hazard model, negative binomial and random negative binomial models, cointegration and two stage least square methods, stock adjustment model, Engle-Granger causality, and random effect and fixed effect models. The methods applied mainly depended on the data period covered. Most of the studies conducted were country-wise, industry-wise and firm-wise in nature, using panel data for analysis.

Different methods have been used to measure uncertainty by different studies. In general, the future behaviour of an economic variable is uncertain since the probability of future events cannot be determined a priori. Hence, the future volatility of an economic variable is seen as a stochastic process that evolves over time with a random and a deterministic component. Both conditional and unconditional measures of volatility have been used in the literature in order to proxy exchange rate volatility. A classic measure used to proxy volatility is the unconditional measure of rolling variance and moving average of standard deviation of the exchange rate [Pain and Welsum (2003); Bouoiyour and Rey (2005); Chowdhury (1993); Cushman (1985 and 1988); Goldberg and Kolstad (1995); Lin, et. al. (2006); Campa (1993); Chakrabarti and Scholnick (2000); Revil and Quere (2001); and Gorg and Walkin (2002)]. It is often argued that unconditional measures of
volatility should be stronger measures of total volatility, because they include both the expected and unexpected volatility (Goldberg and Kolstad 1995). On the other hand, conditional measures such as Auto-Regressive Conditional Heteroscedasticity (ARCH) and GARCH process are popular measures of volatility. The ARCH/GARCH models have been used by several studies [Becker and Hall (2009); Crowley and Lee (2003); Amuedo-Dorantes and Pozo (2001); Lin, et. al. (2006); Darby, et. al. (1999); Vita and Abbott (2007); and Athukorala and Rajapatirana (2003)] that focus on volatility, since they generate conditional variance of a variable. The present study makes use of volatility of exchange rate generated from ARCH/GARCH models, Moving Average Standard Deviation method, and Hodrick and Prescott method to measure exchange rate uncertainty.

In sum, the effects of exchange rate and exchange rate volatility on FDI are ambiguous. However, earlier literature [Froot and Stein (1991); Kogut and Chang (1996); Klein and Rosengren (1993); Kogut and Chang (1996); Blonigen (1997); Goldberg and Klien (1997); Kosteletou and Liargovas (2000); Quere and Revil (2001); Martin, et. al. (1999); Kiyota and Urata (2004); Brooks, et. al. (2004); Sharma (2000); Cushman (1985); Crowley and Lee (2003); Chakrabarti and Scholnick (2002); and Ihrig (1997)] mostly support the negative and significant impact of real exchange rate levels on FDI. Whereas, some studies like Gopinath, et. al. (1998); Revil and Quere (2001); Alaba (2003); Aizenman and Marion (2001); and Cushman (1988) found positive impact of exchange rate levels on FDI. Whereas, Dewenter (1995); Gastanga, et. al. (1998); and Campa (1993) found no relationship between exchange rate and FDI.

Thus, different models and assumptions that link exchange rate volatility to FDI reveal divergent results in empirical literature. While some studies [Gopinath, et. al.
One of the explanations that may aid in understanding why systematic conclusive evidence could not be established by various studies is that there is no unique measurement of exchange rate risk. One of the reasons could be that different studies utilize alternative measures of exchange rate risk, and sometimes even the same study uses different measures and compares their significance across them. Another aspect that may have contributed to the inconclusive results in literature could be that analyses have been conducted over different time spans and across different countries, using time series or cross-sectional data base. In the present study, the researcher aims to find out if exchange rate levels and its volatility have any effect on FDI in both short-run and long-run in India, besides identifying the factors determining foreign decision to invest in India.