



ANALYSIS OF CURRENCY DERIVATIVES MARKET AND ITS IMPACT ON FOREIGN EXCHANGE RATE VOLATILITY

Priyanka Rani and Prof. Karampal Narwal

Guru Jambheshwar University of Science and Technology, Hisar, Haryana

Abstract

Purpose: This paper aims to examine the extent to which currency derivatives affects foreign exchange rate volatility by using various currency pairs until 2018 by identifying research gaps and future development sand designing an agenda for future research.

Design/Methodology/Approach: The study consists of a systemic literature review academic articles indexed on various journals. The articles were reviewed based on the following features: derivatives, currency derivatives, use of currency derivatives by various firms' interrelationship between currency derivatives and foreign exchange rate volatility and price discovery in currency derivatives market. Time period of the study taken for 1983-2018.

Findings: The study found that currency derivatives and foreign exchange rate volatility are interrelated with each other. Currency derivatives have impact on foreign exchange rate volatility. Some of the studies found positive relationship while some studies found no effect on foreign exchange rate volatility.

Originality / Value: Foreign exchange market is of volatile nature. There is always a risk of adverse movement in the price of the currency. So, to mitigate the risk of adverse movement in foreign exchange rate, currency derivatives are used as a major tool. This paper aims at understanding the currency derivatives market and how it affects foreign exchange rate volatility.

Keywords: Currency Derivatives, Foreign Exchange Rate Volatility, Currency Futures and Currency Options.

1.Introduction

In 1992-93 India's foreign exchange market experienced various structural changes and these changes resulted into rupee convertibility on current account. Further number of foreign trades across nations increased and due to increased number of foreign trades across nations foreign exchange market becomes more and more volatile. Therefore, big flow of cross border trade, investments and capital around the global market, comes with foreign exchange rate risk inherent in such transactions. The need to mitigate the risk give rise to use currency derivatives. The Indian currency derivatives market have shown a tremendous growth both in terms of volume and contracts traded but it is still on maturing stage and Indian economy is co integrated with global economy (Pallavi, 2015; Guru, 2010).Increased exchange rate volatility of INRUSD during conventional and non-conventional trading hours gives participants a new platform to mitigate their foreign exchange rate risk by use of currency derivatives (Chakravarty & Parveen, 2010). Currency derivatives helps in minimizing the risk of exchange rate volatility. NSE started its operation on August 29, 2008 with launch of currency futures in US Dollar-Indian Rupee (USDINR) followed by the Metropolitan Stock Exchange of India (MSEI) in October 2008, the United Stock Exchange of India Ltd. (USE) in September 2010 and the BSE (formerly known as Bombay Stock Exchange Ltd.) in November 2013. In March 2010 other currency pairs like Euro- INR, Pound Sterling-INR and Japanese Yen-INR were also introduced. On the same segment, interest rate futures were introduced for trading on August 31, 2009. Being a standardized product, currency futures traded across all the exchanges have common features in terms of minimum tick size, minimum contract size, quotations, etc. NSE holds a predominant share of nearly 65% of the total number of outstanding currency future contracts, followed by BSE and MSEI with 18% and 16% respectively (Nath and Pacheco, 2018). All currency futures contracts are quoted in rupee terms and are settled in cash in INR. SEBI and RBI allowed USDINR options in Indian currency derivative market as on July 30 2010. SEBI approved it on dated July 30, 2010 and RBI also approved it on July 30 2010. Announcement in the Fourth Bi-monthly Monetary Policy Statement 2015-16 (Para 38), RBI permitted the recognized stock exchanges to offer cross-currency futures contracts and exchange traded options contracts in the currency pairs of EUR-USD, GBP-USD and USD-JPY. Recognised stock exchanges are also permitted to offer exchange traded currency option contracts in EUR-INR, GBP-INR and JPY-INR in addition to the existing USD-INR option contract, with immediate effect.As of now options are available on NSE (National Stock Exchange) and USE (United Stock Exchange).Options are playing an important role in financial markets. Options are widely active traded instrument in most financial assets like equities, commodities, currency and interest rate. RBI allowed banks to offer foreign currencyINR European options to its customers with effect from July 7, 2003.Style of Options – There are two types of Options:

a) European Style Options: In India, all currency options in OTC market are European style. European style options exercised only on expiration date.

b) American Style Options: American options can be excised by the buyer any time on or before expiration date. Currency American Style options not allowed in India.



2. Objectives of the Study

The objectives of present study are to take the stock of present status of research based on the subject currency derivatives by reviewing the past published and unpublished research work on same topic in a well-organized manner. It represents how currency derivatives works and how it is useful for hedging by various firms. So, the present study also tries to comment on the present status of the research on the same subject matter and to suggest the prospects of future research on the same topic.

More specifically the objectives of the present study are to:

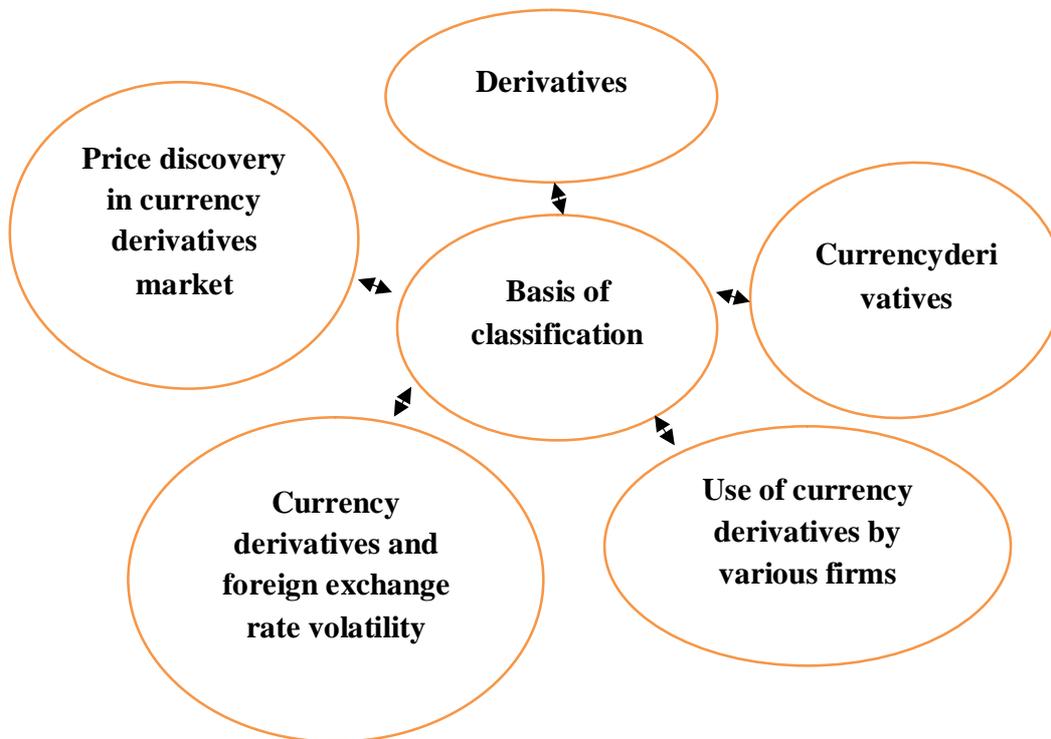
- I. To Synthesize the existing literature on currency derivatives market;
II. To Arrange the publication in an orderly manner to enable easy and quick search;
III. To classify the research articles according to various approaches and methodologies adopted; and
IV. To Explore the issues in the same area and suggest some agenda for future work.

3. Literature review

The study aims to examine the important points of present information and methodologies adopted for explaining the concept of currency derivatives trading and its impact on foreign exchange rate volatility. It is characterized by a logical flow of ideas to arrive at the objectives of the study. The currency derivatives market was analysed by many researchers. A selective/random literature survey of relevant research articles has been undertaken. From this viewpoint an attempt has been made to lay firm foundation by reviewing the existing literature on currency derivatives market that is relevant for getting domain knowledge about the field and further to find out the gaps for further research.

3.1 Derivatives

Derivatives is a financial instrument with a value that is derived from the underlying asset or group of assets. Fluctuations in the underlying assets helps in determination of price of the derivatives. In other words, Derivative means a forward, future, options or any other hybrid contract of pre-determined fixed duration. These instruments derive their value from the price and other related variables of the underlying asset. A simple example of derivative is butter, which is derivative of milk. The price of butter depends upon price of milk, which in turn depends upon the demand and supply of milk (Vashishtha and Kumar, 2010).



3.2 Currency Derivatives

Currency risk exposure are very important for the firms and financial institutions who are more susceptible to exchange rate risk. To manage the currency exchange rate risk various strategies are used. Currency derivatives are one of the most suitable currency risk management tools (Pandey,2014; Sivakumar and Sarkar, 2008). Derivatives market includes INR options, currency futures, forwards, exotic options, rupee forward rate agreement, both rupee and cross currency swaps. In a study Mittal (2012) concluded that



issuance of derivatives product to hedge foreign exchange rate risk has facilitated the integration of domestic economy with world economy. Indian currency derivatives market is showing a very high growth since its introduction of currency futures and options in India both in terms of volume and trading (Pallavi, 2015; Sivarajadhanavel and Chandrakumarmangalam, 2013; Mahanta, 2012). Similarly, Guru (2009) explored the recently launched currency futures market in India and its growth and global trends in forex derivatives market. As foreign currency turnover has increased due to high trade between nations and huge capital flow so there is need for hedging the risk of adverse movement in foreign exchange rate (Annachhatre, 2012).

Exchange traded currency derivatives were increased as compare to OTC derivatives. USDINR was the most traded currency pair at the initial stage (Rajkumar and Rani, 2012). Furthermore, some researchers explored growth and development of currency futures market in India and analysed that there was increased exchange rate volatility of INRUSD during conventional and non-conventional trading hours (Chakravarty & Parveen, 2010). Currency forward market plays a major role in determining foreign exchange spot rate and minimising the risk associated with it (Srikanth et al., 2012). USDINR forwards in Indian foreign exchange market affected by many factors in the market (expectations, increasing FII) and it was concluded by collecting primary data. Currency derivatives market, its trading procedure and uses of various currency derivatives instruments makes investors to manage fluctuations in the exchange rates. Both over the counter and exchange markets have the facility of currency derivatives. Currency derivatives are useful to achieve stability in the earning in foreign exchange market (Tebogo, 2012). Furthermore, Kadyan (2014) analysed the Indian rupee role as an international currency. It was concluded from the study that Indian rupees was not an international currency at the time of the study. Indian rupee has high volatility and its chances of becoming international currency is still so far. In a study Pandey (2014) analysed the currency risk management by using currency derivatives tools. The study explained the transaction, translation and economic exposure. The study also explained how currency futures works for currency risk management procedure. Currency derivatives was proved as a successful tool for hedging the risk involved in foreign exchange market. The monthly turnover of currency derivatives at NSE during February 2018 rose at 5,06,671 crores from 1,57,554 crores in December 2011. During the same time the monthly turnover of currency derivatives at BSE rose at 4,21,034 crores from 5,40,691 crore and the monthly turnover of currency derivatives at MSEI fell by 6.1 per cent to 9,928 crore from 10,573 crore as per data from securities Exchange Board of India (SEBI) and stock exchanges. Average daily turnover of currency future and options reached at Rs. 16778.20 crore in 2015 (Pallavi, 2015). In a study some new features like introduction of late evening hours, options, and products on other currencies, cross currencies were also suggested (Chakravarty & Parveen, 2010).

3.3 Use of Currency Derivatives by Various Firms

Currency derivatives are used by various firms to reduce their exposure of variety of risk. It is used by mostly those firms who has growth opportunities. Cost and benefits characteristics of firms helps in making decision regarding use of currency derivatives or not and also regarding particular choice among various currency derivatives instruments. Hedging through use of currency derivatives helps in reduction of under investment costs (Geczy et al. 1997). Similarly, Howton and Perfect (1998) investigated the currency derivatives and interest rate derivatives use by US firms. By using interest rate coverage and leverage it was indicated that those firms which has high risk exposure they are more likely to use derivatives. Foreign currency derivatives also used for speculation purpose along with hedging purpose, but firms should use them for hedging rather than speculation (Allayannis and Ofek, 2001). Which hedging instrument the firm should use it totally depends upon structure of a firm (Srivastva, 2013). Firms market value affected by making decision regarding use of currency derivatives or not. There is a positive relation between firm's market value and use of currency derivatives (Allayannis and Weston, 2001). Firms in the situation of greater growth opportunities and tighter financial constraints are more likely to use currency derivatives (Gambhir and Goel, 2003). Forex derivatives market affected by many factors like market liquidity, investors behaviour, regulatory structure and tax laws. In a study, Wong (2003) examined the hedgable exchange rate risk and non hedgable price risk of a competitive exporting firm by using currency options. Hedging role of currency futures is because of two distinct sources of non-linearity. First is the multiplicative nature of price and exchange rate risk. Second is the marginal utility function of the firm.

Currency derivatives are also used by firms for hedging transaction, translation and economic exposure as they affect firms in a different way (Srivastva, 2013). Currency derivatives used by firms for hedging committed transaction exposure to increase firm value by reducing indirect cost of financial distress or alleviating the underinvestment problem (Hagelin, 2003). Cross hedging also used by firms to analyse the foreign exchange rate risk exposure to a foreign currency cash flow of various multinational firms where direct opportunities are not available. A scenario was analysed in a study where currency derivatives market does not exist between domestic and foreign currencies, then cross currency derivatives used by firms (Chang and Wong, 2003). In some studies, hedging of financial risks by using various alternatives available to Indian corporates was analysed. Researchers reported that forward and option contracts are mostly used contracts for hedging followed by swaps (Sivakumar and Sarkar, 2008; Bhagawan and Lukose, 2017). Swaps and cross currency options are moderately used hedging instruments (Debasish, 2008). There are also non-users of derivatives who have some reasons like confused perceptions of derivatives use, fear of high costs, technical and administration constraints for managing currency risk. Firm decision to hedge negatively related to liquidity and investment opportunities and positively related to



size, foreign exchange exposure and leverage. Study concluded that firm's characteristics makes differences for using or not using currency derivatives and Indian firms use currency derivatives for reduce volatility in profitability (Bhagawan and Lukose, 2017).

3.4 Currency derivatives and Foreign exchange rate volatility

The FX is the most important financial market in the world. It facilitates trade, investment and risk sharing across borders. A key assumption in the concept of foreign exchange risk is that exchange rate changes are not predictable and this is determined by how efficient the markets for foreign exchange are.

3.4.1 Currency Futures

There is high volatility in FX market and introduction of currency futures affect the volatility of EURINR (Gupta, 2017). As, Pukthuanthong et al. (2007) analysed the case of floating exchange rate, which states that purchasing future contracts on currencies market priced at a discount and selling future contracts priced at a premium resulted into a profitable trading strategy. It explains the case of random walk theory. Though, the study of the volatility and impact of currency futures and options volumes on exchange rates becomes even more important in context of India given the emerging status of the economy and also the Indian market is not as operationally efficient as other developed nations' markets are. Pandey (2011) analysed that in terms of contracts traded and open interest at NSE and MCX currency futures were developed at rapid phase because it was proved as a good deal to hedge the risk. Similarly, Sarang (2012) analysed growth and evolution of currency futures in India. The study concluded that volatility increased substantially in 2011-12 to June 2012 due to issues coming out of global market.

In a study it was examined that volatility, trading volume and market depth are related with each other in currency futures market. By using granger causality test, variance decomposition and impulse response function it was concluded that Return volatility and Trading volume were reversely affected to each other because of sequential information hypothesis that explains the relationship between return volatility and trading volume. Return volatility possesses some predictive power with trading volume, but not with open interest (Fung and Patterson, 1999). Similarly, Guru (2010) considered that there is no causal relation between currency future volume and spot market volatility or between currency futures open interest and spot market volatility. Results also presented that impact of volatility in future markets on spot markets can be said to be low and that spot market volatility is overwhelmingly explained by spot market volatility innovations not by future market innovations. Also tells that return in forward market have effect on volatility of return in future market. As volatility increases it brings high trading in hedging instruments. And when it decreases it brings low trading. Many variables influence the foreign exchange derivatives market (Pavaskar and Kala, 2013). Chatrath et al. (1996) found a positive relationship between the level of futures trading activity and the volatility in exchange rate changes of British Pound, Deutsche Mark, Swiss Franc, Canadian dollar, and the Japanese Yen. Similarly, some other studies also found positive relationship between currency derivatives and exchange rate volatility while some of them found no relationship between these factors (Sahu, 2012; Rastogi, 2011). In a study, Chatrath et al. (1996) evidenced positive relationship between the level of futures trading activity and the volatility in exchange rate changes for British Pound, Deutsche Mark, Swiss Franc, Canadian dollar, and the Japanese Yen. Some studies evidenced that volatility has reduced after the introduction of currency futures in India. In a study, Nath and Pacheco (2018) analysed the currency future market in India. There is also impact of good news on spot exchange rate return as it causes more volatility (kumar, 2015; Thenmozhi and Thomas, 2007). Futures and spot market both have impact on each other in some way (Thenmozhi and Thomas, 2007). In India volatilities in exchange rate of various leading currencies causes volatility in daily exchange rate of Indian Rupee (Sahoo, 2012). Studies with regard to effect of currency futures on the foreign exchange rate volatility provides mixed results for various nations. Some of the studies found evidence that issuance of currency futures brings high volatility in the currency derivatives market while some other research found no effect on foreign exchange rate volatility (Sharma, 2011). Introduction of currency derivatives brings efficiency in the market as they are helpful in hedging and speculation purposes because currency exchange rate is harder to predict for market participants (Liu, 2007) and it was also analysed by Tornell and Yuan (2012). Sriram and Senthil (2013) found that Spot market reacts to new information faster as compared to futures market and because of unidirectional causality in currency market spot causes the futures. By examining the short-term causal relationship between spot return and future return of JPYINR traded in India it was found that there was a unidirectional causal relationship between spot return and future return of JPYINR currency pair in India (Raghu and Shanmugam, 2013). There is also bi-directional relationship between spot and futures market. Future market has very large impact on spot market (Bhat and Suresh, 2014, Yaganti et al.). In the case of lead lag relationship between future and spot market by taking following currencies -USD, GBP EURO and JPY, it was found that futures market come out as leading market (Kharbanda and Singh, 2017). In a study, bidirectional causal relationship was also found between volume and returns (Mittal and Kumar, 2016). Similarly, in a study impact of currency derivative on exchange rate volatility of Pound sterling was examined and it was found that introduction of currency futures trading has helped in reducing the exchange rate volatility of the foreign exchange market in India. Futures contracts considered as an unbiased predictor of changes in the spot rate for the Indian rupee US dollar (Kumar and Truck, 2014). Pre futures time period has consistent shock of volatilities having ARCH and GARCH effect as compared to moderate ARCH effect in post-introduction period (Kumar et al., 2015). There is also affect of recent news on currency derivatives as well as previous day's affect starts reducing. It was also indicated that in the post currency futures period



currency futures trading reduces volatility of JPYINR and GBPINR and increases volatility of EUROINR during post currency period (Sakthivel et al., 2017a). Furthermore, Kumar (2017) examined the coexistent and causal relationship between return, volatility and trading volume of currency future market for these currency pairs USDINR, EURINR, GBPINR and JPYINR. Positive relationship was found between currency future return and trading volume. Currency futures and interbank markets affect each other in some way and that brings volatility in the currency future market (Clifton, 1985). Exchange traded currency derivatives were increased as compare to OTC derivatives. USDINR was the most traded currency pair during the time of the study (Rajkumar and Rani, 2012). In a study, it was found that hedging effectiveness of currency futures is lower than that of OTC forward (Mohanraju, 2014). When there are no directly available currencies in the market then cross hedging also used by various firms.

3.4.2 Currency Options

Currency options can also be used for reducing exchange rate risk as well as for speculation purpose. Put call parity condition can be used with interest rate parity theory and with short and long position in forward exchange market (Giddy 1983). Similarly, in a study put call parity conditions for USDINR was analysed and it was found that there was violation of put call parity in USDINR currency option market and various arbitrage opportunities (Bhat and Arekar, 2015). In the currency option market, implied volatility has more information content than measures based only on information in historical price data. The study also suggested that to make decisions about future realised volatility, implied volatility cannot be taken as an unbiased predictor even it shows data too high or too low compared to actual volatility (Kazantzis and Tessaromatis 2001). Efficiency of currency options market was analysed by Hoque et al. (2008) by using four currencies British Pound, Swiss franc and Japanese Yen vis a vis the U.S. dollar. With regarding to calls and put options results showed that calls are overpriced relative to put. In another study, it was found that Foreign Exchange rate fluctuations are affected by international monetary market which have impact on interbank trading also. Currency futures and options both tools are effective for hedging but when it is about a comparative study currency future provides more effective hedge for covered position as well as currency option are effective for uncovered position. Uncovered position means company should choose the effective tool of hedging on the basis of flexibility, cost, effectiveness, liquidity (Demaskey, 1995; Maurer and Valiani, 2007). While Shastri et al. (1996) analysed that Currency Options market introduction resulted in less volatility of underlying securities vis-à-vis improvement in price stability for the British pound, Canadian dollar, German mark, Japanese yen and Swiss franc.

3.5 Price discovery in Currency derivatives market

Currency derivatives also play an important role in the price discovery and preventing the risk. Somehow managing the risk (Singhvi and Pandya, 2016; Tse et al., 2006). Spot foreign exchange market are more informative for price discovery than prices in futures market (Cabrera et al. 2009; Chen and Gau, 2010). By applying Johanssen & VECM and Garch-BEKK model Sehgal et al. (2015) found that in between futures market and spot market & futures markets long run equilibrium relationship was there. While in the case of volatility spill over it moves from futures to spot in short run and spot to futures in long run. Similarly, Sakthivel et al. (2017b) found unidirectional causal relationship from currency spot to futures prices of JPY/INR, GBP/INR and EUR/INR and bidirectional between currency spot and future prices of USDINR. Kumar (2018) analysed the price discovery process in currency market and lead lag relationship between spot and futures prices in foreign exchange market. It was found that prices in the Indian and south African currency (ZAR), spot market are more informative than the currency futures market and in the Brazilian currency (BRL) futures market leads the spot market.

4. Research Methodology for Reviews

4.1 Identification of Journals: Our main aim is to focus on the publications related to currency derivatives market. The choice of papers has been based on previous literature reviews, whose purpose was to identify papers which had made a significant contribution to currency derivatives field. Firstly, we chose currency derivatives as a broader area and then chose some journals dealing with currency derivatives market.

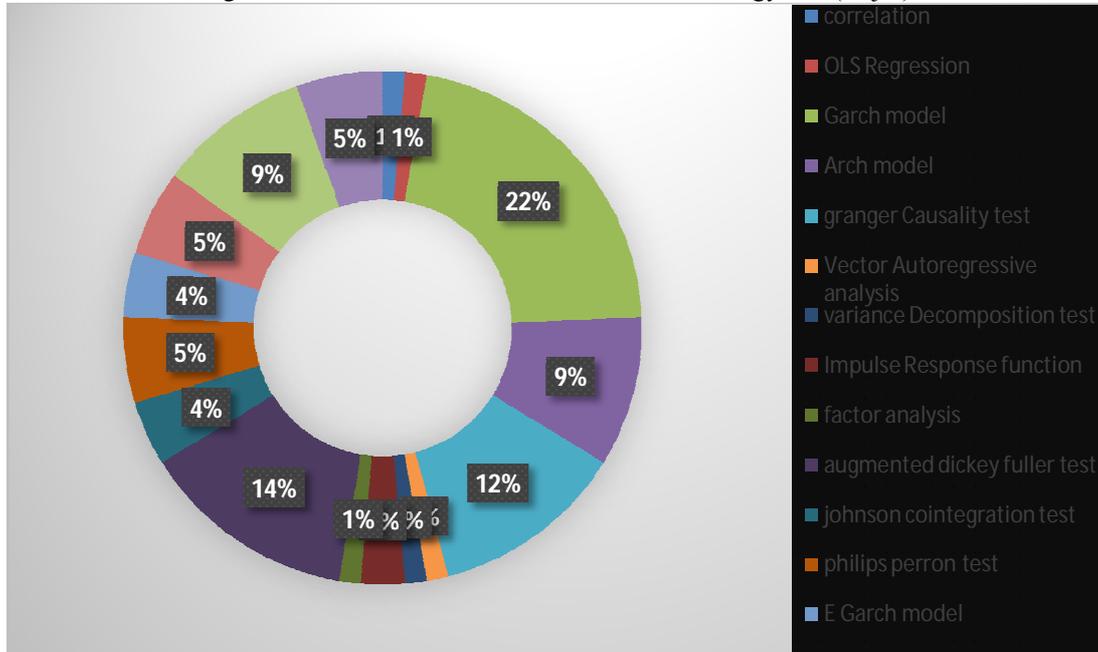
4.2 Selection of Papers: After being identified the journals, next step is to select those papers which are relevant for the topic. Selection of papers was on the basis of relevancy of the topic or area of the study. Consequently, many papers on currency derivatives were found in various journals selected in between 1983-2018. The highest percentage of these papers were quantitative empirical papers. Most of them used secondary data, collected from various online sources. Some of them are theoretical in nature.

5. Description and Classification of Reviews: A total 75 publications collected through the various journals are analysed in a systematic manner. Now, in this section analysis are based on year of publication, various currency pairs used, research methodology adopted, journal of publication.

5.1 Analysis by research methodology adopted: From figure 1 it can be seen that majority of research papers used Garch model, augmented dickey fuller test, Granger causality test for testing the currency derivatives market and its impact on foreign exchange rate

volatility. Other models for price discovery were also used in the study like lower partial moment methodology etc. Others BEKK Garch model, jarquebera test, tarch model, random walk hypothesis were also used.

Figure 1. Classification on the basis of tools/methodology used (major)



5.2 Analysis by year of publication: Figure 2 confirms the classification on the basis of year of publication. The analysis by year of publication confirms that selected papers were published from 1983 to 2018. Scarce study was found in between 1985 to 1994 during literature search. Most of research papers are concentrated in 2012 and 2017.

5.3 Analysis by currency pairs used: Figure 3 shows classification on the basis of currency pairs used. By analysing the various research articles, it was concluded that main focus of the studies was on US Dollar. In Indian studies USDINR, GBPINR, JPYINR and EURINR are highly used currency pairs. In foreign studies other currency pairs like Canadian dollar, swiss franc, German mark, Mexican peso, Singapore dollar, Russian ruble, South Korean won, Australian dollar, South African rand were also used.

Figure 2. Year-wise classification of studies

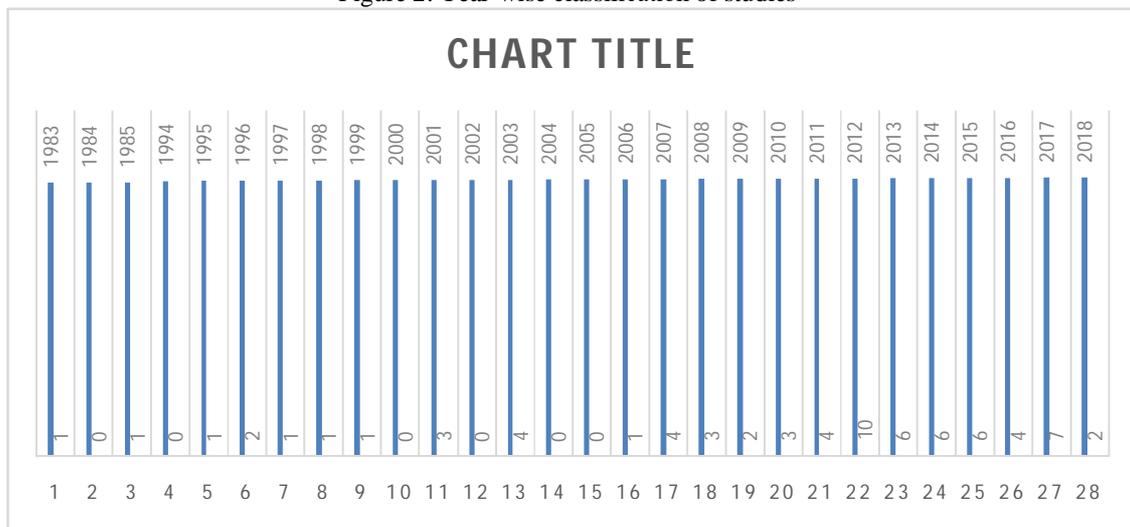
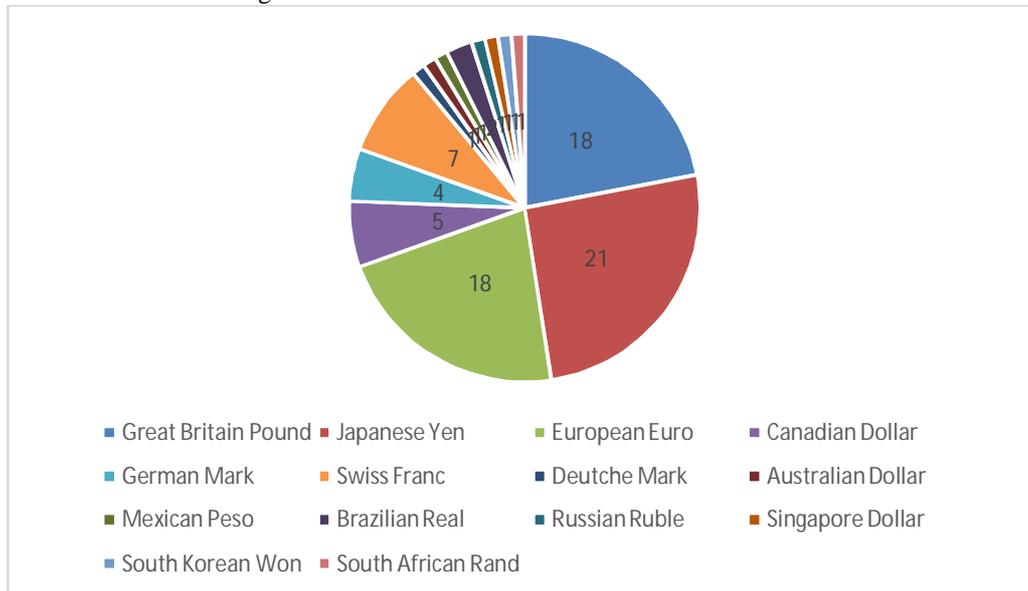


Figure 3. Classification on the basis of Currencies used



6. Conclusion

The currency derivatives market in India is showing a remarkable growth. During the early 1990s, India embarked on a series of structural reforms in the foreign exchange market. The movement away from pegged exchange rate regime to partially floated in 1992 and fully floated in 1993 was instrumental in developing a market-determined exchange rate of the rupee and was a significant step in the progress towards total current account convertibility. In order to advance Indian foreign exchange market to international standards, a well-developed foreign exchange derivative market was essential which started in 2008. Currency futures trading in India in INR-US\$ started on August 29, 2008. Till January 2010, exchange rate futures were available only for US \$ vis-à-vis Indian Rupee. Exchange traded currency futures have now been expanded to Euro, Pound and Yen pairing. SEBI and RBI allowed currency option on exchanges as on July 30, 2010. The Indian FX market witnessed increase inflows and outflows of various currencies. At the time of introduction of currency futures and option in India, it was thought that the currency derivatives market in India would make a notable contribution towards improving the menu of options available for currency risk management. International experience of the emerging markets with the introduction of currency derivatives is a mixed one. Many research studies conducted regarding analysing currency futures and spot market volatility interrelationship by using various currency pair. In several cases, the INR US\$ is the major currency pair which was taken by most of the Indian studies. Few researchers found volatility to be reduced following the constitution of currency futures market, some other cases evidenced no impact on spot market volatility. Yet there is no study conducted regarding measuring the impact of currency derivatives (currency futures and options) on foreign exchange rate volatility by using the currency pairs USDINR, EURINR, GBPINR and JPYINR. In the light of the above, it will be interesting to observe and analyse the impact of introduction of currency derivatives on foreign exchange rate volatility.

7. Research Gaps and Future Research Directions

The above-mentioned literature suggests that the currency market all over the world face a situation of uncertainty and are characterized by high volatility. This instability and volatility in currency market gave rise to currency derivatives market. Since the introduction of currency futures contracts in 2008 and currency options in 2010 in India, very limited number of studies have been conducted so far. Previous studies in the field of currency derivatives market in India has main emphasis on currency futures only. Hence there is a need to explore more the currency futures and options both markets and add relevant finding to existing literature. After an extensive review of the literature, we notice that no studies have been conducted in the Indian currency derivatives market mainly in currency futures and options market for testing the impact of currency derivatives on foreign exchange rate volatility with respect to currency pairs USDINR, EURINR, GBPINR and JPYINR. Various studies in the field of currency futures market and spot market volatility has been explored through literature but very few studies are available with sufficient evidence of the identified variable in Indian context. Some studies regarding exploration of currency futures and forward market and lead lag relationship between futures and spot market have been addressed by previous literature. A couple of studies have been conducted regarding usage of currency derivatives by various firms. Some analytical studies conducted in currency derivatives market for evaluating currency



options market's efficiency and its relationship with illiquidity, volatility, returns and speculation in currency market, price discovery in the currency futures and options market by using various currency pairs, but no study has been conducted which shows the impact of both currency futures and options market on foreign exchange rate volatility regarding currency pairs- USDINR, EURINR, GBPINR, JPYINR. Some of the previous studies in the field of currency derivatives market mainly focuses on US Dollar only as it was the first currency pair introduced in the field of currency futures. In India currency derivatives market is yet to be explored. Hence, the above research gaps offer a great opportunity for future research directions.

References

1. Aggarwal, N., Aggarwal, N., Dewangan, A., & Aggarwal G. (2013). Hedging of currency option in trading market. *International Journal of Economic and Management Strategy*, 3(1), 1-6.
2. Allayannis, G., & Weston, P. J. (2001). The use of foreign currency derivatives and firm market value. *The review of financial studies*, 14(1), 243-276.
3. Allayannis, G., & Ofek, E. (2001). Exchange rate exposure, hedging, and the use of foreign currency derivatives. *Journal of international money and finance*, 20(2), 273-296.
4. Akram, V., & Rath, N. B. (2017). Exchange rate misalignment and economic growth in India. *Journal of Financial Economic Policy*, 9(4), 414-434.
5. Annachhatre, M. (2011). Exchange Rate Volatility and Risk Management–Indian Scenario. *Economic Survey*, 2012. <file:///C:/Users/priyanka/AppData/Local/Microsoft/Windows/INetCache/IE/9E4DX00K/7.%20Meenal%20Annachhatre.pdf>
6. Bhat, A., & Arekar, K. (2015). An empirical test of efficiency of exchange-traded currency options in India. *Business and Economics Research Journal*, 6(4), 1.
7. Bhat, R. B., & Suresh, V. N. (2014). Price Volatility and Market Efficiency of Futures Market in India. *IOSR Journal of Business and Management (IOSR-JBM)*, 16(3), 11-18.
8. Chang, C. E., & Wong, P. K. (2003). Cross-hedging with currency options and futures. *Journal of Financial and Quantitative Analysis*, 38(3), 555-574.
9. Clifton, V. E. (1985). The currency futures market and interbank foreign exchange trading. *Journal of Futures Markets*, 5(3), 375-384.
10. Chen, L. Y., & Gau, F. Y. (2010). News announcements and price discovery in foreign exchange spot and futures markets. *Journal of Banking & Finance*, 34(7), 1628-1636.
11. Chakravarty, R. R., & Praveen, G. D. (2010). Exchange traded currency derivatives markets in India: The road ahead. *Macroeconomics and Finance in Emerging Market Economies*, 3(1), 139-146.
12. Chatrath, A., Ramchander, S., & Song, F. (1996). The role of futures trading activity in exchange rate volatility. *Journal of Futures Markets: Futures, Options, and Other Derivative Products*, 16(5), 561-584.
13. Cabrera, J., Wang, T., & Yang, J. (2009). Do futures lead price discovery in electronic foreign exchange markets? *Journal of Futures Markets: Futures, Options, and Other Derivative Products*, 29(2), 137-156.
14. CFA kumar S., Tavishi, G. Raju, Shahab, T., & Khatua, K. A. (2015) Empirical testing of exchange rate volatility with the introduction of currency futures in India. 2011 International Conference on Economics and Finance Research IPEDR, 4, 366-368.
15. Chandra, A., & Thenmozhi, M. (2012). Liquidity in currency options market in India. Retrieved on 2 June 2018 from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2255475.
16. DeMaskey, L. A. (1995). A comparison of the effectiveness of currency futures and currency options in the context of foreign exchange risk management. *Managerial Finance*, 21(4), 40-51.
17. Debasish, S. S. (2008). Foreign exchange risk management practices-a study in Indian scenario. *BRAC University Journal*, v (2), 81-91.
18. Ehlers, T., & Packer, F. (2013). FX and derivatives markets in emerging economies and the internationalization of their currencies. *BIS Quarterly Review*. Retrieved on July 2018 from <https://ssrn.com/abstract=2404448>
19. Fung, G. H., & Patterson, A. G. (1999). The dynamic relationship of volatility, volume, and market depth in currency futures markets. *Journal of International Financial Markets, Institutions and Money*, 9(1), 33-59.
20. Gupta, R. (2017). EURO/INR futures and exchange rate volatility. *International Journal of Academic Research and Development*, 2(4), 268-270.
21. Géczy, C., Minton, A. B., & Schrand, C. (1997). Why firms use currency derivatives. *the Journal of Finance*, 52(4), 1323-1354.
22. Guru, A. (2009). Forex derivative markets in India: Developments thus far and road ahead. Retrieved on July 19, 2018 from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1420615.
23. Guru, A. (2010). Interplay between exchange traded currency futures markets, spot markets and forward markets: a study on India. *Indian Economic Review*, 45(1), 111-130.



24. Giddy, H. I. (1983). Foreign exchange options. *Journal of Futures Markets*, 3(2), 143-166.
25. Gambhir, N., & Goel, M. (2003). Foreign exchange derivatives market in India-Status and prospects. *Derivatives Markets in India*, 2003, 205-220.
26. Hoque, A., Chan, F., & Manzur, M. (2008). Efficiency of the foreign currency options market. *Global Finance Journal*, 19(2), 157-170.
27. Hagelin, N. (2003). Why firms hedge with currency derivatives: An examination of transaction and translation exposure. *Applied Financial Economics*, 13(1), 55-69.
28. Howton, D. S., & Perfect, B. S. (1998). Currency and interest-rate derivatives use in US firms. *Financial Management*, 27(4), 111-121.
29. Kazantzis, I. C., & Tessaromatis, P. N. (2001). Volatility in currency markets. *Managerial Finance*, 27(6), 1-22.
30. Kumar, S. (2017). Revisiting the price-volume relationship: a cross-currency evidence. *International Journal of Managerial Finance*, 13(1), 91-104.
31. Kumar, S. (2018). Price discovery in emerging currency markets. *Research in International Business and Finance*. Retrieved on July 20, 2018 from <https://doi.org/10.1016/j.ribaf.2018.07.001>.
32. Kumar, S., & Trück, S. (2014). Unbiasedness and risk premiums in the Indian currency futures market. *Journal of International Financial Markets, Institutions and Money*, 29, 13-32.
33. Kumar, S., & Pathak, R. (2016). Do the calendar anomalies still exist? Evidence from Indian currency market. *Managerial Finance*, 42(2), 136-150.
34. Kadyan, H. (2014). Indian rupee's role as an international currency. *Abhinav-National Monthly Refereed Journal in Commerce and Management*, 3(2), 35-44.
35. Kharbanda, V., & Singh, A. (2017). Lead-lag relationship between futures and spot FX market in India. *International Journal of Managerial Finance*, 13(5), 560-577.
36. Kumar, A. (2015). Impact of currency futures on volatility in exchange rate: A study of Indian currency market. *Paradigm*, 19(1), 95-108.
37. Liu, S. (2007). Currency derivatives and exchange rate forecast ability. *Financial Analysts Journal*, 63(4), 72-78.
38. Mahanta, D. (2012). Indian currency futures: An analytical study of its performance. *International Journal of Marketing, Financial Services & Management Research*, 1(11), 72-77.
39. Maurer, R., & Valiani, S. (2007). Hedging the exchange rate risk in international portfolio diversification: Currency forwards versus currency options. *Managerial Finance*, 33(9), 667-692.
40. Mittal, S., & Kumar, A. (2016). Modelling volatility in Indian currency market. *International Journal of Bonds and Derivatives*, 2(1), 40-58.
41. Mohanraju, L. B. (2014). Currency futures trading in India. *Asian Journal of Multidisciplinary Studies*, 2(10), 146-152.
42. M. Bhagwan P., & P.J. Lukose J. (2017). The determinants of currency derivatives usage among Indian non-financial firms: An empirical study. *Studies in Economics and Finance*, 34(3), 363-382.
43. Mittal, K. A. (2012). foreign exchange market in India: Derivatives, expertise and insight. *GIAN JYOTI E-JOURNAL*, (1)3, 174-188.
44. Nath, G., & Pacheco, M. (2018). Currency futures market in India: An empirical analysis of market efficiency and volatility. *Macroeconomics and Finance in Emerging Market Economies*, 11(1), 47-84.
45. Pavaskar, M., & Kala, V. S. (2013). Impact of volatility in rupee-dollar exchange rates on currency future trading volume. *Financial Vision*, 1(4), 17-19.
46. Pallavi, E. V. P. A. S. (2015). A new era of currency derivatives market in India. *IOSR Journal of Economics and Finance (IOSR-JEF)*, 6(3), 36-40.
47. Pandey, K. D. (2011). Currency futures in India: An introduction. *ZENITH: International Journal of Multidisciplinary Research*, 1(8), 18-26.
48. Pandey, K. D. (2014). Currency risk management through currency derivatives. *SAMZODHANA Journal of Management Research*, 2(1), 1-11.
49. Pukthuanthong, K., Thomas III, R. L., & Bazan, C. (2007). Random walk currency futures profits revisited. *International Journal of Managerial Finance*, 3(3), 263-286.
50. Raghu, H. R. R., & Shanmugam, V. (2013). A Study on Causal Relationship between Spot Return and Future Return of JPY/INR Currency Pair Traded in India. Retrieved on July 20, 2018 from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3000787.
51. Rajkumar, D., & Rani, E. (2012). Currency futures in India: a review of its trend and progress. *International Journal of Multidisciplinary Management Studies*, 2(12), 82-95.
52. Rastogi, S. (2011). Impact of Currency Futures on Spot Market Volatility: An Empirical Study. *Vidwat: The Indian Journal of Management*, 4(2), 3-8.



53. Singh, S., & Tripathi, K. L. (2014). A study of currency market volatility in India during its pre and post derivative period. *International Journal of Core Engineering & Management (IJCEM)*, 1(6), 104-120.
54. Sahu, D. (2012). Dynamics of currency futures trading and underlying exchange rate volatility in India. *Dynamics*, 3(7), 15-24.
55. Sharma, S. (2011). An empirical analysis of the relationship between currency futures and exchange rates volatility in India. RBI Working Paper Series. Reserve Bank of India. Retrieved on May 24, 2018 from <https://rbi.org.in/scripts/PublicationsView.aspx?id=13323>.
56. Sahoo, S. (2012). Volatility transmission in the exchange rate of the Indian rupee. RBI Bulletin Publications, <https://rbidocs.rbi.org.in/rdocs/Publications/PDFs/08WPT220612FL.pdf>, Accessed on may, 24, 2018.
57. Srivastava, S. (2013). Hedging instruments for foreign currency risk. *Asian Journal of Multidimensional Research*, 2(1), 26-33.
58. Sakthivel, P., Chittedi, K. R., Sakyi, D., & Anand, V. V. (2017a). The effect of currency futures on volatility of spot exchange rates: Evidence from India. *International Journal of Economic Research*, 14, 427-435.
59. Sakthivel, P., Chittedi, K. R., & Sakyi, D. (2017b). Price discovery and volatility transmission in currency spot and futures markets in India: An empirical analysis. *Global Business Review*, 20(4), 1-15.
60. Singh, S., & Tripathi, K. L. (2016). A critical evaluation of volatility in Indian currency market. *Research Journal of Finance and Accounting*, 7(9) 26-34.
61. Sehgal, S., Ahmad, W., & Deisting, F. (2015). An investigation of price discovery and volatility spill over in India's foreign exchange market. *Journal of Economic Studies*, 42(2), 261-284.
62. Sivakumar, A., & Sarkar, R. (2008). Corporate hedging for foreign exchange risk in India. Retrieved on July 2018 from <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.615.5946>.
63. Sriram, M., & Senthil, M. (2013). Market Efficiency and Volatility Spill over in Spot & Futures Currency Market (with respect to \$ and Rupee). *International Journal of Management Excellence*, 1(3), 45-53.
64. Srikanth, M., Chittedi, K. R., & Tripathy, N. (2012). Dynamics of USD/INR forwards in the Indian foreign exchange markets. *AIMS International Conference of Management*. ISBN: 978-81-924713-8-9, 514-521.
65. Singhvi, S. A., & Pandya, A. R. (2016). Study on currency derivatives and their impact on value of currency. *Management*, 3(7), 59-69.
66. Shastri, K., Sultan, J., & Tandon, K. (1996). The impact of the listing of options in the foreign exchange market. *Journal of International Money and Finance*, 15(1), 37-64.
67. Tebogo, B. (2012). Currency derivatives: Valuation and risk management. Retrieved on July 19, 2018 from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2043514.
68. Thenmozhi, M., & M. Thomas, S. (2007). Price discovery and volatility spill over in spot and futures market: Evidence from India. *Indian Journal of Capital Market*, 4(2), 1-28.
69. Tornell, A., & Yuan, C. (2012). Speculation and hedging in the currency futures markets: Are they informative to the spot exchange rates. *Journal of Futures Markets*, 32(2), 122-151.
70. Tse, Y., Xiang, J., & Fung, W. K. J. (2006). Price discovery in the foreign exchange futures market. *Journal of Futures Markets*, 26(11), 1131-1143.
71. Wong, P. K. (2003). Currency hedging with options and futures. *European Economic Review*, 47(5), 833-839.
72. Yaganti, H. C., Kamaiah, B., & Gupta, H. (2015). Exchange traded currency future markets and risk management in India. *Journal of International Economics*, 6(2), 13-22.

Filename: 11
Directory: C:\Users\DELL\Documents
Template: C:\Users\DELL\AppData\Roaming\Microsoft\Templates\Normal.dotm
Title:
Subject:
Author: Windows User
Keywords:
Comments:
Creation Date: 12/21/2020 11:11:00 AM
Change Number: 22
Last Saved On: 4/12/2021 8:28:00 PM
Last Saved By: Windows User
Total Editing Time: 108 Minutes
Last Printed On: 4/12/2021 8:28:00 PM
As of Last Complete Printing
Number of Pages: 10
Number of Words: 6,754 (approx.)
Number of Characters: 38,503 (approx.)