Assessing the spillover effect of normalising unconventional monetary policy of the Federal Reserve in the United States on capital flows in India

By

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Abstract

In this research paper, we examine the indirect effect on capital flows, specifically in terms of Foreign Direct Investment in India, on account of the normalisation of unconventional monetary policy by the Federal Reserve in the United States. The importance of U.S. dollar currency has been explained and justified in the context of this research. The literatures revolving around the topical issue of non-standard monetary policy of the Federal Reserve has been discussed. We frame our research question, providing an appropriate rationale for this research. We consider quantitative analysis as the preferred methodology to understand the impact on capital flows. Within this methodology we use the statistical techniques of correlation and multiple regression analysis to statistically verify the difference in the capital flows. We choose a dataset for the period between 2008 to 2018 on macroeconomic indicators such as GDP, Inflation, Foreign Exchange rates of India and Fed Reserve fund rates and monetary base (MBase) of the U.S. economy as explanatory variables to assess the outcome in the variation of FDI in India. The analysis conclude that Federal Reserve fund rates and monetary base (total amount of money circulation) in the U.S. contribute negatively to FDI inflow in India whereas Inflation and Foreign Exchange rates are statistically significant explanatory variables in determining the effect on FDI flow to India. Hence, this paper makes an attempt to contribute to the existing literatures on the topic of unconventional monetary policy impact by developed central banks on capital flows to Emerging Markets.

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Chapter 1 – Introduction

The United States dollar (USD) currency enjoys popularity as the most favoured currency by businesses and governments alike across the world (Goodman, 2019) (Item no.1 in Appendix). In a majority of funding activity the USD is the preferred choice for lending to most of the borrowers outside of the United States, i.e. non-U.S. corporates issue debts and get loans sanctioned from banks in USD denomination, irrespective of their business and revenues not belonging primarily to the country. This trend is particularly relevant for companies in Emerging Market economies (EMEs), especially in the aftermath of the financial crisis in 2008 the dependency on this currency has risen in international debt markets (Aldasoro and Ehlers, 2018). As a consequence, an appreciation or depreciation of the currency has a logical impact on those who deal in USD denominated debt transactions. This increase or decrease in the value of the currency is majorly influenced by the monetary policies of the Federal Reserve (the Central Bank of America) as they govern and regulate all of the monetary activity related to the United States (Martin, Mukhopadhyay and Hombeeck, 2017).

Bräuning and Ivashina (2018) state that the monetary policy of the Federal Reserve has direct and indirect impact all over the world, particularly in Emerging Markets as the government and corporate borrowings in these markets is in USD. For such economies foreign bank loans constitute a significant portion of cross-border capital and that more than 80% of this money is in U.S. dollars. The impact of falling U.S. interest rates by the Fed Reserve acts as a "push factor" for credit availability in the EMEs, thereby indicating a relationship between the easing or tightening of policy and the expansion or contraction of credit outside of the United States. Fratzscher (2011) explains the term "push factor" in terms of changes in monetary and fiscal policies of the advanced economies acting as one of the reasons for a rise in flow of capital towards emerging markets. In other words, any reduction of interest rates by the central bank of a developed country leads to a logical increase (pushing) of capital flow to a developing country.

Earle (2009) mentions that the recent financial crisis a decade ago caused the beginning of a recessionary phase across economies around the world. Abbasi (2015) analysed that this phase led to a loss of confidence amongst the investor community and the public in the financial markets and institutions safeguarding the interests of the consumers. There was a lack of liquidity in interbank funding market and banks could not evaluate the worth of the assets of other banks. The term "liquidity" refers to cash and ability of assets or instruments to be easily bought or sold in the financial market such as capital or money markets for the

purpose of raising cash from such a transaction. Mishkin (1996) states that in times of a contraction of the economy, the central bank usually resorts to a monetary policy transmission mechanism of reducing interest rates (expansionary) and other decisions that would revive growth in the economy. A normal fall in the interest rate incentivises businesses to borrow and spend more and induces investment and also decreases the reserve requirement for banks resulting in more lending to consumers but at the same time makes savings less attractive for its citizens. All such decisions are taken in the interest of stimulating the economy back to its regular level of functioning, where there exists adequate levels of demand, investment, employment and price stability in the country.

But after the financial crisis in 2008, the Federal Reserve in the United States reduced the federal funds rate towards the zero lower bound i.e. between 0 - 0.25%. This was not the norm, but rather an exception that the Fed Reserve resorted to, to reduce the interest rates to such low levels. In addition to this, since this measure alone was seen to be not wholly effective, the central bank therefore, decided to inject cash directly into the financial system by printing money and use it to buy assets, mostly government bonds and from banks or pension funds. This process of infusing money into the economy is known as the "Quantitative Easing"(QE) programme (The Economist, 2015). Here, it is to be noted that now the Federal Reserve is in the phase of normalising monetary policy since December 2015 onwards and not monetary tightening as is in the case of regular central bank functioning. Hence, this phase will form a part of the backdrop of this research. The term "normalisation" indicates the return of both short-term interest rates and securities holdings of the Fed Reserve to more normal levels, i.e. reversal of zero lower bound interest rates that were in effect since the onset of financial crisis and no further expansion of the Federal Reserve's balance sheet.

The QE and reduction of interest rates to zero lower bound were unconventional monetary policy measures undertaken by the Federal Reserve in the aftermath of the financial crisis. The QE programme was carried out in three phases between 2008 and 2014. Czeczeli (2016) points out that during this programme an unprecedented amount of money – 3.7 trillion dollars, was pumped into the American economy, but the end result of carrying out such a programme is still debatable amongst experts in the financial world. However, the United States still continues to be the strongest economy in the world. The purchase of assets by the Federal Reserve created a demand for long-term instruments, encouraged investors to take longer positions and thereby reducing liquidity risk of the instruments. The term "liquidity risk" refers to the inability of the assets to be converted into cash for the purpose of raising capital for any organisation. Therefore, this measure signalled a good sign for an economy that had suddenly experienced a severe liquidity crunch. However, Feldstein (2010) and Chen (2013) analyse that due to the increase in money supply the value of the dollar depreciated.

This depreciation of the currency made the domestic (U.S.) market less attractive and as a result of this, the investors started to invest in foreign (EMs) bonds and equities resulting in the demand and appreciation of foreign currencies. The banks were also incentivised to lend more money aka 'the carry trade' and a part of it was used for foreign funding investment due to better returns which also caused the value of foreign currencies to increase (Wigglesworth and Wagstyl, 2013). In addition to this Bräuning and Ivashina (2018) highlight that the zero lower bound constraint on Fed Reserve's rate caused an increase in the supply of the dollar making foreign loans available at cheaper rates. This phase of excess money availability will form a part of the timeline in the Indian context of this research, as the country has been discussed in past literatures as one of the emerging markets to have received more than expected capital during this period.

The withdrawal of QE programme and lower interest rate regime:

The turnaround took place when the reversal (tapering) of the programme started in 2014. Bouraoui (2015) mentions that withdrawal of the quantitative easing programme had a negative impact on emerging markets which resulted in decline in the balance of payments position and as a consequence a depreciation of exchange rates of those countries to a considerable extent. The Balance of Payments (BOP) position is the record of a country's international trade and financial transactions. The BOP consists of Financial/Capital account and Current account transactions indicating the amount of trade and investment that a country gives and receives over a period of time (Melvin and Norrbin, 2017).

Estrada, Park and Ramayandi (2016) analysed that equity markets of emerging countries did experience a drop in prices when the tapering news was announced by the Fed Reserve in 2013. They concluded that although Asian equity markets were less affected due to the tapering, but they were not totally immune to its negative effects. An important point here is the negative response to the equity markets and similar type of analysis will be carried out in this research, but from a general perspective of capital flows to verify whether the inflows experienced a spike or a drop after the increase in interest rate was announced by the Fed Reserve. Mishra, N'Diaye and Nyugen (2018) examined long-term government bond yields of EMs, on the backdrop of how resilient the financial markets of emerging countries were when the episode of tapering took place after the first announcement and concluded the government bond yields experienced an increase. However, the government bond yields are not considered in this research as one of the characteristics to assess whether they experienced a rise or fall in the yield due to fluctuation of capital flows, because we specifically look at capital flows and the variation within it due to certain macroeconomic factors in India and changes in the foreign (U.S.) monetary policy.

As part of unwinding its unconventional monetary policy, the Federal Reserve also started normalising the federal funds rate from December 2015 onwards from zero lower bound gradually raising it upto 2.5% (Board of Governors of the Federal Reserve system, 2018). Burns *et al.* (2014) cautioned that normalisation of interest rates could lead to a fall in portfolio investments and that a rise in global bond yields by 200 basis points could reduce capital inflows by around 80% to emerging market countries thus leading to slowdown by 0.6% in the GDP of these countries over a period of time. Cuipa (2016) in the wake of the first increase in interest rates in December 2015, outlined the possible risks that emerging countries would experience due to gradual increases in the target benchmark rate. The article mentions that all the money that flowed to emerging markets during the period of monetary easing would experience a reversal resulting in acute shortage of finances to such countries. Steffen (2016) emphasised particularly on countries that had weaker financial markets or higher current account deficits and dependency on commodity exports, to prepare themselves for further rate hikes. All of the above studies are important and relevant in the context of this research as the timeline for the findings would include the period of post-normalisation of interest rates by the Fed Reserve to evaluate and verify the fluctuation of capital flows to India.

One of the emerging countries that is likely to be affected by any change in the Federal Reserve monetary policy is India as it has substantial dealings with the United States in terms of trade and other financial relations. Martin *et al.* (2014) outline that India is an important trading partner in terms of bilateral relations with United States. The trade flows between the countries have risen by 78.3% between 2009 and 2013. The U.S. service sector imports from India had increased from USD 12.22bn to USD 19.041bn between the same period. The U.S. has been the sixth-largest source of Foreign Direct Investment (FDI) in India, forming 5.4% of all FDI inflows between 2000 and 2014 with USD 24.3bn flowing in 2013 alone. According to a report by the India Brand Equity Foundation (IBEF) (2019), the primary and secondary markets have drawn the attention of Foreign Institutional Investors (FII) and Foreign Portfolio Investors (FPI) to India that have acted as one of the major factors of the country's financial markets, investing around USD 171.81bn between 2002 and 2018 which prompted the total market capitalisation of all listed companies on Bombay Stock Exchange to cross to a more than expected mark. This research however, does not propose to assess the capital flows from any particular country's perspective towards India, rather the above figures mentioned are just an observation and not to establish the extent of the relation specifically between two countries.

There exists a range of literature analysing the spillover effects of adopting quantitative easing measures and its tapering such as Tan (2015), Cho and Rhee (2014), Gagnon *et al.*

(2011), Bouraoui (2015), etc. but little, if any, research is available on normalisation of interest rates and its impact on capital flows since it is a recent phenomenon. This area is worthy of research because according to Lagarde (2016) emerging economies comprise 85% of the world's population and have contributed to more than 80% of global growth since the financial crisis and have also played a key role in providing employment to developed countries as well.

The Author, therefore, intends to fill a gap and add value to the existing literature by analysing the effects of interest rate normalisation over capital flows in India as an emerging market. A lot of studies have relied upon methodologies like Event study, Vector Auto-regression, etc. to assess and understand the impact of the application and reversal of the quantitative easing process in developed economies and its spillover effect on emerging markets. The Author on the contrary, proposes to use statistical analysis to decipher the capital flow movement in India, in the wake of unwinding of the zero lower bound interest rates of the Federal Reserve in the United States. The later sections of this document will comprise of research question, a literature review section discussing what the existing literatures says on the topic of unconventional monetary policy and Indian capital flows, the methodology section that will present the findings of this research, its analysis and interpretation and finally the conclusion.

Chapter 2 - Literature Review

2.1. Introduction:

This section will include the review of previous literature on the topic of unconventional monetary policy. The purpose of this section is to highlight the objectives of the past research, to critically analyse the concepts and methodologies undertaken by them and to understand their findings and conclusion, simultaneously pointing out the limitations related to this topic. In addition to this, an observation will be made in the literatures on the issue of spillover analysis, the transmission channels through which they occur, especially the exchange rate channel and the different methodologies adopted to derive the results. Lastly, the capital flows towards India in particular would be examined to understand the importance of foreign capital to the economy. On reviewing this literature an attempt will be made to understand them from different perspectives and their importance within the context of this research will be explained as well.

2.2. Current Literature:

The current literature on adoption and reversal of non-standard monetary policy by the Federal Reserve on any particular country is sparse. There is literature that examines the impact of the onset and the tapering of unconventional monetary policy on emerging markets in general. Chen *et al.* (2015) found that the impact during the unconventional monetary phase was more in comparison to traditional easing and tightening of monetary policy before the global financial crisis. Lin *et al.* (2018) analyse a phase-wise impact of the QE programme on emerging market economies' foreign exchange reserves, stock markets and foreign exchange markets. They also find that this type of non-standard monetary policy helps emerging countries experience increased capital flows in the short-term but does not sustain the same upward trend for a longer period of time. Bouraoui's (2015) research focuses only on the impact that caused fluctuation in the value of currencies of emerging markets due to capital flows particularly during the last phase of the QE programme. The study finds depreciation in currencies, but the size of the impact differed from one country to another. Bahmani and Toms (2015) have examined the impact of increased money circulation in the United States on FDI from that country to Brazil as an emerging economy. They concluded that QE in U.S. lead to a surge in capital flows and a transfer of technology in the form of FDI towards Brazil.

The above studies have more or less concentrated on the effects of the quantitative easing either in whole or in part on different macroeconomic and financial market indicators of emerging markets. This research would also focus on similar indicators of the Indian economy to assess the impact on capital flows. However, this research takes inspiration from the literature mentioned on assessing the impact of QE on Brazil. For the purpose of this research the methodology and variables used to study the impact of FDI in Brazil would be similar to assess the impact on capital flow in India, but in the different scenario of normalisation of interest rates in the U.S. Since Bahmani and Toms (2015) in their conclusion have pointed out the ability of FDI to cause potential retrenchment of capital from the host country due to a change in the domestic situation, therefore the author intends to understand this aspect from India's perspective as an emerging economy receiving FDI from developed economies.

However, as far as assessing the impact of normalisation of interest rates is concerned, due to lack of research there are Working Papers of certain banks and world renowned institutions like the International Monetary Fund, World Bank, etc. mentioning the possible effects of

increase in the federal funds rate on the emerging markets. Dahlhaus and Vashishtha (2014) anticipated that due to conventional wisdom, bond markets would be the first one to notice some movement as investors would look for instruments that provide higher yields for their investments. However, they mention that exact influence of the policy would depend on the level of interaction between a particular emerging market and the United States. Guichard (2017) calls for more research to be done in this area on the drivers of capital outflows, financial policy spillovers and the effect of exchange rate fluctuation in relation to its different transmission channels.

However it is to be noted that a quantitative research provides a conclusive evidence of a particular change in explanatory variables due to the introduction of certain policy measures and its impact on the dependent variable, whereas the objective of a working paper is to elicit comments and debate from different quarters and is considered to be a work-in-progress towards carrying out an actual research.

2.3. Theoretical Framework:

As mentioned earlier in the introduction, the USD currency enjoys global significance amongst businesses and governments alike, therefore we could assume with reasonable probability that any change in the Fed Reserve monetary policy would cause a spillover effect on all those transactions dealing in this particular currency. The term "spillover effect" can be explained as the change in the domestic policies of one country having an indirect impact over the economy of another country. Brauning and Ivashina (2018) state that due to USD currency domination, any easing in monetary policy in that country noticed a 32-percentage point increase in credit lending by banks whereas a contraction of the policy led to a reduction of lending towards Emerging markets. Chen, Mancini-Griffoli and Sahay (2015) concluded that emerging markets experienced a rise in demand for debt instruments, domestic currency and surge in asset prices whereas economists were concerned about the domestic export and import situation due to fluctuations in the exchange rate caused by an extraordinary monetary stimulus(quantitative easing) in the United States after the financial crisis. All such are characteristics caused due to spillover effects of an advanced economy monetary policy on a developing economy.

These effects take place through various different channels such as exchange rate channel (the value of a particular currency against another currency for the purpose of conversion), trade flows (the total amount of goods and services imported from and exported to between two countries) and capital flows (the total amount of money that is invested by one country in another country by way of Foreign Direct investment, Foreign Portfolio investment or

banking flows). As per United Nations Conference on Trade and Development(UNCTAD), Foreign Direct Investment(FDI) is a long-term investment by an entity or an individual in one economy into an enterprise/company of another economy by way of exercising a controlling interest in the business. FDI can be via three channels – equity, reinvested earnings and intra-company loans (United Nations, 2007).

The term Foreign Portfolio Investment (FPI) as mentioned by the Reserve Bank of India (the central bank) is an investment by any entity or individual in one country by way of equity, debt or other financial instruments in the recipient country's capital market. According to the International Monetary Fund(IMF) portfolio investment mainly comprise of equity and debt securities and instruments within each of these that are tradable on various different stock exchange and financial markets. Koepke (2015) reviews that flow of cross-country capital depends on a range of factors that form part of the popular "Push-Pull" framework which help in understanding whether it depends only on either the "Push" factor or the "Pull" factor of this framework or the derived result is a combination of both the characteristics in each of the two countries.

The abovementioned literatures concentrated on the cause and effect proposition of capital flows amid application and unwinding of QE programme. This research would instead, emphasise on finding if any change occurred in the capital inflow to India due to reversing of lower bound interest rates in comparison to the period when the interest rates were at its zero lower bound. On understanding the impact, the research would not go deeper into the aspects of whether which part of the financial market was more affected or less affected as discussed in the studies above, but would simply state the factors that led to a change in the flow towards India.

2.4. General Spillover analysis:

The Spillover effect can take place in a number of ways depending upon the situation. Basri (2017) says that a mere discussion of ending the Quantitative Easing programme in early 2013 caused the exchange rates, stock and bond markets of the five main emerging markets to drop significantly. Bouraoui (2015) also supports by stating that the announcements and confirmation of tapering the programme during May and June 2013 caused severe capital outflows from emerging markets and led to major fall in the currency value of those markets. Estrada *et al.* (2016) found a slump in the equity markets of emerging countries in the wake of the announcement of reducing the monetary easing policies by the Fed Reserve chairman at the time. The above are examples of spillover effects occurring during the unwinding of the QE programme whereas such situations have occurred even when the Fed

Reserve implemented the credit easing policy by purchasing assets due to which the emerging markets experienced large influx of capital into their economies.

Pyun (2016) on determining the factors behind equity and debt flows to emerging markets concludes that spillover effect did occur in different ways on observing the portfolio of a bigger dataset of twenty-six years. Lin *et al.* (2018) also conclude with similar findings of spillover effects on foreign reserves, foreign exchange market and stock market of emerging countries during the onset of the QE programme. Wei and Bandara (2009) conclude that spillover in the form of Foreign Direct Investment has been beneficial for the technological sector in their economy. They state that FDI has played a positive role in increasing the competitiveness of the firms in few of the Chinese provinces and suggest some strategies to attract more foreign capital in this way to give a further boost to their economy.

Fratzscher, Duca and Straub (2016) on comparing the results of the European Central Bank (ECB) and the Federal Reserve's unconventional monetary policy, states the U.S. dollar has a bigger and wider impact on international financial markets. This is due to the different factors such as the most important reserve currency, the country's bond market and preference of the currency for emerging markets for the purpose of acquiring loans especially after the financial crisis. The study concluded that ECB unconventional monetary policies affected more within the European area and had negligible impact in regions outside of this area.

All the above literatures speak about spillover effect in common, some of them occurring due to mere announcements whereas others on the actual execution of monetary easing policies. The effects also occurred on reversal of these policies by the Fed Reserve as a result the emerging countries noticed an outflow of capital from their economies. Similarly, this research would also make an effort to contribute to the existing literature by examining the spillover effect of normalising interest rates by the Fed Reserve and its impact on the capital flows in India.

2.5. Exchange Rate channel:

The exchange rate channel is one of the vital metrics to assess the performance of any economy. It is the rate at which a particular currency's value is ascertained in comparison to another currency. As mentioned in the introduction the U.S. dollar is the preferred currency amongst the financial community worldwide. The reason behind this is the faith that investors repose in the American economy and its advanced financial market. The value of any currency depends on a number of factors such as central bank interest rates, debt levels of a country and the overall strength of the economy. As per economic theory a fluctuation in exchange rate can be attributed to various reasons. A currency's worth drops if the prices of

goods and services produced in the domestic market goes beyond acceptable levels for consumption. This swing in price is known as the rate of inflation that forms part of a fundamental metric of any economy and over which the central banks keep a watchful eye. As a result of this a central bank tweaks the short-term or the long-term lending rates depending upon the need of the situation. If the lending rates are higher it enhances the value of that nation's currency whereas if the rates go lower then the currency value drops.

However, an increase or decrease in the value of a currency does not solely depend on monetary policy but on a host of other factors. One of the ways in which a currency's value is maintained is the exchange rate regime that is adopted by a particular country. Some countries adopt a fixed rate system whereas others adopt a floating rate system. India has adopted a 'managed floating rate system' wherein the currency is exchanged in a free market until the central bank intervenes to manage the worth of the currency by selling or buying it from its reserves (Lumen Learning, 2019). The exports, imports and the international investment of that economy is dependent on the exchange rate value of the domestic currency. For example, if the dollar appreciates then the imports in India would become expensive and on the other hand exports to the United States would be beneficial to the Indian economy as that would bring in more revenue, thereby contributing to the GDP of the country positively. From an international investment perspective, India as a developing country would be a more lucrative destination for investment for Foreign Institutional investors if they receive a good rate of interest for their returns.

Most of the empirical research articles on the impact of monetary policies of advanced economies on cross-border capital flows do consider exchange rate as one of the variables that might cause an effect on different forms of international flows that an emerging country receives from developed countries. Shin (2017), Bouraoui (2015), Park *et al.* (2016), Lin *et al.* (2018), Shastri and Shastri (2016) and Pattayat (2016) have all included exchange rate as either the independent or the dependent variable in accordance to aim or objectives of the research. Bouraoui's (2015) research particularly focuses on the performance of emerging market currencies during the initial phase of tapering of the quantitative easing programme. The findings conclude that the unwinding of the programme led to significant capital outflows and thereby the EM exchange rates did depreciate in value, but the size of depreciation differed from one country to another. Lin *et al.* (2018) conclude that the foreign exchange markets appeared to be the second most affected variable in the first stage of the QE programme, but notices a descending impact over the next two stages of the programme on the emerging markets.

On the contrary Shin's (2017) findings conclude that capital reversals during the tapering had no role to play in the decreasing exchange rates of developing countries. As also from an Indian perspective, Shastri and Shastri (2016) results suggest that interest rate differentials did not have any effect on exchange rate movements of the Indian currency in any way. The term 'interest rate differential' refers to the difference in the interest rate between two currencies in a pair. This is of particular concern in foreign exchange market for pricing purposes. This research would also consider exchange rate as a factor to assess the effect on capital flows in India, but to simply look at the variation it cause to the flow instead of exploring its various dynamics in other contexts.

2.6. Alternative Methodologies:

This section will acknowledge the various types of methodologies and capital flow models used to empirically assess the movement of different forms of capital flow in the current literatures.

The existing literatures examine the effects of non-standard monetary policies of central banks from multiple angles. Bouraoui (2015) used event study methodology to understand the impact of the tapering of QE programme on depreciation in currencies and also regression analysis to further understand the factors that drove the value of currencies to drop. Patnaik, Shah and Singh (2013) also use a modified event study methodology to derive answers to what factors drove foreign investors to invest in India. Dhingra, Bulsara and Gandhi (2015) used Auto Regressive Integrated Moving Average model to forecast Foreign Institutional investment flows towards India. Lei and Liu (2015) applied vector autoregressive model to understand the effects of U.S. money supply on global business cycles. Mallick and Sousa (2013) used different VAR techniques such as Bayesian, Sign Restrictions and Panel VAR to assess the impact of monetary policy transmission on commodity prices in five main emerging market economies.

Event study methodology is widely used in the field of finance to assess the impact of a certain economic event over the market value of a company. It mainly concentrates on a particular day of announcement of any policy rolled out by banks or government and how it affects the performance of capital flows of an enterprise. However in the above literatures this methodology has been used from an economic perspective to evaluate the fluctuations in exchange rate market and understand the behavior of foreign investors towards a particular economy on separate occasions of similar or different announcements in the financial market. On the other hand the VAR (Value at Risk) analysis is mainly applicable to estimate the

percentage of loss that an organisation or a country is likely to suffer on account of any loss of investment or capital.

A number of studies do use only regression analysis but the aim and objective differ from each other as well from the objective of this research. Pattayat (2016) does regress variables to ascertain the impact on GDP in India but uses Johnson Co-integration test to understand the relationship between the dependent and independent variables. The objective of the research is to examine the factors behind FDI flows towards India. This study will also make an attempt to determine the relationship between the variables, but using a basic correlation technique with the help of certain software tools available for analysing quantitative data. Ramirez and Gonzalez (2017) used regression analysis to empirically prove the determinants that caused international capital flows to fifteen emerging markets in the post-crisis period due to monetary easing measures undertaken in the advanced economies.

2.7. Related literature for Indian capital flows:

Rani (2013) mentions that the present flow of outside investment in India can be attributed to the phase of globalisation that India undertook during the 1990's. The economic policies of the country were made accommodative by adopting the Liberalisation, Privatisation and Globalisation (LPG) model that opened the economy for foreign investors to invest in the country in the form of direct investment or joint ventures with local businesses. Since then, India has benefitted immensely in terms of receiving capital, technical know-how, advanced machinery and other infrastructure from developed nations. This requirement was necessary for fulfilling the demands of the increasing population, employment and restructuring the balance of payments position of the country that experienced a crisis situation due to its depleting foreign exchange reserves.

However, Majumdar and Nag (2015) state that the net capital flows increased from USD 7057mn in 1990-91 to USD 106,585mn in 2007-08 i.e. just before the financial crisis. Their research paper offers an exploratory view of different forms of capital flows towards India categorising them depending upon their characteristics and offers a detailed view of how each of the flows react based on those characteristics on the dataset of the period between 1990 and 2014. The research highlights the importance of foreign capital flows to India as a developing economy in the recent decade. India attracts capital via different channels and each of these channels affect the economy in their own individual ways. On analysing the capital flows from six different angles, the findings provide that Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) form the main components of capital flows followed by banks, commercial lending and short-term loans to India. FDI can take shape in the form of

Equity, reinvested earnings and other capital whereas FPI includes Foreign Institutional Investment (FII) either through equity or debt and Global Depository Receipts (GDR) or American Depository Receipts (ADR).

However, after the crisis in 2008, the emerging countries' exposure to such capital became uncertain due to bankruptcy of Lehmann Brothers and consequently lack of interbank liquidity among commercial banks thereby leading to a shortage in lending and borrowing transactions worldwide. All the developing nations faced some or other obstacle in their economic activity due to this reason. However, not all of the negative effects in emerging economies can be attributed to the crisis, as attraction of capital and foreign funds depends on a range of other domestic factors as well.

India also as one of the emerging markets, could not remain totally immune to the effects of the crisis. The country experienced declining exports, turnaround of capital flows and a major chunk of the commodity sector underwent a considerable drop in comparison to the pre-financial crisis period. The country faced an unprecedented volatility in its capital flows in the 2008-2009 financial crisis compared to 1990's depleting foreign exchange reserve problem and the Asian crisis during 1997-98. The reason behind such a fluctuation can be attributed to an increase in global integration of India with the world market over a period of two decades from 1990 to 2010. The Foreign Institutional investors (FII) rearranged their portfolios concentrating towards their home countries instead of sustaining their investments in India as a result of which the portfolio flows in 2008-2009 were very low in comparison to 2007-2008.

The value of INR currency declined drastically within a span of six months between April 2008 and October 2008. The capital markets namely the Bombay Stock Exchange(BSE) and the National Stock Exchange(NSE) plunged due to withdrawal of investments by the FIIs, as a consequence the stock, bond, money and credit markets faced lack of demand. Following this, the Foreign Direct Investment(FDI) also noticed a downward pressure during the same period. All these falling indicators led to a cascading effect on decreasing employment, consumer expenditure, less investments and consequently a negative effect on the Gross Domestic Product (GDP) of the country.

Shylajan (2014) addresses that a major reason behind the spillover effect of the financial crisis towards India is its external sector vulnerability, mainly due to the trade interactions with the rest of the world. The current account deficit in Balance of Payments position has been the most fragile and continues to be on the rise coupled with weakening of the currency, increase in external debt, all have played a role post the financial crisis of 2008-09 in reversing of

capital flows from India. At the same time, Siddiqui and Azad (2012) reason that India being a developing and capital scarce country does require FDI and FII intervention as this would be beneficial for both, the country and the investors at the same time. They categorise the importance of FDI being a medium to long term investment and FII a short term investment and through their research on correlating the impact on returns on Bombay Stock Exchange, they conclude that a rise in returns cannot be solely attributed to FII investment but other domestic investment also have a role to play. They emphasise the need to channelise the foreign investments to areas where businesses find it difficult to raise capital from the capital markets.

Tan (2015) tracks the performance of Indian equity funds for the period that coincided with the onset of the quantitative easing programme. It concludes that the Indian CNX500 price index during five year ten months period did exceedingly well in comparison to other developed market indices and acknowledges that the phase of QE did play a role in in the equity funds performing better during the research period. However, Shin's (2017) findings conclude that the actual capital flows during the QE programme were the ones that were mostly responsible for the reversal of flows during withdrawal of the programme. But Estrada *et al.* (2016) from an equity markets perspective conclude that, emerging countries faced a slump in their stock markets during the talk for unwinding of the QE programme, but India as one of the countries in the sample data faced less pressure in comparison to other neighboring Asian countries in its stock prices. This conclusion is also supported by Basri (2017) stating that India prepared itself better in terms of policy-making and other measures that made the country fundamentally strong in order to deal with any upcoming change in the developed financial market. At the same time, it also cautions that similar short-term strategies would not work in the future in the country's favour for mitigating the current account deficit.

Pattayat (2016) analyses the determinants of FDI inward flows towards India for the dataset of the period between 1980 and 2013 and the findings suggested that GDP, Trade openness and Exchange rate are fundamental factors of FDI in India whereas on the contrary Pradhan and Kelkar's (2014) research conclude that these variables did have a positive impact but they were found not to be statistically significant. There were some basic differences in both the studies on understanding what factors lead to an inflow of FDI in India. The former literature used a dataset of thirty-three years whereas the latter used a dataset of twenty-one years. As also the methodology used to determine the factors were different in both the studies. Pattayat (2016) applied Johnson's Co-integration test for understanding the long run relationship between the dependent and the independent variable and merely three explanatory variables were used whereas Pradhan and Kelkar (2014) applied a simple regression analysis to ascertain the relationship and used six variables for the research.

The different dataset and the methodology used is what has led to a different outcome for both the studies on understanding the FDI flows in India. The dataset of thirty-three years includes a decade old data before the Liberalisation, Privatisation and Globalisation event of 1991 and thereafter, whereas the dataset of twenty-one years would include events only after the Indian economy was made accommodative for foreign investors since 1991. Since then various events such as the Asian crisis of 1997-98 and the U.S. financial crisis of 2008-09 and the credit easing programme(QE) thereafter, have also been included in both the datasets that have had an impact on the capital flows in India.

Jacob and Nair's (2013) research on Foreign Portfolio Investment(FPI) in India concludes that capital flows through this medium are not significant when compared to other forms of flows. Moreover, FPI was considered to be the riskiest form of capital flow as it is less regulated than other forms of receiving investment. Sarma (2013) on specifically analysing flows from just one country, highlights that United States has been one of the major contributors to the FPI as opposed to FDI in India. Especially during the year 2010 and 2011, the FPI from United States was sixty-five times and fifty-nine times respectively, more than FDI. This trend indicated that investors in U.S. preferred investing in Indian capital and financial markets rather than invest directly into any Indian business or enterprise. As also given the nature of Portfolio investments, it is relatively easier to invest in equity or bonds in order to have a share in a company as opposed to a direct investment that would be either by way of investing right from the base infrastructure in setting up operations and having a controlling stake in the company in order to have a certain degree of influence on managing the affairs of the company, which need not necessarily be the case in FPI.

As of recently, Jacob and Katookaran (2018) empirically analysed the investment pattern of Foreign Institutional Investors (FIIs) in different sectoral indices of Indian listed corporate entities. The research found that there was a direct relationship between FIIs and all the sector specific market indexes, i.e. the movement of sectoral indices were in consonance with the movement of FIIs on the Bombay Stock Exchange. The research also suggests that FIIs can have an indirect effect on foreign exchange reserve fluctuation that could render the value of INR currency vulnerable to their movements.

2.8. Literature Review Conclusion:

On concluding we note that spillover effects did occur according to most of the literatures due to the adoption of non-standard monetary policy of the central bank of the developed economy. However, there are certain differences amongst the findings of each of the studies that can be addressed in future research. Firstly, the indirect effects of unconventional

monetary policy have been observed for emerging markets in general and not from any particular country's perspective. Secondly, the timeline considered has been quite vast – more than twenty or thirty years and the dataset included either quarter or annual data for analysis. Thirdly , with regards to the methodology, the literatures have used VAR, event study, vector auto-regression techniques, whilst each of them having their own strengths and limitations. Instead, this research intends to use standard statistical methods like correlation, coefficient and regression to statistically verify the outcome of the results.

Chapter 3 – Research Question

The main objective of this research is to contribute to the existing literature on unconventional monetary policy by developed economy central banks and its impact on emerging markets. This study aims to assess the effects of such policy from the perspective of India as an emerging economy.

The sub-objectives as part of the main objective would be :

- To statistically verify the spillover effect, if any, has occurred in the capital flow towards India due to normalisation of zero lower bound interest rates.
- To understand the impact on foreign capital flow by considering the external(foreign) and internal(domestic) variables from Indian economy's perspective.
- To ascertain as which of the macroeconomic indicators cause fluctuation in the inflow of capital to India.

Chapter 4 – Methodology

4.1. Introduction:

This section will outline the criteria for choosing the requisite sample of U.S. dollar currency and India as an emerging market. Having chosen the samples, an explanation will be given for the variables shortlisted and the quantitative methodology chosen for this research. Further, we will also elaborate the statistical analysis part of quantitative study and also have a look at the use of other possible methodologies. Lastly, the limitations for choosing this type of methodology will also be highlighted and the potential for further research in this area will also be mentioned.

4.2. Sample Selection Criteria:

India and the United States Federal Reserve, (i.e. the central bank of America) are selected as samples due to the importance of U.S. as a developed economy and India as one of the emerging countries'. As explained earlier in the introduction and also reiterated by Martin *et al.* (2017) that USD is the preferred choice of currency for international lending and issuance of debt instruments specifically to emerging countries, for cross border trade and also the reserve currency in general as also in terms of external assets owned by other countries. The assessment in the above study concludes that due to such factors, a spillover effect takes place on all those countries dealing with large amount of transactions in USD currency and therefore their GDP faces fluctuations as a result of change in the central bank monetary policy in the United States.

Similarly, the Indian foreign exchange reserve comprises of Foreign Currency Assets (FCAs), gold reserves, Special Drawing Rights (SDRs) and the country's reserve position with the International Monetary Fund (livemint, 2019). A majority of all these reserves are held in United States dollar currency and therefore we can assume that any change in the currency would indirectly affect the capital flows in India. Kohli's (2015) study mentions the importance of reserves in order to stabilise exchange rate fluctuations thereby preventing the Indian currency from depreciating since this is one of the aspects that determine an investor's decision to invest in a country.

Moreover Sarma (2013) analyses that U.S. is one of the major source of foreign investor in India with FPI exceeding over FDI in different sectors of the economy. The FPI which includes FIIs and individual investors putting capital into the Indian financial market by way of equity, bonds or other marketable securities have been considered to be more volatile than FDI investments (Majumdar and Nag, 2015). Therefore from this viewpoint it can be understood that short-term investing and pulling out of the capital market by Foreign Portfolio Investors can have an impact on the reserves of the Indian government that is governed by the central bank of the country. As also India has been considered as a stable market to invest in comparison to other emerging countries (Dunkley, 2018) but, a recent development took place in the country's financial system as the government carried out a demonetisation drive that scrapped eighty-six percent of the currency in circulation in November 2016 as a result the growth rate can be deemed to have an impact due to such a decision (Mudgill, 2017).

The central banks of other developed nations such as Bank of Japan, Bank of England and the European Central Bank were also considered, but they did not fit into the abovementioned criteria for the study of this research. Although the other countries in terms of ranking may have more capital flowing into India (Santander TradePortal, 2019), however, the USD

continues to be the dominant currency in which the transactions takes place between the two nations (Manikandan, 2019). At the same time, other emerging countries such as Brazil, Russia, China were also considered for this research, but studying on those would imply collecting extensive data on each of the countries thereby altering the objectives of this research. This can be understood as one of the limitations of this study and can be considered as a potential area for future research.

4.3. Research Methodology:

This study will undertake a methodology that will adopt a quantitative approach to present the desired results of the research objectives. As part of this approach the data used for analysis will be secondary in nature, i.e. numericals mentioned in terms of amount or percentages from databases like Bloomberg or Thomson Reuters. In other words, the numbers would already be collected from different reliable sources, compiled together and categorised for easy understanding in the database itself. These numericals would be macroeconomic variables (indicators) of Indian economy that would already be represented in a structured form in the database. This type of data is preferred for this study since it is relatively less time-consuming and resource heavy and goes in line with answering the research questions. However, this is a form of external data that will be acquired from third party websites or repositories, the quality and accuracy of which cannot be verified by the author.

But the data available on sources like Bloomberg, World Bank, International Monetary Fund (IMF) and the Organisation for Economic Co-operation and Development (OECD) are established institutions that are referred upon by researchers and professionals worldwide, for their ability to capture and present information that is high-quality and believable. Therefore the author for this research would also refer these sources for the purpose of analysing and finding results to address the research area. A sample of eleven years data from 2008 to 2018 will be collected for examination of capital flows towards India. This sample will represent the variations that have occurred, if any, that would explain fluctuation of capital flows during separate time periods. Further, a statistical analysis will be performed as part of the quantitative approach undertaken for this research, that will be explained in detail in the next section. However, it is to be noted that all quantitative methodology does not solely refer to statistics, but is the most commonly used form of analysis for interpreting the numerical data (Statistics Solutions, 2019b).

4.4. Research Variables:

This section will outline the variables considered for this research and why they have been chosen to explain the impact on capital flows. Each of the variables will be justified and its

importance explained in the context of this research. The Indian macroeconomic variables that have been considered are the Gross Domestic Product (GDP), Inflation, Exchange rates, Fed Reserve fund rates and the amount in the monetary base of the Federal Reserve in the U.S. which indicates the total amount of money in the United States that is circulating either in public or in the commercial deposits kept by the central bank. These will be considered as independent variables. The Foreign Direct Investment (FDI) specifically, will be considered as the dependent variable, i.e. the capital flow. The dependent variable will be regressed against the independent variables in order to understand as which of them cause an impact on the capital flows. All data derived for the variables from the concerned sources are figures mentioned in U.S. dollar.

The Gross Domestic Product (GDP) of a country relates to the size and performance of its economy. This metric can be measured in different ways but, for the purpose of this research, the Nominal GDP in expenditure terms has been considered for assessment. It is one of the important variables for any economic research as it accounts for all goods and services produced for consumption in the market. This plays a very significant role for investors to consider when they decide to invest in any economy, simply due to its significance as an economic indicator (Callen, 2018). A number of literatures (Bahmani and Toms, 2015; Pattayat, 2016) have taken GDP as a dependent or an independent variable.

The inflation of a country refers to the increase in prices of goods and services in the economy over a given period of time. The total cost of regularly purchased items by citizens of any country every year is compared to a particular base year that forms an index known as Consumer Price Index (CPI) and the difference of each year relative to the base year is known as Consumer Price Inflation (Callen, 2018). This measure is of utmost importance to investors as it is one of the main criteria when investing in any asset, especially for portfolio investors, as it forms an important component when calculating the time value of money. As also the central banks of every country have to keep a check on levels of increase in inflation as part of their monetary policy, in order to increase or decrease federal interest rates for the purpose of borrowing and lending activity in the economy. Another reason inflation is important, is because it can have an indirect effect on the appreciation or depreciation of the value of currency in the country, thereby causing a fluctuation in the exchange rate market. This variable has been mentioned by (Pradhan and Kelkar, 2014) as one of the independent variables to understand the variation in FDI flows into India.

The Exchange rates have always been a vital part of any financial and economic research in the past as there appears to be a constant impact on the currency of emerging countries due to a shift in the policies adopted by the developed economies. It is as important a variable as the

GDP and inflation in economics. The exchange rate market has a spillover effect from outside policies as well as a direct effect from internal (domestic) situation. The central bank from time to time tweaks the interest rate regime keeping in mind the rate of inflation, in order to balance the value of currency in the global markets. For example, a central bank may increase interest rates to curb a rise in inflation in a particular country, so as to avoid an erosion of value of the national currency against other developed currencies in the exchange rate market. This variable has been a subject of interest for different literatures (Lin *et al*., 2018; Bouraoui, 2015; Kohli, 2015) especially in gauging the volatility or the appreciation/depreciation of exchange rates.

The data of monetary base of the American economy has also been considered, since the timeline for this research also includes the period before the normalisation of interest rates, when there was an increased circulation of money in the economy. We have considered this variable having an assumption that it may have a significance in the capital flow to India. It has been considered by (Czeczeli, 2016 ; Adhikari, 2017) to understand the effects of the QE programme.

Lastly, the Federal funds rate has been considered as a variable, since these are the rates that the Federal Reserve determines which then becomes the basis for all other commercial banks to decide the interest rates for lending activity amongst each other. This fund rate was at its zero lower bound since December 2008 until December 2015 when the Federal Reserve gradually started the normalisation process of raising interest rates to bring the monetary system back to its traditional system of functioning. This variable has been referred by (Ramirez and Gonzalez, 2017; Pyun, 2016; Bräuning and Ivashina, 2018).

4.5. Statistical Methodology:

This methodology will be adopted for deriving the results of this research as the author intends to use quantitative data of a secondary nature to explain and verify the difference that has occurred, if any, in the flow of capital towards India. The Statistics are tools used to capture and interpret a particular trend that has occurred over a period of time, in order to understand what a particular timeline indicates about the nature of findings of any research. It is the science of collecting, organising, presenting, analysing and interpreting the different pieces of information, to reach a conclusion with respect to any specific research question.

This methodology is further divided into two branches – Descriptive and Inferential Statistics. The Descriptive part gives a description of the sample and the data whereas the Inferential part signals what trend the data is actually trying to showcase. The Inferential statistics quantifies in exact measure as to what extent a difference exists between two variables and

whether they are in absolute terms or based on probabilities and it also quantifies as to what extent two variables are related to each other (Dawson, 2008). For the purpose of this study, the author intends to use only the branch of inferential statistics, i.e. to present, analyse and interpret the data using the tools such as Microsoft Excel or SPSS since the primary work of collecting and organising the data would be done by the database or repository as mentioned in the above section. The data would be a set of monthly values for a particular macroeconomic variable in the form of a continuous numerical time-series figures.

Within this branch of Inferential Statistics, the author would carry out correlation test and regression analysis to statistically verify the fluctuation of capital flows in India. The correlation test would aid in determining the strength and direction of the relationship between two continuous variables. There are different types of Correlation tests, but for this research, the Pearson's correlation test will be carried out as this is the appropriate one to be applied in the case of linear regression analysis. The value of a correlation coefficient always falls between the range of -1 and +1, where -1 indicates a weak negative correlation and +1 denotes strong positive correlation and 0 indicates no correlation between variables (Statistics Solutions, 2019a).

The next step would be to perform a linear multiple regression analysis and derive as to which of the independent variables most affect the outcome variable. The dependent/outcome variable in this case will be the FDI (capital flow) whereas the independent variables will consist of GDP(India), Inflation(India), foreign exchange rates(INR/USD), monetary base and Fed Reserve fund rates of the United States. By carrying out the regression analysis, we are trying to understand the dependent variable, i.e. we are trying to account for the variation in capital flow based on the variation in our independent variables. This would help in determining whether which of the independent variables are causing the maximum or minimum variation in the dependent variable.

4.6. Formula Model:

$$LNFDI = \alpha + \beta LNGDP\ Ind + \beta 2FX + \beta 3INF + \beta 4LNMBASE + \beta 5Fedrates \ldots\ldots \text{ Model 1}$$

$$LNFDI = \alpha + \beta FX + \beta 2INF + \beta 3LNMBASE + \beta 4Fedrates \quad \ldots\ldots \text{ Model 2}$$

4.7. Model Key:

LN	Logarithm of a number.
A	Alpha.
B	Beta.

FDI	Foreign Direct Investment.
GDP	Gross Domestic Product.
FX	Foreign Exchange rate.
INF	Inflation.
MBASE	Monetary Base of Federal Reserve.
Ind	India.
Fed rates	Federal Fund (interest) rates.

4.8. Justification of the Methodology:

Upon deciding the appropriate methodology to be adopted for this research, the statistical methodology was considered to be the most suitable since it is the most commonly used form of analysis to derive the results of any quantitative research. Also statistical analysis makes it easy to interpret the message that the data collected tends to indicate. We chose to use monthly data for the variables mentioned for the purpose of explaining the research question. However, the GDP data is released quarterly and annually by the concerned sources, but by taking the quarterly data and dividing it by three we get the monthly data for the following three months of that quarter, in order to align it with other variables.

Further, we have taken the logarithm numbers of the GDP, monetary base and FDI for the purpose of making the data uniform for analysis, in order to get the best possible results. The data collected for FDI, GDP and Exchange rates has been accessed from Bloomberg as it is one of the most reliable database for any sort of financial or macroeconomic information for professionals and students to refer, whereas the data for Inflation has been accessed from the source of OECD. The Fed funds rate and the monetary base numbers have been sourced from FRED, i.e. the database of Federal Reserve Bank of St.Louis that stores financial and economic information pertaining to the country of the United States (FRED, 2019).

The other studies have used different methodologies depending on their research objectives such as Value at Risk (VAR), Event Study and Vector Autoregression model. These methodologies were also considered while constructing the methodology for this research. The use of VAR can be beneficial to measure the risk, i.e. the maximum loss expected in a particular time period by taking a pre-determined level of confidence in statistical analysis. However, this method includes different types of approach that could lead to a different outcome which can possibly mislead the ultimate result of any research. This method can be difficult to calculate with a large dataset and it does not state the size of loss that could possibly occur in any case scenario.

The event study analysis looks at assessing the impact of only one particular event and its response to the financial/capital market. A majority of studies on monetary policy use this method to understand the reaction to such policies. It can be useful to gauge the trend on different multiple events in a given time period, but differs from a normal statistical approach where the discussion revolves around the entire research period in a given timeline. The Vector Autoregressive model is basically used for the purpose of economic forecasting, measuring the effect of different shocks of the variables and understanding those shocks in the context of fluctuation of different variables. The goal of this research however, was to understand the variation in the capital flows and hence we decided upon using a standard regression analysis to present our results rather than using any of the above methodologies. Also, the methodology that we have proposed is in line with the peer reviewed existing literature of Bahmani and Toms (2015) where they assess the impact of QE on FDI in Brazil.

4.9. Research Limitations:

Whilst conducting this research, we experienced different limitations pertaining to the methodological part. The initial decision was to collect the FDI and FPI data and club them together as one dependent (outcome) variable and regress them against other independent variables. The required data for FDI towards India could be accessed from the appropriate source, but we could not collect the information for FPI due to difficulty in gathering consistent data of the required timeline for the purpose of analysis. Therefore, we have considered only FDI as the capital flow variable for this research and perform the correlation and regression analysis for deriving our results. Further, we have taken the timeline that represents only the post 2008 financial crisis period, to understand the fluctuation in capital flows to India. The variables shortlisted for analysis are regular macroeconomic indicators of any economy, the data collected is monthly information and the methodology chosen is a standard regression analysis. Our samples consist of only Fed Reserve monetary policy and India as an emerging market.

The future works can consider different developed economy central bank monetary policy effect on any other emerging market. In addition to this, FPI information as a capital flow variable can also be included and other relevant independent variables for determining the factors affecting such capital flows. The timeline can possibly stretch beyond years before the crisis and the frequency of the data can vary in comparison to this study. As also the methodology can differ, making use of other sophisticated tools of determining capital flow impact.

Chapter 5 – Results

In this section, we will analyse the results of the findings that have been derived as answers to the research question for this study. In doing so, we will try to link our results with the previous literature/s that have taken similar determinants to understand the causality in the outcome variable. We have used Statistical Package for Social Sciences (SPSS) as a tool to carry out the correlation and regression analysis for the purpose of interpreting our results. The matrix, tables indicating the output will be mentioned for reference, while explaining the results. In addition to this, certain graphs showing the trend or comparison between two variables will also be referred for a better understanding of the analysis.

5.1. Correlation Observation:

Upon putting together the dependent variable and the independent variables in a correlation matrix, we ascertain the strength of the relationship amongst each of the variables. We note that FDI as the dependent variable has a weak to moderate correlation with the independent variables but theoretically speaking it is considered to be related to the explanatory variables. This is because FDI as a capital flow depends on different macroeconomic factors of any country, therefore we have taken the most common indicators of the Indian economy as the explanatory(independent) variables – GDP, Inflation and exchange rate data to understand the variation in the outcome(dependent) variable.

Correlations

		MBase	FDI	GDP	FX	Inflation	Fedrates
MBase	Pearson Correlation	1	.237**	.824**	.489**	-.471**	-.349**
	Sig. (2-tailed)		.006	.000	.000	.000	.000
	N	132	132	132	132	132	132
FDI	Pearson Correlation	.237**	1	.387**	.454**	-.459**	.181*
	Sig. (2-tailed)	.006		.000	.000	.000	.038
	N	132	133	132	132	132	132
GDP	Pearson Correlation	.824**	.387**	1	.857**	-.748**	.188*
	Sig. (2-tailed)	.000	.000		.000	.000	.031
	N	132	132	132	132	132	132
FX	Pearson Correlation	.489**	.454**	.857**	1	-.805**	.527**
	Sig. (2-tailed)	.000	.000	.000		.000	.000
	N	132	132	132	132	132	132
Inflation	Pearson Correlation	-.471**	-.459**	-.748**	-.805**	1	-.386**
	Sig. (2-tailed)	.000	.000	.000	.000		.000
	N	132	132	132	132	132	132

Fed rates	Pearson Correlation	-.349**	.181*	.188*	.527**	-.386**	1
	Sig. (2-tailed)	.000	.038	.031	.000	.000	
	N	132	132	132	132	132	132

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Further, we examine the relationship amongst the independent variables, i.e. GDP, Foreign exchange rates, Inflation, Monetary Base of the United States and Federal Funds rate. We see that GDP has a high negative correlation (-0.74) to Inflation which is a commonly understood relation, that as Inflation increases there is a fall in purchasing power of the currency, leading to less consumption by the people and therefore it negatively affects the GDP of any country. We can also notice that GDP has a positive correlation to the Monetary Base of the United States. This can presumably indicate that when the Federal Reserve increased its money circulation in the domestic financial market, it also had an indirect effect on the economies of emerging markets. This could be by way of an increase in outflow of capital from developed countries to developing countries, due to cheap availability (low interest rates) of money in the domestic market. Therefore we reasonably assume that the Indian economies' inward FDI increased due to this being one of the factors in spillover effect of capital flow.

On the other hand the exchange rates are highly positively correlated (0.85) to GDP because a rising GDP has a positive effect on the rates in terms of appreciation of the currency, as they are a reflection of the economy performing well over a period of time. The inflation has a significant negative correlation (-0.80) with exchange rates as a rise in inflation has an influence in the value of a currency to drop, leading to a depreciation of the currency against other currencies in the exchange rate market. The remaining variable of Fed Reserve fund rates has a weak to moderate correlation with the other variables. Here, it is to be noted that when it comes to understanding the relationship between two variables, we should not assume correlation to be the same as causation. The purpose of correlation analysis is to simply indicate the level of association between any two variables. It is measured on a scale of -1 to +1, thereby suggesting that any two variables can either be positively associated or negatively associated. On the other hand, the aspect of causality would be reflected through the regression part of analysis.

A high level of correlation either positive or negative is a case of multi-collinearity among the explanatory(independent) variables. One of the assumptions for carrying out the regression analysis is that, one of the two highly correlated independent variables should not be considered as a criteria for assessing the outcome of the dependent variable, since it would

fail to give the desired results. Therefore we exclude GDP as a variable from the original model equation and have presented a second equation in the Formula model by taking the remaining variables that are less correlated amongst each other, to understand the level of variation that they cause to the outcome variable. This is in line with the previous literature that we referred to for the purpose of framing our research paper. The literature examined only the impact of quantitative easing on FDI in Brazil whereas we consider both the timelines after the financial crisis into our dataset – the onset of lower interest rates (2008-2015) and the unwinding of the stimulus programme (2015-2018) in our research.

5.2. Regression, Coefficient and Significance analysis :

We hypothesised that the normalisation of Federal Reserve interest rates have caused a reversal of capital flows from India. This is in line with the current literatures that have examined the impact of tapering of the Quantitative Easing programme by the Federal Reserve on capital flows in emerging markets. For carrying out the regression analysis we take Monetary base, Federal Reserve fund rates, Inflation and Foreign exchange data only. Upon performing the analysis we get the Model summary, the ANOVA table, the coefficient table and the residual statistics.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.493[a]	.243	.219	.40274	1.625

a. Predictors: (Constant), MBase, Fedrates, Inflation, FX

b. Dependent Variable: FDI

In the model summary table, the R Square value (also known as the coefficient of multiple determination) is a widely used measure of fit for regression models. This measure indicates the proportion of variance in the dependent variable explained by the variation of independent variables. The range of this coefficient is between 0 to 1, where 0 indicates no variation at all and 1 indicating 100% variation. Our model represents that when we take monetary base, Fed Reserve fund rates, Inflation and Forex data together as a set of variables to assess the impact, we get a variation of 0.24 in FDI as the dependent variable. In other words, when we multiply our R square by 100, it results in a mere 24% variation in FDI as the capital flow. This shows that the result of our analysis is below our expectation as the proportion of variance is not very significant. The set of independent variables in the model equation that we framed to assess the effect on FDI did not cause much of a deviation on the dependent variable.

The Adjusted R square is also an important component to refer in the model summary as it increases or decreases based on the improvement that every independent variable brings to the model. In our model, the Adjusted R square (0.22) has decreased in comparison to the result of R square(0.24) indicating that each new independent variable added to the equation improves the model by less than expected by chance.

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	6.612	4	1.653	10.191	.000[b]
	Residual	20.599	127	.162		
	Total	27.211	131			

a. Dependent Variable: FDI

b. Predictors: (Constant), MBase, Fedrates, Inflation, FX

Further, we go on to test the overall model through the ANOVA table in the analysis. This aspect reflects the overall reliability of the model that we framed for our research. The F-value (10.19) indicates the variance of one independent variable is not equal to the variance of another independent variable. In other words, the variance between the data are not equal. The Significance (also commonly known as p-value) column in the table shows a figure of 0.000 which is less than 0.05, which means that our model as a whole is statistically significant. But this does not lead us to any final conclusion on our analysis as this fact may vary when we check the regression coefficients in the next table of our findings.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	8.484	1.126		7.538	.000
	FX	.004	.002	.434	2.274	.025
	Inflation	-.040	.019	-.284	-2.154	.033
	Fedrates	-.135	.096	-.223	-1.405	.162
	MBase	-.199	.165	-.187	-1.202	.232

The Coefficients table reflects the regression coefficients of the individual variables that we included in our model equation for analysis. The Unstandardised Beta (B) coefficients column is better preferred to explain the level of variation in the dependent variable than the Standardised Beta coefficients column. This is because the former is a raw data produced by the model at the time when the analysis is performed as original whereas the latter gives results if the variables itself would have been standardised in the first place by some form of conversion in their values. Therefore, looking at the values in 'B' column, we interpret the data as follows :

- For every one-unit increase in Foreign exchange rates, the FDI increases by 0.004 or 0.4%, if the rest of the variables are held as constant.
- Secondly, for every one-unit increase in Inflation, the FDI decreases by 0.4 or 4%, considering all other as constant.
- Thirdly, for every one-unit increase in Fed rates, the FDI decreases by 0.13 or 13%, assuming rest as constant.
- Lastly, for every one-unit increase in monetary base of the U.S., the FDI decreased by 0.19 or 19%, holding other variables as constant.

The above findings suggest that, as and when the USD/INR exchange rate experiences an appreciation, it indicates a decrease in the value of Indian currency, thereby attracting foreign investors to allocate their money in the country in the hope of receiving better returns in the future. However, in the other cases, when inflation increases, it's a slight discouragement among outside investors to invest in a country where the consumer price index is on a rise on a regular basis. Similarly, for every one-unit increase in Fed Reserve rates and monetary base of the U.S. economy, the capital flow appears to decrease by 13% and 19% respectively. These two are the most negative coefficients amongst the three variables that indicate a fall in capital flow towards India.

This could possibly suggest that an increase in money circulation in the U.S. economy during the credit easing would have lured the investors to invest more towards that country due to cheap availability of financing (lower interest rates). On the other hand, when the Fed rates increased the outside investors would have looked at exploring other emerging markets that would be less impacted in terms of macroeconomic circumstances. Here, it is to be noted that capital flow in this research has not been assessed from any particular country's perspective, rather the total FDI flow towards India has been taken as the dependent variable.

However, when we look at the t test column of the regression coefficients in conjunction with the Sig. column (p-value), we notice that the t ratio for FX is 2.27 with an associated p-

value of 0.02 and t ratio for inflation is -2.15 with an associated p-value of 0.03. These p-values are below the widely accepted critical p-value of 0.05, which goes on to prove that foreign exchange rates and inflation are statistically significant explanatory variables of the movement in FDI flows to India. In other words, there exists a statistical evidence that a variation in the movement of foreign exchange rates causes a positive response in capital flow, whereas a variation in inflation causes a negative response in capital flow. On the other hand the remaining variables, i.e. Fed rates with a t ratio of -1.40 having an associated p-value of 0.16 and monetary base with a t ratio of -1.20 having an associated p-value of 0.23, indicate that although they do cause a variation in the movement in capital flows, they are not statistically significant as their p-value figures are beyond the standard critical value of 0.05. This means that their probability of causing a variation in FDI flows is by chance and not in absolute terms.

Overall, the R-square value suggests that foreign exchange rates and inflation contribute a major deviation in the 24% variation of the dependent variable whereas Fed rates and monetary base of the U.S. constitute a minor proportion of the variance. We can therefore reasonably assume, that the remaining 76% of the variation in the dependent variable would have been caused due to factors such as macro-prudential policies, tax regime and other relevant economic decisions of the government in the host country. This can be considered as one of the limitations of this research, that can be used as variables for future findings on the reasons affecting FDI flows in India.

Further, we observe that as per previous literatures, GDP has had a positive relationship with FDI, therefore having considered the variable in our correlation analysis, it reiterates the fact that GDP does have a moderate positive correlation with FDI in India. But on carrying out the regression analysis, by adding GDP as a variable, it reflects that a one-unit increase in GDP causes the FDI to decrease by 0.03 or 3% (Item no.2 in the appendix) which is not in line with the findings of the previous literature. Moreover, we notice that the foreign exchange rate as an explanatory variable loses its statistical significance by 0.01 in comparison to when we exclude GDP as an independent variable in our analysis (Item no.2 in the appendix). Therefore, we presented our findings as per the revised equation in Model 2, by addressing the assumption of multi-collinearity in our correlation results.

Chapter 6 - Discussion section

6.1. Introduction:

This section will include the discussion regarding the results that have been derived according to our analysis. While discussing we will attempt to connect our results with the findings and conclusions of previous literature. Also, the potential for future research will be highlighted in the light of the limitations of this research.

6.2. Discussion on analysis:

The results of this research were quite different to what we proposed to find as part of our analysis. We chose GDP, inflation and exchange rates as the macroeconomic indicators of the Indian economy and Fed fund rates and monetary base of U.S. as external indicators for understanding the variation of FDI flow to India. Upon regressing the FDI against the other variables we did not find a pronounced variation in the total FDI capital inflow towards India. However, our set of variables i.e. the model that we considered to assess the impact on FDI has proven to be statistically significant via the ANOVA table in our analysis.

We hypothesised that the normalisation of Fed Reserve fund rates would have caused some spillover effect on the capital flow. The resulting analysis does indicate a negative relationship between FDI flow to India and the Fed Reserve fund rates, but it does not turn out to be statistically significant as per our expectation. Moreover, this can be ratified when we look at the graph (Item no.3 in the appendix) indicating a substantial drop in FDI in India between the period of December 2015 and May 2016, when the normalisation of the rates started taking place. However, this trend does not seem to continue over the next two years of gradual increase in normalising interest rates by the Fed Reserve, thereby indicating that there may be other relevant factors that would have continued to attract foreign capital towards India.

Therefore, we can reasonably infer that Foreign direct investment in India reduced on account of an increase in Fed Reserve interest rates. However, we do not have any conclusive evidence in previous literatures using Fed Reserve fund rates as a variable to compare with the findings of our results, as this is a recent development in the sphere of developed economy central bank monetary policy. But there have been certain working papers or articles such as Burns *et al.* (2014) and Steffen (2015) that talk about the possible negative implications of a rise in the interest rate on emerging markets. Hence, if we consider this, we can to some extent, agree with the suggestions of such literature that caution the emerging market capital flow due to normalisation of interest rates.

The monetary base of the U.S. economy also conveys a negative relationship with the FDI in India. This too can be understood, since the U.S. economy had introduced a stimulus (QE) programme, the tapering of which had started taking place around 2014 onwards, indicating signs of growth in the U.S. economy. This could have possibly caused some decrease in the flow of FDI towards India and the reasons for it could vary – ranging from comparative difference between the domestic policies of other emerging countries, financial regulation or increasing investment in their own (U.S.) economy itself. However, one of the differences in the comparatively less impact of increasing interest rates to quantitative easing in India, can be attributed to the fact that the decision for tapering of the QE was a sudden announcement (Bouraoui, 2015), whereas interest rate normalisation was an informed development by the Fed Reserve in the United States.

This fact can be further confirmed by looking at the graph (Item no. 4 in the appendix) denoting increased fluctuations in FDI in India compared to the monetary base of the U.S. between the period of January 2014 and January 2015, when the withdrawal of the QE programme started taking place. This could possibly be the explanation for the highest negative variation in FDI due to a point increase in monetary base of the U.S. economy. The existing literature (Bahmani and Toms, 2015) took monetary base as a variable to assess the effect of only quantitative easing on U.S. FDI in Brazil, therefore their results differ from the findings of our result, where we considered both the timelines, i.e. during the QE and after the QE. They conclude that an increase in money circulation in the U.S. led to an indirect effect in capital flow to Brazil, whereas our conclusion is in a different time-frame (tapering) leading to a negative impact on capital flow to India.

The Inflation rate and FDI are bound to have an inverse relationship between them as a regular increase in inflation rate causes crowding out, of outside investment from the host economy. This is because higher prices leads to an increase in cost and lowers profit amongst potential future investment in any economy. An acceptable rate of inflation is an important criteria to attract foreign capital, especially in emerging markets. However, we notice decrease in FDI due to an increase in inflation rate from India's perspective. Further, this is a statistically significant explanatory variable causing a negative variation in the proportion of FDI flow in India.

Additionally, this can be proven when we look at the graph (Item no.5 in the Appendix) visibly signifying the contrast between the two variables. An increasing trend in inflation at the beginning of our dataset keeps the FDI lower, whereas a decreasing trend at the end of the dataset encourages more investment in the Indian economy, with the peak investment being received at the time when the inflation was at its lowest between the period of July 2017 and

December 2017. Our findings are similar and at the same time different from the inference in the findings of (Pradhan and Kelkar, 2014). They conclude that inflation had a positive impact on FDI in India, whereas our analysis suggests that inflation has a negative impact. However, both the findings agree on a common ground, that inflation is a significant variable for understanding the importance of foreign capital inflow to India.

The foreign exchange rate is the only variable having a positive relationship in our findings with the FDI in India, indicating that exchange rates is an important determinant in the influence of foreign capital flow towards India as an emerging market. Moreover, this too stands out to be a statistically significant explanatory variable, in response to the total proportion of variance in our model. It indicates that as the value of INR depreciates in comparison to the value of USD, the foreign investors look at the Indian market as worthy of investment. In other words, when the U.S. dollar currency appreciates versus other foreign currencies, the investors tend to look towards such foreign (Indian) markets due to less cost of investment and better profits, hoping to receive positive returns for their investment.

This movement can be observed when looking at the graph (Item no.6 in the appendix) that as and when the U.S. dollar has appreciated, the foreign investment towards India has noticed an upward swing in the economy. These findings are also in agreement with existing literatures (Pattayat, 2016; Pradhan and Kelkar, 2014) that a positive relationship exists between exchange rate and FDI. However, contrary to our research, (Pradhan and Kelkar, 2014) do not find a statistical significance in this variable. This difference could possibly be due to the different time periods being considered for the study on assessing capital flow in India. Moreover, an increasing rate of inflation has a logical impact on decrease in currency value in any economy. This characteristic can be experienced in our research also, where inflation has had a negative impact on the INR currency.

However, when we simply look at fluctuations in FDI in India over the entire time period in our dataset, we notice that on account of a shift in the Fed Reserve monetary policy, whether quantitative easing or normalisation of fund rates, there has not been a pronounced decline in the flow of capital from developed countries. This can be attributed to certain positive factors at play in the domestic situation of the country's economy. Basri (2017) mentions that the monetary authorities played a vital role in stabilising the Indian rupee (INR) that was followed by a positive sign in economic growth. As also, the government of the day gave importance to role of exchange rates as a shock absorber, in order to keep the foreign capital consistently flowing in the economy. The improvement in the current account in the balance of payments position of the country also made the investor to reciprocate in a favourable manner by further investment.

Pradhan and Kelkar (2014) further highlight the distinguishing factors that drive FDI flows in India – big size of the market with a relatively young population, rising middle class group, increase in disposable income and growth in urbanisation. From a sectoral perspective, the Information technology, telecommunication, automobile and housing market are some of the areas that attract Foreign Direct Investment. Moreover, India promotes English as one of the important official languages for the purpose of communication, which also acts as an important criteria for foreign investors when investing in emerging markets. These differentiating reasons could possibly play a major role in the continuing trend of outside capital into the Indian economy. The other emerging markets would probably have different demographics when it comes to attracting foreign capital. Basri (2017) points out one aspect of rising current account deficit of Brazil and Turkey during the taper tantrum, which discouraged outside investment in the countries.

Overall, the statistical significance of the result of our model analysis suggests, that spillover effect has occurred in the Indian economy due to the normalising of unconventional Federal Reserve monetary policy. These effects are either positive or negative, with a notable exception being that two factors – exchange rate and inflation prove to be statistically significant whereas the other two - Fed Reserve fund rates and monetary base of the U.S. economy do not prove to be statistically significant factors. This leads us to conclude that exchange rate channel and inflation as individual explanatory variables support our hypothesis and Fed fund rates and monetary base explanatory variables do not lend credible support to what we initially hypothesised.

6.3. Limitations:

The possible limitations to this research could be that out of hundred percent variation in FDI, 24% is due to the factors that we took as variables to assess the impact, whereas the remaining 76% variation are due to factors which are beyond the remit of this research. This unexplained variation can act as a potential area for future research. Also, other emerging markets can be assessed on the backdrop of non-standard monetary policy by different developed central banks. In addition to this, Lin *et al.* (2018) suggest assessing changes in financial accounts and foreign portfolio investment of emerging markets.

Chapter 7 – Conclusion

The U.S. dollar currency has a dominant position in the global financial context. Especially after the financial crisis in 2008, the indirect or spillover effects have continued largely due to unconventional monetary policies of the Fed Reserve. But after the tapering of quantitative easing programme, the emerging markets have reportedly undergone fluctuations in their inward capital flows. Similarly, the Fed Reserve has been in the process of normalising its federal fund rates that were at its lowest levels post the crisis. This paper made an attempt to determine whether India as an emerging market faced any retrenchment in its inward capital flow of FDI in particular, due to rising interest rates and a consequent appreciation of U.S. dollar.

We used forex, inflation, GDP of India; Fed fund rates and monetary base of the U.S. as variables to test the difference in capital flow towards India for the period between of 2008 and 2018. We used a simple linear regression technique to derive the answers to our question. The findings suggest that foreign exchange and inflation are the main indicators of statistical significance in affecting FDI over this period. The Fed rates and the monetary base did not play a major role in determining the difference in FDI. We hypothesised that normalisation of Fed fund rates would have caused some difference in the flow of capital to India, however our results do depict some variation, but they do not support our hypothesis in its entirety. The significance of exchange rates and inflation as factors have been in continuation with existing literatures in the Indian context whereas research on Fed Reserve rates and other major central bank policies are sparse and growing.

However, future research on Indian capital flows can consider Volatility Index, balance of payments position in addition to other variables for conducting a quantitative study. A qualitative study on measuring the productivity of capital flows can also considered for further findings in this area.

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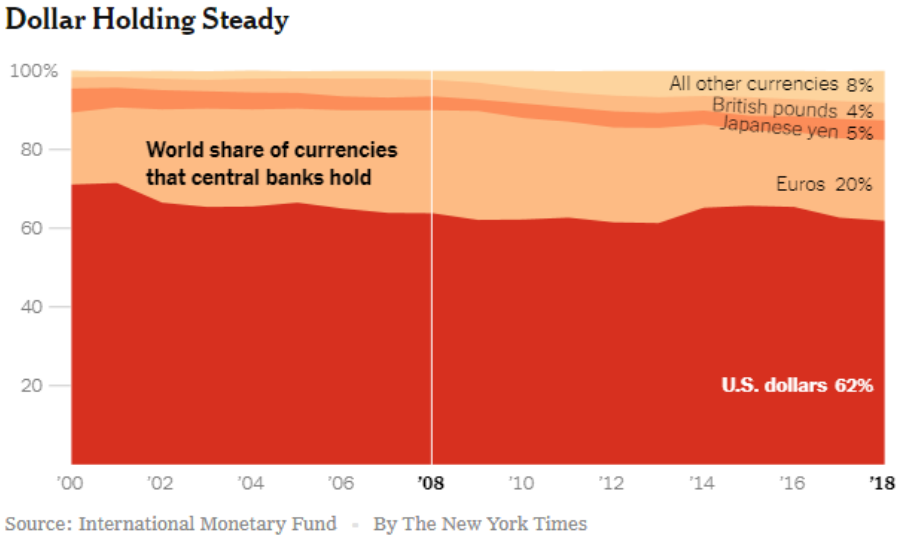
Appendices:

Item no.1.



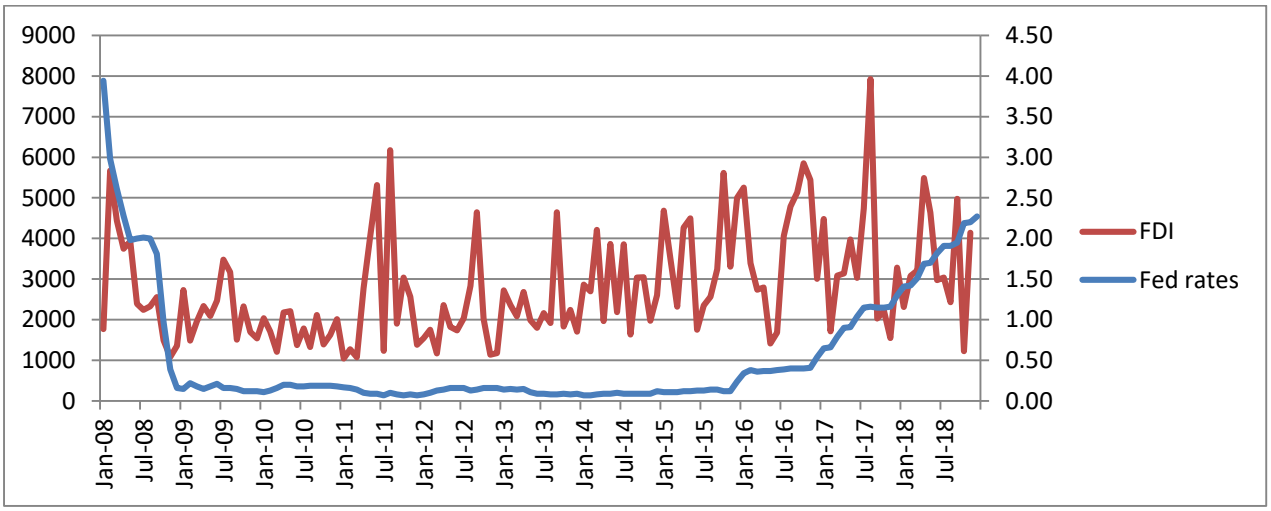
Item no. 2.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	8.003	7.355		1.088	.279
	MBase	-.177	.361	-.167	-.492	.624
	Fed rates	-.131	.115	-.216	-1.143	.255
	GDP	-.031	.475	-.028	-.066	.947
	FX	.004	.002	.443	1.841	.068
	Inflation	-.040	.019	-.285	-2.142	.034

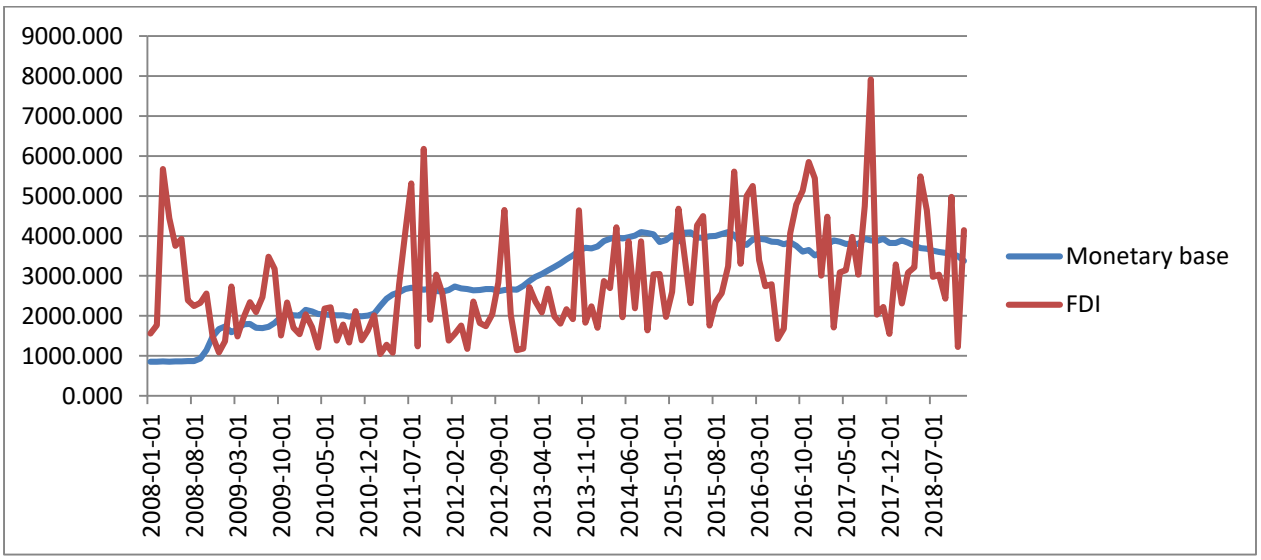
a. Dependent Variable: FDI

Item no. 3.



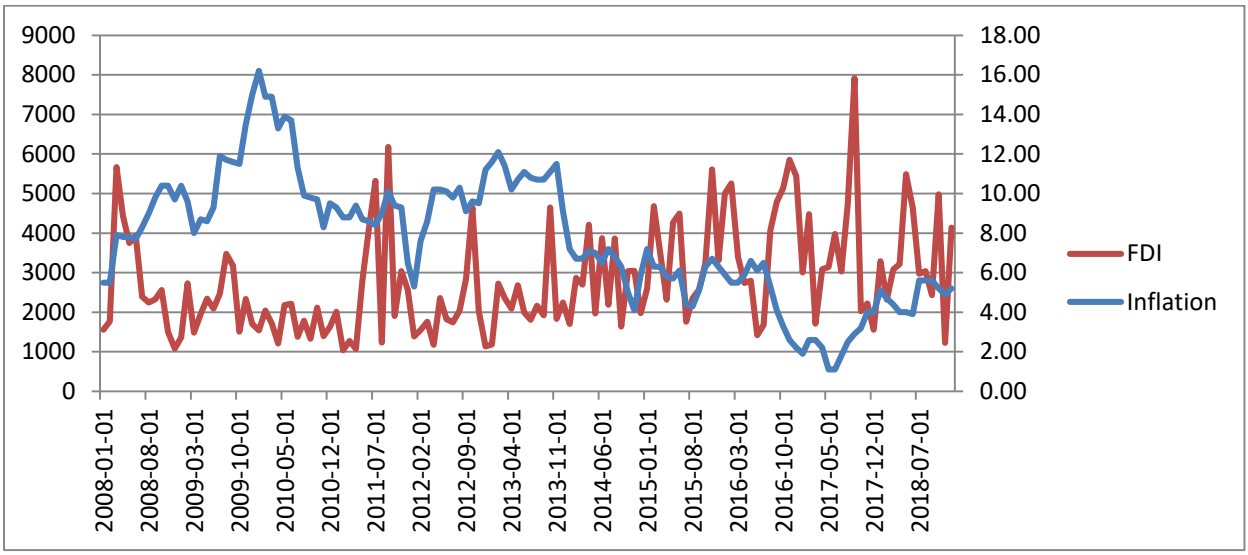
Fed rates vs FDI (India) (Jan 2008 - Nov 2018).

Item no. 4.



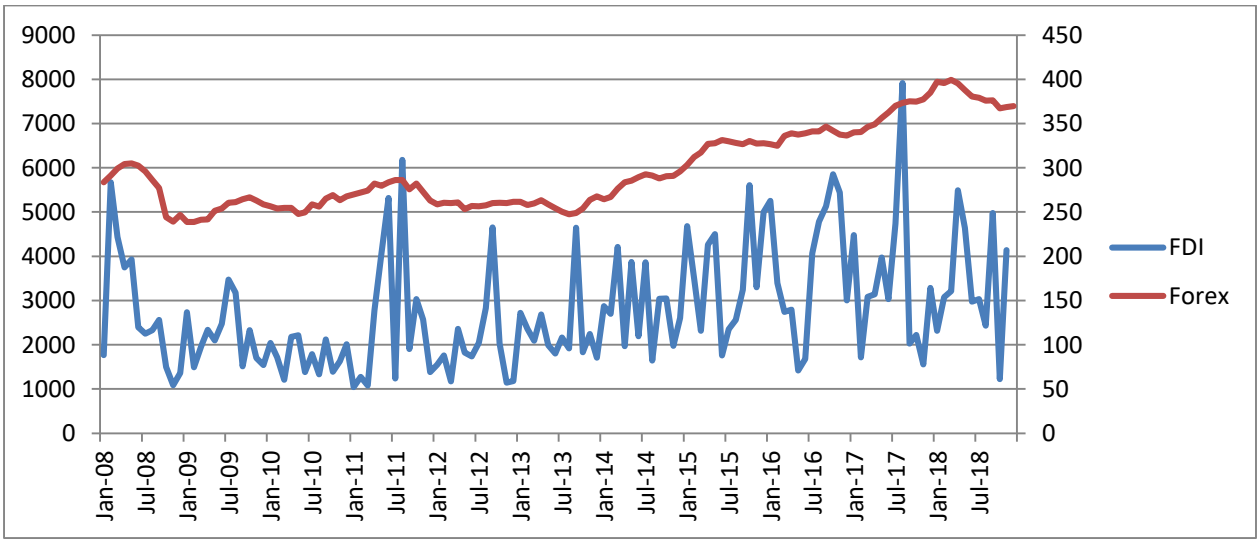
Monetary base vs FDI (India) (Jan 2008 – Nov 2018).

Item no.5.



Inflation vs FDI (India) (Jan 2008 - Nov 2018)

Item no. 6.



Foreign exchange rate vs FDI (India) (Jan 2008 – Nov 2018).